PART D – SHIRE OF NARROGIN

1. Declarations of Due Consideration

2. Disclosure of Interests

3. Form 1 DAP Applications

3.1 Lot 9 (No.76) Narrogin Valley Road, Narrogin Valley - Battery Energy Storage System (BESS) – DAP/25/02873

4. Form 2 DAP Applications

Nil**.**

5. Section 31 SAT Reconsiderations

Nil.

Part D – Item 3.1 - LOT 9 NO. 76 NARROGIN VALLEY ROAD, NARROGIN VALLEY- PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS)

Form 1 – Responsible Authority Report
(Regulation 12)

DAP Name:	Regional Development Assessment Panel	
Local Government Area:	Shire of Narrogin	
Applicant:	GHD/South Energy	
Owner:	Roy McLeod	
Value of Development:	$400 million ☒ Mandatory (Regulation 5) ☐ Opt In (Regulation 6)	
Responsible Authority:	Shire of Narrogin	
Authorising Officer:	Dale Stewart – Chief Executive Officer	
LG Reference:	DA10/24-25	
DAP File No:	DAP/25/02873	
Application Received Date:	13 February 2025	
Report Due Date:	8 May 2025	
Application Statutory Process Timeframe:	90 Days	
Attachment(s):	1. Development Application Report 2. Schedule of Submissions (State Government Agencies) 3. Schedule of Submissions (Public) 4. Amended Bushfire Management Plan 5. Technical Memorandum 6. Applicants Updated Site Feature Survey	
Is the Responsible Authority Recommendation the same as the Officer Recommendation?	☒ Yes ☐ N/A	Complete Responsible Authority Recommendation section
	☐ No	Complete Responsible Authority and Officer Recommendation sections

Responsible Authority Recommendation

That the Regional Development Assessment Panel resolves to:

1. **Accept** that the DAP Application reference DAP/25/02873 is appropriate for consideration as a "Use Not Listed" land use and compatible with the objectives of the zoning table in accordance with Clause 3.3.4 of the Shire of Narrogin Local Planning Scheme No.3.

2. **Approve** DAP Application reference DAP/25/02873 and accompanying plans (As contained in the Development Application Report in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the *Planning and Development (Local Planning Schemes) Regulations 2015,* and the provisions of Clause 3.3.4(a) of the Shire of Narrogin Local Planning Scheme No.3, subject to the following conditions:

Conditions

1. This approval constitutes planning consent only and is valid for four (4) years from the date of determination. If the development is not substantially commenced within this period, the approval shall lapse and be of no further effect.

2. The development shall be carried out in accordance with the approved plans received 13 February 2025 and any supporting documents, subject to modifications required by these conditions, to the satisfaction of the Shire of Narrogin.

3. Prior to commencement of Stage 1 development, the applicant shall submit and have approved by the Shire of Narrogin detailed plans including the following, where applicable:

    a) Operation and Maintenance Building;

    b) Ablutions;

    c) Permanent and temporary laydown areas;

    d) Staff and contractor vehicle parking and upgraded crossover/accessway;

    e) Internal roads;

    f) Fencing;

    g) Lighting plan demonstrating compliance with light spill and amenity standards.

4. Prior to commencement of any Stage 2 and/or Stage 3 works, the applicant shall submit to and have approved by the Shire of Narrogin detailed development plans and specifications including:

    a) Battery Energy Storage System (BESS) units;

    b) Substations;

    c) Switchrooms; and

    d) Associated electrical and safety infrastructure.

5. Prior to the commencement of development, a Construction Management Plan (CMP) shall be submitted to and approved by the Shire of Narrogin. The CMP shall address:

a) Construction hours;

b) Traffic and access management, including a Traffic Management Plan;

c) Dust, noise, and vibration management;

d) Site safety and hazard controls;
e) Waste management;

f) Water supply and sewer arrangements; and

g) Drainage management.

6. Prior to the commencement of development, detailed stormwater and surface water drainage management plans shall be submitted to and approved by the Shire of Narrogin. These plans shall be implemented on-site for the life of the development.

7. Prior to commencement, detailed design for the proposed effluent disposal system shall be submitted and approved by the Shire of Narrogin and implemented thereafter.

8. Prior to operation of any part of the development, a certificate of compliance must be submitted to the Shire of Narrogin confirming that the bushfire protection measures contained in the revised Bushfire Management Plan (BMP) dated 15 April 2025 have been implemented to the satisfaction of a Level 3 Bushfire Practitioner.
9. Prior to the commencement of the development the applicant must establish and maintain a vegetation buffer (landscaping screening) to the satisfaction of the Shire. The plan must address additional screening through the edge planting and the retention of existing remnant vegetation along the road frontage and property boundary to the south of the property and within the site.

10. Prior to the operation of the approved development, a post-construction acoustic report shall be submitted to the Shire of Narrogin confirming that all noise emissions comply with the Environmental Protection (Noise) Regulations 1997.

11. Prior to occupation or operation, a Decommissioning and Rehabilitation Plan shall be submitted to and approved by the Shire of Narrogin. The plan shall include:

    a) Infrastructure removal strategy;

    b) Site rehabilitation proposals;

    c) Waste and materials disposal management; and

    d) Estimated decommissioning costs and financial mechanism.

12. Prior to the commencement of the use all vehicle access point(s) onto the local road network, car parking areas and internal vehicle accessways shall be constructed to the satisfaction of the local government.

13. Prior to the commencement of the development, the applicant is to submit and implement a public art plan demonstrating investment into art for the site to the satisfaction of the Chief Executive Officer. The Applicant shall elect either to:

    a) Make a cash-in-lieu contribution to the Shire of Narrogin for the provision of public art; or

    b) Coordinate and implement a public art project in consultation with the Shire, in accordance with the Shire of Narrogin's Public Art Strategy & Masterplan 2019 and Public Art Contribution Policy Guidelines.

14. Prior to the commencement of development, the proponent shall enter into a legally binding agreement with the Shire of Narrogin to establish a Community Enhancements Fund (CEF), in accordance with the Shire's adopted Community Enhancements Fund Policy.

15. The CEF agreement, subject to condition 13 above shall:

    a) Set out the proponent's commitment to provide annual contributions, based on installed nameplate capacity, at a minimum of:

        - $150 per MWh per annum for battery storage capacity indexed annually to the Consumer Price Index (CPI);

    b) Define the payment schedule (typically annually in advance or as otherwise agreed);

    c) Allocate at least 10% of each annual contribution to a designated Indigenous Nations Fund;

    d) Be executed prior to the issue of a building permit or within a timeframe agreed to by the Shire; and

    e) Bind successors in title or operators of the facility for the life of the project.

16. All Community Enhancements Fund (CEF) contributions shall be held by the Shire in a dedicated reserve and administered in accordance with the Community Enhancements Fund Policy, ensuring alignment with community priorities and transparent governance.

17. The applicant is required to upgrade and seal Booth Street to the southern end of the subject property at the cost of the applicant to the satisfaction of the Shire.

18. The applicant shall be responsible for the repair, reinstatement or replacement of any road infrastructure that is damaged, becomes unsafe or fails to meet appropriate engineering standards where the damage to the road network is caused by reason of use of the road in connection with the approved development, to the satisfaction of the local government (or where agreed to by the local government the applicant may instead arrange payment to the local government for such repair, reinstatement or replacement works to be undertaken).

19. The applicant shall consult with Main Roads WA Heavy Vehicle Services prior to the use of any Oversize Overmass (OSOM) vehicles for construction or operation.

20. No later than one (1) year prior to the cessation of operations (anticipated or otherwise), the operator shall submit to the Local Government for approval, a Detailed Decommissioning and Rehabilitation Plan (DDRP). The DDRP shall address the following to the satisfaction of the Local Government:

    a) Establishment of a suitable financial mechanism such as a bank guarantee or bond to secure the operator's decommissioning and rehabilitation obligations, as outlined in the DDRP;

    b) A comprehensive schedule and methodology for the removal of all aboveground and below-ground infrastructure associated with the facility;

    c) Detailed measures for the recycling, reuse, or disposal of materials in accordance with relevant legislation and guidelines;

    d) Specific proposals for site rehabilitation and land restoration, including soil stabilisation and revegetation strategies;

    e) An updated and detailed estimate of decommissioning and rehabilitation costs, prepared by a qualified independent professional; and

    f) Finalised details of the financial security mechanism to ensure that sufficient funds are available to carry out the decommissioning and rehabilitation works.

Advice Notes

1. The applicant is reminded that this approval does not constitute a building permit. A building permit must be obtained from the Shire of Narrogin prior to the commencement of any construction works requiring approval under the Building Act 2011.

2. This approval does not exempt the applicant from compliance with any other relevant legislation including, but not limited to, the Environmental Protection Act 1986, the (Health Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974, and the Heritage Act 2018.

3. If any works are proposed in proximity to Water Corporation or Western Power assets, further approval or assessment may be required from the relevant agency.

4. The applicant must ensure continued compliance with all relevant environmental, safety and emergency legislation and best practice guidelines relevant to Battery Energy Storage Systems, including but not limited to fire prevention, spill management and emergency evacuation protocols.

5. Any clearing required as part of construction or bushfire prevention may require an application to be made to the Department of Water and Environmental Regulations.

6. The proponent is strongly encouraged to develop a Regional Participation Plan, clearly demonstrating their strategic commitment to maximising local labour, trade, and industry involvement. This Regional Participation Plan should explicitly detail practical measures for engaging local businesses, tradespeople, apprentices, and trainees. Where feasible, this should include active collaboration with local business networks, local workforce providers, technical and further education institutions, the establishment of an accessible information portal, and the hosting of targeted information sessions to promote and facilitate local participation in available work packages and procurement opportunities.

7. The proponent is advised to carefully identify, acknowledge, and implement measures to mitigate predicted significant impacts on scarce local natural resources, such as gravel, sand, and water supplies, essential for the construction phase. Effective strategies must be put in place to prevent significant depletion or inflation of resource prices, thereby ensuring the sustained availability of these resources for ongoing community needs, domestic purposes, road construction, and general infrastructure projects.

8. All properties or portions thereof, that have an approved development classification of Industry, Abattoir, Transport Depot, Hard Rock Quarries or Renewable Energy Facility (or similar if not defined under the Local Planning Scheme No. 3) will be subject to a valuation of GRV, from the date of commencement if the facility or approval of the change in the Government Gazette, whichever is the latter.

9. The applicant is advised that a separate Development Application shall submit and have approved by the Shire of Narrogin a detailed proposal for any associated temporary/transient workforce accommodation, in accordance with the Shire's Local Planning Policy – Temporary/Transient Workforce Accommodation.

10. The workforce accommodation shall:

    a) Be established only for the duration of the construction phase of the Solar and Battery Energy Hybrid Facility and shall be limited to a period of three (3) years from the date of occupancy.

    b) Include a Management Plan, Needs Assessment, Infrastructure Servicing Plan, and Decommissioning Plan to the satisfaction of the Shire.

    c) Be used solely for the accommodation of workers directly involved in the construction of the approved renewable energy facility with the approval of the Shire.

    d) Be removed, and the site rehabilitated to the satisfaction of the Shire, within 6 months of the conclusion of the construction works, unless an alternative legacy use has been approved by the Shire.

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

Reasons for Responsible Authority Recommendation

The proposed Battery Energy Storage System (BESS) development aligns with the strategic direction of the Shire of Narrogin Local Planning Strategy and is consistent with the objectives of the Rural zone under Local Planning Scheme No. 3. The application responds to site constraints including bushfire, access, and servicing requirements and is supported by relevant referral agencies including DFES. The staged nature of the proposal has been appropriately addressed through recommended conditions that require progressive technical detail. The proposal is consistent with best practice for utility infrastructure and aligns with relevant State and Local Planning Policies.

The application is supported subject to conditions designed to ensure staged compliance, site rehabilitation, and bushfire and construction management.

Details: outline of development application

Region Scheme	N/A
Region Scheme - Zone/Reserve	N/A
Local Planning Scheme	Shire of Narrogin Local Planning Scheme No.3
Local Planning Scheme - Zone/Reserve	Rural
Structure Plan/Precinct Plan	N/A
Structure Plan/Precinct Plan - Land Use Designation	N/A
Use Class and permissibility:	Use Not Listed (considered under Clause 3.3.4 of LPS No. 3)
Lot Size:	29.73 hectares
Existing Land Use:	Vacant Land (Rural)
State Heritage Register	No
Local Heritage	☒ N/A ☐ Heritage List ☐ Heritage Area
Design Review	☒ N/A ☐ Local Design Review Panel ☐ State Design Review Panel ☐ Other
Bushfire Prone Area	Yes

	Bushfire Management Plan (BMP) has been provided.
Swan River Trust Area	No

Proposal:

The application seeks development approval for the construction and operation of a utility-scale Battery Energy Storage System (BESS) at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley. The subject site is zoned 'Rural' under the Shire of Narrogin Local Planning Scheme No. 3 (LPS3) and has an approximate area of 68.75 hectares. The proposal comprises a staged development with full approval sought for Stage 1, and in-principal approval sought for Stages 2 and 3 under Clause 74 of the Deemed Provisions of the Planning and Development (Local Planning Schemes) Regulations 2015.

Stage 1 of the development includes the following components:

- Installation of a 200MW / 800MWh battery energy storage system comprising:
    - 233 battery container units;
    - 69 Power Conversion Systems (PCS), including inverters and switchgear;
    - One 250MVA substation transformer;
- A 220/33kV Switch room;
- Ancillary infrastructure including:
    - Three auxiliary transformers with backup diesel generators;
    - Operations and maintenance (O&M) building;
    - Spares room and communications facilities;
    - Six 50kL water tanks for firefighting;
    - 13 car parking bays and site fencing;
    - Internal access roads, including a 10m-wide perimeter road and 6m-wide internal roads;
- Transmission infrastructure linking the site to the adjacent Western Power Narrogin South substation, comprising a combination of underground and overhead 220kV transmission lines;
- Site access via Narrogin Valley Road, with secondary access from Mellons Road;
- Earthworks, landscaping, and a retaining wall exceeding the Scheme's 1.2m height standard (variation sought).

The development will be constructed over a period of approximately 20 months. Up to 100 workers may be on-site during peak construction periods. On completion, the site will operate with up to four staff.

The application also identifies indicative layouts for Stage 2 and Stage 3, each comprising an additional 200MW / 800MWh of battery capacity. These future stages are not proposed for immediate construction and will be subject to separate, detailed technical review and assessment prior to implementation. Approval is sought under Regulation 74 for these stages to be considered in-principle, with conditions requiring updated documentation prior to commencement.

The proposal is supported by technical documentation including:

- A Bushfire Management Plan (BMP) and Bushfire Risk Assessment;
- Acoustic Assessment;
- Environmental Summary and Hydrology Report;
- Traffic Impact Statement (Appendix L of the applicant's submission); and
- Construction and Environmental Management Plan (CEMP) framework.

No clearing of native vegetation is proposed as part of Stage 1. The proposal avoids sensitive environmental features and provides for on-site servicing, including water storage and wastewater disposal, without the need for connection to reticulated services.

Proposed Land Use	Battery Energy Storage System (Utility Infrastructure)
Proposed Net Lettable Area	N/A
Proposed No. Storeys	N/A
Proposed No. Dwellings	N/A

Background:
The subject site is located at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley and is zoned 'Rural' under the Shire of Narrogin Local Planning Scheme No. 3 (LPS 3). The lot is approximately 68.75 hectares in area and is currently used for low-intensity agricultural purposes. A single dwelling and associated outbuilding are located on-site. The surrounding locality consists predominantly of broadacre farming, rural landholdings, and remnant vegetation. The Western Power Narrogin Terminal South substation is situated immediately to the northwest of the site.

There are no previous Development Assessment Panel (DAP) applications or approvals associated with the subject land.

The current application proposes a staged Battery Energy Storage System (BESS) development, with Stage 1 forming the basis of this approval request and indicative future staging (Stages 2 and 3) to be considered under Regulation 74 of the Planning and Development (Local Planning Schemes) Regulations 2015. Stage 1 includes the full development of a 200MW/800MWh BESS facility, with associated civil works, access, and infrastructure to support future expansion.

The application was submitted to the Shire of Narrogin in early February 2025. Due to an internal administration error, there was a delay in generating and issuing the development invoice, resulting in formal lodgement with the DAP Secretariat on 13 February 2025. Public advertising was undertaken by the Shire from 16 January 2025 to 28 February 2025, and the application was referred to relevant government agencies for comment.

The application is supported by a range of technical reports, including a Bushfire Management Plan, Environmental Noise Assessment, Traffic Statement, Ecological

Assessment, and preliminary civil design. During the assessment period, the applicant submitted an updated Bushfire Management Plan and supplementary bushfire risk report in response to referral comments provided by the Department of Fire and Emergency Services (DFES).

Legislation

- *Planning and Development Act 2005* – Part 11A Development Assessment Panels and Development Control.
- *Planning and Development (Local Planning Schemes) Regulations 2015* – Regulations 64 outlines the advertising procedures and timeframes for public consultation
- *Planning and Development (Development Assessment Panels) Regulations 2011*
- *Shire of Narrogin Local Planning Scheme No. 3*

State Government Policies

- State Planning Policy 2.0 – Environment and Natural Resources (SPP2.0)
- State Planning Policy 2.5 – Rural Planning (SPP2.5)
- State Planning Policy 3.7 – Planning in Bushfire Prone Areas (SPP3.7)
- State Planning Policy 4.1 – Industrial Interface (relevant to potential noise and land use compatibility)

State Government Position Statements

- Western Australian Planning Commission (WAPC) Position Statement: Renewable Energy Facilities (2020)

Structure Plans/Activity Centre Plans

N/A

Local Policies

- Shire of Narrogin Strategic Community Plan 2017 - 2027
- Shire of Narrogin Local Planning Strategy
- Draft Local Planning Policy (Advertised 17 May 2025) – Temporary/Transient Workforce Accommodation
- Community Enhancements Fund Policy
- Public Art Contribution Policy (11.4)
- Shire of Narrogin Rating Principles & Change in predominant Use of Rural Land Policy

Public Consultation

In accordance with Clause 64 of Schedule 2 of the *Planning and Development (Local Planning Schemes) Regulations 2015*, the application was advertised as a ‘complex application’ due to its classification as a ‘Use Not Listed’ under the Zoning Table of the Shire of Narrogin Local Planning Scheme No. 3.

Advertising was undertaken for a period of 42 days from 16 January 2025 to 28 February 2025 and included the following measures:

- Letters sent to landowners and occupiers within a one-kilometre radius of the subject site;
- Publication of the application details on the Shire of Narrogin's website and Facebook Page.
- Display of a site notice on the property; and
- Placement of a public notice in the *Narrogin Observer* newspaper.

At the conclusion of the advertising period, three (3) submissions were received. Of the submissions, one expressed support and raised no issues. The remaining two submissions objected to the proposal; however, both were incorrectly referencing a separate DAP application for a solar energy facility advertised concurrently but located at a different site.

As such, the objections received did not relate to the proposed Battery Energy Storage System (BESS) at Lot 9 (No. 76) Narrogin Valley Road. The matters raised were reviewed and referred to the applicant for comment. A summary of themes and the relevant planning response is provided below:

Issue Raised	**Officer comments**
Visual impacts from solar panels, glint and glare, and property devaluation	These matters relate to a separate solar energy facility application and do not apply to the subject proposal, which does not include any solar panels or reflective infrastructure.
EMF exposure, fire risk and concerns regarding proximity to residences	The proposal relates to battery storage infrastructure only. No part of the BESS is located within 20 metres of a residential dwelling, and bushfire risk has been addressed through a Bushfire Management Plan.
Access impacts via Parks Road or Booth Road	The proposal does not involve access via Booth Road, which is unconstructed. Access is proposed via Narrogin Valley Road and Mellons Road, both of which are sealed or formed. Although the applicant has indicated that Booth Road at this stage does not formed part of the access road, the Shire is of the view that as the proposed development fronts onto Booth Street, it is recommended that Booth Street be sealed to the satisfaction of the Shire. The Artistic impression shows an access point onto the site via Booth Street.

Although the submissions were not directly relevant to the proposed development, they were acknowledged and considered. The applicant provided a response to each submission, which has been included in the Schedule of Submissions (Attachment 3). No modifications to the proposal were required as a result of the public consultation process.

Referrals/consultation with Government/Service Agencies

The application was referred to the following government agencies in accordance with the Planning and Development (Local Planning Schemes) Regulations 2015:

- Department of Fire and Emergency Services (DFES);
- Water Corporation;
- Department of Planning, Lands and Heritage (DPLH);
- Department of Water and Environmental Regulation (DWER);
- Main Roads Western Australia;
- Department of Biodiversity, Conservation and Attractions (DBCA);
- Department of Jobs, Tourism, Science and Innovation (JTSI); and
- Western Power.

Of these, a formal submission was received from the Department of Fire and Emergency Services (DFES). DFES reviewed the original Bushfire Management Plan (BMP) submitted with the application and advised that it did not adequately demonstrate compliance with State Planning Policy 3.7 – Planning in Bushfire Prone Areas. Key matters raised included:

- Unsubstantiated vegetation classification (Plot 3);
- Absence of validated Method 2 BAL contour modelling;
- Need for a site-specific Bushfire Risk Management Plan;
- Clarification on firefighting water tank siting and water supply access; and
- Recommendation to consult local emergency services during project implementation.

In response, the applicant submitted an amended BMP dated 15 April 2025, supported by a revised Bushfire Risk Report and a technical response to DFES's comments. These documents addressed the identified issues, including provision of Method 2 radiant heat calculations, updated mapping, confirmation of asset siting in BAL-12.5 areas, and intent to prepare a facility-specific Risk Management Plan. The amended BMP also references CFA Renewable Energy Facility Guidelines (Victoria, 2023) as industry best practice.

While DFES acknowledged receipt of the revised BMP, it advised the Shire that a formal review may not be completed prior to the RAR deadline. As such, a condition of approval is recommended requiring written endorsement of the amended BMP by DFES prior to commencement of development.

No objections or additional comments requiring modification of the application were received from other referral agencies.

Internal consultation

Internal consultation was undertaken with the Shire of Narrogin's Environmental Health Services team, including the Manager of Environmental Health and the Environmental

Health Officer. The application was also referred to the Shire's Executive Manager Technical and Rural Services.

At the time of preparing this report, no formal comments or requests for additional information were received from the above officers. As such, no amendments to the plans or supporting documentation have been made in response to internal referrals at this stage.

This matter has been addressed in the relevant sub-sections of the Planning Assessment where appropriate.

Design Review Panel Advice

Not applicable

Other Advice

Not applicable

Planning Assessment:
The proposal has been assessed against all relevant legislative requirements of the *Shire of Narrogin Local Planning Scheme No. 3* (LPS3), the *Planning and Development (Local Planning Schemes) Regulations 2015 (Deemed Provisions)*, and applicable State Planning Policies. The following matters have been identified as key considerations for the determination of this application:

- Land Use Permissibility and Zone Objectives
- Bushfire Risk and Emergency Management
- Acoustic Amenity and Noise Emissions
- Access and Traffic Impact
- Servicing, Drainage, and Infrastructure
- Environmental Considerations
- Visual and Landscape Impact

These matters are outlined and assessed below.

1. Land Use Permissibility and Zone Objectives

Provision	Requirement	Proposal	Assessment
LPS3 – Clause 3.3 Zoning Table and Clause 3.4.2	Use not listed may be considered if consistent with zone objectives	Use Not Listed (Battery Energy Storage System)	Consistent with the objectives of the Rural zone

Discussion:

The proposed Battery Energy Storage System (BESS) is not a defined land use under LPS3 and has been assessed as a 'Use Not Listed' in accordance with Clause 3.3. 4.. The Council, acting on advice from planning officers, has resolved that the land use may be consistent with the objectives of the Rural zone as outlined in Clause 3.1.2 of LPS3, which include:

- To provide for the maintenance or enhancement of specific local rural character.
- To protect broad acre agricultural activities such as cropping and grazing and intensive uses such as horticulture as primary uses, with other rural pursuits and rural industries as secondary uses in circumstances where they demonstrate compatibility with the primary use.
- To maintain and enhance the environmental qualities of the landscape, vegetation, soils and water bodies, to protect sensitive areas especially the natural valley and watercourse systems from damage.
- To provide for the operation and development of existing, future and potential rural land uses by limiting the introduction of sensitive land uses in the Rural zone.
- To provide for a range of non-rural land uses where they have demonstrated benefit and are compatible with surrounding rural uses.

The proposal does not involve high-impact industry or urban-style development. The proposed infrastructure is setback significantly from property boundaries and is compatible with the rural setting. No conflict with primary agricultural uses has been identified.

2. Bushfire Risk and Emergency Management

Provision	Requirement	Proposal	Assessment
SPP 3.7 and Guidelines	BAL assessment, siting and design, APZ and emergency access	BMP and Bushfire Risk Report submitted; Revised BMP received 15 April 2025	Compliance subject to revised BMP and DFES advice

Discussion:
The site is identified as bushfire prone. A Bushfire Management Plan (BMP) and Bushfire Risk Report (BRR) were submitted and referred to DFES, which provided formal comment on 24 April 2025. Key issues raised included vegetation classification, BAL contours, water supply, and lack of a site-specific Risk Management Plan. The applicant subsequently submitted a revised BMP and technical responses.

Conditions of approval have been recommended requiring that the development be implemented in accordance with the updated BMP and that further endorsement from DFES be obtained prior to commencement. These conditions are considered necessary to satisfy Policy Measures 6.5 and 7.1 of SPP 3.7 and to address risk in a staged development context.

3. Acoustic Amenity and Noise Emissions

Provision	Requirement	Proposal	Assessment
Environmental Protection (Noise) Regulations 1997 and Clause 67(n) of Deemed Provisions	Development must comply with prescribed noise limits	Acoustic Assessment submitted; mitigation measures proposed	Further verification required post-construction

Discussion:
An Acoustic Assessment (Appendix G) was submitted and reviewed by the Shire's Environmental Health Officers. The modelling identifies predicted exceedances under unmitigated scenarios. However, mitigation through attenuated inverter models, acoustic barriers, and operational controls (e.g. fan speed reduction) are expected to achieve compliance.

4. Access and Traffic Impact

Provision	Requirement	Proposal	Assessment
Clause 67(t) of Deemed Provisions; WAPC Transport Impact Assessment Guidelines	Local traffic impacts must be assessed and managed	Access via Narrogin Valley Road; Main Roads referral issued	Oversize movements to be managed under OSOM permit conditions

Discussion:
Vehicle access will be from Narrogin Valley Road. The proposal involves oversize vehicle deliveries during construction. Main Roads WA provided advice that any Over Size Over Mass (OSOM) movements require separate permits.

While a formal Traffic Impact Assessment was not submitted, the Shire's Technical Services Team has reviewed the access arrangement. A Construction Traffic Management Plan (TMP) has been recommended as a condition of approval to manage delivery staging, road safety, and contractor parking.

5. Servicing, Drainage, and Infrastructure

Provision	Requirement	Proposal	Assessment
Clause 67(q), (r), (s) of Deemed Provisions	Development must be adequately serviced	Onsite water tanks, drainage and effluent disposal	Acceptable subject to detailed design and staging controls

Discussion:

The site is not connected to reticulated services. The applicant proposes to use onsite water tanks (6 x 50kL), construct effluent systems, and manage stormwater via site-specific drainage measures.

Conditions are recommended requiring submission of detailed engineering plans for:

- Civil works and site drainage
- Wastewater design
- Water tank locations (as per BMP)

These are standard requirements and reflect the staged nature of the development.

6. Environmental Considerations

Provision	Requirement	Proposal	Assessment
Clause 67(n) of Deemed Provisions and EPA Guidance	Consideration of environmental impacts	No clearing proposed; minor tree removal exempt	Acceptable subject to no clearing without approval as per advice note 5.

Discussion:
No clearing of native vegetation is proposed. The site is largely cleared agricultural land. A standard condition is recommended to prohibit clearing unless exempt under the Environmental Protection Act 1986 or permitted under a separate clearing permit.

7. Visual and Landscape Impact

Provision	Requirement	Proposal	Assessment
Clause 67(m), (n), (p) of Deemed Provisions and LPS3 Table 5	Consider bulk, scale, and interface with surroundings	Structures set back >400m from Narrogin Valley Rd	Complies with Scheme setbacks; low impact due to scale and siting.

Discussion:
While no Visual Impact Assessment was provided, the proposal does not include reflective materials or elevated structures visible from the public realm. The site's size and separation distances (e.g. 445m setback from the road) mitigate landscape and amenity impacts. No additional screening is recommended.

Public Art Contribution Policy
The proposed Solar and Battery Energy Storage System constitutes a major infrastructure project, with an estimated value exceeding the $2 million threshold set out in the Shire's Public Art Contribution Policy. While the policy has typically applied to new buildings and refurbishments, its underlying objective—to support community identity and improve the public realm through art—can be appropriately applied to large-scale infrastructure developments, particularly where they are prominent or have long-term impacts on the surrounding area.

Given the scale, visibility, and long-term presence of this development, a Public Art Contribution is considered consistent with the intent of the policy and the broader goal of integrating significant projects into the cultural and visual landscape of the community. It also offers an opportunity to embed local identity and the renewable energy theme into artistic initiatives.

This approach aligns with the State Government's Percent for Art Scheme, which encourages the integration of public art into both private and public sector developments, including utility and infrastructure projects. Such consistency promotes fairness across development types and encourages diverse applications of public art.

Due to the site's remote and specialised nature, a cash-in-lieu contribution is considered the most suitable mechanism. This will allow the Shire to allocate funds towards delivering public art in more publicly accessible and strategic locations, enhancing community benefit and visibility.

In line with the Shire of Narrogin's Public Art Policy, Art Strategy & Masterplan 2019, and associated Public Art Contribution Policy Guidelines, a public art contribution is required for this project. A cash-in-lieu approach is recommended to ensure delivery of impactful and contextually relevant public art within the broader community, while respecting the site-specific constraints of the proposed development.

Draft Temporary Transient Workforce Accommodation Policy
The proposed Battery Energy Storage System (BESS) is a major infrastructure project that will require a temporary construction workforce. As such, any associated workforce accommodation would fall within the scope of the Shire's Draft Local Planning Policy – Temporary/Transient Workforce Accommodation.

This policy provides a comprehensive framework for the assessment of temporary accommodation proposals for transient workers, particularly those servicing large-scale industrial, resource, or energy projects such as this. It aims to ensure these facilities:

- Are appropriately located;
- Deliver a high standard of design and amenity;
- Minimise social and environmental impacts;
- Provide community benefits where possible; and
- Are clearly temporary, with defined pathways for decommissioning or adaptive reuse.

Key Consideration:
<u>Zoning and Land Use Compatibility</u>

- Workforce accommodation is a discretionary use in Rural and Rural Townsite zones under the Shire's Local Planning Scheme No. 3.
- If the accommodation is to be located within or adjacent to the BESS facility (which is likely in a rural location), it will need to be justified under the policy's guidance for remote or semi-remote camps.
- The Shire generally discourages isolated "camps" unless no reasonable alternative exists and integration with town infrastructure or housing is unfeasible.

<u>Need and Justification</u>

- The proponent shall submit a Workforce Accommodation Needs Assessment, detailing:
    - The number of workers and duration of stay,
    - The inadequacy of existing housing stock to meet the demand,
    - Linkage to the specific construction phase of the energy project.

The proposed development is expected to require up to 100 workers during peak construction of Stage 1, with construction anticipated to occur over approximately 20 months. Workers are proposed to be transported daily from Narrogin and surrounding areas by minibus and coach, with on-site parking provided for up to 40 light vehicles. The workforce is expected to be accommodated within existing residential or commercial accommodation in the Shire of Narrogin and nearby local government areas. No temporary or transient workforce accommodation is proposed as part of this application. Should such accommodation be proposed in the future, the provisions of the policy would apply.

Servicing and Infrastructure

- The policy requires a detailed Infrastructure Servicing Plan, covering potable water, power (preferably grid-connected or renewable), waste disposal, and road access.
- Any required extensions to infrastructure must be delivered or funded by the proponent, including upgrades to local roads or drainage systems if impacted.

Design and Amenity:

- Accommodation must be of high quality, avoid the “camp” aesthetic, and include landscaping and recreation spaces.
- A Management Plan will be required outlining rules, behaviour protocols, integration strategies, and a complaints process.

Legacy and Decommissioning

- The policy strongly encourages a Decommissioning Plan or, ideally, a legacy housing outcome (e.g., modular units that can be converted to seniors or affordable housing post-construction).
- If no legacy use is proposed, full site remediation must occur at the end of the approved term.

Time-Limited Nature

- The Shire will require the accommodation approval to be time-limited (e.g., 2–5 years), aligned with the construction timeline.

The proposed temporary accommodation is necessary to support the construction of the renewable energy facility and is capable of being managed in accordance with the Shire’s policy requirements. It is essential that this component be subject to detailed approval to ensure appropriate location, design, management, and eventual removal or legacy use.

In the event that the applicant is proposing to establish a Workforce accommodation, it is recommended that, prior to the commencement of development, the proponent shall submit and have approved by the Shire of Narrogin a detailed proposal for any associated temporary/transient workforce accommodation, in accordance with the Shire’s Draft Local Planning Policy – Temporary/Transient Workforce Accommodation.

Conclusion:

The proposed Battery Energy Storage System (BESS) at Lot 9 Narrogin Valley Road has been assessed against the relevant provisions of the Planning and Development (Local Planning Schemes) Regulations 2015, the Shire of Narrogin Local Planning Scheme No. 3 (LPS3), applicable State Planning Policies, and local planning policies.

The key considerations in the assessment of this application include:

- The proposed “Use Not Listed” land use classification, requiring consideration under Clause 3.3.4 of LPS3;
- Compliance with State Planning Policy 3.7 – Planning in Bushfire Prone Areas and the adequacy of the submitted Bushfire Management Plan;
- Infrastructure and servicing matters such as water, drainage, wastewater, and access;
- Potential visual, acoustic, and environmental impacts;
- Proximity to sensitive land uses and interface management with surrounding rural zoned land;
- The staged nature of the proposal and related requirements for conditional controls over subsequent phases.

The application seeks discretion from the local government as the use is not expressly listed in the zoning table of the Scheme. Under Clause 3.3.4(a), Council has the discretion to determine that the use may be consistent with the objectives of the Rural zone. Upon assessment, it is considered that the proposal satisfies the zone objectives, including enabling innovative non-rural uses that do not compromise agricultural potential or rural character. The proposal is therefore capable of being supported under the Scheme subject to conditions.

The application has been the subject of public consultation and agency referrals. All matters raised in public submissions have been reviewed and addressed, noting that submissions were largely directed to a separate solar project. No objections were received from referral authorities. DFES identified modifications required to the Bushfire Management Plan, which have been addressed in a revised BMP. It is recommended that a condition require final DFES endorsement of the BMP prior to commencement of works.

The application presents a land use that supports broader strategic goals for renewable energy infrastructure in regional areas. Subject to conditions ensuring appropriate bushfire management, servicing, and operational mitigation, the proposal is considered to be consistent with the planning framework and is recommended for approval.

Narrogin BESS

Application for Development Approval

Narrogin BESS Development Pty Ltd

10 December 2024

→ **The Power of Commitment**



Project name	South Energy Narrogin BESS						
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Acknowledgement of Country

GHD acknowledges Aboriginal and Torres Strait Islander peoples as the Traditional Custodians of the land, water and sky throughout Australia on which we do business. We recognise their strength, diversity, resilience and deep connections to Country. We pay our respects to Elders of the past, present and future, as they hold the memories, knowledges and spirit of Australia. GHD is committed to learning from Aboriginal and Torres Strait Islander peoples in the work we do.



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Table 1 Abbreviations used

Term	Abbreviation
Annual Exceedance Probability	AEP
Australian Height Datum	AHD
Battery Energy Storage System	BESS
Biodiversity Conservation Act 2016	BC Act
Biosecurity and Agriculture Management Act 2007	BAM Act
Bushfire Management Plan	BMP
Department of Planning, Lands and Heritage	DPLH
Department of Primary Industries and Regional Development	DPIRD
Department of Water and Environmental Regulation	DWER
Development Application Report	DA Report
Eco Logical Australia	ELA
Environmental Protection (Noise) Regulations 1997	Noise Regulations
Environmental Protection and Biodiversity Conservation Act 1999	EPBC Act
Hectares	Ha
Kilovolt	kv
Kilovolt hours	kVh
Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley	The Site
Main Roads Western Australia	MRWA
Megawatt	MW
Megawatt hour	mWh
Metres	m
Narrogin BESS	The Proposal, The Project
Narrogin Bess Development Pty Ltd	South Energy
Planning and Development (Local Planning Schemes) Regulations 2015	The Regulations
Planning and Development Act 2005	PD Act
Shire of Narrogin Local Planning Scheme No. 3	LPS3
South West Interconnected System	SWIS
State Planning Policy	SPP
The Shire of Narrogin	The Shire
Traffic Impact Assessment	TIS
Vehicles Per Day	Vpd
Weed of National Significance	WoNS
Western Australian Planning Commission	WAPC, the commission

1. Introduction

GHD Pty Ltd (GHD) acts on behalf of Narrogin BESS Development Pty Ltd and South Energy, acting as the development manager (herein 'South Energy'), the proponent of the Narrogin Battery Energy Storage System (BESS), in preparing this application for approval to commence development under the Shire of Narrogin's Local Planning Scheme No. 3 (LPS No.3).

The proposed BESS is located at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the site). Stage 1 of the project comprises one 200MW / 800MWh BESS facility, with supporting substation control building, operations and maintenance shed and laydown and facilities area. The BESS is proposed to connect to an existing Western Power substation on the adjacent land parcel at Lot 8 (No. 153) Booth Street, Narrogin Valley.

Two future expansions stages (stage 2 and 3) are also planned, with the footprints of each expansion indicated on the development plans. While stage 1 is fully committed by the proponent, stages 2 and 3 are subject to the finalisation of further technical and financial details. As a result, this application seeks approval for stage 1 works, and given that the elements of stages 2 and 3 will mirror stage 1, it is requested that these are considered under Regulation 74 of the *Planning and Development (Local Planning Schemes) Regulations 2015* (the Regulations). Regulation 74 enables submission of further details around the design and technical characteristics, accompanied by sufficient additional supporting information, and the post approval phase. It is submitted that the post approval approach enables stages 2 and 3 to be dealt with most efficiently by the Shire of Narrogin (Shire) directly.

Western Australia has experienced significant growth in renewable power generation projects, including solar and wind, over the past decade. The management of power fluctuations associated with renewable energy sources is critical to maintain grid stability, preserve power reliability and limit outages. BESS's regulate fluctuations by receiving excess power from the grid, storing, and then releasing energy as required, improving reliability and cost-effectiveness of power supplies.

Narrogin's renewable energy sector is expected to undergo significant growth, owing to its proximity to power infrastructure and distribution networks in the South West Interconnected System (SWIS), as well as an abundance of solar and wind resources. Several large-scale renewable energy projects are currently underway in the locality, with proponents currently seeking regulatory approvals and undertaking detailed design. Offering the charge and discharge of stored energy, equivalent to approximately 70,000 households worth of power in each 4-hour discharge cycle, the project will support the uptake of renewable energy generation in Narrogin.

The project benefits the Narrogin community by:

– Improving network stability and reducing risk of outages
– Supporting more uptake of renewable energy generation projects
– Keeping electricity prices lower through management of power fluctuations
– Contributing to WA's clean energy and renewables targets

This report sets out the context of the project and demonstrates consistency with the existing planning framework. The report includes description and commentary on the following matters:

– Site details and locational information/context.
– Background, stakeholder engagement activities and outcomes.
– Description of the applicable regulatory, planning and environmental attributes.
– Consideration against the relevant planning and broader regulatory framework.
– Justification for the project against various strategies, policies and regulatory requirements of the State government and Shire of Narrogin.

1.1 Scope and limitations

This report has been prepared by GHD for Narrogin BESS Development Pty Ltd and may only be used and relied on by Narrogin BESS Development Pty Ltd for the purpose agreed between GHD and Narrogin BESS Development Pty Ltd.

GHD otherwise disclaims responsibility to any person other than Narrogin BESS Development Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request.

2. Land and location

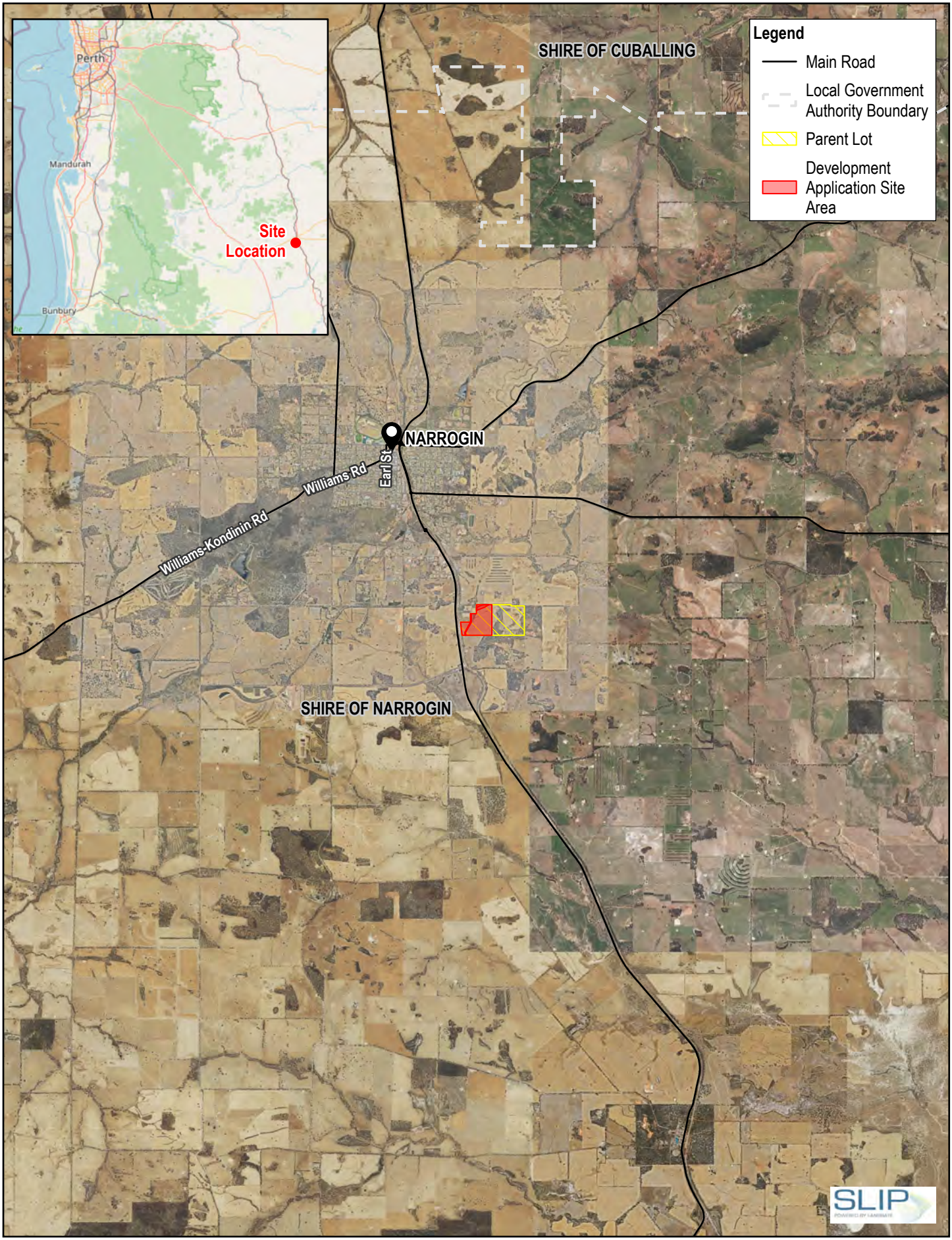
2.1 Regional context

The proposal is located in the Western Australian Wheatbelt region, within the Shire of Narrogin local government area. The Shire is 195 kilometres southeast of Perth, covering an area of 1,618.8 km^2. Narrogin is known for its rich agricultural landscape, with extensive wheat, barley and livestock farming. The location of the proposal in its regional context is depicted in Figure 1.

Narrogin's renewable energy sector is expected to undergo significant growth, owing to its proximity to power infrastructure and distribution networks in the South West Interconnected System (SWIS), as well as an abundance of solar and wind resources.

Several large-scale renewable energy projects are currently underway, with proponents currently seeking regulatory approvals and undertaking detailed design. This includes Neoen, a French renewables developer currently developing a 200 MW solar farm east of Narrogin, and Ace Power, currently developing a 200 MW solar farm in Narrogin Valley. FutureEnergy Australia is also developing a renewable diesel production facility at Lot 31 Great Southern Highway, which is in close proximity to the proposal.

Narrogin is an excellent location for the project, because it offers unmatched synergies to current and future renewable energy projects, which together can significantly contribute to Western Australia's transition to clean energy.



Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Narrogin BESS Development Pty Ltd
South Energy Narrogin BESS

Project No. **12638490**
Revision No. **0**
Date **04/12/2024**

Regional Context

FIGURE 1

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Print date: 04 Dec 2024 - 15:03

Data source: Landgate_Subscription_Imagery\WANow: OpenStreetMap: © OpenStreetMap (and) contributors, CC-BY-SA. Created by: klabez

2.2 Local and site context

The BESS is proposed to be located on lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the site). The site tenure is described in section 2.3 below.

The lot is bound by Narrogin Valley Road to the north, a freehold lot to the east, public purposes and freehold lot to the south.

Lot 9 comprises of predominately agricultural land and remnant vegetation with improvements consisting of one residential dwelling and one shed which are both located near to the southern lot boundary. Importantly, a Western Power substation is located in the northwest adjoining lot. To the west of the lot is the Great Southern Highway and the Avon Yard Albany Railway.

Surrounding land uses include agricultural, cropping, grazing pastoral and rural lifestyle. Remnant vegetation is dispersed throughout the area.

The site generally slopes towards the northwest. Natural ground levels range from 376 metres AHD at the south-eastern corner to 350 m AHD at north-western corner of lot 9. The location of the Proposal in its local context is depicted in Figure 2 (Esri, 2024). Photographs of the site dated 9 August 2024 are provided in Figure 3 and Figure 4 (GHD, 2024).

Further description of the site's ecological characteristics, including flora and fauna is provided in section 5.1.



Paper Size ISO A4

0 150 300 450 600

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Narrogin BESS Development Pty Ltd
South Energy Narrogin BESS

Project No. **12638490**
Revision No. **0**
Date **04/12/2024**

Site Context

FIGURE 2

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Figure 3 *Photograph of site from Mellons Road, looking northeast*



Figure 4 *Photograph of site from Mellons Road, looking west*

2.3 Lot details

South Energy has selected this site as it offers several key advantages for installation and operation of the BESS described as follows.

– The lot has excellent access to Western Australia's energy infrastructure because of the adjacent Narrogin South Substation. This proximity minimises the amount of transmission infrastructure required to integrate the BESS into the network.
– The site's terrain is generally flat and has already been significantly cleared for agricultural purposes. As a result, the site requires minimal bulk earthworks and clearing of vegetation to facilitate the BESS.
– The site is highly accessible due to established transport networks. The site is connected to Narrogin Valley and Mellons Road. Minimal to no roadside vegetation is required to be cleared to access the site.
– Narrogin's renewable energy sector is anticipated to grow significantly. As described in section 2.1 there are several energy projects underway which all of which have significant potential to integrate with the proposed BESS.

The subject land parcel is described in Table 2. Notifications and easements on the Certificate of Title are described in Table 3.

Table 2 Lot description

Landgate ID	Lot on Plan	Vol/Folio	Description	Registered Owner	Area (ha)
1274777	D067821 9	1702/85	76 Narrogin Valley Road, Narrogin Valley 6312	Roy Kenneth John Mcleod	68.7474

Table 3 Notifications and easements

Type	Landgate ID	Doc ID	Description
Easement	3887593	9 - C768618	Easement to Electricity Networks Corporation for electricity transmission purposes

Duly completed application forms are provided in **Appendix B**. A Certificates of Title are provided in **Appendix I**.

3. Proposal description

3.1 Proposal need

Western Australia has experienced significant growth in renewable power generation projects, including solar and wind, over the past decade. Since 2018, renewable energy power generation has grown from 15 to 35 percent and as of 2023, over 350,000 roof top PV systems have been installed in homes and businesses in the SWIS region (refer Figure 5) (Synergy, 2024; The Chamber of Minerals and Energy of Western Australia, 2024). To ensure reliable power is delivered to homes and business throughout the SWIS, energy supply (generation) and demand (consumption) need to be balanced. One way of achieving this balance is using BESS systems.

BESS systems can help regulate supply and demand by receiving excess power from the grid, storing, and then releasing back to the grid as required. This is especially useful for renewable power systems such as solar and wind which do not output power at consistent rates (Synergy, 2022).

The project will contribute to stability and reliability of the SWIS, allow for an increased supply of renewable energy and progress Western Australia's transition to renewable energy sources.

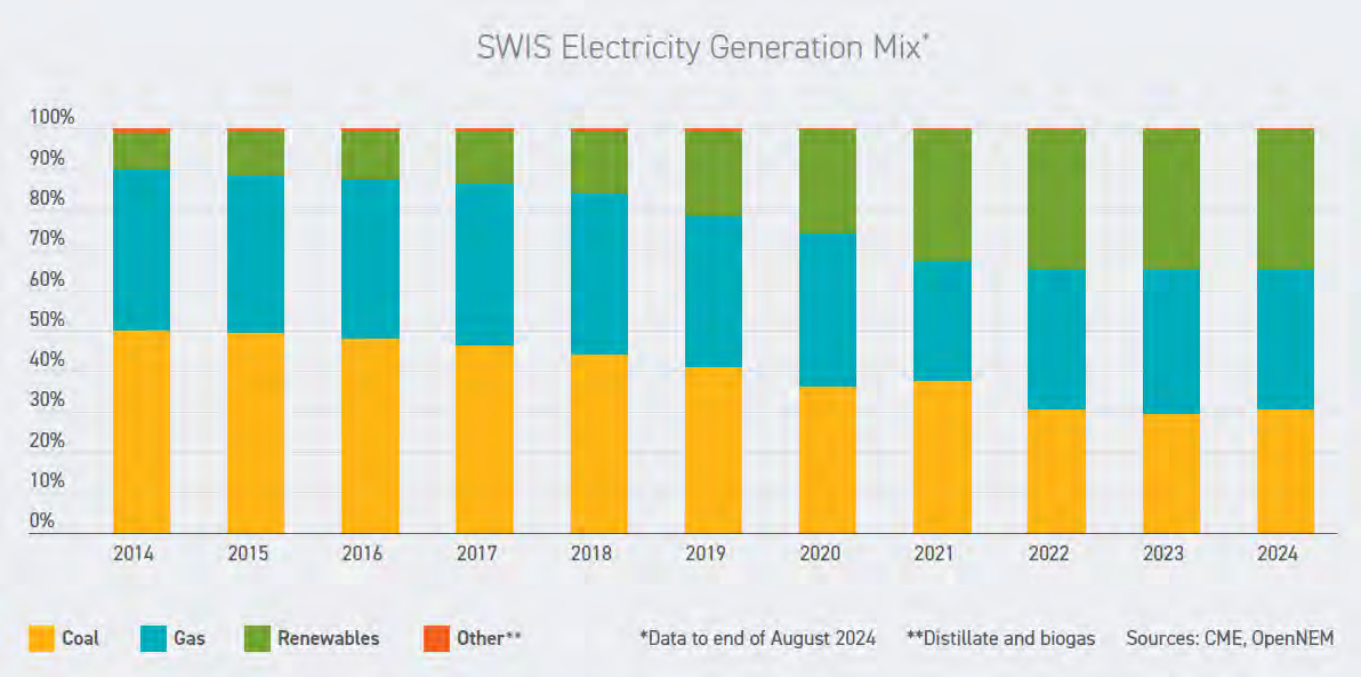


Figure 5 SWIS electricity generation mix

3.2 Infrastructure

The project is designed to have a capacity of 200MW / 800MWh. It will connect to an existing Western Power substation located on the northwest adjacent lot 8 (No 153) Booth Street via 220kV lines.

The facility has been designed to include two future expansions (stage 2 and 3), with the footprints of each expansion indicated on the development plans. The proposed facility layout sets aside areas for future stage 2 and 3 substation expansions, switch rooms, generators and transmission infrastructure. The two future stages are anticipated to have a capacity of 200MW / 800MWh each.

Stage 1 of the proposal as shown in the development plans will be constructed first. Stage 2 and 3 expansions will be undertaken at a later date and are subject to the finalisation of further technical and financial details.

Table 4 provides a summary of key project elements that form the proposal. Development plans are included in this report at **Appendix A**.

Table 4 Project details

Element	Description
Stage 1 BESS	233 Battery containers, inclusive of battery racks and cooling systems. 69 power conversion systems, inclusive of battery inverters and switchgears. 1 x 250 MVA substation transformer
Potential Future Expansion	Infrastructure and development footprint to support two future expansions, each consisting of 200MW / 800mWh systems. Denoted as 'BESS STAGE 2 (FUTURE)' and 'BESS STAGE 3 (FUTURE)' on development plans.
Transformers	Three 500kVA Auxiliary transformers with back-up generators
Switch room	One 220/33TX switch room. Provision for two future (stage 2 and 3) switch rooms of the same design and capacity.
Buildings	Spares and stores, operations and maintenance, network communication infrastructure
Fire Water Tanks	Six 50kL tanks
Parking	13 car parking bays.
Transmission Infrastructure	220kV line to Narrogin Terminal South (underground/overhead) 33kV Cabling to connect infrastructure systems throughout site.
Roads	Approximately 3 kilometres of internal roadways throughout the facility. Roads include a 10m wide perimeter road and 6m internal roads.
Site works	Cut and fill to level site as required. Batter slopes not exceeding 1:3 throughout.

3.3 Access and construction characteristics

The facility will be accessed from Narrogin Valley Road. The road is a sealed single carriage way and is classified as a Local Distributor. The road is part of restricted access vehicle (RAV) network meaning it can be accessed by large and heavy vehicles for construction and operational purposes.

A secondary access will be made to Mellons Road, which runs parallel to Great Southern Highway.

Further information relating to traffic impacts of the proposal in construction and operational phases are described section 5.7. A Traffic Impact Statement is provided in **Appendix D**.

Construction of stage 1 is expected to involve:

– Construction period of approximately 20 months.
– Workforce of up to 100 personnel on site during peak construction period.
– On-site construction to occur up to seven days per week between 7:00am and 7:00pm.
– On-site parking area for constriction personnel to accommodate 40 light vehicles. Remainder of construction workforce to access site via 10 seat bus coming from Narrogin. Anticipated frequency of approximately 15 one-way trips per day during peak construction.
– Semi-trailers and B-Doubles will be used to transport large and heavy equipment to site.

Construction characteristics for stages 2 and 3 are expected to be similar to stage 1.

3.4 Operational characteristics

Once commissioned, typical operation will involve up to 4 employees attending the site. Additional personnel may attend site during planned maintenance activities.

3.5 Approval subject to later details

Regulation 74 of the Regulations permits a decision maker to grant approval to a development subject to later details. This application includes indication of two future stages that will expand the proposal. Future stages will

not alter the land use and will be near the same as stage 1 in scale, works proposed and impacts. This includes the installation of additional BESS units, site works, and expansions to transmission and control systems.

Stage 2 and 3 works are not expected to introduce additional constraints in terms of bushfire risk, water management, traffic, ecology, heritage, or noise impacts. While full details for stages 2 and 3 have not been finalised, the supporting technical reports appended to this application considered have considered them to the extent possible. It is noted that battery technology is witnessing rapid enhancement, reducing land areas required and external impacts.

Additional noise impact modelling will be undertaken to support stage 2 and 3 expansions. Stage 2 and 3 works will not generate the need for extra employees to attend the site. It is requested that this development application be granted approval, subject to a condition requiring:

– Submission of further design details/plans relating to stage 2 and 3 works prior to the commencement of works relating to those stages; and,
– Modification to any management plans/requirements arising from the progression of stage 2 and 3 works. Specifically, updates to the Acoustic Assessment provided at **Appendix G** to include assumptions of additional noise outputs.

Implications relating to bushfire management, transport, hydrology and site ecology are not expected to be impacted by the further stages and have been adequately addressed in the appended reporting.

4. Planning considerations

4.1 Legislative considerations

4.1.1 Planning and Development Act 2005

The *Planning and Development Act 2005* (PD Act) controls use and works on land throughout Western Australia. In the context of this proposal, the PD Act provides for the application of State planning policies and the Shire's local planning framework, as discussed in sections 4.3 and 4.4.

4.1.2 Environmental Protection (Noise) Regulations 1997

The *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) sets standards and guidelines for acceptable levels of noise in different environments. Its objective is to prevent noise pollution from affecting human health and wellbeing, and it establishes penalties for non-compliance. An Acoustic Impact Statement has been prepared (refer **Appendix G**), where noise modelling has been undertaken to demonstrate the extent of predicted compliance with the Noise Regulations. Section 5.5 describes consistency with the Noise Regulations in greater detail.

4.2 Strategic considerations

4.2.1 State Planning Strategy

The State Planning Strategy 2050 (Western Australian Planning Commission, Government of Western Australia, 2014) outlines the context, goals, and strategic direction for planning in Western Australia. The strategy places emphasis on fostering development of renewable energy infrastructure to support the on-going sustainable growth and development of Western Australia. The strategy also recognises the importance upgrading electricity network infrastructure to manage the impacts of increased usage of renewable energy generation.

The proposal aligns with the Strategy because it introduces additional energy storage capacity into the SWIS, thereby supporting the provision of future renewable energy generating facilities.

4.2.2 Western Australian Future Battery Industry Strategy

The Western Australian Future Battery Industry Strategy (Government of Western Australia, 2019) outlines the state's plan to develop a sustainable and globally competitive battery industry. The strategy aims to capitalise on Western Australia's abundant reserves of critical minerals, infrastructure technology and skills to establish a value-adding battery materials and manufacturing sector. The strategy sets out specific actions to be taken across five focus areas, including investment attraction, research and development, skills and training, infrastructure, and regulatory and policy frameworks.

The Proposal strongly aligns with the Strategy because it provides for an opportunity for domestic integration, installation and management of a significant battery energy storage system, with potential for future expansion.

4.2.3 Energy Transformation Strategy

The Western Australian Energy Transformation Strategy Stage 2: 2021-2025 (Government of Western Australia, 2021) follows on from the Stage 1 strategy, and outlines the State's progress and key actions to transition to clean, efficient and reliable energy.

Stage 2 of the Strategy highlights a substantial increase in large-scale solar power generation in the SWIS and continues to emphasise the importance of renewable energy systems as a key pathway to reduce the State's greenhouse gas emissions. The strategy provides several themes to guide the State's ongoing energy transition.

The proposal aligns with Theme 2: *Integrating new technology into the power system* and Theme 3: *keeping the lights on as the power system transitions* because it contributes to the security and dependability of the SWIS energy supply and supports provision of renewable power energy to homes and businesses in the region.

4.2.4 Wheatbelt Regional Planning and Infrastructure Framework

The Wheatbelt Regional Planning and Infrastructure Framework (Western Australian Planning Commission, 2015) describes the vision for the region and considers:

– Objectives and planning approaches for communities, economy and the environmental amenity of the region
– Coordination of Infrastructure projects, services and initiatives
– Strategic and infrastructure planning

The framework identifies the region as having an abundance of renewable energy sources, and anticipated growth in sector accordingly. The report notes however, that the SWIS has (at the time of publication) limited capacity to receive renewable energy inputs, which remains an issue to date as identified in recent government publications.

This BESS will contribute to the resolution of this constraint by storing excess power generated by renewable energy infrastructure. Further, the proposal also will improve SWIS stability and contribute to economic diversity of infrastructure development and associated employment in the Narrogin region.

4.3 State planning policies

4.3.1 State planning policy 2.5 – Rural planning

SPP2.5 describes policy outcomes to protect and preserve rural land assets due to the importance of their economic, natural resource, food protection and landscape values. The proposal is located on land zoned ‘Rural’ under LPS3.

The proposal would have a minor impact on rural land supply in Narrogin, as it would occupy 29.25 ha of land which is currently being used for agricultural purposes. The proposal does not involve any activities or land uses that would impact or constrain the use of surrounding rural land. Further consideration on the proposal’s compatibility with its rural setting and zoning is provided in section 4.4.2.2 and 4.4.2.1.

4.3.2 State planning policy 2.9 – Water resources

SPP2.9 provides guidance in the planning, protection and management of surface and groundwater catchments, including consideration of availability of water and waterways management, wetlands, waterways, and estuaries and their buffers, and implementation of total water cycle management principles in the land use planning system.

The Proposal has considered how its interaction with water and the natural environment is managed though a Hydrology Assessment (refer **Appendix E**) This includes consideration of surface stormwater runoff, flood risk and site hydrology mapping. Refer to section 5.6 for further detail.

4.3.3 State planning policy 3.7 – Planning in bushfire prone areas.

SPP3.7 directs how land use should address bushfire risk management in Western Australia. It applies to all land designated as bushfire prone. SPP3.7 seeks to guide the implementation of effective risk-based land use planning and development to preserve life and reduce the impact of bushfire on property and infrastructure. Portions of the project site designated bushfire prone. As a result, the Proposal is supported by a Bushfire Management Plan (BMP) prepared by Western Environmental.

The BMP demonstrates consistency of the proposal with the provisions of SPP3.7. Further discussion on this matter is provided in section 5.4.

4.4 Local planning framework

4.4.1 Shire of Narrogin Local Planning Strategy

The Shire's Local Planning Strategy was endorsed in 2019 (The Shire of Narrogin, Western Australian Planning Commission). Strategy 3 subsection 4.4 *Power and Energy* describes key priorities for the Shire which include:

– Maintenance and upgrading of the network to ensure reliability of supply electricity.
– Capacity upgrades in the medium to long term to cater for an expected increase in demand for power arising from the development and release of new residential, industrial and rural living lots.
– To support the development of alternative energy production in the Shire such as, micro-grids, solar and wind which have significant potential and environmental benefits.

In response to these priorities, the Shire identifies the following key actions relevant to this proposal:

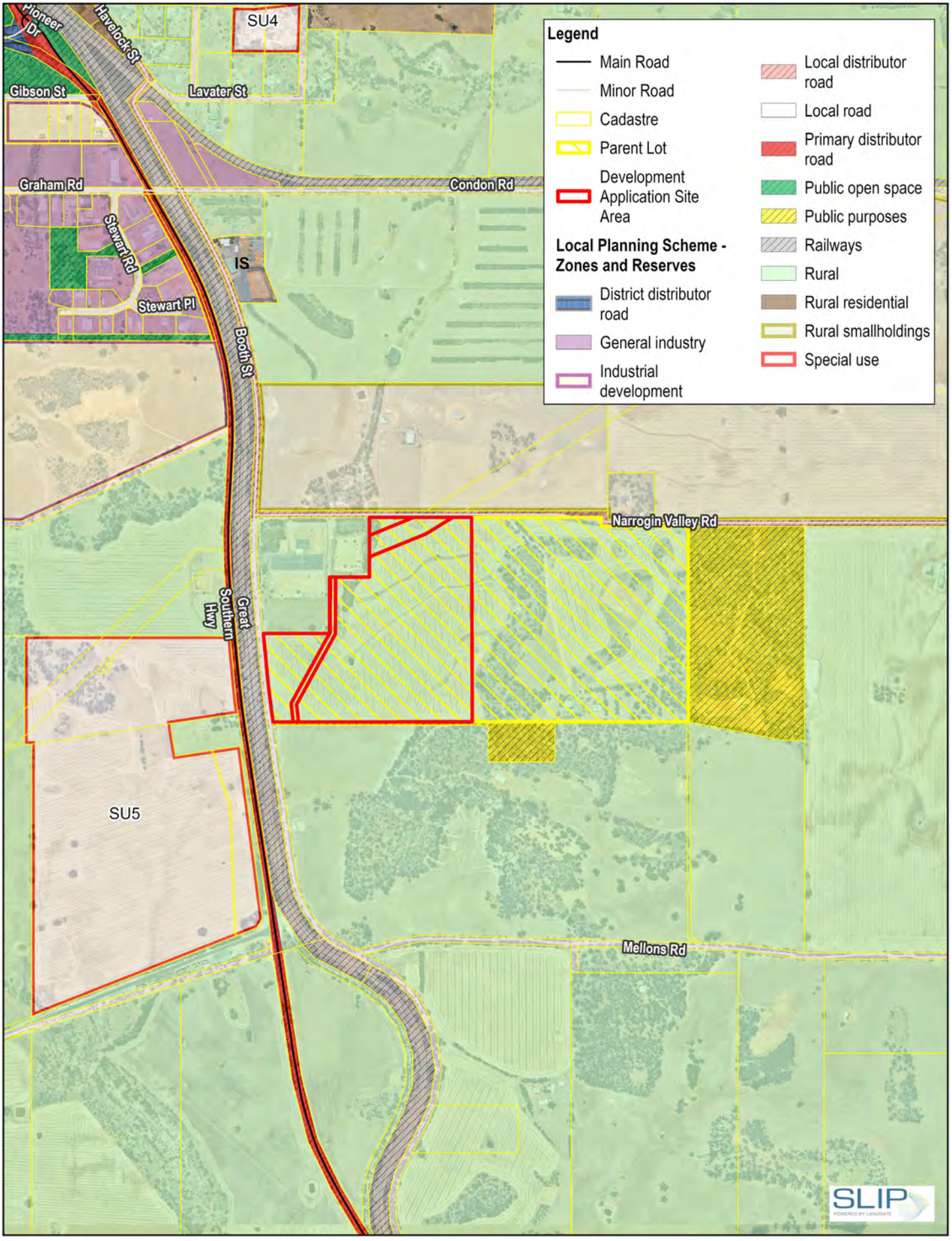
– Encourage and support in the development of alternative power supply schemes such as solar/battery micro-grids.
– Facilitate and support any necessary upgrades to existing power supply infrastructure in the Shire to enable the provision of sufficient supplies of power to satisfy current and future anticipated demand.
– Have due regard for all relevant Western Australian Planning Commission Strategies, State Planning Policies and Operational Policies when considering proposals for the development and use of land that requires the provision of power in the Shire.

The proposal strongly aligns with these priorities and actions as identified in the Shire's Local Planning Strategy because it contributes to the reliability of the regional electricity supply, increases capacity of the network, and supports the usage of alternative energy sources, including solar and wind.

As described throughout section 4.2, the proposal aligns with several State level strategies and policies.

4.4.2 Shire of Narrogin Local Planning Scheme No. 3

LPS3 controls how land can be used and developed across the Shire. LPS3 sets out specific requirements for development applications depending on the intended land use and existing zoning. LPS3 was gazetted in May 2023 and provides a contemporary planning framework for the Shire. LPS3 contains objectives, as well as zoning and development provision which apply to the proposal, which are discussed in the following sections of this report.



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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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Narrogin BESS Development Pty Ltd
South Energy Narrogin BESS

Project No. 12638490
Revision No. 0
Date 04/12/2024

Local Planning Scheme No. 3 - Zones and Reserves

FIGURE 3

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4.4.2.1 Land use permissibility

LPS3 described a range of land use types in Division 2 – Land use terms used in the Scheme. The proposal involves development of a facility used for the purpose of storage of electricity. The proposal comprises of infrastructure to store, control and discharge energy to the SWIS electricity grid as required. LPS3 contains a broad range of land use terms, however none of which fully describe the general nature of the proposal which include:

– The works of the land use to develop a BESS facility and associated transmission infrastructure; and
– The use of the facility to store electricity, for later use.

As a result, the is submitted that the proposed land use should be considered a 'use not listed' for the purpose of determining land use under LPS3. Clause 3.3.4 of LPS3 describes how unlisted uses should be assessed by the Shire.

> *'The local government may, in respect of a use that is not specifically referred to in the zoning table and that cannot reasonably be determined as falling within a use class referred to in the zoning table —*
>
> *(a) determine that the use is consistent with the objectives of a particular zone and is therefore a use that may be permitted in the zone subject to conditions imposed by the local government; or*
>
> *(b) determine that the use may be consistent with the objectives of a particular zone and advertise under clause 64 of the deemed provisions before considering an application for development approval for the use of the land; or*
>
> *(c) determine that the use is not consistent with the objectives of a particular zone and is therefore not permitted in the zone.'*

An assessment of the proposal against the objectives of the zone is provided in the following section.

4.4.2.2 Zones, reserves and objectives

The site is zoned 'Rural' (refer Figure 6) (Department of Planning Lands and Heritage, 2024). Clause 3.1.2 of LPS3 sets out the objectives of the Rural zone which are provided below in Table 5, along with commentary on the consistency of the proposal with each objective.

Table 5 Objectives of the Rural zone

Objective	Comment
To provide for the maintenance or enhancement of specific local rural character.	The region is characterised by remnant vegetation, agricultural land, commercial developments and transport infrastructure. The development context also contains electrical transmission infrastructure being Western Power Narrogin substation. The BESS is limited in height and situated on land which is not significantly elevated with respect to its surrounds. Visibility of the facility is limited by remnant vegetation surrounding the lot, meaning the wider rural character is maintained.
To protect broad acre agricultural activities such as cropping and grazing and intensive uses such as horticulture as primary uses, with other rural pursuits and rural industries as secondary uses in circumstances where they demonstrate compatibility with the primary use.	Whilst the proposal is surrounded by land used for rural purposes, the proposal would not introduce a land use that would impact or prejudice any existing agricultural activities. The proposal's development footprint (inclusive of future stages 1 and 2) will utilise 29.52 ha of land and will therefore have minimal impact on the overall rural and agricultural land supply within the Shire.
To maintain and enhance the environmental qualities of the landscape, vegetation, soils and water bodies, to protect sensitive areas especially the natural valley	Refer to section 0 which details how the proposal has been designed and sited to minimise its environmental impacts.

Objective	Comment
and watercourse systems from damage.	
To provide for the operation and development of existing, future and potential rural land uses by limiting the introduction of sensitive land uses in the Rural zone.	The Proposal is not a sensitive land use that would the diminish or restrict the ability for adjoining or adjacent land to be used for rural land use purposes.
To provide for a range of non-rural land uses where they have demonstrated benefit and are compatible with surrounding rural uses.	The proposal is compatible with the adjoining western power electrical transmission land use. LPS3 establishes special use zone 5 to the west of the site as shown in Figure 6. The purpose of this zone is to support the Narrogin Future Energy Park and the proposed renewable diesel biorefinery plant, which as discussed in 0 the proposed BESS is compatible with. The BESS is also compatible with surrounding rural land uses as it does not inhibit the carrying out of rural and agricultural activities, as noted in the above section. The proposal will benefit surrounding rural land uses through the provision of reliable energy, and support for future renewable energy projects.

4.4.2.3 Development requirements

Clause 4.8 of LPS3 sets out general site and development requirements. Table 6 summarises the requirements for developments located in the Rural zone as well as the general development requirements for the proposal. Discretion to vary these development requirements where it can be suitably demonstrated that the proposal will not adversely impact on the amenity of surrounding land and developments, occupants or the streetscape.

There are no site-specific development requirements, structure plans, special control areas or local development plans which apply to this proposal.

Table 6 Rural Zone, and General Development Requirements

		Required	Proposed
Minimum Lot Area (m2)		N/A	-
Minimum Effective Frontage		N/A	-
Minimum Boundary Setbacks (m)	**Front**	20 (50 to Primary Distributor Roads)	The setbacks have been measured from the nearest structure or building, and exclude roads, fencing and slope batters. The Stage 1 BESS facility is set back 445 metres from the northern lot boundary abutting, Narrogin Valley Road.
	Side	20	The O&M building is set back 125 metres from the western lot boundary, abutting Mellons Road.
	Rear	20	The BESS containers are set back 45 metres from the eastern lot boundary. The 500kVA auxiliary transformer and back up generators are set back 27 metres from the southern lot boundary.
Secondary Street (all zones)		May be reduced to minimum of 50% of primary/front street setback as determined by the local government	N/A not required.
Maximum Plot Ratio		N/A	-
Minimum Car Parking Spaces		N/A	-
Maximum building height		No site shall be developed or building constructed to contain more than two	The battery containers will be 3 metres in height. No elevations have been produced for the proposed

	storeys or exceed 10 metres in height measured to the highest proportion of the building from mean natural ground level.	buildings at this stage, however given their nature and use it is not anticipated any buildings will exceed 10 metres in height.
Retaining Walls	No retaining wall shall be constructed which alters the contours of the natural surface by more than 0.5 metres, or no more than 1.2 metres in the Rural Residential, Rural Smallholdings and Rural Zones	One retaining wall is proposed to be located 15 metres north of transmission bay 1. The purpose of the retaining wall is to protect remnant vegetation. The retaining wall will be 45 metres in length, and approximately 5.4 metres in height, as measured from the natural ground level to its highest point. The proposed retaining wall does not comply with this provision however the wall is considered acceptable as it has been provided for the purpose of retaining vegetation. The wall has a small footprint in the context of the development and would not have an adverse visual impact on the locality.
Fencing	Fencing in the Rural zone shall be no greater than 1.5 metres in height and constructed from post and wire or post and rail	An indicative fence line is shown on the development plans. Height and specification of the fencing has not been provided at this stage.

4.4.3 Local planning policies

There are no local planning policies which apply to this proposal.

4.5 Planning and Development (Local Planning Schemes) Regulations 2015

Clause 67 of the Regulations sets out the matters to be considered when determining a development application. Table 7 demonstrates the consistency of the Proposal with the relevant criteria.

Table 7 Matters to be considered when determining a development application

(a) the aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area.	Refer to comments in section 4.4.2.
(b) the requirements of orderly and proper planning including any proposed local planning scheme or amendment to this Scheme that has been advertised under the Planning and Development (Local Planning Schemes) Regulations 2015 or any other proposed planning instrument that the local government is seriously considering adopting or approving.	N/A – There are no draft or proposed local planning schemes, or other proposed planning instruments that apply to the proposal.
(c) any approved State Planning Policy.	Refer to comments in section 4.3.
(d) any environmental protection policy approved under the Environmental Protection Act 1986 section 31(d).	N/A – None applicable.
(e) any policy of the Commission.	Refer to comments in section 4.3.
(f) any policy of the State	Refer to comments in section 4.3.
(fa) any local planning strategy for this Scheme endorsed by the Commission.	Refer to comments in section 4.4.1.
(g) any local planning policy for the Scheme area.	N/A – None applicable.

(h) any structure plan or local development plan that relates to the development.	N/A – None applicable.
(i) any report of the review of the local planning scheme that has been published under the Planning and Development (Local Planning Schemes) Regulations 2015.	N/A – None applicable.
(j) in the case of land reserved under this Scheme, the objectives for the reserve and the additional and permitted uses identified in this Scheme for the reserve.	N/A – The proposal does not relate to land reserved under LPS3.
(k) the built heritage conservation of any place that is of cultural significance. (l) the effect of the proposal on the cultural heritage significance of the area in which the development is located.	Refer to comments in section 5.2.
(m) the compatibility of the development with its setting, including – (i) the compatibility of the development with the desired future character of its setting; and (ii) the relationship of the development to development on adjoining land or on other land in the locality including, but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the development.	The proposal is isolated from surrounding sensitive land uses and does not result in significant air or noise emissions (or emissions that cannot otherwise be mitigated), or traffic volumes that may impact surrounding land development as identified in the supporting technical reports. Refer to comments in section 5.7, which addresses the proposal's built form in relation to adjoining land.
(o) the likely effect of the development on the natural environment or water resources and any means that are proposed to protect or to mitigate impacts on the natural environment or the water resource.	Refer to comments in section 5.1, which address the proposal's potential environmental impacts and mitigation strategies.
(p) whether adequate provision has been made for the landscaping of the land to which the application relates and weather any trees or other vegetation of the land should be preserved	The proposal is located in a lot which has been used as a cropping field for approximately 30 years, with substantial cleaning, earthworks and topsoil removal occurring over that period. The site contains several small areas of remnant vegetation located predominately towards the northeastern corner of the site. These areas will not be disturbed or cleared as a result of the proposal. Existing onsite remnant vegetation will be retained and protected, subject to bushfire management requirements.
(q) the suitability of the land for the development taking into account the possible risk of flooding, tidal inundation, subsidence, landslip, bush fire, soil erosion, land degradation or any other risk.	The proposal is supported by several studies demonstrating management/mitigation of environmental risks relevant to the site: – Hydrology Assessment (**Appendix E**) – Bushfire Management Plan (**Appendix C**) – Ecological Site Assessment (**Appendix J**) The contents of these reports are summarised in respective bodies in section 5.
(r) the suitability of the land for the development taking into account the possible risk to human health or safety.	There are no significant human safety risks generated by the proposal. However, there are potential human safety risks in the occurrence of a bushfire. Refer to comments in section 5.4 for consideration of human safety in this respect.
(s) the adequacy of — (i) the proposed means of access to and egress from the site; and (ii) arrangements for the loading, unloading, manoeuvring and parking of vehicles (t) the amount of traffic likely to be generated by the development, particularly in relation to the capacity	The Project is supported by a Traffic Impact Statement (**Appendix D**). The proposal will not generate volumes of traffic that exceed the capacity of the road network.

of the road system in the locality and the probable effect on traffic flow and safety.	
(u) the availability and adequacy for the development of the following — (i) public transport services; (ii) public utility services; (iii) storage, management and collection of waste; (iv) access for pedestrians and cyclists (including end of trip storage, toilet and shower facilities); (v) access by older people and people with disability	The proposal is not readily accessible by public transport, bicycles or pedestrian routes. The site will be accessed by authorised personnel only. The site will not be accessible to the public. The site will generate minimal operational waste. Construction waste management will be subject to detailed considerations as part of a Construction Environmental Management Plan (CEMP), to be prepared by a condition of development approval. General waste and recyclable waste will be disposed of by an authorised service provided in accordance with the Shire's requirements.
(v) the potential loss of any community service or benefit resulting from the development other than potential loss that may result from economic competition between new and existing businesses.	Post-construction, the proposal is not expected to result in the loss of any community service of benefit. The proposal does not generate undesirable economic competition between existing businesses. The proposal will support future renewable energy projects and economic investment in the region.
(x) the impact of the development on the community as a whole notwithstanding the impact of the development on particular individuals.	The proposal aligns with strategic planning policies as noted in section 4.2, and benefits the local community by: – Improving the security and reliability of the electricity supply in the Narrogin region for households and businesses; and – Contributing to the State's the transition to renewable energy sources.

5. Environmental considerations

5.1 Flora and fauna

An Ecological Site Assessment has been prepared by EcoLogical Australia (ELA). The assessment includes comprises of a reconnaissance flora and vegetation survey, basic fauna survey, and targeted black cockatoo habitat assessment.

Their assessment identified a total of 23 taxa from nine families and 18 genera across the survey area. The flora families with the greatest number of species included Poaceae with five species, Myrtaceae with six species, and Asteraceae with five species. Refer to Figure 7 which shows vegetation types as they occur across the site. ELA noted that there is no record of threatened species listed under the EPBC Act or BC Act within the survey area.

Priority tree species were found, but they were planted and not naturally occurring trees. It is noted that 23 taxa, representing 69% of the total flora recorded, were introduced (weed) species which are not listed as Weed of National Significance (WoNS) or Declared Pests under the BAM Act.

For fauna, the survey recorded a total of 14 vertebrate fauna species (with two introduced), which comprised 10 birds, 3 mammals and 1 reptile. There are no threatened species listed under the EPBC or BC Act or Priority listed species by DBCA identified. Two introduced (feral) fauna species were recorded and are listed as a Declared Pest s 22(2) under the BAM Act with a Category 3 management control level. Two fauna habitat types are within the survey area:

– Plantation (Fauna habitat 1; 0.64 ha); aligns with the vegetation types ‘Plantation (*Eucalyptus camaldulensis*)’ and ‘Plantation (*Mixed Eucalyptus spp. And Casuarina obesa*)’
– Remnant native trees (Fauna habitat 2; 0.16 ha); aligns with vegetation types’ *Corymbia calophylla* low isolated clumps of trees over mixed weeds’ and ‘Remnant *Eucalyptus camaldulensis* trees’

For the black cockatoo habitat assessment, the survey area occurs outside the modelled distribution of Baudin’s Cockatoo, therefore this species was not considered in the report. Carnaby’s Cockatoo and Forest Red-tailed Black Cockatoo were considered as having the potential to be present, since the area is within their known breeding range. However, no primary or secondary signs of either species were recorded during the field survey.



Figure 7 Site vegetation classification (Source: Ecoogical Australia)

5.2 Soils and earthworks

DPIRD (2022) soil mapping describes the soil composition as saline wet soils (Soil Group 101), grey deep sandy duplex (Soil Group 403), and deep sandy gravel (Soil Group 301). DWER (2017) identifies the site as having extremely low risk of acid sulphate soils occurring.

The proposed development will require earthworks to level the site to accommodate the faciality. The quantity of cut and fill will be confirmed at construction phase of the project. The potential impact of the proposed earthworks is degradation of surrounding agricultural soil due to construction activities such as contamination from runoff.

This risk will be considered in further detail and addressed in the construction management plan to ensure that any potential impact to surrounding agricultural soils is minimised. The overall loss of productive agricultural soil as a result of the proposed development will be 29.5 ha as determined by the facility's footprint, inclusive of futures stages two and three.

5.3 Cultural heritage

5.3.1 Aboriginal heritage

A review of the Department of Planning, Lands and Heritage's (DPLH) Aboriginal Heritage Inquiry System, and preliminary written advice from DPLH confirms that there are no registered sites of Aboriginal cultural heritage significance on the site, or the immediate surrounds.

A copy of the DPLH Aboriginal Cultural Heritage Inquiry System (CHIS) search has been included as Appendix F.

5.3.2 European heritage

A review of the Heritage Council of Western Australia's InHerit database shows that there are no sites of state or local European cultural heritage significant on the site, or the immediate surrounds.

5.4 Bushfire risk

A Bushfire Management Plan (BMP) (refer **Appendix C**) has been prepared by Western Environmental to address the requirements of SPP 3.7 and the associated guidelines (refer **Appendix C**). The proposal has also been assessed against the Country Fire Authority (CFA) Design Guidelines and Model Requirements for Renewable Energy Facilities (Version 4) (CFA Guidelines). The approach to managing bushfire risk is described in the BMP and summarised as follows:

– No native vegetation is proposed to be cleared to facilitate the application of any bushfire mitigation measures.
– All land located within 100 m of the classified vegetation depicted in Figure 4 (of the BMP) is considered bushfire prone and is subject to a Bushfire Attack Level (BAL) assessment in accordance with AS 3959:2018.
– All proposed habitable, non-habitable and renewable energy infrastructure assets will be sited in areas subject to BAL-12.5 or lower. All proposed assets within Stage 1 are sited in areas with a radiant heat flux not exceeding 10 kW/m2.
– Water tanks will be provided for firefighting purposes and will include six 50 kL firefighting water tanks, offering a total of 300 kL of water for bushfire protection of the habitable buildings and renewable energy infrastructure.
– The proposed development incorporates internal roads throughout the subject site, which each have a minimum width of 6 m. The internal roads will be designed to comply with the vehicular access technical requirements as per the Guidelines. Perimeter roads which each width of 10 m will be maintained along the eastern and southern project boundaries.
– Early evacuation of the subject site will be the primary emergency response to following during a bushfire emergency. In accordance with the CFA Guidelines, an emergency evacuation plan will be prepared prior to commencement of operations.

Figure 8 shows the BAL assessment and associated setback distances that have been calculated for the project.

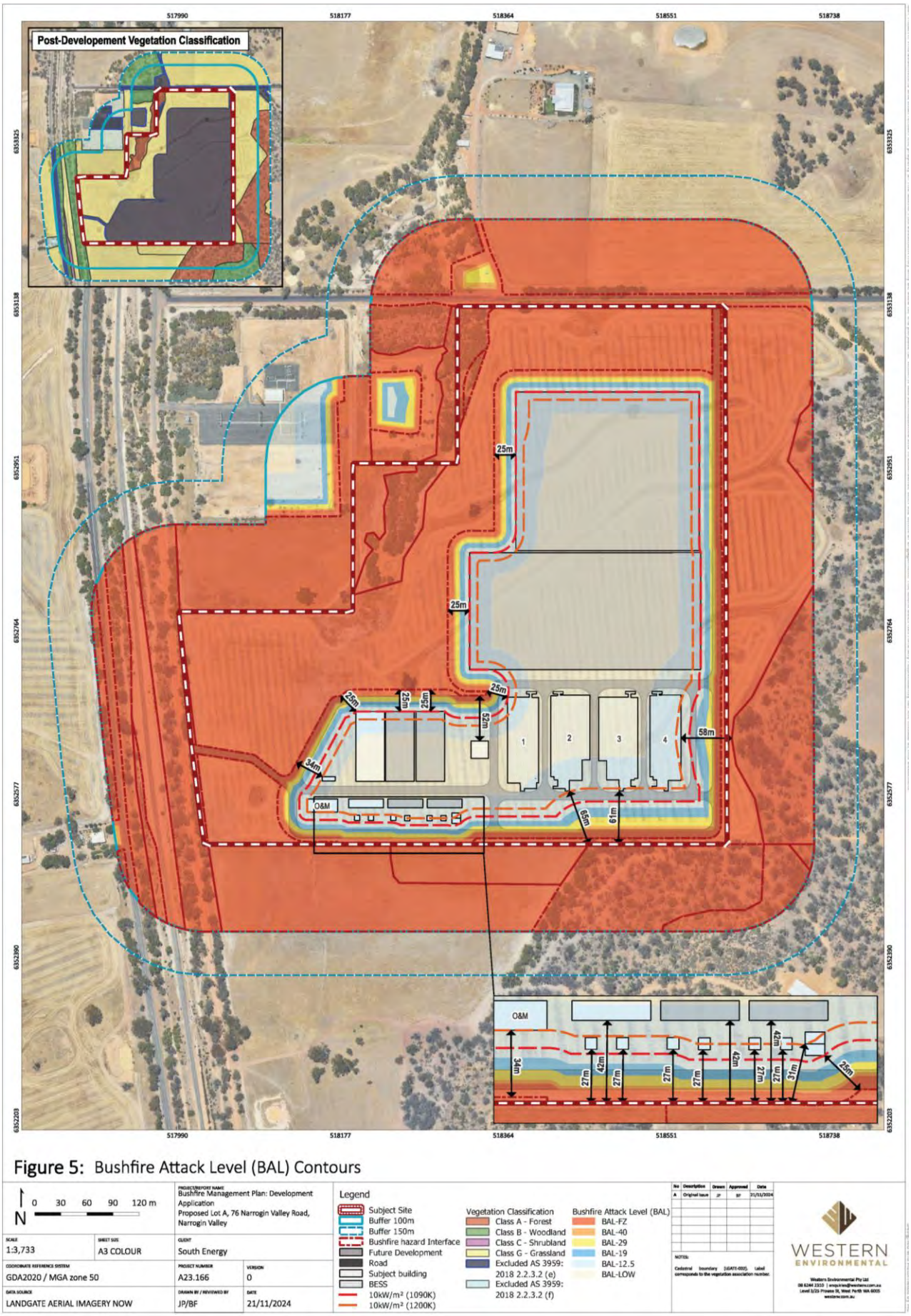

Figure 8 ***Bushfire Attack Level Contours (Source: Western Environmental)***

5.5 Acoustic impact

Project equipment, including containerised battery banks, inverters and other onsite equipment/plant such as heating/cooling systems in site buildings, have the potential to generate noise emissions. To understand the extent of these emissions and demonstrate potential to comply with the provisions of the Noise Regulations, an Acoustic Assessment has been prepared (refer **Appendix G**).

The Acoustic Assessment modelled four assessment scenarios:

- **Scenario 1:** unmitigated operation at evening peak, Sunday day, and public holiday day times
- **Scenario 2:** unmitigated operation at night, where the outside ambient temperature is at or below 30 degrees
- **Scenario 3:** operation with attenuated inverters at evening peak, Sunday day, and public holiday day times
- **Scenario 4:** operation with attenuated inverters night, where the outside ambient temperature is at or below 30 degrees

The Acoustic Assessment applied the modelling assumptions to estimate noise levels at six (6) receivers surrounding the site. A detailed description of the assumptions used to inform predicted noise levels is contained in the Acoustic Assessment.

Under the scenarios the project is the level of exceedance projected at a small number of receivers was between 1 to 5dB(A). It is noted that while the predicted noise emission levels are based on the best available information at the time of preparing the Acoustic Assessment, post-construction monitoring will provide robust indication of the level of compliance with the assigned levels.

Should operation of the Project be shown to exceed assigned levels, there are several options available to achieve compliance proposed, including:

- Installation of absorptive noise walls.
- Reduce fan speed of battery pack during hot days and night
- Fan and air intake attenuators

5.6 Hydrology assessment

A Hydrology Assessment has been prepared (refer **Appendix E**) to investigate flood risk of the proposed site. The assessment considers site characteristics including climate, topography, soil, ground water and surface water. The key findings of the assessment are summarised as follows:

- Topography of the site dictates minor overland flows travelling north-west towards Narrogin Brook.
- The project site is in an upstream portion of the Narrogin Brook catchment, resulting in no external catchments draining to the site or major streams traversing the development area.
- Maximum flood depths for the 1% Annual Exceedance Probability (AEP) event remain below 0.3 m within the project site, with higher inundation depths up to 1m towards the north-west where flows reach Narrogin Brook. Results indicate flood inundation risk within the project site is low and can be managed.
- Maximum flood velocity for the 1% AEP event is below 1 m/s across the project site, indicating scour risk is low and scour protection is likely not required for infrastructure.

In order to appropriately manage surface water on the site, a Surface Water Management Plan (SWMP) will be prepared to support detailed design and construction. The SWMP will identify approaches to:

- Design of on-site stormwater detention basins, and construction sediment control.
- Appropriate fire water or contaminated water detention, treatment and/or disposal.
- Measures to control erosions and sediment impacting downstream areas.



Figure 9 Flood depth at 1% AEP

5.7 Visual impact

Narrogin Valley is characterised by mixed remnant vegetation, broadacre farming activities and other rural commercial land uses. Infrastructure including transport networks, transmission lines, communication towers, residential dwellings, fencing and sheds are present throughout the area. The topography of the land is gently undulating. Vegetation comprises of a variety of grasses, as well as medium woodland including york gum, salmon gum, powderbark and mallet as described in the ecological site assessment.

The locality is characterised by predominantly rural cropping landscapes and fragmented remnant vegetation. Leading to the site, Booth Street has a semi-industrial character owing to several commercial properties, industrial laydowns and depots. Western Power has several existing assets in the immediate surrounds, including the Narrogin Depot, high voltage transmission lines, and Substation, which sits on the corner of Mellons Road and Narrogin Valley Road.

The proposal is not anticipated to significantly degrade the visual character of the local context. This is because the facility and associated infrastructure is low in height and setback significantly from site boundaries. The battery containers which account for most of the facility's footprint are 3 metres in height, and ancillary buildings will be single storey. The site is also not significantly elevated with respect to its surrounds and is generally screened by existing mature vegetation.

The project will be most visible from surrounding public roads including Narrogin Valley Road and Mellons Road. These roads have low traffic volume as identified in the TIA and benefit from screening of existing roadside vegetation. The BESS will also be visible from the Great Southern Highway (Primary Distributer Road with moderate traffic volume) however views will be obscured by multiple layers of remnant roadside vegetation.

Portions of the facility are expected to be visible from surrounding properties, namely No. 37 (Lot 2949) Narrogin Valley Road and No. 18522 (Lot 21) Great Southern Highway. Table 8 summarises the proposals' location in

respect to surrounding land uses within 1km radius of the project site. Distance measurements have been taken from the central area of BESS stage 1. The table shows that sensitive land uses are not expected to have direct line of site to the proposed facility due to separation distances, vegetation and topography.

Table 8 Surrounding land use

#	Description	Approximate Location	Comment
1	Residential dwelling – No. 37 (Lot 2949) Narrogin Valley Road	750 metres north of site	Direct line of site from facility moderately obscured by mature vegetation on along both sides of Narrogin Valley Road. Significant separation distance between dwelling and facility.
2	Residential dwelling – Lot 9 (No. 76) Narrogin Valley Road	450 metres east of Site	Direct line of site from facility significantly obscured by dense area of mature vegetation on western boundary of affected lot.
3	Residential dwelling – No. 18522 (Lot 21) Great Southern Highway	550 metres west of site	Direct line of site from facility moderately obscured by four rows of mature vegetation along Great Southern Highway and Booth Street.

South Energy is committed to preserving visual amenity in the local context where possible. A number of measures will be considered, including treating the battery containers with ‘pale eucalypt’ colour to blend the facility with its surrounds.

Artistic impressions of the facility are provided in **Appendix H**.

5.8 Dust and air emissions

The potential for dust emissions and associated impacts from the project are primarily a result of transport, earthworks and other construction activities. A CEMP will be prepared to support construction activities and minimise dust/air impacts. The CEMP will include standard mitigation strategies to avoid, minimise and mitigate dust emissions as reasonably required.

5.9 Waste management

Throughout the construction period, the EPC (Engineering, procurement and construction) contractor will be responsible for the appropriate deferment, sorting and disposal of construction waste. Waste management will be addressed through the projects CEMP and implementation closely monitored by South Energy.

On-going waste generation from the project, post construction, are expected to be minor and capable of disposal at the Shire’s Narrogin Waste Management Facility, located on White Road, Narrogin. This facility is licensed to handle significant volumes of liquid and solid waste, as well as Class II and III putrescible waste.

5.10 Traffic impact

A Traffic Impact Assessment (TIS) (refer **Appendix D**) has been prepared in accordance with WAPC Transport Impact Assessment Guidelines. WAPC Guidelines classify this project as having a ‘moderate’ level of transport impact as it is expected to generate fewer than 100 vehicle trips during peak hour.

5.10.1 Road hierarchy

The road hierarchy surrounding the proposal consists of:

– Primary Distributor: Great Southern Highway
– Local Distributor: Booth Street and Narrogin Valley Road
– Access Road: Mellons Road

5.10.2 Construction traffic

The TIS has been informed by the following construction traffic characteristics:

– Expected 20-month construction period (with 2 months contingency)
– A workforce of up to 100 persons on-site (approximate) during the peak construction period
– Construction up to 7 days a week on a 7 am to 7 pm staggered shift arrangement
– Expected minimum on-site parking for 40 light vehicles to accommodate the construction workforce
– Up to 30 truck movements at the site are expected per day (one-way) at peak construction
– Remaining portions of the construction workforce to arrive at the site via 10-seat bus/coach operated from the town of Narrogin. Bus service frequency is expected to reach approximately 15 one-way trips per day during peak construction
– Delivery vehicles used to transport large and heavy equipment will mostly be semi-trailers with the occasional B-Double

The proponent will engage with Main Roads Western Australia (MRWA) regarding permit requirements for any construction movement via high wide load (HWL) or over size over mass (OSOM) vehicles.

Project components are expected to arrive via the Fremantle Port. The majority of the construction workforce is expected to be accommodated in the Shire of Narrogin and surrounding local government areas during works.

Similar construction characteristics are expected for subsequent project stages.

5.10.3 Operational traffic

The TIS has been informed by the following operational traffic characteristics:

– The project is forecasted to generate up to 8 vehicles per day (four in, four out).
– Occasional additional vehicles will access the site for maintenance services.

Forecasted traffic volumes during the operation of the BESS are minor and are significantly below the maximum capacity of the surrounding road network. No upgrades to the surrounding road network are required to support the project.

5.10.4 Site access and intersections

The TIS considered the ability for large vehicles to traverse key intersections along Booth Street and Narrogin Valley Road. Swept path modelling based on 19 metre semi-trailer and B-Double vehicles was undertaken.

At the Great Southern Highway, Condon Road and Booth Street intersection, it was identified that both types of vehicles may have some difficulty in turning lanes. Similarly, at the Booth Street and Narrogin Valley Road B-Double Vehicles would also have difficulty in turning lane.

The TIS notes that to resolve these intersection difficulties, road widening could be considered. However, due to the low frequency of large vehicles during construction phase the TIS recommends that traffic management measured are to be used instead. Traffic management is to be further detailed through the preparation of a Traffic Management Plan.

5.10.5 Vehicle parking

Parking for all light vehicles is proposed in close proximity to the operations and maintenance facility. Car parking will consist of 13 bays and will be designed in accordance with Australian Standard 2890.1- 2004 Parking Facilities - Off-street car parking (AS2890.1).

6. Stakeholder Engagement

South Energy has undertaken extensive community and stakeholder engagement as the project has developed. Engagement activities undertaken are described in Table 9 below.

Community and stakeholder engagement was designed to encourage feedback, understand the Narrogin community's context and facilitate the creation of positive long-term relationships. South Energy's engagement practices acknowledge the importance of having a local presence where possible, enabling multiple opportunities to connect to community. It should be recognised that the project is in early development and further engagement with community stakeholders will occur through to construction of the project. As a potential major employer of the Narrogin region, South Energy intends to build lasting relationships with the Narrogin community well into the operation of the project.

On 14 November 2024, South Energy carried out a community drop-in session at the John Higgins Centre in Narrogin to get feedback on the design of the project. During the drop-in session, a range of project information was presented inclusive of the site map, artistic impressions, project timeline, environmental studies and approval information. The drop-in session allowed the community to provide feedback, ask questions and clarify areas of interest. The session was attended by members of the public and industry representatives.

Feedback from the session related to matters including the proposed design, the site layout, noise impact, infrastructure services, road, air quality, traffic, fire mitigation, impact on agricultural land, and local employment during both the construction and operational phases.

South Energy also contacted residents in a ~2km radius around the site individually to discuss the Proposal. The South Energy team left a FAQ sheet and letter (the letter included project details and the project manager's contact to call and discuss any comments) in the mailbox for those who were not at their homes during the tour. South Energy will continue to be engaged as the project progresses.

South Energy also presented to the Shire of Narrogin on several occasions, including for a formal meeting with the Elected Members on 13 November 2024. Feedback from the Shire has been positive. Individual engagement with a range of other interested stakeholders has occurred as outlined in Table 17.

Feedback from these engagements has been considered during the Proposals development phase.

Table 9 Major Stakeholder Engagement Activities

Stakeholder	Summary of Engagement
Department of Planning Lands and Heritage	South Energy has been engaging with DPLH since 2023 regarding the project generally and the subdivision application for the site.
Shire of Narrogin	South Energy also presented to the Shire of Narrogin on several occasions, including for a formal meeting with the Elected Members on 13 November 2024. Feedback from the Shire has been positive.
Western Power	South Energy has been in ongoing engagement with Western Power. The project is now under Western Power's Critical Project Framework Assessment process.
Surrounding Residents	Surrounding residents contacted remotely on several occasions during project concept development. South Energy attended properties in a ~2km radius on 14 November 2024 for a non-formal discussion to collect early thoughts. Feedback was positive. South Energy team left a FAQ sheet and letter for those who were not at their homes.
Narrogin Community	Community drop-in session at the John Higgins Centre held on 14 November 2024. Approximately 15 attendees including members of the public and industry representatives. Feedback related to matters including project design, layout, noise impact, infrastructure services, road, air quality, traffic, fire mitigation, agricultural land and local employment.

Stakeholder	Summary of Engagement
Department of Fire and Emergency Services	South Energy engaged with the Assistant Director Land Use Planning Rural Fire Division at DFES in August 2024. The engagement provided an opportunity to introduce the project and discuss the proposed bushfire management approach.
Energy Policy WA, Department of Energy, Mines, Industry Regulation and Safety	South Energy engaged with the Coordinator of Energy at Energy Policy WA (EPWA). EPWA provided in principal support for the project and acknowledged the valuable contribution BESS facilities can provide as the SWIS transitions to a decarbonised electricity supply. A copy of correspondence from EPWA is provided in Appendix K.

7. Summary

South Energy proposes the installation of a Narrogin Battery Energy Storage System with this report and the accompanying information provide rational in support of the project.

The BESS, located at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley, comprises the installation of one 200MW / 800MWh BESS and supporting infrastructure. The operating principle of this BESS is to receive power from the grid, store this as potential energy and release it back to the network when it is needed, improving grid stability and reliability.

The facility may be expended in the future, with potential for two subsequent stages each comprising of 200MW / 800MWh BESS facilities.

The project results in a minimal impact on the amenity of the rural locality and is consistent with State and local planning strategies and policies. The project will improve power reliability in the SWIS, support future renewable energy projects in the region and contributes strongly to objectives of State government policies, including the Energy Transformation Strategy and the Wheatbelt Regional Planning and Infrastructure Framework.

8. References

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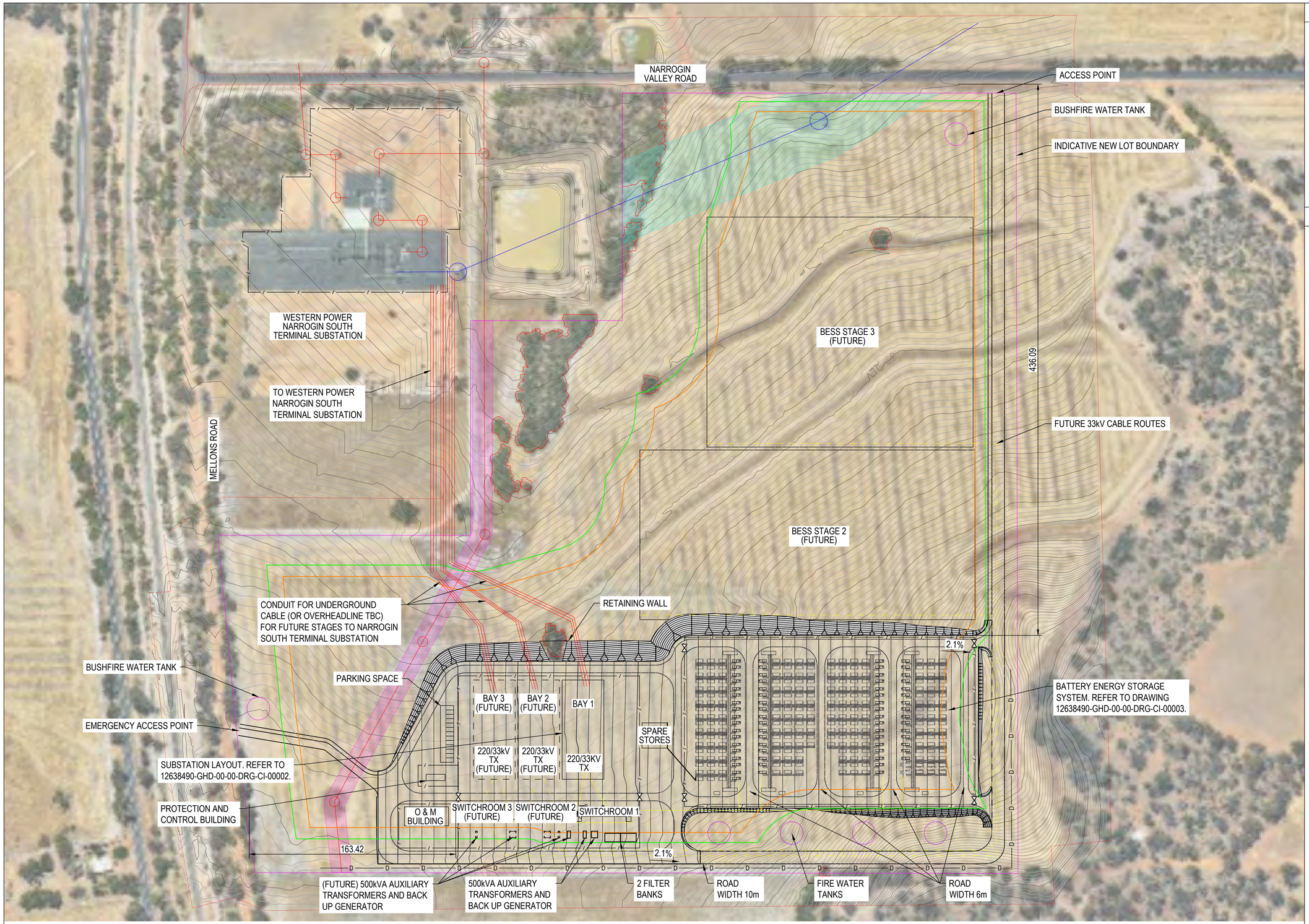
Appendices

Appendix A

Development Plans



OVERALL LAYOUT

SCALE 1 : 1500

NOTES

1. ALL COORDINATES ARE LOCATED IN MGA2020 ZONE 50.
2. IMAGE SUPPLIED VIA LANDGATE SLIP V5 AND IS NOT TO SCALE, SHOWN FOR VISUAL GUIDE ONLY.
3. CONNECTION ARRANGEMENT AND POINT OF CONNECTION AT NARROGIN TERMINAL SOUTH SUBSTATION.
4. NUMBER AND SIZE OD WATER TANKS TO BE CONFIRMED WITH BUSHFIRE CONSULTANTS. THE PROPOSED DEVELOPMENT DESIGN INCLUDES PROVISIONS FOR SIX (6) 50,000 L.
5. ACCESS ROAD DESIGN TO BE CONFIRMED WITH PROGRESS OF DETAIL DESIGN.
6. DESIGN CONTOURS AND BATTER INDICATIVE ONLY, DETAILED DESIGN YET TO BE CONDUCTED.

LEGEND

- 10kW/m' (1090K) ASSET PROTECTION ZONE BESS AND OTHER INFRASTRUCTURE
- 10kW/m2 (1200K) ASSET PROTECTION ZONE HABITABLE BUILDINGS
- 220kV OHL EASEMENT
- 66kV OHL EASEMENT
- VEGETATION
- EXCAVATION - FILL
- EXCAVATION - CUT
- 66kV POLES
- 220kV POLES
- FIRE WATER TANKS
- BUSHFIRE WATER TANKS
- EXISTING CONTOURS
- DESIGN CONTOURS
- EXISTING 66kV OVERHEAD LINE
- EXISTING 220kV OVERHEAD LINE
- INDICATIVE DRAINAGE LINE
- INDICATIVE FENCE LINE
- DEVELOPMENT APPLICATION SITE AREA
- 33kV CABLE ROUTES
- 220kV LINE
- GATE
- POWER CONVERSION SYSTEM (BATTERY INVERTER, TRANSFORMER AND SWITCHGEAR).
- BATTERY CONTAINER (BATTERY RACKS AND COOLING SYSTEM).

THIS DRAWING INCLUDES COLOURED INFORMATION
COPIES OF THIS DRAWING MUST BE PRODUCED IN COLOUR

PRELIMINARY NOT TO BE USED FOR CONSTRUCTION

Rev	Description		Checked	Approved	Date
P01	CONCEPT DESIGN		MW	HS	06.12.24

Author J. BABOR **Drafting Check** M. WOOTTEN
Designer E. SALTER **Design Check** D. HOY

0 15 30 45 60 75m
SCALE 1:1500 AT ORIGINAL SIZE

N

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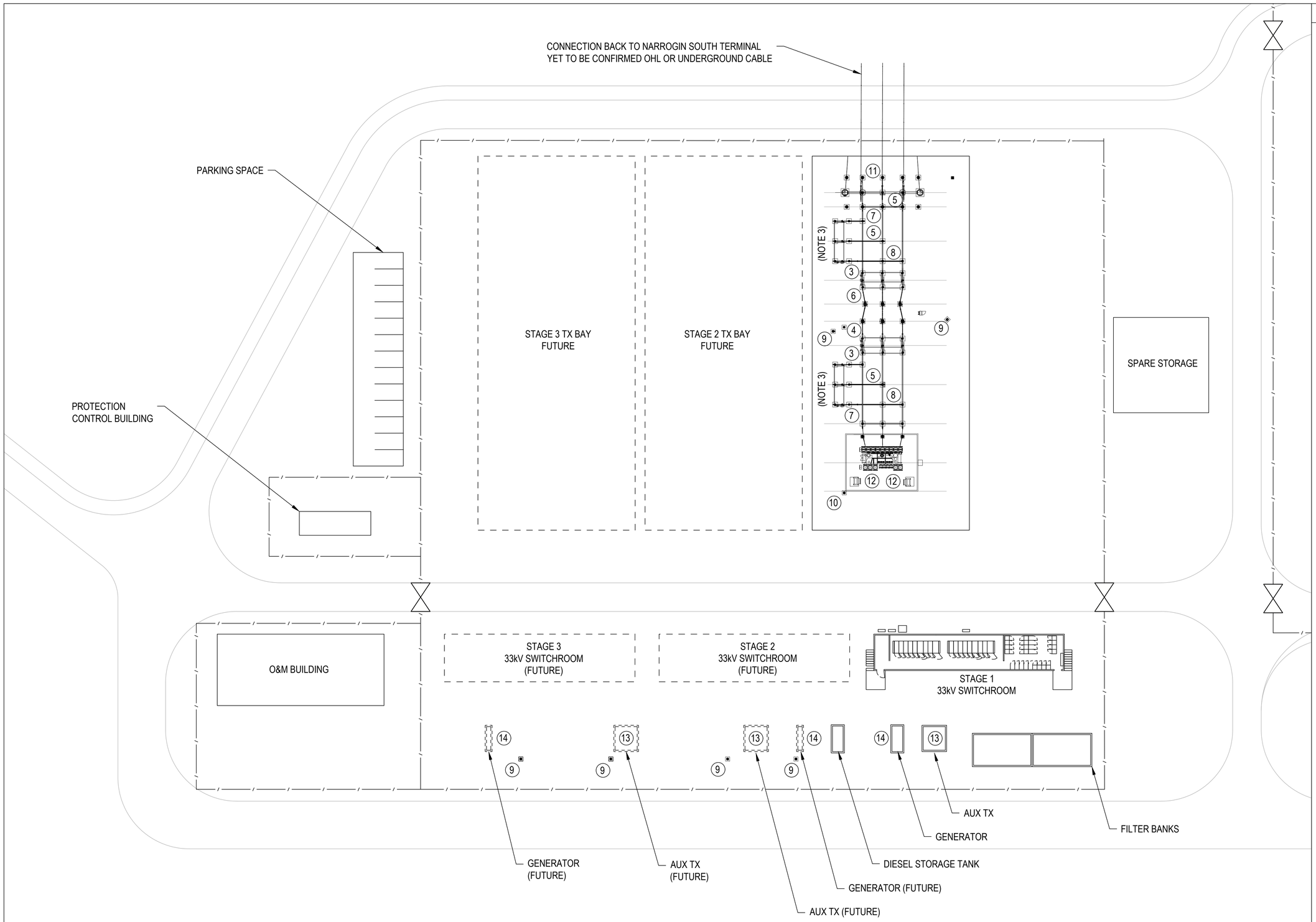
Project No. 12638490

Client NARROGIN BESS DEVELOPMENT PTY LTD
Project NARROGIN BESS
Status CONCEPT DESIGN

Drawing Title NARROGIN BESS CONCEPT DESIGN OVERALL LAYOUT PLAN
Size A1
Drawing No. 12638490-GHD-00-00-DRG-CI-00001
Rev P01

Plot Date: 6 December 2024 - 11:51 AM Plotted by: Johann Fleur Babor
File Name: C:\Users\jbabor\OneDrive - GHD\Desktop\2024 Projects\12638490 - South Energy Narrogin BESS\DRAWINGS\12638490-GHD-00-00-DRG-CI-00001.dwg



SUBSTATION LAYOUT PLAN

SCALE 1 : 400

NOTES

1. BOUNDARY FENCE TO BE 2.5m MINIMUM HIGH.
2. LOCATION OF SECURITY HUT, WORKSHOP, SPARES STORAGE, DRAINAGE SUMPS, FIRE FIGHTING (IF REQUIRED) YET TO BE CONFIRMED.
3. STAGING OF BUS CONNECTION FOR FUTURE STAGES TBC.

EQUIPMENT LIST	
ITEM	EQUIPMENT
1	220/33kV TRANSFORMER 250 MVA
2	220kV DISCONNECTOR 1ES HIGH
3	220kV DISCONNECTOR
4	220kV CURRENT TRANSFORMER
5	220kV VOLTAGE TRANSFORMER LOW LEVEL
6	220kV CIRCUIT BREAKER
7	BUS SUPPORT HIGH
8	BUS SUPPORT LOW
9	LIGHTING WITH LIGHTNING MAST
10	LIGHTNING MAST
11	220kV SURGE ARRESTOR
12	EARTHING TRANSFORMER
13	AUX TX REQUIRED FOR EACH STAGE APPROX. 500kVA
14	BACK UP GENERATOR

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FOR CONSTRUCTION

Rev	Description	Checked	Approved	Date
P01	CONCEPT DESIGN	MW	DH	06.12.24

Author J. BABOR **Drafting Check** M. WOOTTEN
Designer E. SALTER **Design Check** K. KIRBY

0 4 8 12 16 20m
SCALE 1:400 AT ORIGINAL SIZE

N

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Project No. 12638490

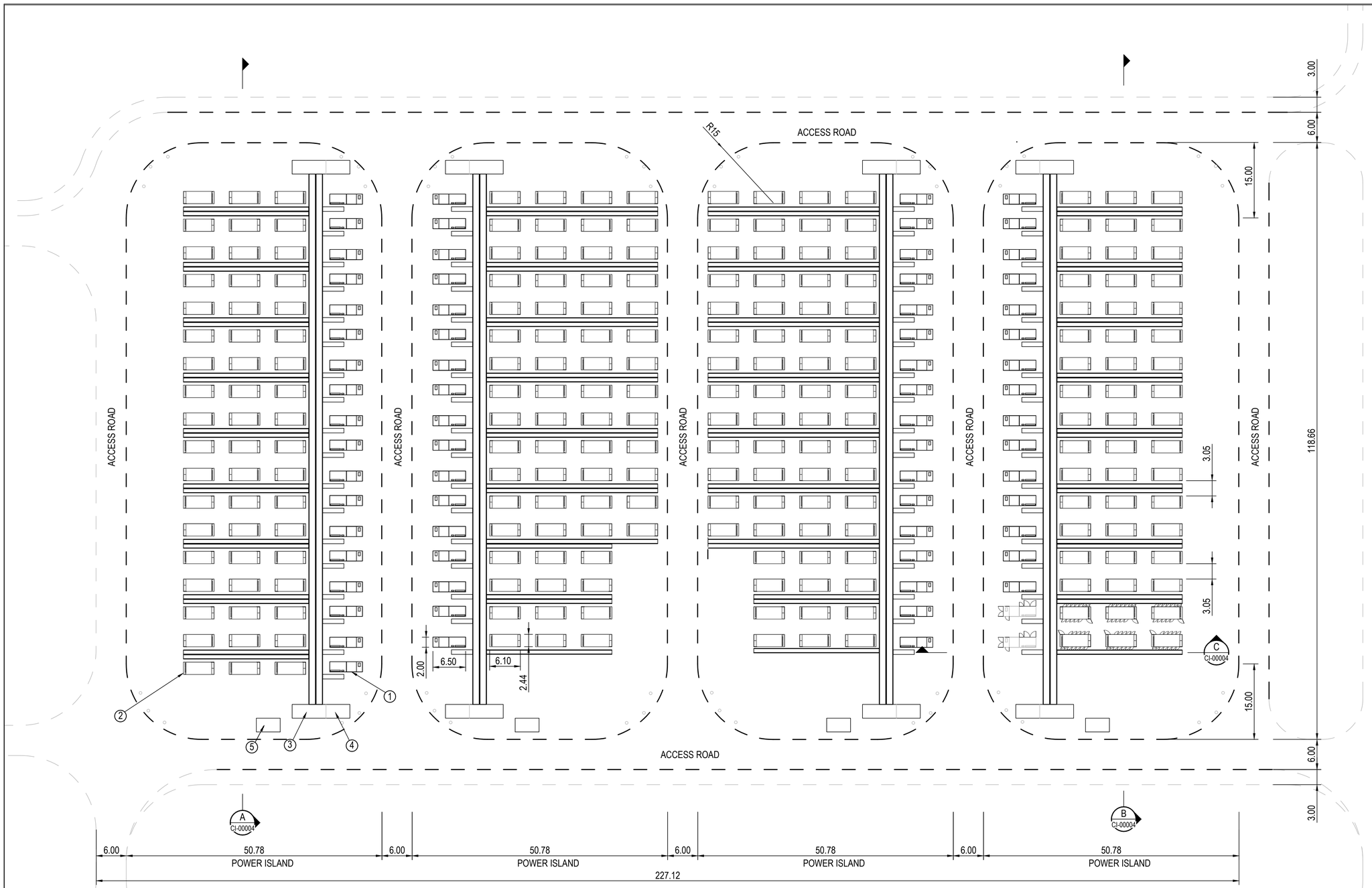
Client NARROGIN BESS DEVELOPMENT PTY LTD
Project NARROGIN BESS
Status CONCEPT DESIGN

Drawing Title NARROGIN BESS CONCEPT DESIGN
SUBSTATION LAYOUT PLAN

Size A1
Drawing No. 12638490-GHD-00-00-DRG-CI-00002
Rev P01

Plot Date: 6 December 2024 - 11:38 AM Plotted by: Johann Fleur Babor

File Name: C:\Users\jbabor\OneDrive - GHD\Desktop\2024 Projects\12638490 - South Energy Narrogin BESS\DRAWINGS\12638490-GHD-00-00-DRG-CI-00002.dwg



BATTERY ENERGY
STORAGE LAYOUT PLAN
SCALE 1 : 500

NOTES

1. BENCHES TO BE INSTALLED 600mm ABOVE V100YEAR ARI. ALL WORKS TO BE DESIGNED AND INSTALLED SUCH THAT OPERATIONAL NOISE IS LIMITED 100dB AT 1m.
2. NO PROVISION FOR FIREWATER OR CONTAMINATED FIREWATER STORAGE.
3. MV VOLTAGE TO BE 33kV.
4. POWER AND ENERGY CAPACITY SIZED BY WARTZILA.
5. REQUIREMENT AND DETAIL FOR STAND ALONE AUXILIARY SKIDS, RMU AND EMERGENCY GENERATORS TO BE CONFIRMED IN DETAILED DESIGN.
6. DOOR CLEARANCES SHOWN ON UNITS IN THE SOUTH EAST ARE TYPICAL OF ALL ENCLOSURES.

DATA TABLE (TOTAL BESS)		
POWER CAPACITY AT POC	223	MW
ENERGY CAPACITY AT POC	844	MWh
NO. OF PCS/INVERTERS	69	
TOTAL NUMBER OF BATTERIES	233	
BATTERY C-RATE	0.26	
NAMEPLATE POWER CAPACITY	289.8	MVA
NAMEPLATE ENERGY CAPACITY	949.0	MWh

DATA TABLE: TYPICAL 3 1 POWER ISLAND (43 IN TOTAL)		
POWER CAPACITY AT POC	3.2	MW
ENERGY CAPACITY AT POC	9.9	MWh
NO. OF PCS/INVERTERS	1.0	
TOTAL NUMBER OF BATTERIES	3.0	
NAMEPLATE POWER CAPACITY	4.2	MVA
NAMEPLATE ENERGY CAPACITY	12.2	MWh

DATA TABLE: TYPICAL 4 1 POWER ISLAND (26 IN TOTAL)		
POWER CAPACITY AT POC	3.2	MW
ENERGY CAPACITY AT POC	13.2	MWh
NO. OF PCS/INVERTERS	1.0	
TOTAL NUMBER OF BATTERIES	4.0	
NAMEPLATE POWER CAPACITY	4.2	MVA
NAMEPLATE ENERGY CAPACITY	16.3	MWh

ITEM	EQUIPMENT LIST	QTY
1	POWER ELECTRONICS PCSM	69
2	WARTSILA QUANTUM 2 BATTERY	233
3	33kV RMU (NOTE 5)	8
4	1100kVA 33/0.415kV AUXILLARY SKIDS (NOTE 5)	8
5	2400kV EMERGENCY GENERATOR (NOTE 5)	4

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Rev	Description		Checked	Approved	Date
P01	CONCEPT DESIGN		MW	DH	06.12.24

Author J. BABOR **Drafting Check** M. WOOTTEN
Designer E. SALTER **Design Check** D. HOY

0 5 10 15 20 25m
SCALE 1:500 AT ORIGINAL SIZE

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Project No. 12638490

Client SOUTH ENERGY PTY LTD
Project NARROGIN BESS
Status CONCEPT DESIGN

Drawing Title NARROGIN BESS CONCEPT DESIGN
BATTERY ENERGY STORAGE SYSTEM
LAYOUT PLAN

Size A1

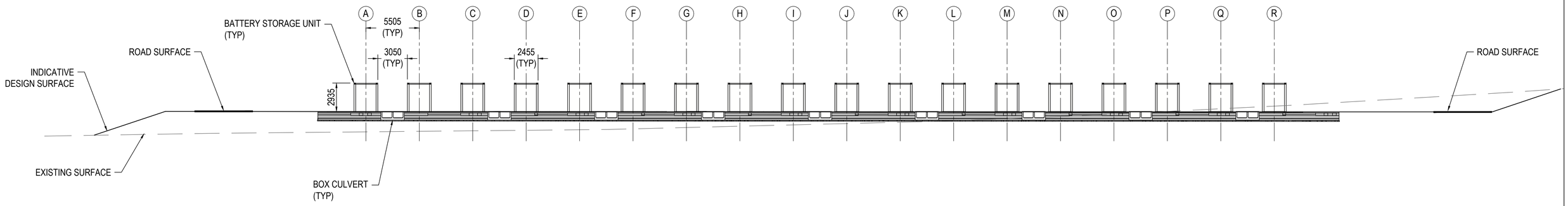
Drawing No. 12638490-GHD-00-00-DRG-CI-00003 P01

Plot Date: 6 December 2024 - 11:57 AM Plotted by: Johann Fleur Babor

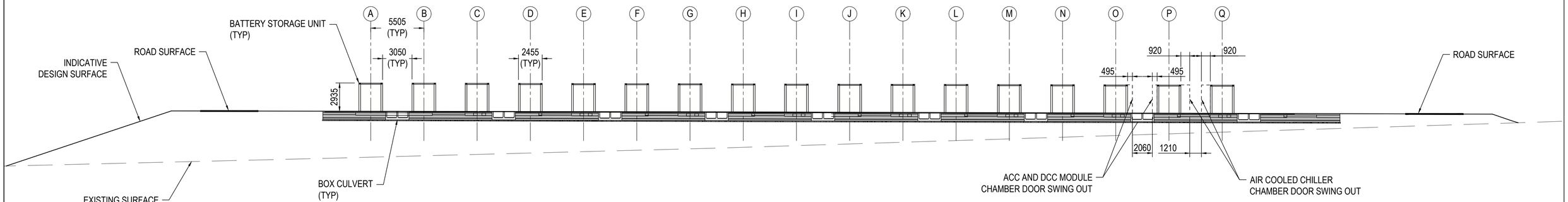
File Name: C:\Users\jbabor\OneDrive - GHD\Desktop\2024 Projects\12638490 - South Energy Narrogin BESS\DRAWINGS\12238490-GHD-00-00-DRG-CI-00003.dwg

NOTE:

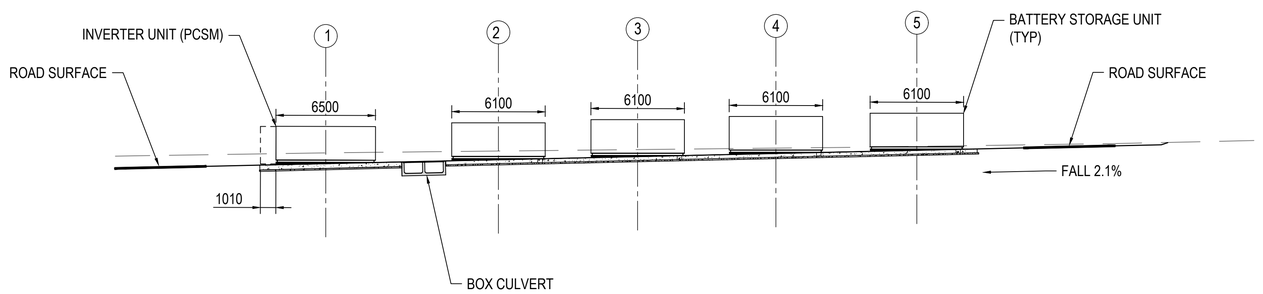
1. INDICATIVE ONLY, CIVIL DESIGN NOT COMPLETED.



SECTION A
SCALE 1 : 200
CI-00003



SECTION B
SCALE 1 : 200
CI-00003



SECTION C
SCALE 1 : 200
CI-00003

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FOR CONSTRUCTION

Rev	Description	Checked	Approved	Date
P01	CONCEPT DESIGN	MW	DH	06.12.24

Author J. BABOR **Drafting Check** M. WOOTTEN
Designer E. SALTER **Design Check** D. HOY

0 2000 4000 6000 8000 10000mm
SCALE 1:200 AT ORIGINAL SIZE

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Project No. 12638490

Client NARROGIN BESS DEVELOPMENT PTY LTD
Project NARROGIN BESS
Status CONCEPT DESIGN

Drawing Title NARROGIN BESS CONCEPT DESIGN TYPICAL SECTIONS
Size A1
Drawing No. 12638490-GHD-00-00-DRG-CI-00004 P01

Plot Date: 6 December 2024 - 11:56 AM Plotted by: Johann Fleur Babor

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Appendix B

Development Application Forms

APPLICATION FOR PLANNING CONSENT

(FDRS005)

Shire of Narrogin
Love the life

89 Earl Street
PO Box 1145
Narrogin WA 6312

(08) 9890 0900

www.narrogin.wa.gov.au
enquiries@narrogin.wa.gov.au

CASHIER HOURS:
8:30am – 4:30pm
MONDAY- FRIDAY

FORMER TOWN OF NARROGIN – TOWN PLANNING SCHEME NO.2
FORMER SHIRE OF NARROGIN – LOCAL PLANNING SCHEME NO.2

Name of Applicant	Hide Shigeyoshi
ABN (If Applicable)	39 008 488 373
Correspondence Address	Level 10, 999 Hay Street, Perth 6000
Applicant Phone Number	+61 8 6222 8289
Applicant Email	hide.shigeyoshi@ghd.com

If Applicant and Owner are different:

Name of Owner	Roy Kenneth John Mcleod
ABN (If Applicable)	
Correspondence Address	76, Narrogin Valley Road, Narrogin Valley WA, 6312 (PO Box 184 Narrogin)
Owner Phone Number	0428366146
Owner Email	cranelines@bigpond.com

I hereby apply for planning consent to:

1. Use the land described hereunder for the purpose of Use not listed (Battery Energy Storage System (BESS))
   and/or
2. Erect, alter or carry out development on land described hereunder in accordance with the accompanying plans.

Existing use of land	Rural
Approximate cost of proposed development	$ 400,000,000.00 AUD
Estimated time of completion	Q1 2027
No of persons to be housed / employed after completion	<20 persons

TITLES OFFICE DESCRIPTION OF LAND

LOCALITY PLAN

Lot No	9	House No	76	Street Name	Narrogin Valley Road				
Suburb	Narrogin		Nearest Street Intersection		Narrogin Valley Road/Booth Street				
Location No	9	Plan or Diagram	D067821	Certificate of Title	1702/85	Volume:	1702	Folio:	85
Title Encumbrances (e.g. Easements, Restrictive Covenants)	Refer Certificate of Title								

LOT DIMENSIONS

Site area	687,474.00	Square metres
Frontage	960.00	Metres
Depth	590.00	Metres

ADVERTISING

The information and plans provided with this application may need to be made available by the local government for public viewing in connection with the application. Do you consent to this?

YES ☑ NO ☐

AUTHORITY

Applicant's Signature ..... Date 26.11.24

NOTE: ALL OWNERS OF THE PROPERTY MUST SIGN THIS APPLICATION FORM. WHERE PROPERTY IS OWNED BY A COMPANY, AT LEAST TWO DIRECTORS OF THE COMPANY MUST SIGN THE APPLICATION.

NOTE: WHERE THE APPLICANT IS NOT THE OWNER, THE OWNER'S SIGNATURE IS REQUIRED.

Owner's Signature ..... Date 25.11.24

NOTE: THIS FORM IS TO BE SUBMITTED TOGETHER WITH COPIES OF PLANS, COMPRISING THE INFORMATION SPECIFIED IN THE PARTICULARS REQUIRED WITH THE APPLICATION OUTLINED BELOW. ADDITIONAL INFORMATION MAY BE REQUIRED AT A LATER STAGE.

NOTE: THE DEVELOPMENT APPLICATION MUST BE ACCOMPANIED WITH THE CORRECT PLANNING FEES (SEE CURRENT SCHEDULE OF FEES)

THIS IS NOT AN APPLICATION FOR A BUILDING LICENCE

PARTICULARS REQUIRED WITH APPLICATION FOR PLANNING CONSENT

Where an application involves the erection or alteration of a building or a change in levels of a site, the plans accompanying an application for planning consent shall, unless especially exempt by the Shire:

a. Indicate the position and describe the existing buildings and improvements on the site and indicate those which are to be removed;
b. Indicate the position (SITE PLAN, FLOOR PLAN AND ELEVATIONS) and describe the buildings and improvements proposed to be constructed, their appearance, height and proposed uses in relation to existing and proposed contours;
c. Indicate the position, type and height of all the existing trees on the site and indicate those to be retained and those to be removed:

DAP FORM 1

Notice of Development Application to be Determined by a Development Assessment Panel

Planning and Development Act 2005
Planning and Development (Development Assessment Panel) Regulations 2011 – regulations 6, 7, 10 and 21

Application Details

To	*Name of local government and Western Australian Planning Commission (if applicable)* Shire of Narrogin	
Planning Scheme(s)	*Name of planning scheme(s) that applies to the prescribed land* Shire of Narrogin Scheme No. 3	
Land	*Lot number, street name, town/suburb* Lot 9 (No. 76) Narrogin Valley Road, NARROGIN VALLEY 6312	
Certificate of Title (provide copy)	*Volume Number* 1702	*Folio* 85
	Location Number 9	*Plan / Diagram Number* D067821
Details of development application made to responsible authority	*Summary of Proposal* Battery Energy Storage System (BESS)	
Development Use	*Residential / Commercial / Industrial / Rural / Mixed Use /Community Housing/ Other* Use Not Listed (BESS)	
Estimated cost of development (GST Exc)	$ 400,000,000.00 AUD	

Part A – Acknowledgement by Applicant and Landowner

DAP Application	☒ I give notice that I have elected to have the development application that accompanies this form determined by a Development Assessment Panel *(regulation 6 & 7)*
Delegated Application	☐ I give notice that I understand that this is an application of a class delegated to a Development Assessment Panel for determination *(regulation 19)*
Community Housing	☐ I give notice that I understand that this application is or includes community housing and have elected to have the development application that accompanies this form determined by a Development Assessment Panel (regulation 6 & 7)

Community Housing Provider	
Provider's Name	
Contact Details	
DAP Community Housing Provider Register Reference	

Applicant Details (to be completed and signed by applicant)

- By completing this notice, I declare that all the information provided in this application is true and correct.
- I understand that the information provided in this notice, and attached forming part of the development application will be made available to the public on the Development Assessment Panel and local government websites.

Name/Company	GHD	
Contact Person	Hide Shigeyoshi	
Address	*Street Number/PO Box number, street name, suburb, state, postcode* Level 10, 999 Hay Street, Perth 6000	
Contact Details	*Email* hide.shigeyoshi@ghd.com	*Phone* +61 8 6222 8289
Signature		*Date* 26.11.24

Please note: unless otherwise requested, the DAP Secretariat will contact you via your nominated email address provided above.

Landowner Details (to be completed and signed if landowner is different from applicant)

- By completing this notice, consent is provided to submitting this application.
- If there are more than two landowners, please provide all relevant information on a separate page.
- Signatures must be provided by **all registered proprietors or by an authorised agent** as shown on the Certificate of Title.
- Alternatively, a letter of consent, which is signed by all registered proprietors or by the authorised agent, can be provided.
- Companies, apart from sole directors, are required to provide signatories for **two directors, a director and the company seal or a director and a company secretary**.
- Please note, any Certificate of Title provided MUST be within 6 month validity.

Company (if applicable)		
ACN/ABN (if applicable)		
Contact Details	*Email* cranelines@bigpond.com	*Phone* 0428 366 146
Address	*Street Number/PO Box number, street name, suburb, state, postcode* 76, Narrogin Valley Road, Narrogin, WA, 6312 (PO Box - 184 Narrogin)	
Name/s	Roy McLeod	
Title/s	*Landowner/Sole Director/Director* (2 signatures required)	*Additional Landowner/ Director/Secretary* (if applicable)
Signature/s		
Date	25.11.24	

Appendix C

Bushfire Management Plan

WESTERN
ENVIRONMENTAL

Bushfire Management Plan

Development Application: Narrogin
Battery Energy Storage System

Western Environmental Pty Ltd
(08) 6162 8980
PO Box 437, Leederville, WA 6903
enquiries@westenv.com.au
westenv.com.au

Bushfire Management Plan

Development Application: Narrogin
Battery Energy Storage System

Report No:
A23.166-RPT-BMP-BESS_0_FINAL
Issue Date:
29-Nov-2024
Status
FINAL

Prepared for:
South Energy
Level 27, 150 Lonsdale Street
Melbourne VIC 3000

Prepared by
Western Environmental Approvals Pty Ltd
Unit 5, 162 Colin Street
West Perth WA 6005
westenv.com.au

Internal Review

Author	Reviewed by	Approved by
		
Bridie Farrar Bushfire Consultant	**Daniel Panickar** Senior Principal (BPAD L3 -37802)	**Daniel Panickar** Senior Principal (BPAD L3 -37802)
29-Nov-2024	**22-Nov-2024**	**22-Nov-2024**

Distribution Record

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1. Introduction

1.1 Proposal Details

South Energy, on behalf of Narrogin BESS Development Pty Ltd is seeking to progress a Development Application (DA) for Proposed Lot A, 76 Narrogin Valley Road, Narrogin (hereafter referred to as the subject site, Figure 1). A subdivision application has been lodged for 76 Narrogin Valley Road (Lodgement ID: 2024-228946), for which Western Environmental Approvals Pty Ltd (WEPL) previously prepared a Bushfire Management Plan (BMP; WEPL, 2024). This BMP included bushfire mitigation measures to support a two-lot subdivision, resulting in the creation of Proposed Lot A, in the west of the property, and proposed Lot B in the east of the property. The proposed development will result in an intensification of land use on Proposed Lot A, the subject site, and involves the development of a Battery Energy Storage System (200 MW and 800 MW) facility, a substation control building, an operations and maintenance shed, as well as a laydown and facilities area (Figure 2). The BESS is proposed to connect to an existing Western power substation on the northwestern adjacent land parcel at Lot 8 (No. 153) Booth Street, Narrogin.

The subject site is within a designated bushfire prone area as per the *Western Australia State Map of Bush Fire Prone Areas* (DFES, 2024; Figure 3), which triggers bushfire planning requirements under *State Planning Policy 3.7 Bushfire* (SPP 3.7; WAPC, 2024a) and reporting to accompany submission of the DA in accordance with the associated *Planning for Bushfire Guidelines* (the Guidelines; WAPC, 2024b).

WEPL was commissioned to prepare a BMP to support the DA. This BMP has been prepared by Bushfire Consultant Bridie Farrar and Senior Principal Bushfire Consultant Daniel Panickar (FPAA BPAD Level 3 Certified Practitioner No. BPAD37802). Development at the subject site will be completed in three stages. This BMP pertains to assets which are proposed to be constructed during Stage 1 of the development given the detail of future stages (Stages 2 and 3) had not yet been determined at the time of preparing the BMP.

The building footprints for Stages 2 and 3 have been included in the site plan (Figure 2) and the potential for these assets to be appropriately sited within the subject site has been broadly considered in this BMP. WEPL understands that the DA is to be lodged to cover all three stages of the proposed development and may seek conditional development approval of Stages 2 and 3 on the basis that bushfire planning be undertaken for these Stages in future. Each of these two potential subsequent expansion stages will comprise 200 MW and 800 MW BESS structures. Stages 2 and 3 will require a new BMP or a BMP addendum in order to appropriately assess the proposed assets against the bushfire protection criteria set out in the Guidelines.

1.1.1 Site context

The subject site is located within Shire of Narrogin and is zoned Rural under the Shire of Narrogin Local Planning Scheme No. 3. The subject site contains a mixture of unmanaged, classifiable vegetation as well as cleared areas. The subject site is bound by:

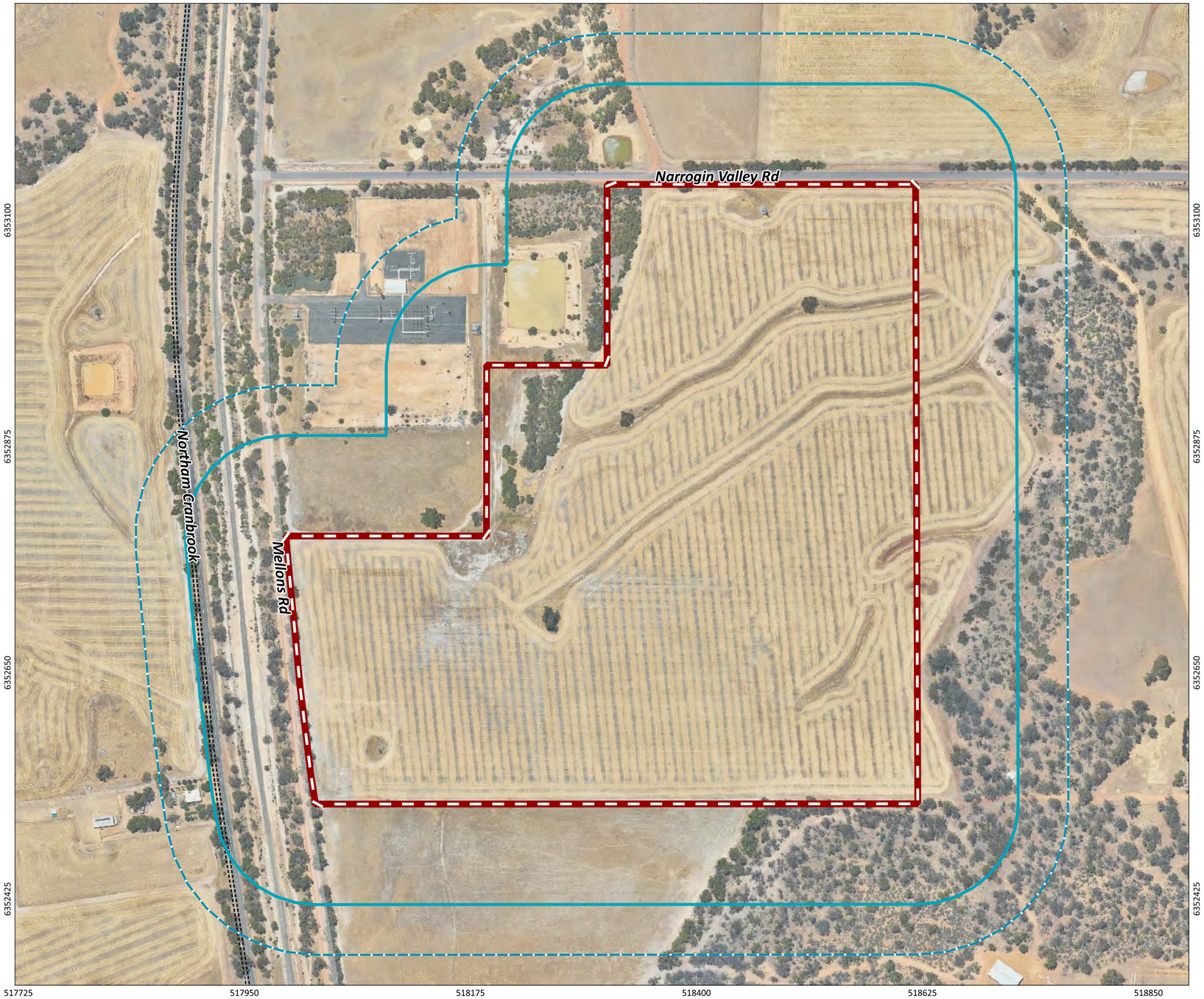
- Narrogin Valley Road and rural lots to the north

- Rural lots to the east and south
- Mellons Road, a train line and Great Southern Highway to the west.

1.2 Purpose and Application of the BMP

This BMP has been prepared in accordance with SPP 3.7 and the Guidelines to support the assessment of the DA for the subject site submitted to the Shire of Narrogin.

In addition, this BMP provides strategies and guidance to reduce the level of bushfire risk exposure for the subject site through implementation of a range of bushfire management measures in accordance with the Guidelines.





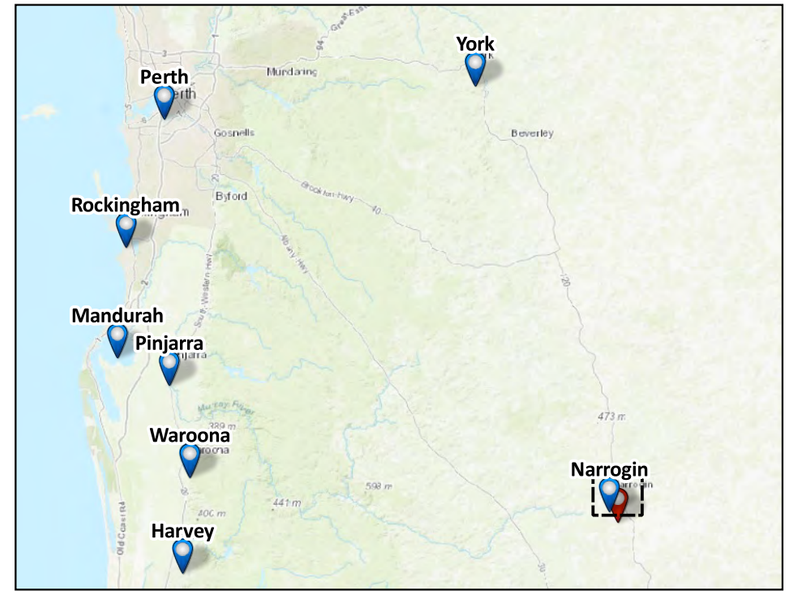


Figure 1: Site Overview

N

0 60 120 180 240 m

SCALE	1:4,495
SHEET SIZE	A3 COLOUR
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
DATA SOURCE	LANDGATE AERIAL IMAGERY NOW

PROJECT/REPORT NAME

Bushfire Management Plan: Development Application
Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley

CLIENT: South Energy

PROJECT NUMBER	VERSION
A23.166	0

DRAWN BY / REVIEWED BY	DATE
JP/BF	28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

NOTES:

Cadastral boundary (LGATE-002). Base map ESRI Topo. Townsites (LGATE-248).

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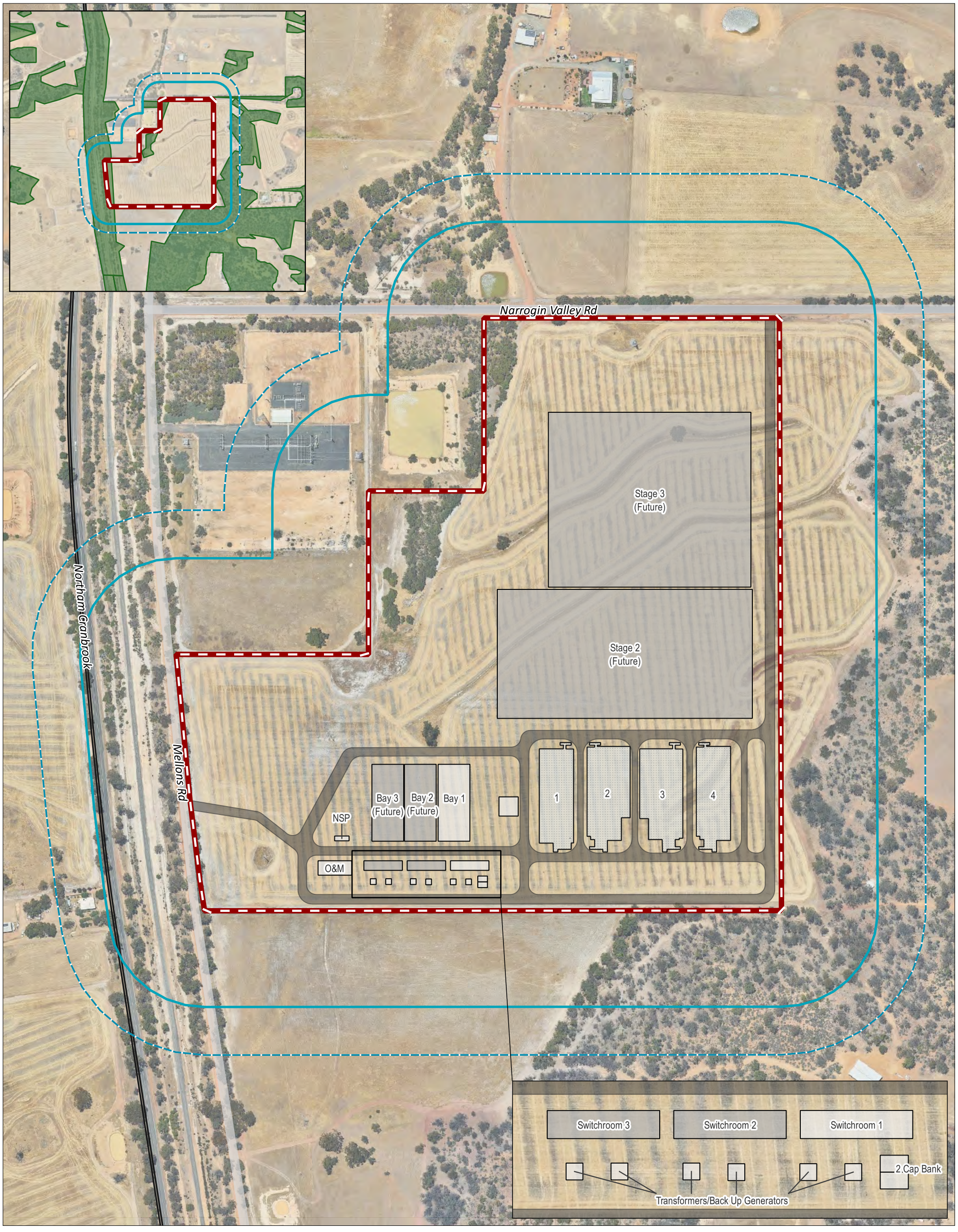

Figure 2: Site Plan

0 30 60 90 120 m

N

SCALE: 1:3,733	SHEET SIZE: A3 COLOUR	CLIENT: South Energy	
COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 50		PROJECT NUMBER: A23.166	VERSION: 0
DATA SOURCE: LANDGATE AERIAL IMAGERY NOW		DRAWN BY / REVIEWED BY: JP/BF	DATE: 28/11/2024

PROJECT/REPORT NAME: Bushfire Management Plan: Development Application
Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Future Development
- Road
- Subject building
- BESS
- Native Vegetation Extent (DPIRD-005)

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

NOTES:

Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.

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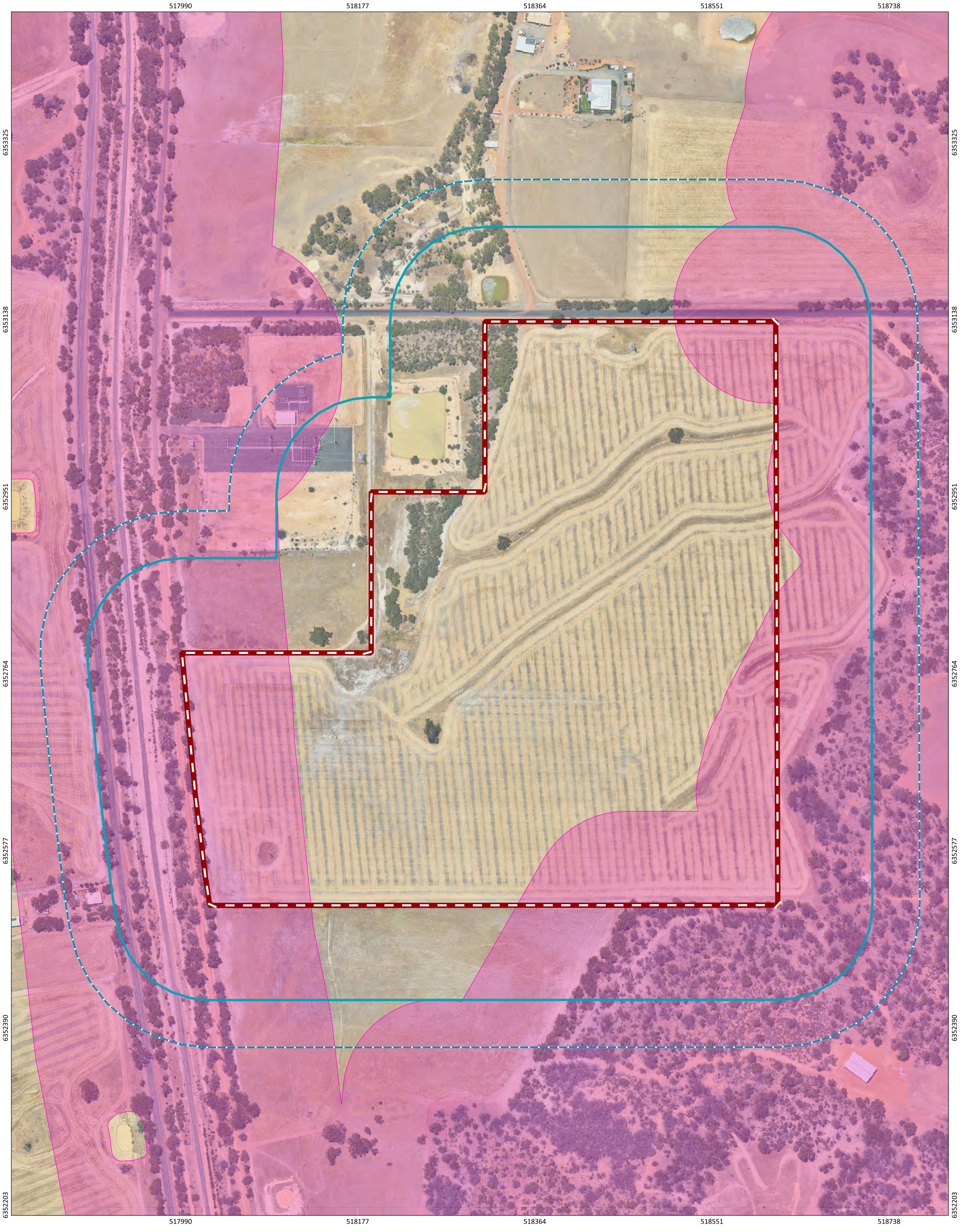

Figure 3: Bushfire Prone Areas

0 30 60 90 120 m N	PROJECT/REPORT NAME Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley	
SCALE 1:3,733	SHEET SIZE A3 COLOUR	CLIENT South Energy
COORDINATE REFERENCE SYSTEM GDA2020 / MGA zone 50	PROJECT NUMBER A23.166	VERSION 0
DATA SOURCE LANDGATE AERIAL IMAGERY NOW	DRAWN BY / REVIEWED BY JP/BF	DATE 28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m

Bush Fire Prone Area Planning (OBRM-023)

- Bushfire Prone Area 2

No	Description	Drawn	Approved	Date
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2. Environmental Considerations

2.1 Native Vegetation - Modification and Clearing

SPP 3.7 policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values.

There is some mapped native vegetation within the subject site (DPIRD-005; Figure 2), which is proposed to be retained, post-development. The remainder of the site has been historically cleared and used for agricultural purposes. Clearing of native vegetation is not required for development to proceed.

WEPL is not aware of any outstanding environmental approvals required for development to proceed.

2.2 Revegetation/Landscape Plans

No revegetation is proposed within the subject site.

Mapped native vegetation which occurs in the northern portion of the subject site will be retained in its current form.

3. Bushfire Assessment Results

3.1 Bushfire Assessment Inputs

The proposed BESS enclosures and substations, if ignited by a bushfire or other means are likely to present a challenge for firefighters to contain. As such, a bushfire assessment has been undertaken for the proposed BESS in accordance with the Guidelines as well as the Country Fire Authority (CFA) *Design Guidelines and Model Requirements for Renewable Energy Facilities Version 4* (CFA Guidelines; State of Victoria, 2023). Inputs to the assessment against the Guidelines are detailed below. The assessments against the CFA Guidelines is presented in Appendix A.

3.1.1 Fire Danger Index

A blanket Fire Danger Index (FDI) 80 is adopted for Western Australia, as outlined in *Australian Standard AS 3959: 2018 Construction of Buildings in Bushfire Prone Areas* (SA, 2018).

3.1.2 Vegetation Classification and Slope under Vegetation

Vegetation and effective slope (i.e. slope under vegetation) within the subject site and surrounding 150 m (the assessment area) were assessed on 17/01/2024 in accordance with the Guidelines and AS 3959: 2018.

The pre-development classified vegetation and effective slope for the site from each of the identified vegetation plots are identified below in Table 1 and Figure 4.

Table 1: Classified Vegetation as per AS 3959: 2018

Plot	Vegetation classification	Effective slope
1	Class A Forest	Downslope >0 to 5 degrees
2	Class A Forest	All upslopes and flat land (0 degrees)
3	Class B Woodland	Downslope >0 to 5 degrees
4	Class B Woodland	All upslopes and flat land (0 degrees)
5	Class C Shrubland	All upslopes and flat land (0 degrees)
6	Class G Grassland	Downslope >0 to 5 degrees
7	Class G Grassland	All upslopes and flat land (0 degrees)
8	Excluded - clause 2.2.3.2 (e)	-
9	Excluded - clause 2.2.3.2 (f)	-

Photographs relating to each area and vegetation type are included in Appendix B.

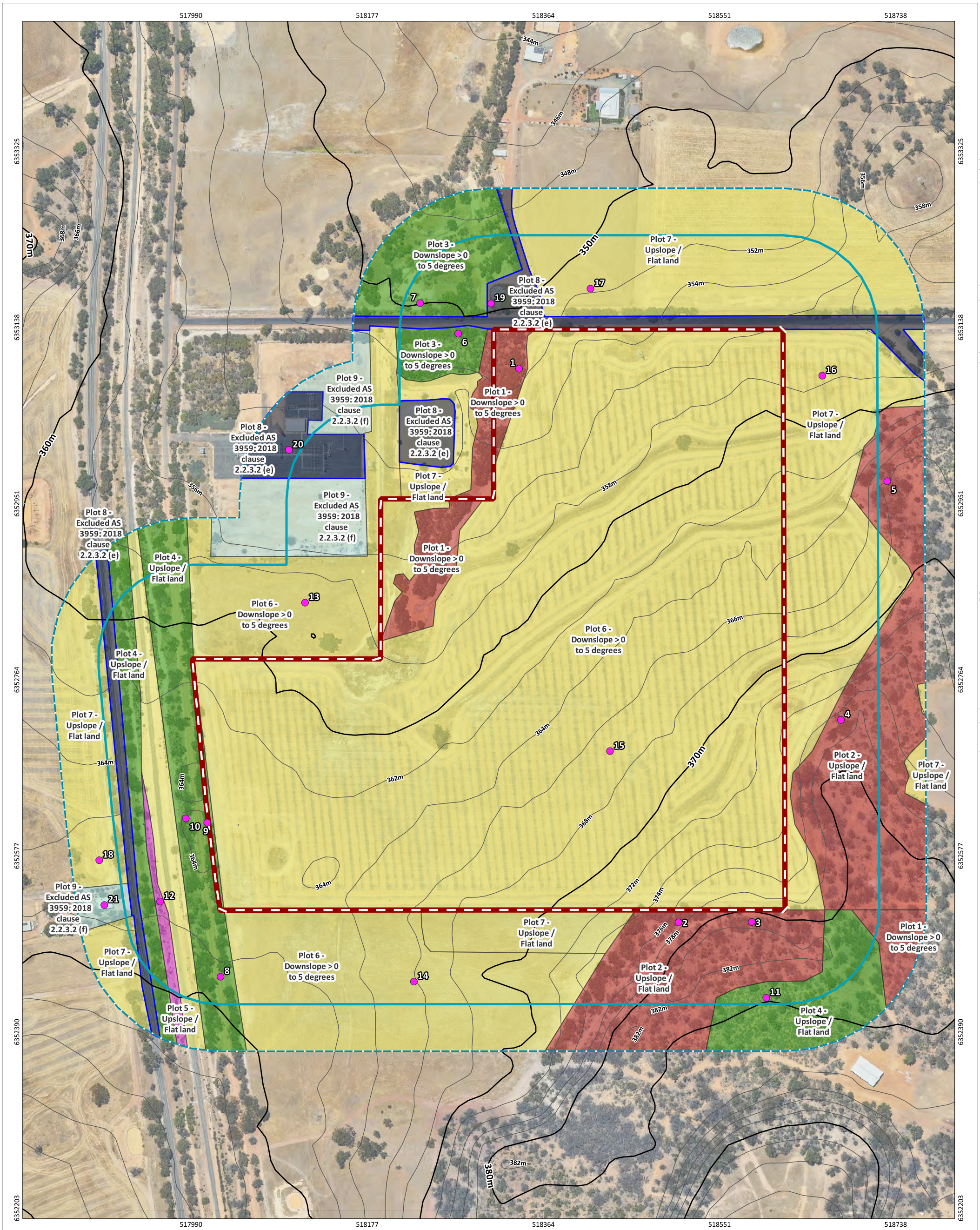

Figure 4: Pre-Development Vegetation Classification

N 0 30 60 90 120 m	PROJECT/REPORT NAME: Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley		
SCALE: 1:3,733	SHEET SIZE: A3 COLOUR	CLIENT: South Energy	
COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 50		PROJECT NUMBER: A23.166	VERSION: 0
DATA SOURCE: LANDGATE AERIAL IMAGERY NOW		DRAWN BY / REVIEWED BY: JP/BF	DATE: 28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Photos

2m Contours (DPIRD-072)

- 2m Contour
- 10m Contour

Vegetation Classification

- Class A - Forest
- Class B - Woodland
- Class C - Shrubland
- Class G - Grassland
- Excluded AS 3959: 2018 2.2.3.2 (e)
- Excluded AS 3959: 2018 2.2.3.2 (f)

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

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3.2 Bushfire Assessment Outputs

A Bushfire Attack Level (BAL) assessment has been undertaken in accordance with SPP 3.7, the Guidelines, AS 3959: 2018 and the bushfire assessment inputs in Section 3.1.

3.2.1 BAL Assessment

All land located within 100 m of the classified vegetation depicted in Figure 4 is considered bushfire prone and is subject to a BAL assessment in accordance with AS 3959: 2018.

A Method 1 BAL assessment (as outlined in AS 3959: 2018) has been completed for the proposed development and incorporates the following factors:

- Fire Danger Index (FDI) rating.
- Vegetation class.
- Slope under classified vegetation.
- Distance between proposed subdivision area and the classified vegetation.

A Method 2 BAL assessment was also undertaken (as outlined in AS 3959: 2018) to determine the 10 kW/m2 threshold line for proposed assets using both a 1200 K and 1090 K flame temperature. These contours have been used to inform appropriate siting of habitable, non-habitable and renewable energy infrastructure assets within the subject site. The 10 kW/m^2 radiant heat flux threshold is widely adopted as being sufficient to significantly reduce the risk of radiant heat from the surrounding vegetation igniting the proposed assets within the site, in line with general advice in the CFA Guidelines. Ultimately, this also implies that the APZ will create adequate separation to prevent the ignition of a bushfire resulting from the functioning of the BESS. The APZ prescribed around these assets is, at its thinnest point, 25 m in width - well exceeding the 10 m recommended by the Western Australian Planning Commission (WAPC) for Renewable Energy Facilities in Bushfire Prone Areas (WAPC; 2020).

This Method 2 calculation has not been undertaken to demonstrate compliance with the bushfire protection criteria. Given this, WEPL understands referral of the DA to DFES is not required as per section 9.4 of the Guidelines.

Based on the identified BAL, construction requirements for relevant buildings/structures can then be assigned. The BAL rating gives an indication of the expected level of bushfire attack (i.e. radiant heat flux, flame contact and ember penetration) that may be received by proposed buildings and subsequently informs the standard of construction required to increase building survivability.

3.2.2 Method 1 BAL Assessment

Table 3 and Figure 5 display the Method 1 BAL assessment (in the form of BAL contours) that has been completed for the proposed BESS in accordance with AS 3959: 2018 methodology.

3.2.3 Post Development Assumptions

The inset in Figure 5 illustrates the post-development vegetation plots following the subject site being cleared and landscaping being planted to a low threat state. The assessment outputs in this BMP have been based on the post development scenario.

Post-development, all proposed assets within Stage 1 will be subject to BAL ratings of ≤BAL-12.5.

Table 2: Method 1 BAL Calculation (BAL Contours)

Plot	Vegetation classification	Effective slope	Separation distances required (m)				
			BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
1	Class A Forest	Downslope >0 to 5 degrees	<20	20 - <27	27 - <37	37 - <50	50 - <100
2	Class A Forest	All upslopes and flat land (0 degrees)	<16	16 - <21	21 - <31	31 - <42	42 - <100
3	Class B Woodland	Downslope >0 to 5 degrees	<13	13 - <17	17 - <25	25 - <35	35 - <100
4	Class B Woodland	All upslopes and flat land (0 degrees)	<10	10 - <14	14 - <20	20 - <29	29 - <100
5	Class C Shrubland	All upslopes and flat land (0 degrees)	<7	7 - <9	9 - <13	13 - <19	19 - <100
6	Class G Grassland	Downslope >0 to 5 degrees	<7	7 - <9	9 - <14	14 - <20	20 - <50
7	Class G Grassland	All upslopes and flat land (0 degrees)	<6	6 - <8	8 - <12	12 - <17	17 - <50
8	Excluded - clause 2.2.3.2 (e)	-	No separation distances required - BAL-LOW				
9	Excluded - clause 2.2.3.2 (f)	-	No separation distances required - BAL-LOW				

Based on the site assessment inputs and BAL assessment, all proposed buildings are exposed to BAL ratings ≤BAL-12.5. A summary of the BAL ratings for these assets within the subject site is provided in Table 4.

3.2.4 Method 2 Radiant Heat Flux Calculations

Table 3 and Figure 5 display the Method 2 BAL assessment and associated setback distances that have been calculated for the proposed BESS in accordance with AS 3959: 2018 methodology. This Method 2 calculation has not been undertaken to demonstrate compliance with the bushfire protection criteria .

Table 3: Method 2 BAL Calculation

Plot	Vegetation classification	Effective slope	Separation distances required (m)	
			10kW/m^2 **@ 1090 K**	10kW/m^2 **@ 1200 K**
1	Class A Forest	Downslope 5 degrees	<60	<75
2	Class A Forest	Flat land 0 degrees	<49	<64
3	Class B Woodland	Downslope 5 degrees	<43	<56
4	Class B Woodland	Flat land 0 degrees	<35	<47
5	Class C Shrubland	Flat land 0 degrees	<24	<33
6	Class G Grassland	Downslope 5 degrees	<25	<34
7	Class G Grassland	Flat land 0 degrees	<22	<30
8	Excluded - clause 2.2.3.2 (e)	-	No separation distances required - BAL-LOW	
9	Excluded - clause 2.2.3.2 (f)	-	No separation distances required - BAL-LOW	

Table 4: BAL Ratings for Assets Within the Subject Site

Proposed Building/Asset	Type	Plot Most Affecting BAL Rating	Separation Distance	Flame Temperature	BAL Rating
BESS 1	Renewable energy infrastructure	Plot 6	25 m	1090 K	BAL-12.5
BESS 2	Renewable energy infrastructure	Plot 2	65 m	1090 K	BAL-12.5
BESS 3	Renewable energy infrastructure	Plot 2	61 m	1090 K	BAL-12.5
BESS 4	Renewable energy infrastructure	Plot 2	58 m	1090 K	BAL-12.5

Proposed Building/Asset	Type	Plot Most Affecting BAL Rating	Separation Distance	Flame Temperature	BAL Rating
NSP	Renewable energy infrastructure	Plot 6	34 m	1090 K	BAL-12.5
Transformers/backup generators	Renewable energy infrastructure	Plot 6	27 m	1090 K	BAL-12.5
2 Cap Bank	Renewable energy infrastructure	Plot 2	25 m	1090 K	BAL-12.5
0&M Shed	Habitable	Plot 6	34 m	1200 K	BAL-12.5
Switch room 1	Non-habitable	Plot 7	42 m	1090 K	BAL-12.5
Spares stores	Non-habitable	Plot 6	52 m	N/A - BAL-LOW due to separation distances	
Bay 1	Non-habitable	Plot 6	25 m	1090 K	BAL-12.5
Ability of future assets to comply with siting requirements					
Switch room 2 (Future)	Non-habitable	Plot 7	42 m	1090 K	BAL-12.5
Switch room 3 (Future)	Non-habitable	Plot 6	42 m	1090 K	BAL-12.5
Bay 2 (Future)	Non-habitable	Plot 6	25 m	1090 K	BAL-12.5
Bay 3 (Future)	Non-habitable	Plot 6	25 m	1090 K	BAL-12.5
Stage 2 (Future)	TBC*	Plot 6	25 m	1090 K	BAL-12.5
Stage 3 (Future)	TBC*	Plot 6	25 m	1090 K	BAL-12.5

*The detail of the asset type and siting is to be confirmed. Figure 6 demonstrates that appropriate siting of both renewable energy infrastructure and habitable buildings is achievable within these areas.

It should be noted that the separation distances provided in Table 4 are subject to change following micro-siting of facilities which may occur post-development approval.

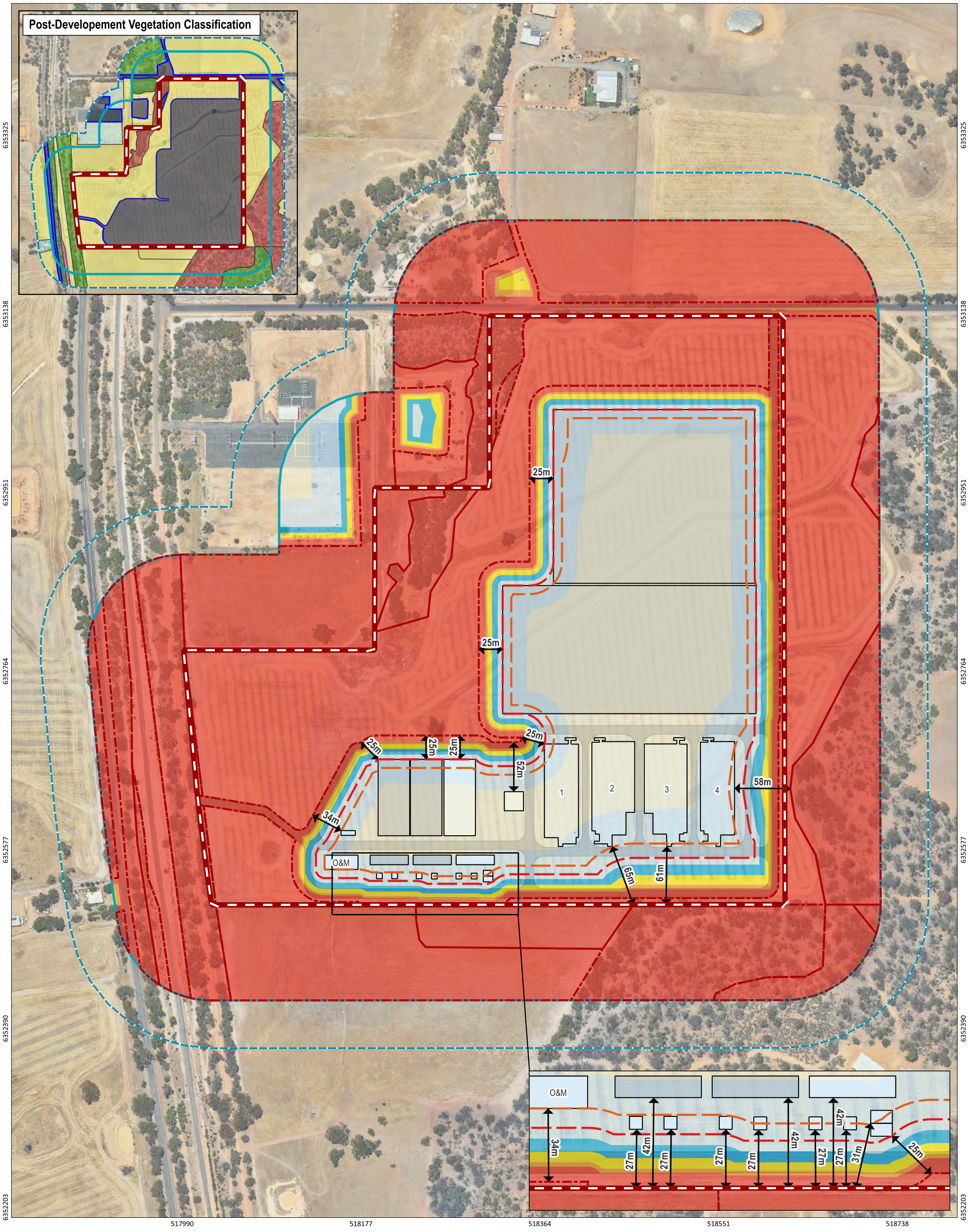

Figure 5: Bushfire Attack Level (BAL) Contours

0 30 60 90 120 m

N

PROJECT/REPORT NAME	Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley
SCALE	1:3,733
SHEET SIZE	A3 COLOUR
CLIENT	South Energy
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
PROJECT NUMBER	A23.166
VERSION	0
DATA SOURCE	LANDGATE AERIAL IMAGERY NOW
DRAWN BY / REVIEWED BY	JP/BF
DATE	28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Bushfire hazard Interface
- Future Development
- Road
- Subject building
- BESS
- 10kW/m² (1090K)
- 10kW/m² (1200K)

Vegetation Classification
- Class A - Forest
- Class B - Woodland
- Class C - Shrubland
- Class G - Grassland
- Excluded AS 3959: 2018 2.2.3.2 (e)
- Excluded AS 3959: 2018 2.2.3.2 (f)

Bushfire Attack Level (BAL)
- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

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4. Identification of Bushfire Hazard Issues

Post-development, all proposed assets will be subject to BAL ratings of ≤BAL-12.5. All proposed assets within Stage 1 are also sited in areas with a radiant heat flux not exceeding 10 kW/m^2.

A reassessment of BAL ratings, through either a BMP addendum or revised BMP will be undertaken when Stages 2 and 3 are to be developed, or if changes to classified vegetation within the assessment area or development design within Stage 1 which require a modified bushfire management response occur.

5. Assessment Against the Bushfire Protection Criteria

5.1 Compliance

The proposed development is required to comply with policy measure 7.1 of SPP 3.7 and the Guidelines.

Table 5 outlines the Acceptable Solutions (AS) that are relevant to the proposal and summarises how the intent of each Bushfire Protection Criteria has been achieved through the application of bushfire risk management measures. No Outcomes-based Solutions (OS) have been proposed for this development. These management measures are depicted in Figure 6 where relevant.

Implementation of this BMP is expected to meet objectives 5.1-5.4 of SPP 3.7.

Table 5: Assessment Against the Bushfire Protection Criteria

Bushfire Protection Criteria	AS	OS	N/A
Element 1: Location **A1.1 Development location**	☐	☐	✓
Not Applicable - This Acceptable Solution does not apply to commercial/industrial development applications.			
Element 2: Siting and design **A2.1a Siting and design**	✓	☐	☐
All proposed habitable, non-habitable and renewable energy infrastructure assets will be sited in areas subject to BAL-12.5 or lower. The proposed development is considered to be compliant with A2.1a.			
A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m^2 (BAL-40 or BAL-FZ)	☐	☐	✓
Not Applicable - No proposed habitable buildings or BESSs will be sited in areas subject to BAL-40 or BAL-FZ.			
A2.2 Asset Protection Zone (APZ)	✓	☐	☐
The proposed development has an APZ sufficient for the potential radiant heat flux to not exceed 10 kW/m^2 and will be managed in accordance with the requirements of 'Standards for Asset Protection Zones' (WAPC, 2024b; Appendix C). The APZ can be contained within the boundaries of the lot. The proposed development is considered to be compliant with A2.1.			
A2.3 Clearing of native vegetation	✓	☐	☐
No native vegetation is proposed to be cleared to facilitate the application of any bushfire mitigation measures at the subject site.			
A2.4 Storage of hazardous, flammable and/or combustible materials	✓	☐	☐
The proposed development includes the establishment of a number of BESS enclosures at the subject. These combustible assets will be situated in cleared areas that are subject to a radiant heat flux not exceeding 10 kW/m^2 (with a flame temperature of 1090 K; **Figure 5**, **Figure 6**). These systems have also been sited and will be designed to comply with the CFA Guidelines (**Appendix A**). The proposed development is considered to be compliant with A2.4.			

Bushfire Protection Criteria	AS	OS	N/A
Element 3: Vehicular access **A3.1 Private driveway**	☐	☐	☐
The proposed development incorporates internal roads throughout the subject site, which each have a minimum width of 6 m. Each of the internal roads are loop roads which link back to the main access point at the **northern** boundary of the subject site (**Figure 2**). The internal roads will be designed to comply with the vehicular access technical requirements as per the Guidelines (**Appendix D**) as well as the CFA Guidelines (**Appendix A**). The proposed development is considered to be compliant with A3.1.			
Element 4: Water supply **A4.1 Water supply**	✓	☐	☐
No existing reticulated water is present at the subject site. Water tanks will be provided for firefighting purposes and will include six 50 kL firefighting water tanks, offering a total of 300 kL of water for bushfire protection of the habitable buildings and renewable energy infrastructure. The proposed development is considered to be compliant with A4.2.			

Note: AS - Acceptable solution, PS - Performance solution, N/A - Not applicable.

5.2 Additional Bushfire Mitigation Measures

5.2.1 Water tank requirements

Each tank and associated stand will be above-ground, constructed of non-combustible material and comply with AS/NZS 3500.1:2018 Plumbing and drainage Water Services.

All exposed water supply pipes and fittings will be metal. Fittings should be located away from the source of bushfire attack.

Each tank will be fitted with a 50mm male camlock coupling with full flow valve.

5.2.2 Renewable Energy Assessment Framework

SPP 3.7 and the Guidelines do not currently provide a comprehensive assessment framework for the assessment of renewable energy facilities, with many of the bushfire requirements only applicable to habitable buildings. Consequently, assessment of the BESS facility against the bushfire protection criteria of the Guidelines may be considered insufficient given the additional risk associated with the proposed development. In the absence of a bushfire assessment framework catered towards renewable energy facilities in Western Australia, the CFA Guidelines are considered the most appropriate framework currently available in Australia. The proposed development has therefore been assessed against the requirements of the CFA Guidelines, tailored to Western Australia. The assessment against the CFA Guidelines (Appendix A) is considered to meet the general objectives and policy requirements of SPP 3.7.

5.2.3 Emergency Response

Early evacuation of the subject site will be the primary emergency response to following during a bushfire emergency. However, if it becomes unsafe to evacuate, shelter-in-place will need to be considered as a last resort response. The habitable O&M building has been strategically located in areas that will be subject to a radiant heat exposure of 10 kW/m^2 at a flame temperature of 1200 K. This is considered an acceptable exposure threshold for buildings which will serve as on-site shelters. These buildings can therefore be used as a last resort temporary shelter in the event evacuation is unsafe during a bushfire emergency. The O&M building is not intended to be used as a community refuge building as it has not been designed to the Australian Building Codes Board Community Refuge Standards but may be used as a place of last resort.

In accordance with the CFA Guidelines, an emergency evacuation plan will need to be prepared prior to commencement of operations. The emergency evacuation plan shall be prepared in accordance with Australian Standard AS 3745-2010 Planning for Emergencies in Facilities, taking guidance from the *Bushfire Emergency Plan (BEP) Manual* (WAPC, 2024c).

5.2.4 Access and Egress

The subject site has two access points which provide vehicular access to the site from Narrogin Valley Road to the north and Mellons Road to the west. Both are public through roads and will provide sufficient access to safer destinations, in the event of a bushfire.

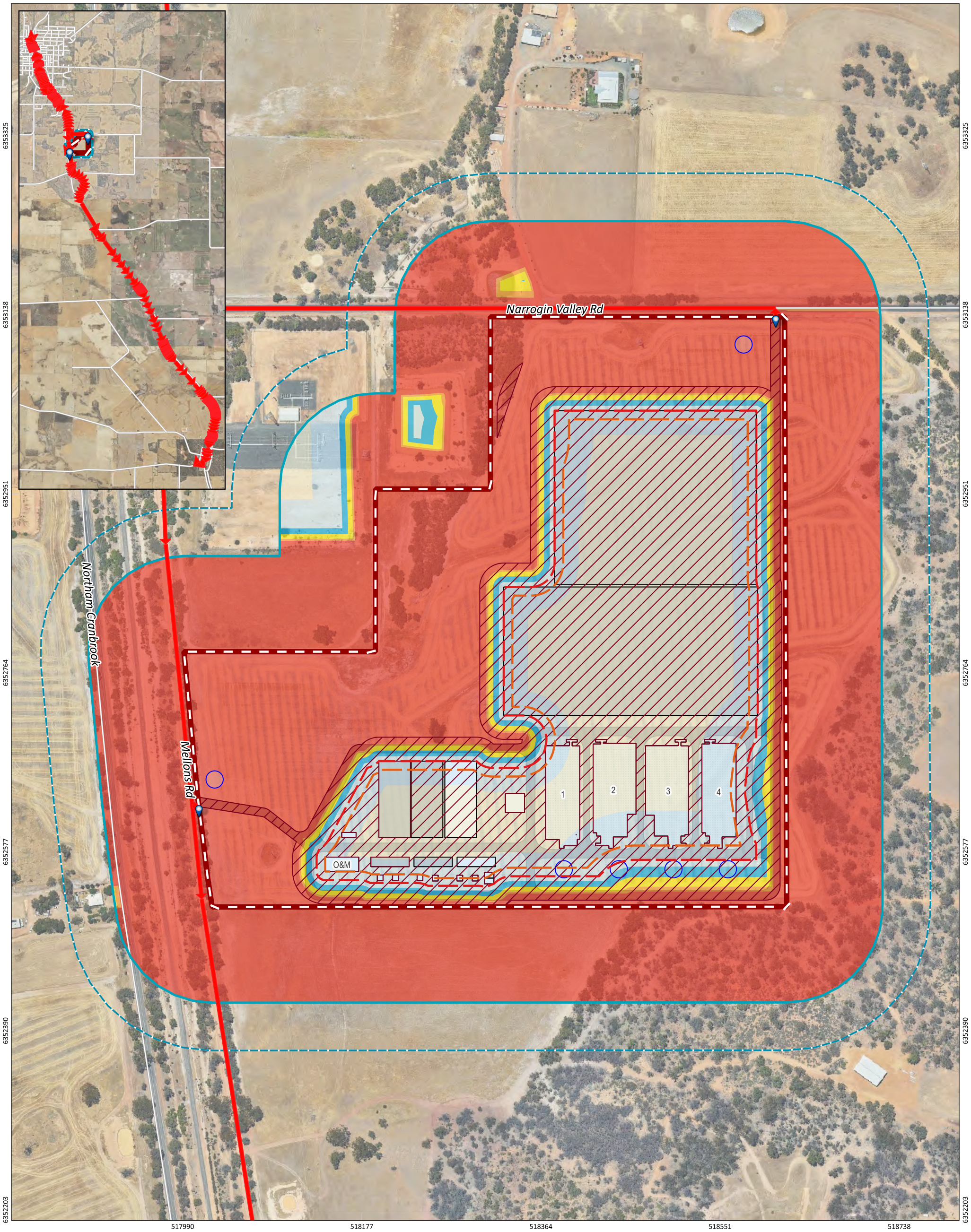

Figure 6: Spatial representation of the bushfire mitigation measures

0 30 60 90 120 m N		PROJECT/REPORT NAME Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley	
SCALE 1:3,733	SHEET SIZE A3 COLOUR	CLIENT South Energy	
COORDINATE REFERENCE SYSTEM GDA2020 / MGA zone 50		PROJECT NUMBER A23.166	VERSION 0
DATA SOURCE LANDGATE AERIAL IMAGERY NOW		DRAWN BY / REVIEWED BY JP/BF	DATE 28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Asset Protection Zone (APZ)
- Firefighting Water Tanks (50kL)
- Future Development
- Road
- Subject building
- BESS
- Access / egress route
- 10kW/m² (1090K)
- 10kW/m² (1200K)
- Access point

Bushfire Attack Level (BAL)

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

Name: Daniel Panickar
Western Environmental Approvals Pty Ltd

Signature:

Accreditation No: BPAD 37802
Expiry: December 2024

BPAD Bushfire Planning & Design Accredited Practitioner Level 3

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6. Responsibilities for Implementation and Management of Bushfire Management Measures

Responsibility for implementation of the bushfire risk management measures outlined in Section 5 of this BMP applies to the developer, future owners/builders within the subject site and the local government. Table 6 provides a works program detailing these measures, timing of implementation and responsibility.

Table 6: Proposed Works Program

No.	Bushfire management measure
Developer responsibilities - Prior to occupancy	
1	Ensure that Asset Protection Zones (APZs) are established and maintained as per the design in Figure 6.
2	Ensure that vehicular access is constructed as per the site plan (Figure 2).
3	Install firefighting water tanks as depicted in Figure 6.
4	Consider the design requirements contained within the CFA Guidelines when establishing the detailed design of the BESS facility.
Landowner responsibilities - Ongoing	
5	Maintain clear access to the firefighting water tanks and associated hardstands to ensure firefighting appliances can access the tanks in the event of a bushfire.
6	Maintain APZs to the standard in the Guidelines.
7	Maintain all firebreaks in accordance with the Shire of Narrogin Annual Firebreak Notice.

7. Conclusion

In the professional opinion of the author, the proposed development satisfies the intent, aim and objectives of SPP 3.7 and the Guidelines and is recommended for approval.

8. References

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Appendix A:
CFA Guidelines Assessment

Background

New and emerging renewable energy technology has outpaced the development of fire and emergency management standards and guidance, especially in Western Australia. The State Government has identified the need for a comprehensive bushfire assessment framework specific to renewable energy facilities however this is yet to be developed. In the absence of a Western Australian assessment framework, the Country Fire Authority (CFA) *Design Guidelines and Model Requirements for Renewable Energy Facilities Version 4* (CFA Guidelines; State of Victoria, 2023) is considered to provide the most appropriate framework for the assessment of renewable energy facilities in designated bushfire prone areas.

The proposed BESS and associated infrastructure have been assessed against the requirements of the CFA Guidelines tailored to the Western Australian planning system as documented below.

Facility Location

The subject site is considered a high-risk environment under the CFA Guidelines given it is designated as bushfire prone. Renewable energy facilities proposed in high-risk environments must address the following:

- An assessment against SPP 3.7 and the associated Guidelines;
- The impact of any ignitions arising from the BESS infrastructure on nearby communities, infrastructure and assets;
- The impact of bushfire on the BESS infrastructure (e.g. ember attack, radiant heat impact and flame contact); and
- Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks on site to an acceptable level.
- The above requirements have been appropriately addressed through the preparation of the BMP (WEPL, 2024) and information provided by the Client.
- WEPL is not aware of peat soils within 10 m of the proposed infrastructure.

Facility Design

Emergency Vehicle Access

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Construction of a four (4) metre perimeter road within the perimeter fire break.	✓	A 4 m wide perimeter road will be constructed along the edge of the subject site.
Roads must be of all-weather construction and capable of accommodating a vehicle of 15 tonnes.	✓	Internal access roads will be constructed of an all-weather surface material and designed to accommodate a 15-tonne vehicle.
Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface.	✓	All internal access roads will be a minimum 4 m in width constructed of an all-weather surface material. A 4 m vertical clearance will be maintained at all times.
The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than 50 metres.	✓	Finished ground levels will be determined during detailed design stage. Road grades will be designed to adhere to the relevant requirements of the Guidelines.
Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	Finished ground levels will be determined during detailed design stage. Road grades will be designed to adhere to the relevant requirements of the Guidelines.
Roads must incorporate passing bays at least every 600m, which must be at least 20 metres long and have a minimum trafficable width of six (6) metres. At least one passing bay must be incorporated where roads are less than 600 metres long.	✓	The internal access roads will allow vehicles to pass, given the roads intersect at regular intervals and the BESS will be located on a hardstand with 6 m clearance between obstructions. The intent of this requirement has therefore been met given there is adequate opportunity for vehicles to pass.
Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, BESS and related infrastructure, substations and grid connection areas.	✓	The existing public road networks provide adequate access for emergency vehicles. The subject site is accessed from Narrogin Valley Road which connects to Mellons Road. Narrogin Valley Road is a sealed road and Mellons Road is partially sealed. Both roads have a minimum width of 7 m for two-way access. The internal private road network includes a series of roads surrounding and throughout the BESS facility.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Provision of at least two (2) but preferably more access points to each part of the facility. The number of access points must be informed through a risk management process.	✓	The main access point to the subject site is in the northern portion, providing access from Narrogin Valley Road. A secondary access point is available in the western portion of the subject site, providing vehicular access from Mellons Road.

Firefighting Water Supply

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Water access points must be clearly identifiable and unobstructed to ensure efficient access.	✓	Water tanks will be provided on site for the storage static water for firefighting purposes. Water access points will be clearly identifiable through signage. All water tanks are located for ease of access and will remain unobstructed.
Static water storage tank installations must comply with AS 2419.1-2021: Fire hydrant installations – System design, installation and commissioning.	✓	The water supply system will be designed in accordance with AS 2419.1-2021. This will be documented at detailed design stage.
The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.	✓	The static water storage tanks will be above ground and constructed from concrete or steel.
The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	✓	The static water storage tanks will be refilled within 24 hours either automatically via a groundwater bore or manually through a local water supply contractor. This will be documented at detailed design stage.
The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (solar panels, wind turbines, battery energy storage systems, etc.).	✓	The static water storage tanks will be located at the main entrance and setback a minimum 10 m from the high-risk BESS infrastructure.
The hard-suction point must be provided, with a 150mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance.	✓	The static water storage system is subject to detailed design however it is expected that each tank will be fitted with the required connection valves and adapters, including a Storz connection.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.	✓	The static water storage tanks and connection points will be located within 4 m of the internal access roads for ease of access. This will be documented at detailed design stage.
An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonne GVM, 15m long and 6m wide, in accordance with GL-11: DFES Site Planning and Fire Appliance Specifications.	✓	A hardstand will be provided to the water connection points for fire service access. The hardstands will be designed to DFES specifications, including minimum 15 tonne GVM, 15m in length and 6m wide. This will be documented at detailed design stage.
The road access and hardstand must be kept clear at all times.	✓	The internal roads and hardstands will be kept clear at all times.
The hard-suction point must be protected from mechanical damage (e.g. bollards) where necessary.	✓	The static water supply system is subject to detailed design. It is likely that bollards will be installed to protect the water connection points from damage.
Where the access road has one entrance, an eight (8) metre radius turning circle must be provided at the tank.	N/A	No dead-end roads are proposed within the subject site.
An external water level indicator must be provided to the tank and be visible from the hardstand area.	✓	All static water storage tanks will be fitted with a level indicator, visible from the hardstand area. This will be documented at detailed design stage.
Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.	✓	Signage will be installed on each static water storage tank.
Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s).	✓	Signage will be installed at the main entrance to the BESS facility.
For standalone BESS facilities where there is no reticulated water available, the fire hydrant system that complies with AS 2419.1-2021 must provide: **i. the fire water supply must be of a quantity no less than 288,000L or as per the provisions of AS2419.1-2021: Fire hydrant installations, Table 2.2.5 (D) for open yards flowing for a period no less than four hours at 20L/s, whichever is the greater.** **ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2021: Fire hydrant installations, Table 2.2.5 (D).** **iii. Fire hydrants must be provided and located so that every part of the BESS is**	✓	The proposed development design includes provisions for six (6) 50,000 L firefighting water tanks to be situation within the subject site, equating to a total of 300,000 L. One firefighting water tank will be situated at each of the two access points to the subject site, whilst the remaining four will be more of less adjacent to the BESS infrastructure, but no closer than 10 m.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet (70m coverage). iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, BESS, buildings, etc). v. The fire water supply must be reasonably adjacent to the BESS and shall be accessible without undue danger in an emergency (E.g. fire water tanks are to be located closer to the site entrance than the BESS). vi. The fire water supply must comply with AS 2419.1-2021: Fire hydrant installations, Section 5: Water storage tanks.		

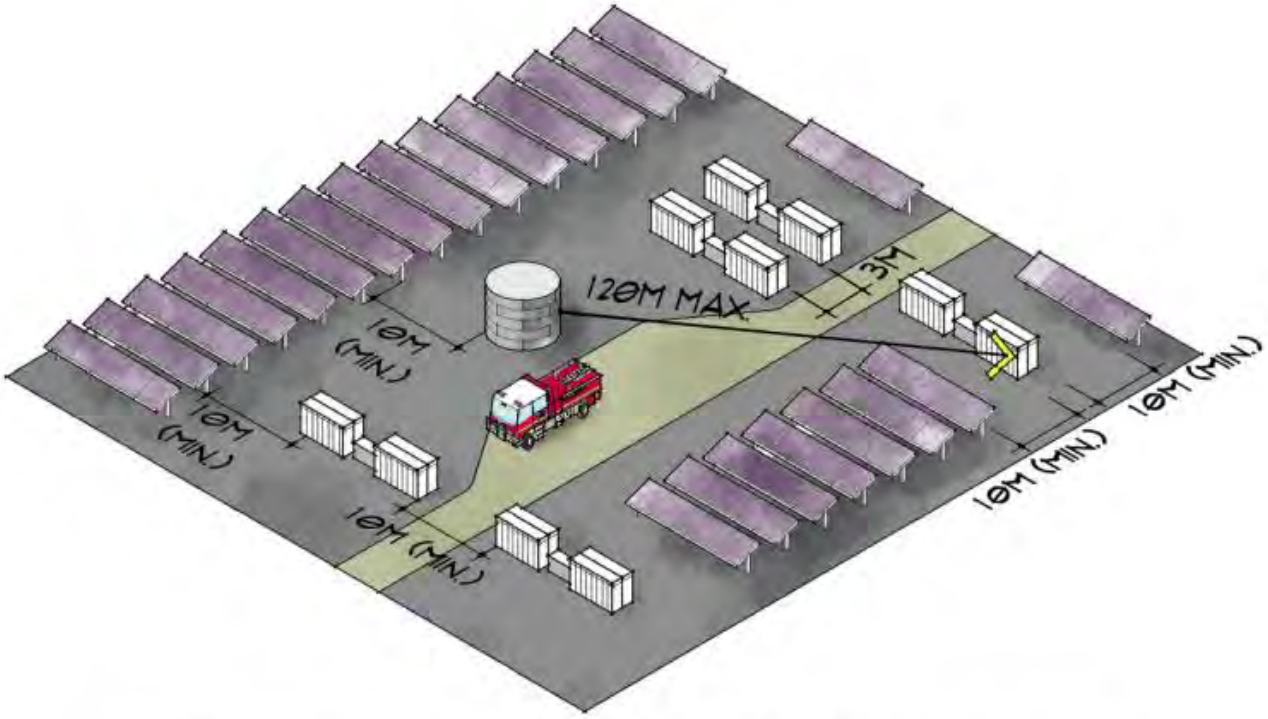

Figure 8: *Potential arrangement for fire water supply tank(s) for facilities with decentralised battery energy storage systems with no reticulated water supply to the site.*



Figure 9: *Best-practice arrangement of fire service infrastructure at facilities with centralised battery energy storage systems without reticulated water supply, or a reticulated water supply that does not meet the performance requirements of AS 2419.1-2021: Fire hydrant installations.*

Fire Detection and Suppression Equipment

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Suitable fire detection and suppression equipment must be provided: **a. For on-site buildings and structures, according to the requirements of the National Construction Code (NCC).** **b. For storage of dangerous goods, according to the requirements of any Australian Standards for storing and handling dangerous goods.** **c. For electrical installations, a minimum of two (2) suitable fire extinguishers must be provided within 3m - 20m of each Power Conversion Unit.** **d. In all vehicles and heavy equipment, each vehicle must carry at least a nine (9) litre water stored pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.**	✓	Fire detection and suppression equipment will be provided in accordance with the relevant legislation. Each power conversion unit will be fitted with aerosol fire extinguishing device along with smoke detectors, heat detectors, combustible gas detectors, water fire suppression system and audible alarm. All authorised vehicles will be required to carry a fire extinguisher which will be confirmed during site inductions as part of the operational management plan.

Landscape Screening and On-Site Vegetation

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Any proposed or existing vegetation must be considered in the BMP for its potential to intensify and propagate fire within and away from the site.	✓	The BMP considers all existing and proposed vegetation within 150m of the subject site.
Where landscape screening is required, for example, to screen visual impacts, the design must consider any potential increase in fire risk due to the type (species), density, height, location and overall width of the screening.	✓	No screening vegetation is proposed as part of the proposed development.
Facilities must be designed so that the radiant heat flux (output) from vegetation does not create the potential for ignition of on-site infrastructure or other vegetation.	✓	The proposed BESS facility will be surrounded by an APZ to ensure the radiant heat flux from vegetation is maintained at 10kW/m^2 which exceeds SPP 3.7 policy requirements.
Radiant heat impact leading to ignition may be mitigated through: • **Vegetation removal (where permitted).** • **Separation from nearby infrastructure (e.g., fire breaks; refer below).** • **The provision of thermal barriers at nearby infrastructure.**	✓	The radiant heat impact has been reduced through the establishment of an APZ to maintain separation between infrastructure and retained vegetation.
Substations should be surfaced to eliminate all vegetation, including grasses.	✓	The substation will be constructed on a non-combustible surface to provide hard standing and reduce bushfire risk.
The Electricity Regulations 1947 and Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines prescribe vegetation clearance requirements for electric lines based on voltage.	✓	Vegetation within proximity to power lines will be managed in accordance with the relevant regulations and codes of practice.

Firebreaks

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
A firebreak must be established and maintained around the perimeter of the facility, commencing from the boundary or from the vegetation screening inside the property boundary.	✓	A perimeter firebreak with minimum width of 4m and minimum vertical clearance of 4.5m will be maintained along the boundary of the subject site, in accordance with the Shire of Narrogin 2024/2025 Firebreak and Fuel Hazard Reduction Notice.
A firebreak must be established and maintained around the perimeter of the BESS, controls rooms, electricity compounds, substations and all other buildings onsite.	✓	Internal access roads provide perimeter access around the BESS, substations and all other associated infrastructure and buildings.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The width of fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.	✓	A minimum 10m wide cleared buffer will be provided inside the subject site boundary. The firebreak buffer will contain non-combustible retaining walls, internal access roads and/or cleared land (non-vegetated) managed as part of the APZ. The APZs have been calculated in relation to the 10 kW/m^2 radiant heat threshold which well exceeds the 10 m minimum requirement.

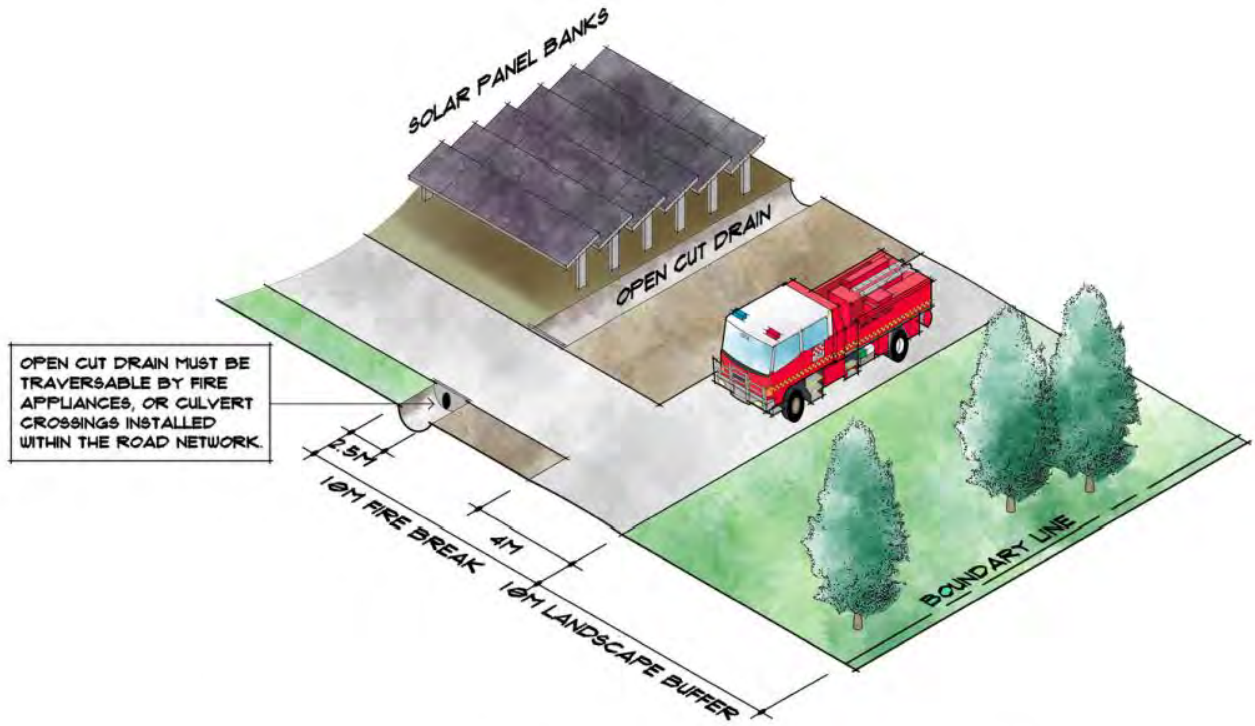

Figure 10: *Typical cross-section indicating fire break requirements at a solar energy facility.*

BESS Specific Requirements

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The design of the BESS facility must incorporate a separation distance that prevents fire spread between battery containers / enclosures and: • **Other battery containers / enclosures.** • **On-site buildings.** • **Substations.** • **The site boundary.** • **Any other site buildings.** • **Vegetation.**	✓	All components of the BESS facility have been designed to prevent fire spread. Detailed design will ensure separation distances within the subject site are in line with globally accepted standard NFPA 855 - Standard for Installation of Statutory Energy Storage Systems and manufacturers specifications.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The design must incorporate a firebreak around the BESS and related infrastructure, of a width of no less than 10m.	✓	A 10m firebreak will be provided (refer above).
The design must incorporate a layout of site infrastructure that: • **Considers the safety of emergency responders.** • **Minimises the potential for grassfire and/or bushfire to impact the BESS.** • **Minimises the potential for fires to battery containers / enclosures to impact on-site and off-site infrastructure.**	✓	The centralised layout enables first responders to safely access the site and fire suppression infrastructure in an emergency. The APZ also provide permanent separation between the proposed BESS facility and areas of vegetation. The BESS facility will utilise infrastructure that integrates fire prevention systems and controls to prevent potential fires. This will be finalised in detailed design.
The BESS must be located reasonably adjacent to a site vehicle entrance suitable for emergency vehicles.	✓	Stage 1 is located adjacent the western vehicular access point from Mellons Road.
The BESS must be located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of a fire at the BESS). **The BESS must be provided with in-built fire and gas detection systems. Where these systems are not provided, measure to effectively detect fires within containers must be detailed within the Risk Management Plan.**	✓	The BESS is setback approximately 250m from the fire water tank at the western entrance. Water tanks are located to the west, north and south of the BESS and as such, firefighting water will be accessible under differing wind conditions. The BESS will be provided with in-built smoke detectors, heat detectors and combustible gas detectors.
The BESS must be provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.	✓	The BESS will be provided with in-built smoke detectors and hydrogen gas detectors to prevent explosions.
The BESS must be provided with suitable ember protection to prevent embers from penetrating battery containers / enclosures.	✓	Any external gaps or ventilation systems can be fitted with ember protection. This will be documented at detailed design stage.
The BESS must be provided with suitable access roads for emergency services vehicles, to and within the site, including to BESS and fire service infrastructure.	✓	The access arrangements enable emergency service vehicles to effectively manoeuvre the site and access the fire service infrastructure, as demonstrated in the Emergency Vehicle Access section.
The BESS must be installed on a non-combustible surface such as concrete.	✓	The BESS will be installed on a non-combustible surface.
The BESS must be provided with suitable ventilation.	✓	The BESS will be fitted with automatic ventilation system.
The BESS must be provided with impact protection to at least the equivalent of a W guardrail-type barrier, to	✓	Suitable impact protection measures may be developed, subject to final

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
prevent mechanical damage to battery containers / enclosures.		hazard risk assessment to be completed during detailed design stage.
The BESS must be provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.	✓	All wiring will be enclosed and all cabling connecting the individual components will be underground.
The BESS must be provided with spill containment that includes provision for management of fire water runoff.	✓	BESS containers will be equipped with spill containment. Fire water runoff will be managed through detail hydrology design.

Facility Construction and Commissioning

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Install and commission fire detection and suppression for the facility at the earliest possible stage of construction.	TBC	A construction programme is yet to be prepared for the project.
Provide first-aid firefighting equipment, such as fire extinguishers (and where possible, portable fire hose reels), appropriate to the identified emergency scenarios, at all construction portables / buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.	✓	Transportable buildings used during the construction phase of the project will include first-aid firefighting equipment.
Provide the required fire protection equipment for any storage of dangerous goods as per the relevant Australian Standards.	✓	Fire protection equipment will be provided in accordance with the relevant standards for the storage of dangerous goods.
Obtain appropriate permits for work during the restricted and prohibited burning periods and ensure that any conditions on the permits are adhered to.	✓	The proponent will be responsible for obtaining any necessary permits during restricted burn periods.
Adhere to restrictions on Total Fire Ban or days of elevated fire danger according to Emergency WA website.	✓	The proponent will adhere to the restrictions of Total Fire Ban days.
During the restricted and prohibited burning periods, ensure vehicle operators are instructed to remain on tracks and are not permitted to drive through paddocks.	✓	Vehicles will only be permitted on designated access roads.
Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities.	✓	Smoking will be restricted to a prescribed area, away from all fire hazards.
Provide remotely accessible site/system security monitoring at the facility.	TBC	This will be determined during the detailed design phase.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Provide training for personnel in the use of on-site first aid firefighting equipment, and responsibilities during emergencies.	✓	Personnel nominated as part of the emergency response team will be required to undertake first aid and firefighting equipment training.
Develop an Emergency Plan for the construction and commissioning phase of the project.	✓	A construction management plan will be developed for the project which will include emergency procedures during the construction and commissioning phase of the project.
Provide an emergency communication system that is reliable and will operate in the event of power failure.	✓	All vehicles will be fitted with two-way radios to enable communication during an emergency. Mobile phone reception is also available at the site.
Notify DFES at least seven days prior to the commissioning of any renewable energy infrastructure at the facility (e.g. BESS).	✓	DFES will be notified prior to commissioning the BESS.
Develop safe work procedures for the facility, including but not limited to: • **Electricity and chemical management.** • **Vegetation management.** • **Site security.** • **Ignition source control, including hot works.** • **Infrastructure, equipment and vehicle maintenance.** • **Emergency management.**	✓	The proponent will develop an operational management plan which will include safe work procedures for the facility.

Facility Operation

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
A BMP must be developed for the facility, in consultation with DFES, before development starts.	✓	A BMP has been prepared in accordance with SPP 3.7 and the Guidelines. The BMP may be referred to DFES in accordance with SPP 3.7 for advice as part of the assessment process. This is at the discretion of the Local Government.
Undertake bushfire prevention and preparedness activities.	✓	An emergency plan will be prepared which will outline bushfire prevention and preparedness activities. In addition, bushfire prevention and preparedness activities will be undertaken in accordance with the Shire of Narrogin 2024/2025 Firebreak and Hazard Reduction Notice.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Facility operators must undertake the following measures: • **Grass must be maintained at or below 100mm in height.** • **Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation.** • **Restrictions and guidance must be adhered to during days of high (and above) fire danger or Total Fire Ban days.**	✓	The proposed BESS facility will be surrounded by an APZ to ensure the radiant heat flux from vegetation is maintained at 10kW/m^2. All grass within the APZ will be maintained at or below 100mm and leaf litter will be removed on a regular basis.
Appropriate monitoring for facility infrastructure must be provided to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled.	✓	The BESS facility will be subject to routine monitoring to identify any shorts, faults or equipment failures. The monitoring regime will be detailed in the operational management plan.
Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. Maintenance must be in line with any relevant Australian Standards and manufacturers requirements.	✓	Inspection, maintenance and repairs will be undertaken in accordance with the relevant Australian Standards and manufacturers requirements.

Appendix B:
Classified vegetation photos

Plot 1	Class A Forest
Photo 1 Trees to 30 m in height with canopy cover estimated between 30% and 70%. Overstorey dominated by Eucalypts with a grassy understorey. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 2	**Class A Forest**
Photo 2 Trees to 30 m in height with canopy cover estimated between 30% and 70%. Overstorey dominated by Eucalypts with grasses and sparse shrubs in the understorey. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 2	**Class A Forest**
Photo 3 Planted Eucalypt trees up to 30 m in height with overall canopy cover exceeding 30%. Understorey mainly consisting of grasses. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 2	Class A Forest
Photo 4 Trees to 30 m in height with canopy cover estimated between 30% and 70%. Overstorey dominated by Eucalypts with a grasses and sparse shrubs in the understorey. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 2	**Class A Forest**
Photo 5 Trees to 30 m in height. Vegetation structure is multi-tiered with an overall canopy cover exceeding 30%. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 3	**Class B Woodland**
Photo 6 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	

Plot 3	Class B Woodland
Photo 7 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 4	**Class B Woodland**
Photo 8 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 4	**Class B Woodland**
Photo 9 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 4	Class B Woodland
Photo 10 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey and sparse shrubs. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 4	**Class B Woodland**
Photo 11 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be upslope/flat land. Drone photography was used to capture this photo due to site access constraints.	
Plot 5	**Class C Shrubland**
Photo 12 Shrubs to 2 m in height with grasses in the understorey. Shrubs make up more than 10% of the overall foliage cover. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 6	Class G Grassland
Photo 13 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 6	**Class G Grassland**
Photo 14 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 6	**Class G Grassland**
Photo 15 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	

Plot 7	Class G Grassland
Photo 16 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 7	Class G Grassland
Photo 17 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 7	Class G Grassland
Photo 18 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 8	Excluded - clause 2.2.3.2 (e)
Photo 19 Permanent dam with areas surrounding the water which are devoid of vegetation. This plot is excluded under AS 3959:2018 Clause 2.2.3.2 (e).	
Plot 8	**Excluded - clause 2.2.3.2 (e)**
Photo 20 Existing Western Power facilities which includes asphalted areas as well as other cleared areas and a permanent dam containing water.	
Plot 9	**Excluded - clause 2.2.3.2 (f)**
Photo 21 Existing dwelling and associated gardens which are managed to a low-threat state. This plot also includes the driveway which is devoid of vegetation.	

Appendix C:
Standards for Asset Protection Zones

The following standards have been extracted from the *Planning for Bushfire Guidelines* (WAPC, 2024).

Every habitable building is to be surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:

a. Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29) in all circumstances.
b. Location: the APZ should be contained solely within the boundaries of the lot on which a building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes).
c. Management: the APZ is managed in accordance with the requirements of '*Standards for Asset Protection Zones*' (below):

• Fences within the APZ:

  - Should be constructed from non-combustible materials or bushfire-resisting timber referenced in Appendix F of AS 3959.

- Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness):

  - Should be managed and removed on a regular basis to maintain a low threat state.

  - Should be maintained at <2 tonnes per hectare (on average).

  - Mulches should be non-combustible (e.g. stone, gravel or crushed mineral earth) or wood mulch >6 millimetres in thickness.

- Trees (>6 metres in height):

  - Trunks at maturity should be a minimum distance of six metres from all elevations of the building;

  - Branches at maturity should not touch or overhand a building or powerline.

  - Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation.

  - Canopy cover within the APZ should be <15 per cent of the total APZ area.

  - Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.

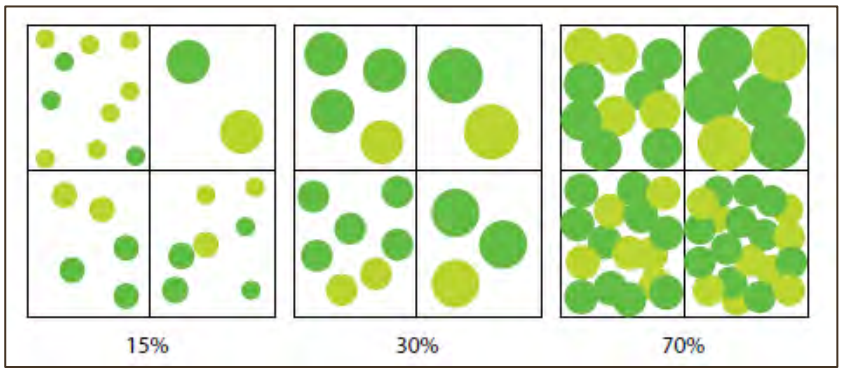

Figure 7: Illustrated tree canopy cover projection (WAPC, 2021)

- Shrub and scrub 0.5 metres to six metres in height (shrub or scrub >6 metres in height are to be treated as trees):
    - Should not be located under trees or within three metres of buildings.
    - Should not be planted in clumps >5 square metres in area.
    - Clumps should be separated from each other and any exposed window or door by at least 10 metres.
- Ground covers <0.5 metres in height (ground covers >0.5 metres in height are to be treated as shrubs):
    - Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above.
    - Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
- Grass:
    - Grass should be maintained at a height of 100 millimetres or less, at all times.
    - Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
- Defendable space:
    - Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.

- LP Gas Cylinders:
    - Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building.
    - The pressure relief valve should point away from the house.
    - No flammable material within six metres from the front of the valve.
    - Must site on a firm, level and non-combustible base and be secured to a solid structure.

ADDITIONAL NOTES

The Asset Protection Zone (APZ) is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level. Hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot.

The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

Plant flammability, landscaping design and maintenance should also be considered for trees, shrub, scrub and ground covers with the APZ. Please refer to explanatory notes '*E2 Managing an Asset Protection Zone (APZ) to a low threat state*,' '*E2 Landscaping and design of an asset protection zone*,' and '*E2 Plant flammability*' in the Guidelines for further information relating to APZ standards.

Appendix D:
Vehicular access technical requirements (WAPC, 2024)

Technical requirements	Public road	Emergency access way[1]	Fire service access route[1]	Battle-axe and private driveways[2]
Minimum trafficable surface (m)	In accordance with A3.1	6	6	4
Minimum horizontal clearance (m)	N/A	6	6	6
Minimum vertical clearance (m)	4.5			
Minimum weight capacity (t)	15			
Maximum grade unsealed road3	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum grade sealed road3	As outlined in the IPWEA Subdivision Guidelines	1:7 (14.3%)		
Maximum average grade sealed road	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Minimum inner radius of road curves (m)	As outlined in the IPWEA Subdivision Guidelines	8.5		

[1]To have crossfalls between 3 and 6%

[2]Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

[3]Dips must have no more than a 1 in 8 (12.5% - 7.1 degree) entry and exit angle.

Appendix D

Transport Impact Statement

Narrogin Battery Energy Storage System

Transport Impact Statement

Narrogin BESS Development Pty Ltd

04 December 2024

→ **The Power of Commitment**



Project name		Narrogin BESS					
Document title		Narrogin Battery Energy Storage System | Transport Impact Statement					
Project number		12638490					
Document number		12638490-REP-A_Narrogin Battery Energy Storage System Transport Impact Statement					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	S McDermott	S Barlow		M Lavery	On File	30/07/24
S3	A	S McDermott	S Barlow		M Lavery	On File	4/12/24

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Abbreviations

Abbreviation	Term referred
ACH Act	*Aboriginal Cultural Heritage Act 2021*
AH Act	*Aboriginal Heritage Act 1972*
AHD	Australian Height Datum
APZ	Asset Protection Zone
BESS	Battery energy storage system
DE	Development Envelope
DFES	Department of Fire and Emergency Services
DPLH	Department of Planning, Lands and Heritage
EPA	Environmental Protection Authority
EP Act	*Environmental Protection Act 1986 (WA)*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
HWL	High wide load
Km/h	Kilometres per hour
LPP	Local Planning Policy
MNES	Matters of National Environmental Significance
MRWA	Main Roads Western Australia
OSOM	Over size over mass
PD Act	*Planning and Development Act 2005*
SPP	State Planning Policy
TIA	Transport Impact Assessment
TIS	Transport Impact Statement
vph	Vehicles per hour
vpd	Vehicles per day
WA	Western Australia, Australia
WAPC	Western Australian Planning Commission

1. Introduction

GHD Pty Ltd (GHD) acts on behalf of Narrogin BESS Development Pty Ltd and South Energy, acting as the development manager (herein 'South Energy'), the proponent of the Narrogin Battery Energy Storage System (BESS), in preparing this Transport Impact Statement (TIS). The TIS has been prepared to support an application for development approval (DA) for the Narrogin BESS, proposed to be located on at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the project).

The proposed BESS is located at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the site). Stage 1 of the project comprises one 200MW / 800MWh BESS facility, with supporting substation control building, operations and maintenance shed and laydown and facilities area. The BESS is proposed to connect to an existing Western Power substation on the adjacent land parcel at Lot 8 (No. 153) Booth Street, Narrogin Valley. Two future expansions stages (stage 2 and 3) are also planned, with the footprints of each expansion indicated on the development plans.

1.1 Purpose of this report

The purpose of this report is to demonstrate that the project is consistent with the WAPC's *Transport Impact Assessment Guidelines (Volume 4 – Individual developments)*.

1.2 Scope and limitations

This report has been prepared by GHD for Narrogin BESS Development Pty Ltd and may only be used and relied on by Narrogin BESS Development Pty Ltd for the purpose agreed between GHD and Narrogin BESS Development Pty Ltd. GHD otherwise disclaims responsibility to any person other than Narrogin BESS Development Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by South Energy which GHD has not independently verified or checked beyond the agreed scope of works. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.3 Level of Transport Impact Assessment

This assessment has been prepared in accordance with the WAPC's *Transport Impact Assessment Guidelines (Volume 4 – Individual developments)*.

Given the project is forecast to generate fewer than 100 vehicle trips at its operational peak hour, it is deemed to have a moderate level of transport impact, meaning the level of assessment required by the WAPC Guidelines is a Transport Impact Statement (TIS). This is outlined in Figure 1, an excerpt from the abovementioned WAPC Guidelines.

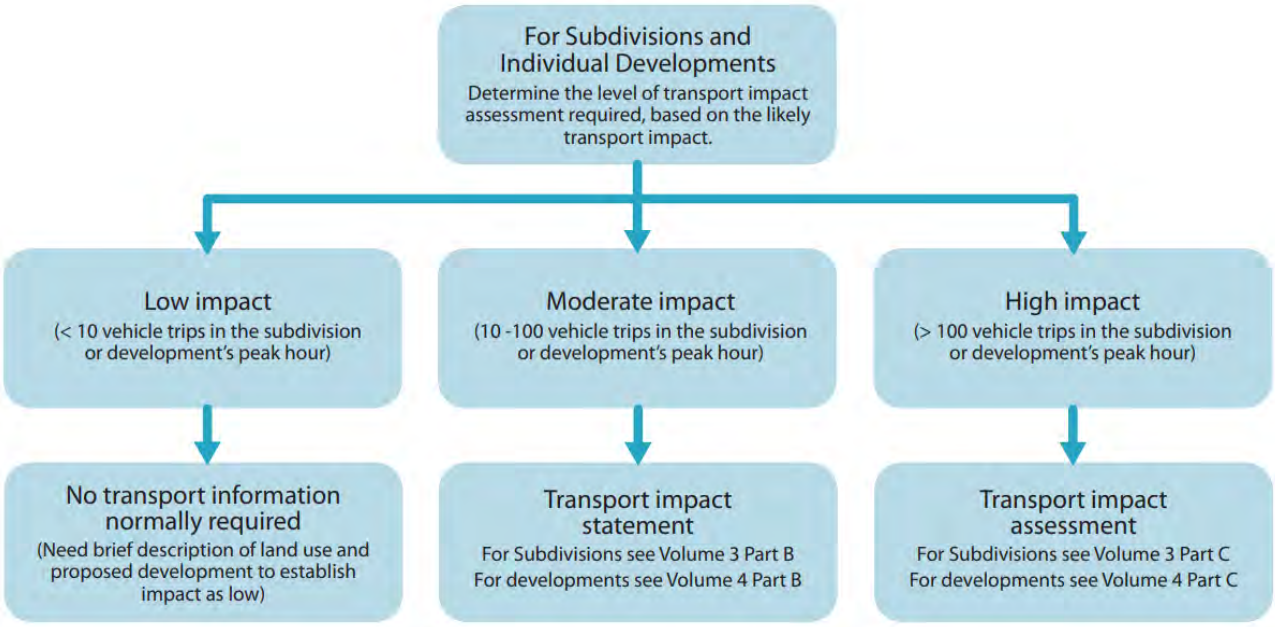


Figure 1 Level of assessment required chart (source: WAPC)

In accordance with the WAPC Guidelines, this TIS will cover the following elements:

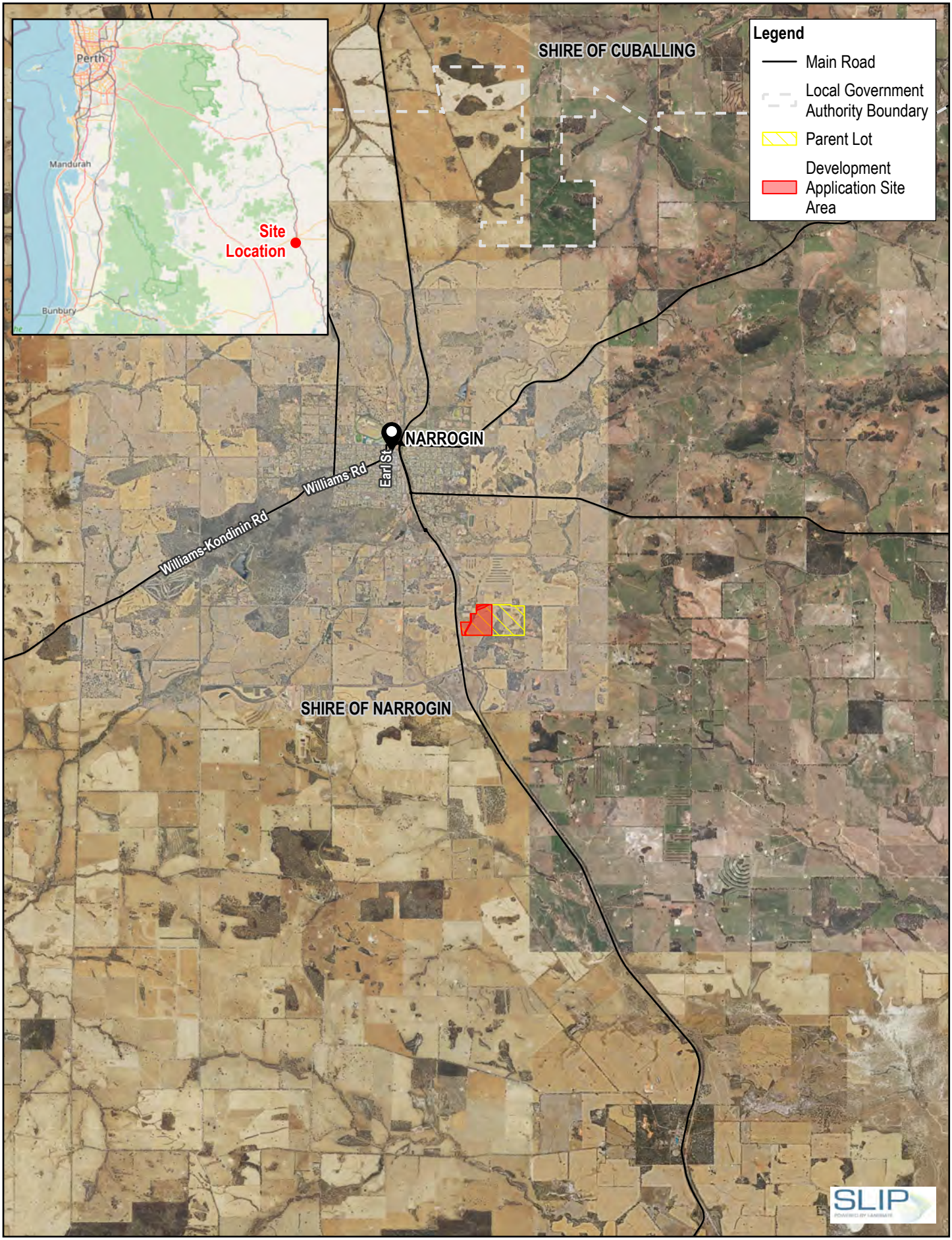
- Proposed development;
- Vehicle access and parking;
- Provision for service vehicles;
- Hours of operation;
- Daily traffic volumes and vehicle types;
- Traffic management on frontage streets;
- Public transport access;
- Pedestrian access;
- Cycle access and end of trip facilities;
- Site specific issues; and
- Safety issues.

2. Land & location

The project is to be constructed in the Shire of Narrogin (the Shire) local government area. The project site comprises one land parcel, Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the site), which is described in detail in section 2.1 below.

The site is approximately 3 kilometres southeast of the centre of the Narrogin Townsite, surrounded by rural land characterised by agricultural land uses, rural residences, and fragmented remnant vegetation. Figure 2 shows Lot 9 in its regional context. The location of the project in its local context is provided in Figure 3.

The site is accessed via Narrogin Valley Road, which leads to the Narrogin Townsite to the north via Booth Street. The Great Southern Highway runs north-south to the West of Booth Street, not directly accessible from the site.



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0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

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Narrogin BESS Development Pty Ltd
South Energy Narrogin BESS

Project No. **12638490**
Revision No. **0**
Date **04/12/2024**

Regional Context

FIGURE 1

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Data source: Landgate_Subscription_Imagery\WANow: OpenStreetMap: © OpenStreetMap (and) contributors, CC-BY-SA. Created by: klabez



Paper Size ISO A4

0 150 300 450 600

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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South Energy Narrogin BESS

Project No. **12638490**
Revision No. **0**
Date **04/12/2024**

Site Context

FIGURE 2

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2.1 Lot Details

The project site comprises the land parcel described in Table 1.

Table 1 Site description

Land ID	Lot on Plan	Vol/Folio	Description	Registered Owner	Area
1274777	Lot 9 on D067821	1702/85	76 Narrogin Valley Road, Narrogin Valley 6312	Roy Kenneth John McLeod	68.7 hectares

3. Proposal description

This TIS supports an application to commence development of a BESS facility located on the site, comprising the installation of a 200MW/800MWh BESS with supporting substation control building, operations and maintenance shed, and laydown and facilities area. The BESS is proposed to connect to an existing Western Power substation on the adjacent land parcel at Lot 8 (No 153) Booth Street, Narrogin Valley.

The project may include two (2) subsequent stages, each comprising 200MW / 800MWh BESS facilities, however, development approval is sought for Stage 1 works only. This TIS addresses Stage 1 works only.

3.1 Workforce

3.1.1 Construction

Details for the construction of the project are not certain due to the project still being in its development approval phase. Construction and operational information will be further considered during the building permit phase as part of a construction management plan developed in conjunction with the construction contractor. However, preliminary information for the expected characteristics of Stage 1 construction is summarised below:

– Expected 20-month construction period (with 2 months contingency)
– A workforce of up to 100 persons on-site (approximate) during the peak construction period
– Construction up to 7 days a week on a 7 am to 7 pm staggered shift arrangement
– Expected minimum on-site parking for 40 light vehicles to accommodate the construction workforce
– Up to 30 truck movements at the site are expected per day (one-way) at peak construction
– Remaining portions of the construction workforce to arrive at the site via 10-seat bus/coach operated from the town of Narrogin. Bus service frequency is expected to reach approximately 15 one-way trips per day during peak construction
– Delivery vehicles used to transport large and heavy equipment will mostly be semi-trailers with the occasional B-Double

The proponent will engage with Main Roads Western Australia (MRWA) regarding permit requirements for any construction movement via high wide load (HWL) or over size over mass (OSOM) vehicles.

Project components are expected to arrive via the Fremantle Port. The majority of the construction workforce is expected to be accommodated in the Shire of Narrogin and surrounding local government areas during works.

Similar construction characteristics are expected for subsequent project stages.

3.1.2 Operational workforce

Once commissioned, the project is expected to operate under the following characteristics:

– the project is expected to generate the need for a skilled industrial workforce of approximately four full time staff, for rolling maintenance and troubleshooting activities. It is anticipated that two staff will be on site at any one time

– The forecast daily traffic generation during daytime operation will be approximately eight vehicles, two-way, per day
– Major maintenance activities will result in additional persons present on-site

3.2 Site access

Th primary access point to the project will be via Narrogin Valley Road during both construction and operation.

Access will be designed to accommodate the largest design vehicle and to allow vehicles to enter without conflicting with vehicles exiting the site.

A secondary access point will be provided on Mellons Road.

4. Existing transport network

4.1 Road hierarchy

The road hierarchy surrounding the project has been obtained from the MRWA *Road Information Mapping System* and is shown in Figure 4. Booth Street and Narrogin Valley Road are Access Roads under the control of the Shire of Narrogin. The Great Southern Highway to the west of the site, is a Primary Distributor Road under the control of MRWA.

4.2 Speed limits

The speed limit on roads surrounding the site has been obtained from the MRWA *Road Information Mapping System* and is shown in Figure 5. The speed limit on Booth Street, Narrogin Valley Road and the Great Southern Highway is 110 km/h.



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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Narrogin BESS Development Pty Ltd
South Energy Narrogin BESS

Project No. **12638490**
Revision No. **0**
Date **04/12/2024**

Road Hierarchy

FIGURE 5

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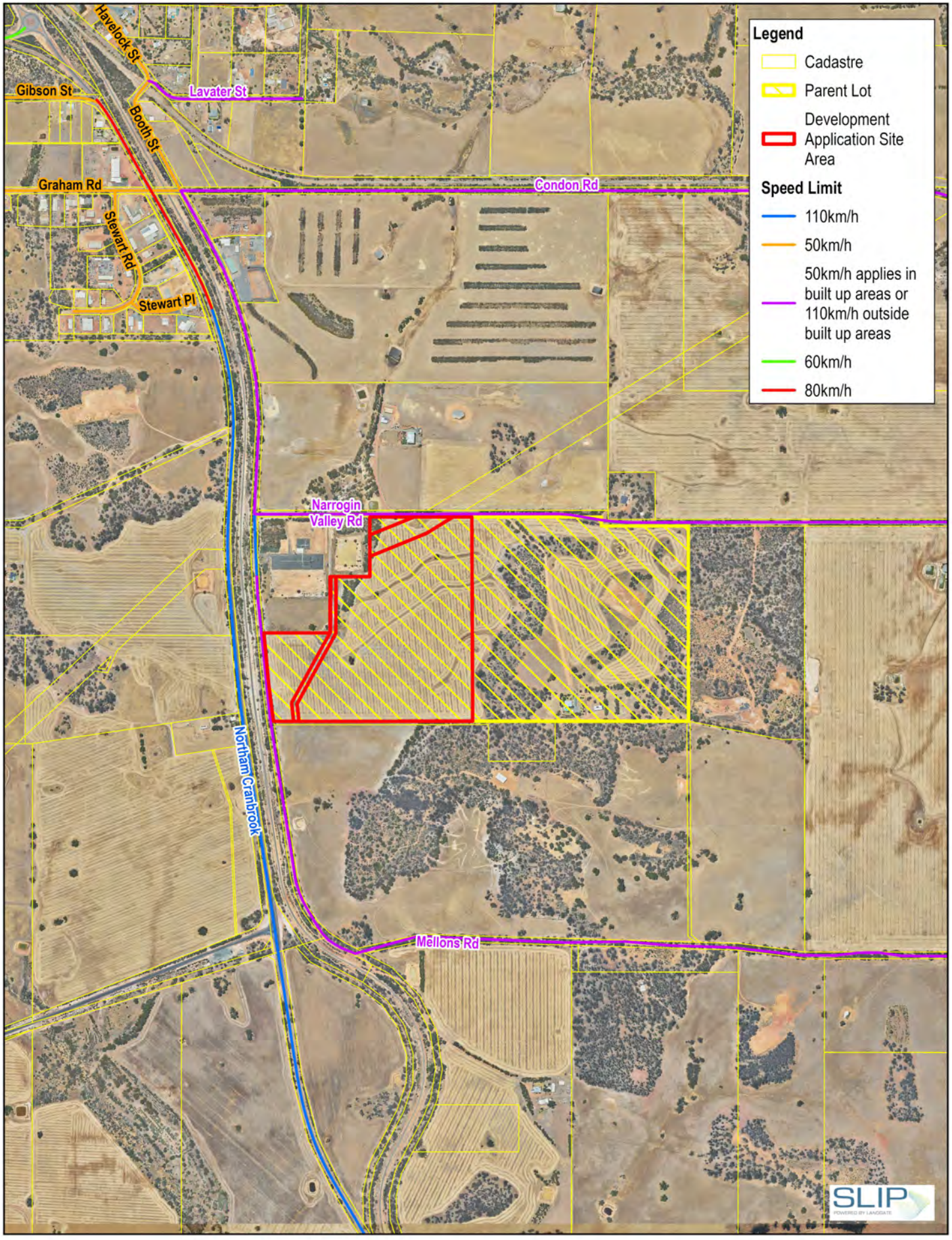

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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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South Energy Narrogin BESS

Project No. 12638490
Revision No. 0
Date 04/12/2024

Existing Speed Limit

FIGURE 6

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4.3 Road description

4.3.1 Narrogin Valley Road

Narrogin Valley Road is a single carriageway, two lane road with narrow unsealed shoulders. Narrogin Valley Road is approximately 6.5 metres (m) wide. The road is classified as a Local Distributor.

In accordance with the *Main Roads WA Road Hierarchy for Western Australia Road Types and Criteria*, anticipated volumes on a Local Distributor in a non-built-up area is 100 vehicles per day (vpd).

4.3.2 Booth Street

Booth Street is a single carriageway, two lane road with narrow, sealed shoulders. Booth Street is approximately 6.5 m wide. The road is classified as a Local Distributor.

In accordance with the *Main Roads WA Road Hierarchy for Western Australia Road Types and Criteria*, anticipated volumes on a Local Distributor in a non-built-up area is 100 vpd.

4.4 Public transport network

There is no direct public transport service to the site. To travel from Perth or Albany would require boarding a TransWA coach to Narrogin, then a taxi to the site.

4.5 Pedestrian and cycling network

There are no bicycle or pedestrian paths adjacent to the site.

4.6 Safety issues - crash analysis

A review of the MRWA *Crash Analysis Reporting System* (CARS) for the five-year period from 1 January 2019 to 31 December 2023 found two reported crashes in the vicinity of the site, both property damage only (PDO) Major. One occurred at night. Details are shown in Figure 6.

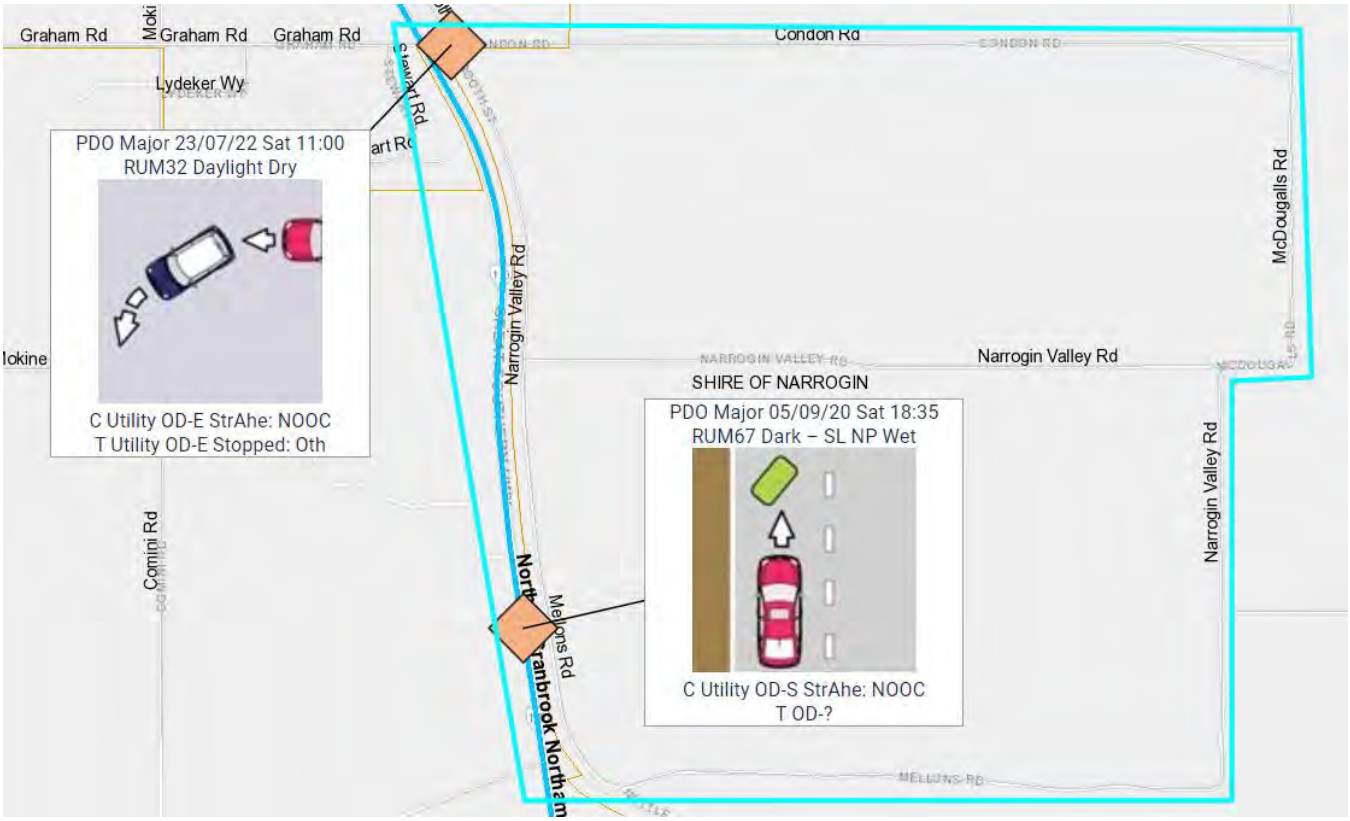

Figure 6 Collision diagram (source: MRWA)

The crash history does not indicate a significant safety issue on the road network surrounding the site.

4.7 Restricted access vehicle (RAV) network

A review of the MRWA RAV Network Map confirms that Narrogin Valley Road is part of the RAV network, as shown in Figure 7.

Great Southern Highway is classified as Tandem Drive Network 7, supporting trucks up to 36.5 m in length.

Narrogin Valley Road and Booth Street are classified for Tandem Drive Network 4, supporting trucks to 27.5 m with conditions:

- Headlights to be switched on at all times
- No operation on unsealed road segments when visibly wet, without road owner's (the Shire) approval
- Maximum speed 40 km/h
- When travelling at night, the RAV must travel at a maximum speed of 40km/h and display an amber flashing warning light on the prime mover

  Direct radio contact must be maintained with other restricted access vehicles to establish their position on or near the road (suggested UHF channel 40)

Booth Street provides RAV access to Great Southern Highway at the Condon Road intersection approximately 1.3km northwest of the site.



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Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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Revision No. **0**
Date **04/12/2024**

RAV Network

FIGURE 7

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4.8 Existing traffic volumes

4.8.1 Road network traffic volumes

Traffic volumes for the surrounding transport network were compiled from publicly available MRWA traffic count data. Only limited information is available, as shown in Figure 8. This indicates 1,068 vpd (2022) on Great Southern Highway. The data provides a total count of vehicles traveling in both direction (i.e. two way), based on average Monday to Sunday counts. Local roads will carry low traffic volumes anticipated less than 100 vpd.

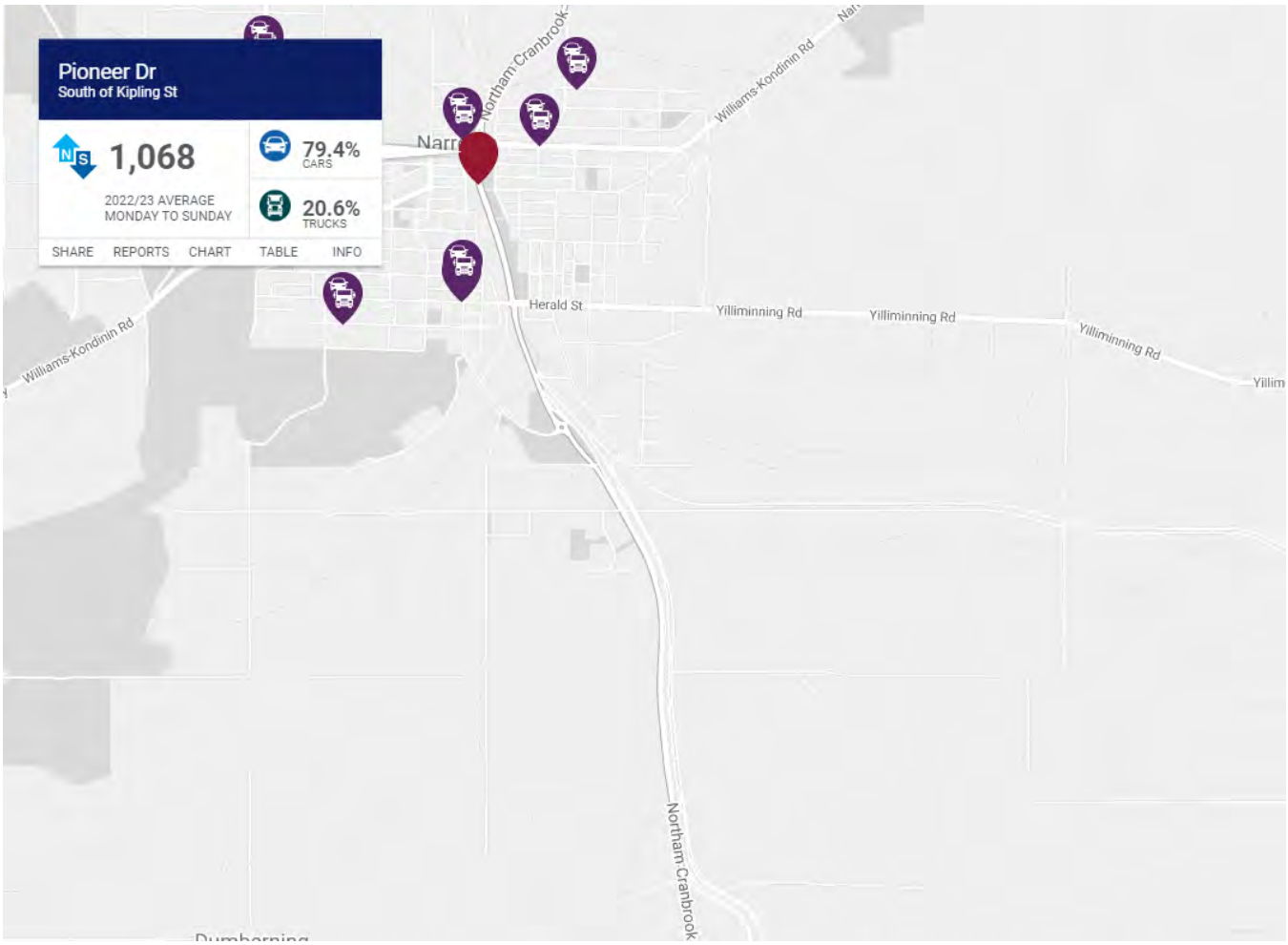

Figure 8 *Existing traffic volumes (source: MRWA)*

5. Stakeholder engagement

5.1 Main Roads WA

Contact was made with MRWA in July 2024, seeking comments on preliminary transport considerations associated with the project. MRWA (Network Manager Narrogin Region) provided the following response:

"Thank you for contacting Main Roads. For the new development, Main Roads will request a Traffic Impact Assessment (TIA) or Traffic Impact Statement (TIS). I believe GHD is preparing the TIS for Stage 1. Once the TIS is completed, please send it to us for review and comments. Main Roads has existing traffic data available on Traffic Maps, and the RAV network status on Main Roads and local roads can be checked on the HVS network map. I am not aware of any traffic issues through this section, except for Condon Road and Booth St, which are restricted to N4. I have cc'ed Gren Putland, our Network Operations Manager, in case he has any further comments."

5.2 Shire of Narrogin

The Shire of Narrogin was contacted in July 2024 by email, seeking input from a traffic perspective. The Shire's Executive Manager Technical and Rural Services provided the following response:

"Not aware of any other developments in the area. We don't have any traffic data for Narrogin Valley Road; however it is a very low volume road."

6. Traffic generation and assessment

6.1 Construction traffic impacts

6.1.1 Road network capacity

The availability of existing traffic volumes on the surrounding road network is limited, however traffic volume on Great Southern Highway is approximately 1,070 vpd two-way, 21% of which is commercial in nature. In accordance with the *MRWA Supplement to Austroads Guide to Road Design* and *Road Reserves Review* the estimated design capacity of Great Southern Highway as a Primary Distributor Road is between 8,000 and 12,000 vpd.

The volume of existing traffic on Narrogin Valley Road and Booth Street is anticipated to be low, less than 100 vpd. As a Local Distributor in an urban developed area, anticipated volumes are up to 6,000 vpd and 100 vpd in a non-urban area, in accordance with MRWA's *Road Hierarchy for Western Australia Road Types & Criteria*.

The project (construction) is forecast to generate up to approximately 210 vpd two-way during the peak construction activity period (late 2025/early 2026), comprising 105 vpd in and 105 vpd out. As the capacity of the surrounding road network is not forecast to be exceeded by the project, no upgrade measures are proposed.

6.1.2 Intersection capacity

It is expected that all project-related traffic will originate in, or transit through, the Narrogin townsite along Great Southern Highway, Booth Street and Narrogin Valley Road.

Peak hour traffic movements at the Great Southern Highway/Condon Road/Booth Street intersections are expected to occur at 05:45-06:45 and 15:00-16:00, with the greatest volumes at up to approximately 100 vph in late 2025 during the construction phase.

Intersection traffic movement data are not available, however no significant impacts are anticipated based on forecast traffic volume. No further measures are proposed to increase intersection capacity for construction purposes.

6.1.3 Preliminary swept path analysis (19 m semi-trailer) – Great Southern Highway/Condon Road/Booth Street

A preliminary swept path analysis for a 19 m semi-trailer was undertaken for the Great Southern Highway/Condon Road/Booth Street intersection (refer Figure 9). The preliminary analysis is based on aerial imagery.

The analysis shows a 19 m semi-trailer may not be able to turn lane correct, however two opposing 19 m trucks are able to pass each other.

As the route is currently rated for RAV Network 4 vehicles (B-Doubles to 27.5 m) and the frequency of semi-trailers for the project construction is relatively low, no upgrades to the intersection are proposed. Ad hoc traffic management could be undertaken as required in view of the infrequent movements of larger vehicles.



Figure 9 *Great Southern Highway/Condon Road/Booth Street preliminary swept path analysis – 19 m semi-trailer*

6.1.4 Preliminary swept path analysis (B-Double) – Great Southern Highway/Condon Road/Booth Street

A preliminary swept path analysis for a B-Double was undertaken for the Great Southern Highway/Condon Road/ Booth Street intersection (refer Figure 10). The preliminary analysis is based on aerial imagery.

The analysis shows a B-Double may not be able to turn lane correct. As the route is currently rated for RAV Network 4 vehicles (B-Doubles to 27.5 m) and the frequency of semi-trailers for the project construction is relatively low, no upgrades to the intersection are proposed. Ad hoc traffic management could be undertaken as required in view of the infrequent movements of larger vehicles.



Figure 10 *Great Southern Highway/Condon Road/Booth Street preliminary swept path analysis – B-Double*

6.1.5 Preliminary swept path analysis (19 m semi-trailer) – Booth Street/Narrogin Valley Road

A preliminary swept path analysis for a 19 m semi-trailer was undertaken for the Booth Street/Narrogin Valley Road intersection (refer Figure 11). The preliminary analysis is based on aerial imagery.

The analysis shows a 19 m semi-trailer may not be able to turn lane correct and as a result, road upgrades / widening could be investigated to improve accommodation of construction vehicle movements.

However, as the route is currently rated with conditions for RAV Network 4 vehicles (B-Doubles to 27.5 m), it is proposed that appropriate ad hoc traffic control measures would be sufficient to minimise impacts to other traffic at the intersection. The *Main Roads WA Standard Restricted Access Vehicle Route Assessment Guidelines* allows for wheel paths to cross the centre line of roads if the sight distances in all directions at the intersection are adequate. A land survey should be undertaken to confirm sightlines at the intersection.

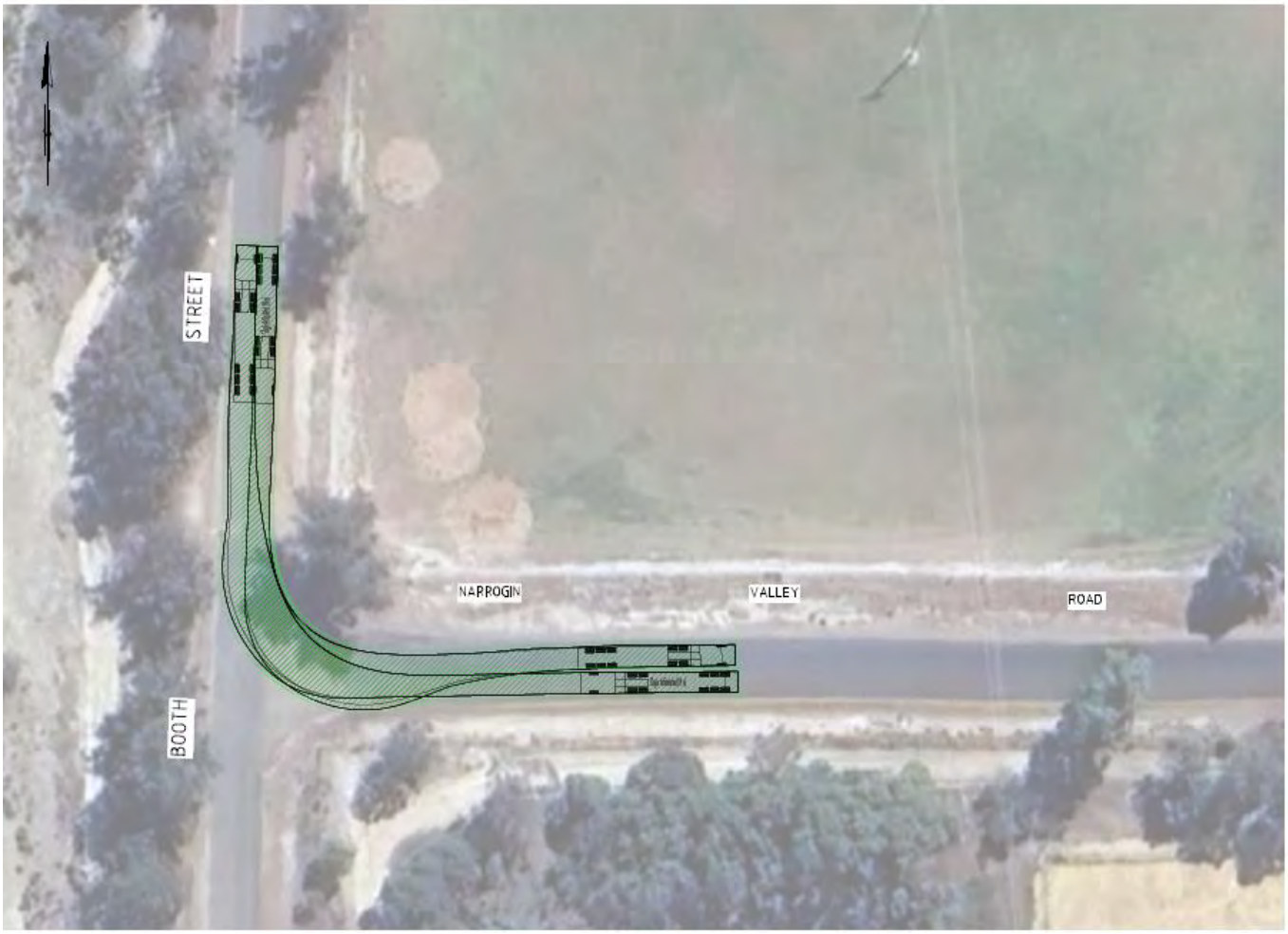

Figure 11 Booth Street/Narrogin Valley Road preliminary swept path analysis – 19 m semi-trailer

6.1.6 Preliminary swept path analysis (B-Double) – Booth Street/Narrogin Valley Road

A preliminary swept path analysis for a B-Double was undertaken for the Booth Street/Narrogin Valley Road intersection (refer Figure 12). The preliminary analysis is based on aerial imagery.

The analysis shows a B-Double cannot turn lane correct. The frequency of B-Doubles accessing the site is anticipated to be low (occasional only). It is proposed that appropriate ad hoc traffic control measures would be sufficient to minimise impacts to other traffic at the intersection.

Should upgrades to the intersection be undertaken to allow a lane correct turn movement of 19 m semi-trailer vehicles as stated above, this will evidently assist in improving B-Double access as well.

MRWA approval should be sought for construction access movements via HWL or OSOM vehicles. Proponents are required to complete and submit an application form to the appropriate MRWA office prior to undertaking any work within affected road reserves.



Figure 12 Booth Street/Narrogin Valley Road swept path analysis – B-Double

6.1.7 Swept path analysis (B-Double and sight distance) – project site access and internal roads

At the detailed design phase, a swept path analysis should be undertaken for a B-Double at the site access point, to ensure the largest vehicle is accommodated.

Sight distances are commensurate with the design speed of the relevant road. A minimum sight distance of 2.5 m x 153 m - 190 m should be available as the design speed of Narrogin Valley Road is 110 km/h adjacent to the site, based on Australian Standard *AS 2890.1- 2004 Parking Facilities - Off-street car parking (AS2890.1)*.

Access will be designed to accommodate the largest design vehicle and to allow vehicles to enter without conflicting with vehicles exiting the site. The internal project roads are to be designed to allow the largest design vehicle to be able to enter and leave the site in a forward direction.

6.1.8 On-site parking and laydowns

All parking requirements associated with the construction phase and turning and manoeuvring areas for delivery laydowns will be accommodated within the site.

The ultimate number of vehicles accessing and parking at the site during construction is subject to further refinement at the building permit phase, however, it is expected that parking for up to approximately 50 light vehicles (workforce) will be provided on site, expected to accommodate up to 100 workforce personnel. Remaining personnel will be transported by 10-seat bus/coach. Allowance for light vehicles, and bus/coach parking as permanent or temporary parking bays to accommodate the anticipated volume of peak construction traffic will be made on the site for the construction period.

6.1.9 Waste collection

Waste collection turning and manoeuvring areas will be accommodated within the site, specifically in close proximity to the project. Waste disposal will be managed by the project operator.

6.1.10 Safety considerations

As the existing road network is fit-for-purpose and capable of accommodating construction traffic associated with the project, safety considerations are minimal.

Section 4.7 identifies the conditions relating to RAV access on Booth Street and Narrogin Valley Road, which will be followed at all times.

A Traffic Management Plan (TMP) will be prepared to ensure construction traffic accounts for any potential restrictions imposed by the Shire (if any).

6.2 Operational traffic impacts

6.2.1 Road network capacity

The project is forecast to generate up to eight vpd during operation at peak activity (four in/four out), with some additional vehicles during routine maintenance. During the operation of the project, the eight vpds are forecast to access and depart the site using the Great Southern Highway.

Forecast traffic volumes during operation added to current volumes of traffic are significantly below the maximum capacity of the existing road network. No upgrade measures are proposed for the road network to support project operations.

6.2.2 Intersection capacity

The Great Southern Highway/Condon Road/Booth Street intersections are currently Stop sign controlled. No further measures are proposed for intersection capacity improvement.

6.2.3 Access/entry crossover and internal roads

Details of the permanent access / entry crossover will be finalised at the detailed design phase, to be constructed at a suitable location on Narrogin Valley Road, achieving a sight distance commensurate with the speed limit of 110km/h.

A sealed two-way crossover is proposed to provide permanent access to the project. The access should be designed to accommodate the swept path for the design vehicle.

The internal roads on the site are to be designed to allow the largest design vehicle to be able to enter and leave the site in a forward direction.

6.2.4 On-site parking

Commercial operations are proposed to start in mid-2027 and plant will operate seven days a week, 24 hours per day.

Parking for all light vehicles is proposed in close proximity to the operations and maintenance facility. Car parking will be designed in accordance with Australian Standard *AS 2890.1- 2004 Parking Facilities - Off-street car parking* (AS2890.1).

The Shire's Local Planning Scheme No. 3 (LPS No. 3) or local planning policies do not contain a land use term or provide parking requirements for a BESS facility. The ultimate number of onsite parking bays will be confirmed at the detailed design phase, however, as a guide, 1 bay will be provided per employee plus 2 bays for visitor parking.

6.2.5 Safety considerations

As the project will generate minimal traffic during operation, it is not anticipated to increase safety considerations on the surrounding road network. As the existing road network is fit-for-purpose and capable of accommodating operational traffic associated with the project, safety considerations are minimal.

Internal access roads and parking will be designed to the relevant Australian Standards and to accommodate the swept path of the largest design vehicle. The design of the internal roads and intersections will be undertaken at the detailed design phase.

7. Conclusion

This TIS has been prepared for the development of the project at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley in the Shire of Narrogin local government area.

Details for the construction of the project are not certain due to the project still being in its development approval phase. Construction and operational information will be further considered during the building permit phase as part of a construction management plan developed in conjunction with the construction contractor.

Based on early-phase calculations, construction is forecast to generate up to approximately 210 vpd two-way during the peak construction activity period (late 2025/early 2026), comprising 105 vpd in and 105 vpd out. As the capacity of the surrounding road network is not forecast to be exceeded by the project, no capacity upgrade measures are proposed.

Forecast traffic volumes during operation, (approximately eight vpd), added to current volumes are significantly below the maximum capacity of the existing road network during operation of the development. No upgrade measures are proposed for the road network to support operations.

All parking associated with construction and with the operation of the project will be provided on site. Site access arrangements and onsite parking and internal roads will be designed to the relevant Australian Standards to accommodate the design vehicle.

Based on the preliminary swept path analysis for a 19 m semi-trailer, the Booth Street/Narrogin Valley Road intersection could be upgraded/widened to allow the vehicle to turn lane correct. Improvements would also benefit the swept path for a B-Double. Notwithstanding, it is noted that the *Main Roads WA Standard Restricted Access Vehicle Route Assessment Guidelines* allows for wheel paths to cross the centre line of roads if the sight distances in all directions at the intersection are adequate. Sight distances should be confirmed by land survey data, to confirm that ad hoc traffic control measures are sufficient to minimise impacts to other traffic at the intersection.

Any impacts associated with construction traffic can be managed through the preparation of a Traffic Management Plan (TMP), endorsed by MRWA and the Shire prior to construction. The TMP would establish safe working parameters at the site access to ensure any impacts are ameliorated.

8. Recommendations

The following recommendations are proposed based on this TIS:

1. A TMP be developed that considers management of construction activity.
2. Construction and operational access to the project are designed based on the largest design vehicle.
3. Any proposed crossovers, parking and internal roads are designed, constructed, sealed, and drained in accordance with the relevant Australian Standards. All parking associated with construction and with the operation of the project be contained on-site.
4. Ad hoc traffic control measures are planned for in the TMP and utilised where required to minimise impacts from large and oversized vehicles to other traffic at intersections.

5. A land survey is undertaken as part of the TMP to confirm sightlines at the Booth Street/Narrogin Valley Road intersection to confirm that sight distances are adequate for wheel paths of a 19 m semi-trailer to safely cross the centre line of the road.
6. At the detailed design phase, a swept path analysis is undertaken for a B-Double at the site access point, to ensure the largest vehicle is accommodated.
7. MRWA is contacted regarding permit requirements for any construction movement via HWL or OSOM vehicles. Any significant campaign cartage activities or significant volumes of personnel movements should be discussed with MRWA.

9. References

8. MRWA – Road Information Mapping System
9. MRWA – RAV Mapping Tool
10. MRWA – Crash Analysis Reporting System
11. MRWA - Traffic Map
12. AS 2890.1- 2004 Parking Facilities - Off-street car parking (AS2890.1).
13. Main Roads WA; Road Hierarchy for Western Australia Road Types and Criteria
14. Road Reserves Review, Department of Planning, Lands and Heritage
15. MRWA Supplement to Austroads Guide to Road Design - Part 3 - Geometric Design
16. MRWA Standard Restricted Access Vehicle Route Assessment Guidelines

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The Power of Commitment

Appendix E

Hydrology Assessment

Narrogin Battery Energy Storage

Hydrology Assessment

Narrogin BESS Development Pty Ltd

04 December 2024

→ **The Power of Commitment**



Project name		Narrogin BESS					
Document title		Narrogin Battery Energy Storage | Hydrology Assessment					
Project number		12638490					
Document number		12638490-REP-A_Hydrology Assessment – Narrogin BESS					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	K Abrenica T Allen	N Gamage	On file	M Lavery	On file	30/07/24
S4	A	K Abrenica T Allen	N Gamage	On file	M Lavery	On file	04/12/24

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Abbreviations

Table 1 Abbreviations Used

Abbreviation	Term Referred
AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ARR	Australian Rainfall and Runoff
ASS	Acid Sulfate Soils
BAM Act	State Biosecurity and Agriculture Management Act 2007
BC Act	Biodiversity Conservation Act 2016
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
CL	Continuing Loss
DA	Development Application
DBCA	Department of Biodiversity, Conservation and Attractions
DPIRD	Department of Primary Industries and Regional Development
DPLH	Department of Planning, Lands, and Heritage
DWER	Department of Water and Environmental Regulation
ELA	Eco Logical Australia
ELVIS	Elevation Information System
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
IFD	Intesity-Frequency-Duration
IL	Initial Loss
WA	Western Australia
WAPC	Western Australian Planning Commission
MWh	MWh Megawatt hour
MW	MW Megawatts
WoNS	Weed of National Significance
SLIP	Shared Land Information Platform
SWIS	South West Interconnected System

Definitions

Table 2 Defined Terms

Term	Definition
BESS facility	The Battery Energy Storage System (BESS) is a type of energy storage system comprising rechargeable batteries and associated infrastructure used to import and export energy into the SWIS.
m^3/s	Cubic meters per second is the measurement of flow rate used in this study for rainfall runoff and peak flows.
QGIS	QGIS is a geographic information system (GIS) application that allows viewing, editing, printing, and analysis of geospatial data.

Term	Definition
IL and CL	Initial Loss and Continuing Loss are losses applied to rainfall in hydrologic modelling. This is a common modelling approach taken in hydrology. Values are often derived for use for rural catchments from a national datahub that has been prepared by Geoscience Australia.

1. Introduction

GHD Pty Ltd (GHD) acts on behalf of Narrogin BESS Development Pty Ltd and South Energy, acting as the development manager (herein 'South Energy'), the proponent of the Narrogin Battery Energy Storage System (BESS), in preparing this Hydrology Assessment. The Hydrology Assessment has been prepared to support an application for development approval (DA) for the Narrogin BESS, proposed to be located on at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the project). The scope of the Hydrology Assessment has been limited to the proposed western lot, which is where the project will be located.

The proposed BESS is located at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the site). Stage 1 of the project comprises one 200MW / 800MWh BESS facility, with supporting substation control building, operations and maintenance shed and laydown and facilities area. The BESS is proposed to connect to an existing Western Power substation on the adjacent land parcel at Lot 8 (No. 153) Booth Street, Narrogin Valley. Two future expansions stages (stage 2 and 3) are also planned, with the footprints of each expansion indicated on the development plans.

1.1 Purpose of this report

The purpose of this Hydrology Assessment report is to outline the methodology and results of the flood footprint assessment undertaken for the site. Findings can be used to guide subsequent effective drainage management for the project.

The scope of work for the Hydrology Assessment included:

– Collection and review of relevant hydrological data, including:
  - Design rainfall depth-frequency-duration data from the Bureau of Meteorology (BoM)
  - Hydrologic data from Australian Rainfall and Runoff (ARR) Guidelines and Geoscience Australia
  - Topographic data depicting flow regimes in the area from South Energy and Geoscience Australia
– Summary of key environmental characteristics of the project site, including:
  - Climatic conditions
  - Topography, drainage, and other relevant surface water features
  - Groundwater, geotechnical conditions, soil properties, and geology
  - Downstream environmental receptors
– Assessment of resulting flood risk to the development, including:
  - Analysis of catchments, overland flow paths and streams
  - Flood modelling for the 1% AEP event to infer flood inundation and scour risk to the project site

1.2 Scope and limitations

This report has been prepared by GHD for Narrogin BESS Development Pty Ltd and may only be used and relied on by Narrogin BESS Development Pty Ltd for the purpose agreed between GHD and Narrogin BESS Development Pty Ltd and its related companies for the purpose set out in this report.

GHD otherwise disclaims responsibility to any person other than Narrogin BESS Development Pty Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring after the date that the report was prepared.

GHD has prepared this report relying on information provided by South Energy, government databases, and other consultants undertaking work within the study area. It is assumed that all provided information are reliable and up to date. The opinions, conclusions and any recommendations in this report are based on these assumptions. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared the Flood Model ("Model") for, and for the benefit and sole use of, Narrogin BESS Development Pty Ltd to support Battery Energy Storage System (BESS) facility at Narrogin flood footprint identification and must not be used for any other purpose or by any other person.

The Model is a representation only and does not reflect reality in every aspect. The Model contains simplified assumptions to derive a modelled outcome. The actual variables will inevitably be different to those used to prepare the Model. Accordingly, the outputs of the Model cannot be relied upon to represent actual conditions without due consideration of the inherent and expected inaccuracies. Such considerations are beyond GHD's scope.

The information, data and assumptions ("Inputs") used as inputs into the Model are from publicly available sources or provided by or on behalf of the Narrogin BESS Development Pty Ltd, (including possibly through stakeholder engagements). GHD has not independently verified or checked Inputs beyond its agreed scope of work. GHD's scope of work does not include review or update of the Model as further Inputs becomes available.

The Model is limited by the mathematical rules and assumptions that are set out in the Report or included in the Model and by the software environment in which the Model is developed.

The Model is a customised model and not intended to be amended in any form or extracted to other software for amending. Any change made to the Model, other than by GHD, is undertaken on the express understanding that GHD is not responsible, and has no liability, for the changed Model including any outputs.

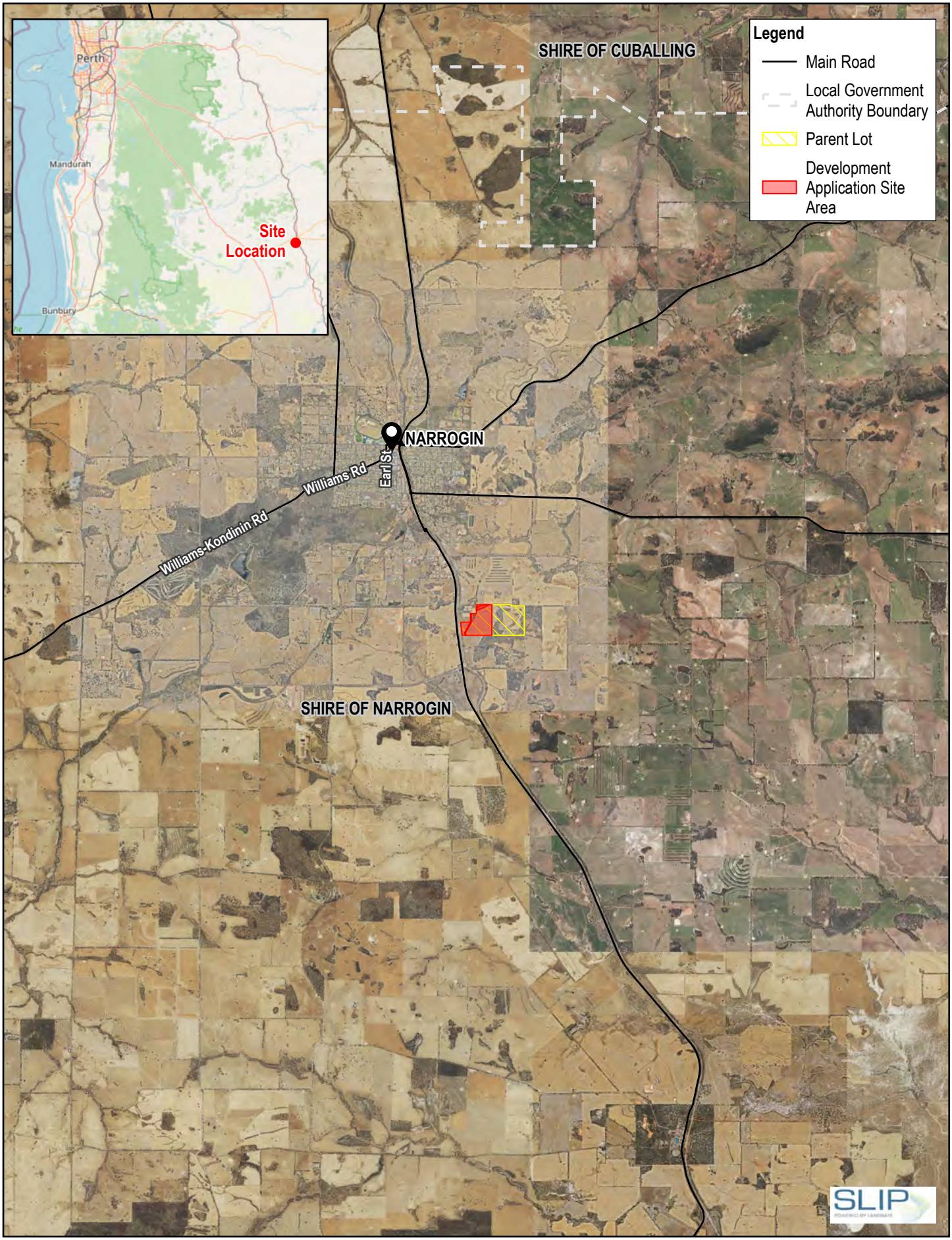
Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

2. Land & location

The project is to be constructed in the Shire of Narrogin (the Shire). The project site comprises one land parcel, Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the site), which is described in detail in Section 2.1 below. An application for the subdivision of Lot 9 has been lodged with the WAPC, proposing to effectively split the existing lot into two. The project will be located on the western lot created by the subdivision.

The site is approximately 3 kilometres southeast of the centre of the Narrogin Townsite, surrounded by rural land characterised by agricultural uses, rural residences and fragmented remnant vegetation. Figure 1 shows Lot 9 and the site in its regional context. The location of the project in its local context is provided in Figure 3.



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Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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Project No. **12638490**
Revision No. **0**
Date **04/12/2024**

Regional Context

FIGURE 1

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Data source: Landgate_Subscription_Imagery\WANow: OpenStreetMap: © OpenStreetMap (and) contributors, CC-BY-SA. Created by: klabez



Paper Size ISO A4

0 150 300 450 600

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

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Revision No. **0**
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Site Context

FIGURE 2

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Print date: 04 Dec 2024 - 15:05

Data source: Landgate_Subscription_Imagery\WANow: . . Created by: klabez

2.1 Lot Details

The project site comprises the land parcel described in Table 3.

Table 3 Site description

Land ID	Lot on Plan	Vol/Folio	Description	Registered Owner	Area
1274777	Lot 9 on D067821	1702/85	76 Narrogin Valley Road, Narrogin Valley 6312	Roy Kenneth John Mcleod	68.7 hectares

3. Site characteristics

3.1 Climate

The Shire is located within the South-Central region of Western Australia (WA) and is characterised by a Mediterranean climate with hot, dry summers, and cold, wet winters.

The closest weather station to the project site is the Narrogin Bureau of Meteorology (BoM) station (Site number: 010614). A summary of monthly climate statistics from 1891 to 2024 is shown in Figure 3.

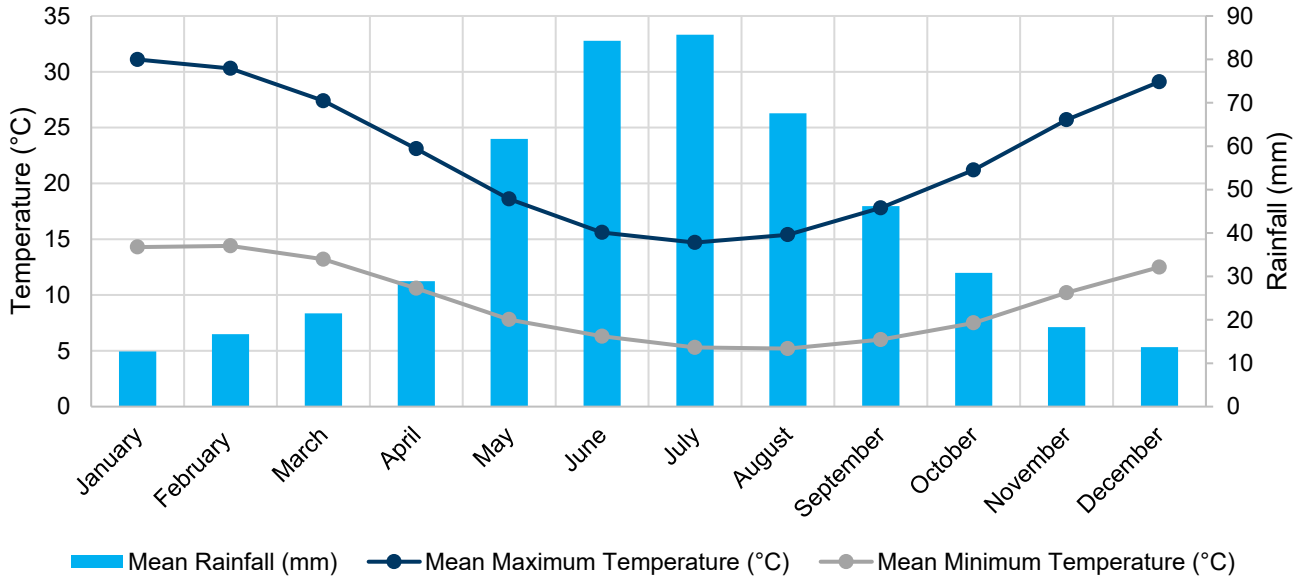

Figure 3 Narrogin climate summary

3.2 Topography

The site generally grades to the north-west, with elevations ranging from 382 m Australian Height Datum (AHD) near the south-east boundary to 352 m AHD at the northern boundary. Local topography is illustrated in Appendix A.

3.3 Geology and soils

Based on soil mapping by the Department of Primary Industries and Regional Development (DPIRD), the site is predominantly composed of saline wet soils (Soil Group 101), grey deep sandy duplex (Soil Group 403), and deep sandy gravel (Soil Group 301), shown in Appendix B.

Soil Group 101 mainly occurs in areas of secondary salinity in the wheatbelt of WA. It is prone to waterlogging and high salinity, which limits growth of most plants. Soil Group 403 is common in south-west WA, it is prone to wind erosion and known to experience waterlogging where clay is present. Soil Group 301 is commonly seen in south-west WA and areas of Jarrah forests, with high gravel content limiting its water-holding capacity. All soil types have moderate infiltration rates.

A review of the Acid Sulfate Soils (ASS) risk maps published by the Department Water and Environmental Regulation (DWER), accessible through Landgate's Shared Land Information Platform (SLIP) indicates that there is an extremely low risk of ASS occurring at the site.

3.4 Contaminated sites

A review of the Contaminated Sites Database published by DWER, accessible through Landgate's SLIP, shows that there is no recorded contamination on the site or the area surrounding it.

3.5 Groundwater

There is limited availability of groundwater data in the project area, however a groundwater study published by DPIRD in 2004 mentions issues with high salinity in Narrogin. This finding is also supported by DWER Groundwater Salinity Statewide data.

3.6 Surface water

There are no major water courses within the project site. Localised overland flow contributes to Narrogin Brook downstream.

3.7 Environment and heritage

3.7.1 Flora and fauna

Ecological Australia (ELA) was engaged by South Energy to do a reconnaissance flora and vegetation survey, basic fauna survey, and targeted black cockatoo habitat assessment in April 2024. From their study, it was found that there are a total of 23 taxa from nine families and 18 genera across the survey area. The flora families with the greatest number of species included Poaceae with five species, Myrtaceae with six species, and Asteraceae with five species.

ELA noted that there is no record of threatened species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) or *Biodiversity Conservation Act 2016* (BC Act) within the survey area. Priority tree species were found, but they were planted and not naturally occurring trees. No additional Department of Biodiversity, Conservation and Attractions (DBCA) listed Priority flora were reported. It is noted that 23 taxa, representing 69% of the total flora recorded, were introduced (weed) species which are not listed as Weed of National Significance (WoNS) or Declared Pests under the *Biosecurity and Agriculture Management Act 2007* (BAM Act).

For fauna, the survey recorded a total of 14 vertebrate fauna species (with two introduced), which comprised 10 birds, 3 mammals and 1 reptile. There are no threatened species listed under the EPBC or BC Act or Priority listed species by DBCA identified. Two introduced (feral) fauna species were recorded and are listed as a Declared Pest s 22(2) under the BAM Act with a Category 3 management control level. Two fauna habitat types are within the survey area:

1. Plantation (Fauna habitat 1; 0.64 ha); aligns with the vegetation types 'Plantation (*Eucalyptus camaldulensis*)' and 'Plantation (*Mixed Eucalyptus spp. And Casuarina obesa*)'
2. Remnant native trees (Fauna habitat 2; 0.16 ha); aligns with vegetation types' *Corymbia calophylla* low isolated clumps of trees over mixed weeds' and 'Remnant *Eucalyptus camaldulensis* trees'

For the black cockatoo habitat assessment, the survey area occurs outside the modelled distribution of Baudin's Cockatoo, therefore this species was not considered in the report. Carnaby's Cockatoo and Forest Red-tailed

Black Cockatoo were considered as having the potential to be present, since the area is within their known breeding range. However, no primary or secondary signs of either species were recorded during the field survey.

3.7.2 Heritage

A search of the Department of Planning, Lands and Heritage's (DPLH) Aboriginal Cultural Heritage Inquiry System and the Historic Heritage Register shows that there are no sites of registered Aboriginal or Historic heritage at or around the site. It is noted that there are no records of heritage surveys having been undertaken at the site.

4. Flood Risk Assessment

To determine flood risk to the site, the local catchment was assessed, with consideration given to local overland flows paths and streams. A two-dimensional (2D) hydraulic model was developed using TUFLOW software to assess the potential extent of flood inundation and scour risk for the 1% Annual Exceedance Probability (AEP) storm event at the project site.

4.1 Catchment delineation

Catchment delineation was undertaken in QGIS using 2-meter contours produced by DPIRD. The catchment area for the project site was calculated to be 42 hectares. The topography data representing the existing ground surface at the project site was also used to map overland flow paths.

The delineated catchment, overland flow paths, and hydraulic structures such as culverts and roadside drains are presented in Appendix C. The figure indicates that surface water runoff generally flows to the north-west and discharges through a culvert under the Narrogin Valley Road.

4.2 Drainage paths

Streams were mapped using the DPIRD topography data and are presented in Appendix D.

The figure indicates there are no major streams within the project site, with minor streams following a north-west direction to discharge into the larger Narrogin Brook downstream. As the site is within the upper reaches of the Narrogin Brook catchment, and there are no surrounding catchments draining to the project site, flood risk is dictated by localised runoff response within the site.

4.3 Flood modelling

A 2D hydraulic model was developed using TUFLOW software to represent local runoff response within the project site, and subsequent flood inundation and scour potential, for the 1% AEP storm event. Model input is detailed in subsequent sections below. The model used a rain-on-grid approach, where rainfall data is applied directly to the topography data representing the existing ground surface within the model domain.

4.3.1 Surface roughness factor

The surface roughness factors applied across the model domain are listed below in Table 4.

Table 4 Surface Roughness Factors

Surface Type	Roughness Coefficient n
Concrete or Asphalt	0.010 – 0.013
Base Sand	0.010 – 0.016
Gravelled Surface	0.012 – 0.030
Bare Clay-Loam Soil (eroded)	0.012 – 0.033

Surface Type	Roughness Coefficient n
Sparse Vegetation	0.053 – 0.130
Short Grass Prairie (Veldt or Scrub)	0.100 – 0.200
Lawns	0.170 – 0.480

4.3.2 Rainfall

4.3.2.1 Rainfall Depths

The Intensity-Frequency-Duration (IFD) rainfall depth data for 1%, 5%, and 20% AEP events were obtained from BoM and are listed in Table 5. No areal reduction factors and climate change factors were applied in the model.

Table 5 IFD Rainfall Depths

Duration	1% (1 in 100) AEP Rainfall (mm)
5 min	14
10 min	20.8
15 min	25
20 min	27.9
25 min	30.2
30 min	32.2
45 min	36.8
1 hour	40.5
1.5 hour	46.7
2 hour	52
3 hour	61.2
4.5 hour	72.9
6 hour	82.8
9 hour	98.9
12 hour	111
18 hour	129
24 hour	142
30 hour	150
36 hour	156
48 hour	163
72 hour	169
96 hour	172
120 hour	174
144 hour	178
168 hour	182

4.3.2.2 Temporal Patterns

Point temporal patterns for the site were sourced from the Australian Rainfall and Runoff (ARR) Data Hub. The data was for East Coast South.

4.3.2.3 Pre-burst Depths

Median pre-burst depths were obtained from the ARR Data Hub. This was input in the model where it is applied with the equation: *Initial Loss = Storm Loss – Pre-burst.*

4.3.2.4 Regional Losses

The Initial Loss / Continuing Loss (IL / CL) Hydrologic Model was utilised, with the following storm losses in Table 6 applied. These values were obtained from ARR Data Hub for approximate centroid of the Narrogin BESS facility.

Table 6 Storm Losses

Type	Value
Storm Initial Losses (mm)	28.0
Storm Continuing Losses (mm/hr)	1.6

4.3.3 Results

Flood modelling results for the 1% AEP event are presented in Appendix E and Appendix F.

Maximum flood depths across the project site are below 0.3 m for majority of the area, with increased flood depths up to 0.8 m at the north-west boundary where flows accumulate around the small dam embankment before continuing to flow north towards Narrogin Brook. Results indicate that flood inundation risk is low for infrastructure within the development area.

Maximum flood velocity remains below 1 m/s across the project site, indicating low scour risk. This result is consistent with having no major streams within the area, with low velocities resulting from minor overland flow.

5. Conclusions

Key findings and conclusions from the hydrology assessment include:

– Topography of the site dictates minor overland flows travelling north-west towards Narrogin Brook.
– The project site is in an upstream portion of the Narrogin Brook catchment, resulting in no external catchments draining to the site or major streams traversing the development area.
– Maximum flood depths for the 1% AEP event remain below 0.3 m within the project site, with higher inundation depths up to 1m towards the north-west where flows reach Narrogin Brook. Results indicate flood inundation risk within the project site is low and could be managed by raising of building floor levels.
– Maximum flood velocity for the 1% AEP event is below 1 m/s across the project site, indicating scour risk is low and scour protection is likely not required for infrastructure.

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Appendix A

Site Topography

517800 518100 518400 518700 519000

6353100

6352800

6352500

Booth

Great Southern

Narrogin Valley

Narrogin Valley

Narrogin BESS area

Legend

Elevation (m)

382

346

Project Boundary

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0 50 100 150 200 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

NARROGIN BESS
HYDROLOGY ASSESSMENT

SITE TOPOGRAPHY

Project No. 12638490
Revision No. B
Date 26/07/2024

Data Source: Bing Aerial Imagery (Imagery Date: 2024; Date Extracted: 27/06/2024) Created by: k.m.abrenica

Appendix B

Soil Types

517800 518100 518400 518700 519000

6353100

6352800

6352500

Booth

Narrogin Valley

Narrogin Valley

Great Southern

Legend

WA Soil Group (DPIRD)

- 101
- 301
- 403
- Project Boundary

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NARROGIN BESS
HYDROLOGY ASSESSMENT

SOIL TYPES

Project No. 12638490
Revision No. B
Date 26/07/2024

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Appendix C

Site Hydrology

517800 518100 518400 518700 519000

6353100 6352800 6352500

Peak Flows
at 1% AEP = 1.849 cms
at 5% AEP = 0.432 cms
at 20% AEP = 0.059 cms

Legend
- Outlet
- Overland Flow Path
- Roadside Drain
- Culvert
- Contours
- Project Boundary

Booth
Narrogin Valley
Narrogin Valle

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0 50 100 150 200 m

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NARROGIN BESS
HYDROLOGY ASSESSMENT

SITE HYDROLOGY

Project No. 12638490
Revision No. B
Date 27/06/2024

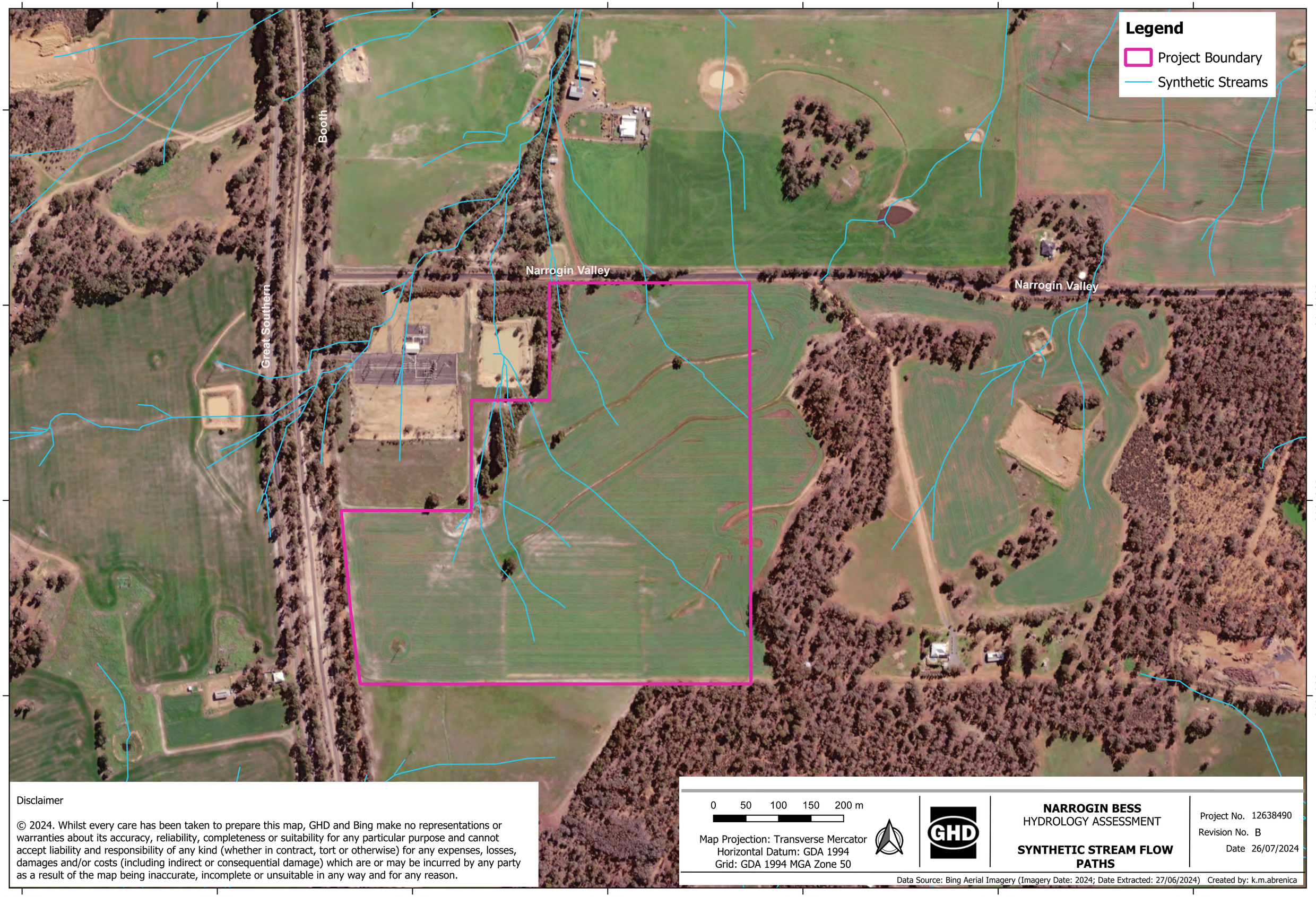
Data Source: Bing Aerial Imagery (Imagery Date: 2024; Date Extracted: 27/06/2024) Created by: k.m.abrenica

Appendix D

Synthetic Stream Flow Paths

517500 517800 518100 518400 518700 519000 519300

6353400 6353100 6352800 6352500



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0 50 100 150 200 m

Map Projection: Transverse Mercator
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Grid: GDA 1994 MGA Zone 50

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NARROGIN BESS
HYDROLOGY ASSESSMENT

SYNTHETIC STREAM FLOW PATHS

Project No. 12638490
Revision No. B
Date 26/07/2024

Data Source: Bing Aerial Imagery (Imagery Date: 2024; Date Extracted: 27/06/2024) Created by: k.m.abrenica

517500 517800 518100 518400 518700 519000 519300

Appendix E

Flood Depth at 1% AEP

517800 518100 518400 518700 519000

6353100

6352800

6352500

Booth

Narrogin Valley

Narrogin V

Great Southern

Legend

Flood Depth (m)

- <= 0.05
- 0.05 - 0.30
- 0.30 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- 2.00 - 3.00
- > 3.00
- Project Boundary

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0 50 100 150 200 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

NARROGIN BESS
HYDROLOGY ASSESSMENT

FLOOD DEPTH at 1% AEP

Project No. 12638490
Revision No. B
Date 14/08/2024

Data Source: Bing Aerial Imagery (Imagery Date: 2024; Date Extracted: 27/06/2024) Created by: k.m.abrenica

Appendix F

Velocity at 1% AEP

517800 518100 518400 518700 519000

6353100 6352800 6352500

Booth

Narrogin Valley

Narrogin V

Great Southern

Legend

Velocity (m2/s)

- <= 0.3
- 0.3 - 0.50
- 0.50 - 0.10
- 1.00 - 1.50
- 1.50 - 2.00
- >2
- Project Boundary

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0 50 100 150 200 m

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

GHD

NARROGIN BESS
HYDROLOGY ASSESSMENT

VELOCITY AT 1% AEP

Project No. 12638490
Revision No. A
Date 26/07/2024

Data Source: Bing Aerial Imagery (Imagery Date: 2024; Date Extracted: 27/06/2024) Created by: k.m.abrenica



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Appendix F

Aboriginal Cultural Heritage Inquiry System Search

Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Register

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Search Criteria

No Aboriginal Cultural Heritage (ACH) Register in Address - 76 NARROGIN VALLEY RD NARROGIN VALLEY

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All Aboriginal cultural heritage in Western Australia is protected, whether or not the ACH has been reported or exists on the Register.

The information provided is made available in good faith and is predominately based on the information provided to the Department of Planning, Lands and Heritage by third parties. The information is provided solely on the basis that readers will be responsible for making their own assessment as to the accuracy of the information. If you find any errors or omissions in our records, including our maps, it would be appreciated if you provide the details to the Department via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form and we will make every effort to rectify it as soon as possible.

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Your heritage enquiry is on land **within or adjacent to** the following Indigenous Land Use Agreement(s): Gnaala Karla Booja Indigenous Land Use Agreement.

On 8 June 2015, six identical Indigenous Land Use Agreements (ILUAs) were executed across the South West by the Western Australian Government and, respectively, the Yued, Whadjuk People, Gnaala Karla Booja, Ballardong People, South West Boojarah #2 and Wagyl Kaip & Southern Noongar groups, and the South West Aboriginal Land and Sea Council (SWALSC).

The ILUAs bind the parties (including 'the State', which encompasses all State Government Departments and certain State Government agencies) to enter into a Noongar Standard Heritage Agreement (NSHA) when conducting Aboriginal Heritage Surveys in the ILUA areas, unless they have an existing heritage agreement. It is also intended that other State agencies and instrumentalities enter into the NSHA when conducting Aboriginal Heritage Surveys in the ILUA areas. It is recommended a NSHA is entered into, and an 'Activity Notice' issued under the NSHA, if there is a risk that an activity will 'impact' (i.e. by excavating, damaging, destroying or altering in any way) an Aboriginal heritage site. The Aboriginal Heritage Due Diligence Guidelines, which are referenced by the NSHA, provide guidance on how to assess the potential risk to Aboriginal heritage.

Likewise, from 8 June 2015 the Department of Energy, Mines, Industry Regulation and Safety (DEMIRS) in granting Mineral, Petroleum and related Access Authority tenures within the South West Settlement ILUA areas, will place a condition on these tenures requiring a heritage agreement or a NSHA before any rights can be exercised.

If you are a State Government Department, Agency or Instrumentality, or have a heritage condition placed on your mineral or petroleum title by DEMIRS, you should seek advice as to the requirement to use the NSHA for your proposed activity. The full ILUA documents, maps of the ILUA areas and the NSHA template can be found at https://www.wa.gov.au/organisation/department-of-the-premier-and-cabinet/south-west-native-title-settlement.

Further advice can also be sought from the Department of Planning, Lands and Heritage via https://achknowledge.dplh.wa.gov.au/ach-enquiry-form.

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Department of Planning, Lands and Heritage

Aboriginal Cultural Heritage Inquiry System

Map of Aboriginal Cultural Heritage (ACH) Register

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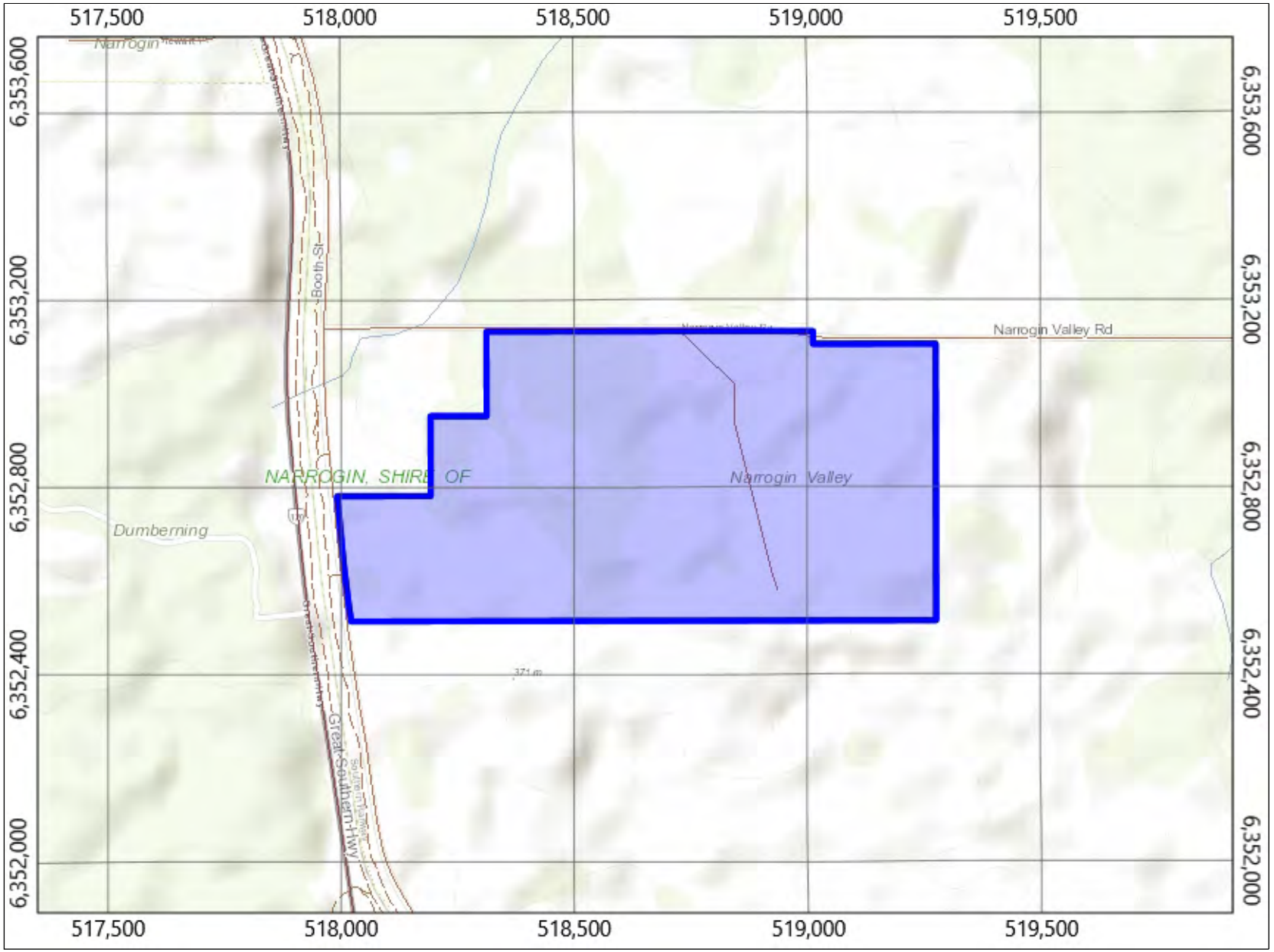

Legend

- Aboriginal Cultural Heritage (ACH) Register
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

0.49 kilometres

Map Scale 1 : 14,800

MGA Zone 50 (GDA94)

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Aboriginal Cultural Heritage Inquiry System

List of Aboriginal Cultural Heritage (ACH) Lodged

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Map of Aboriginal Cultural Heritage (ACH) Lodged

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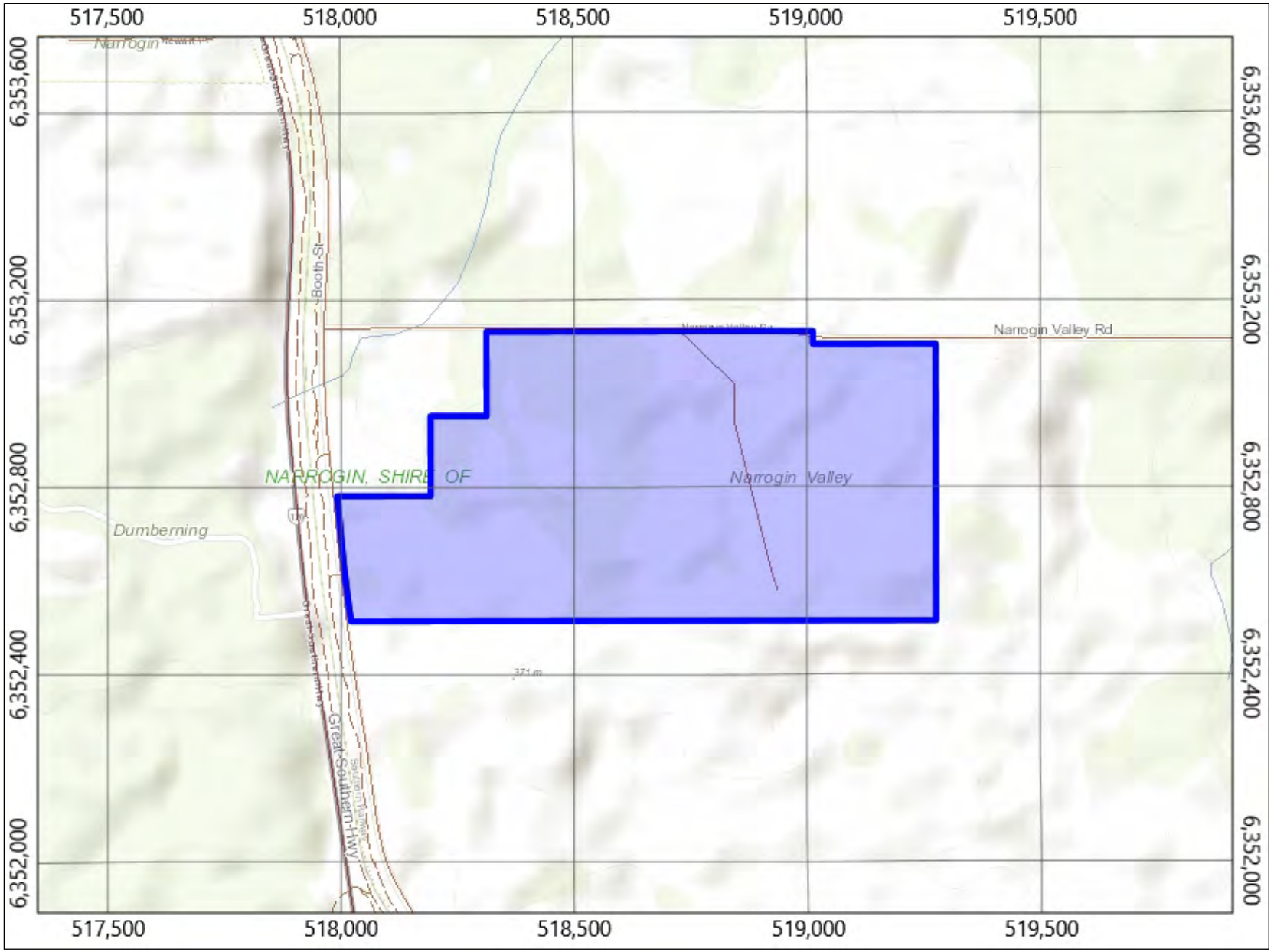

Legend

- Aboriginal Cultural Heritage (ACH) Lodged
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

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Map of Aboriginal Cultural Heritage (ACH) Historic

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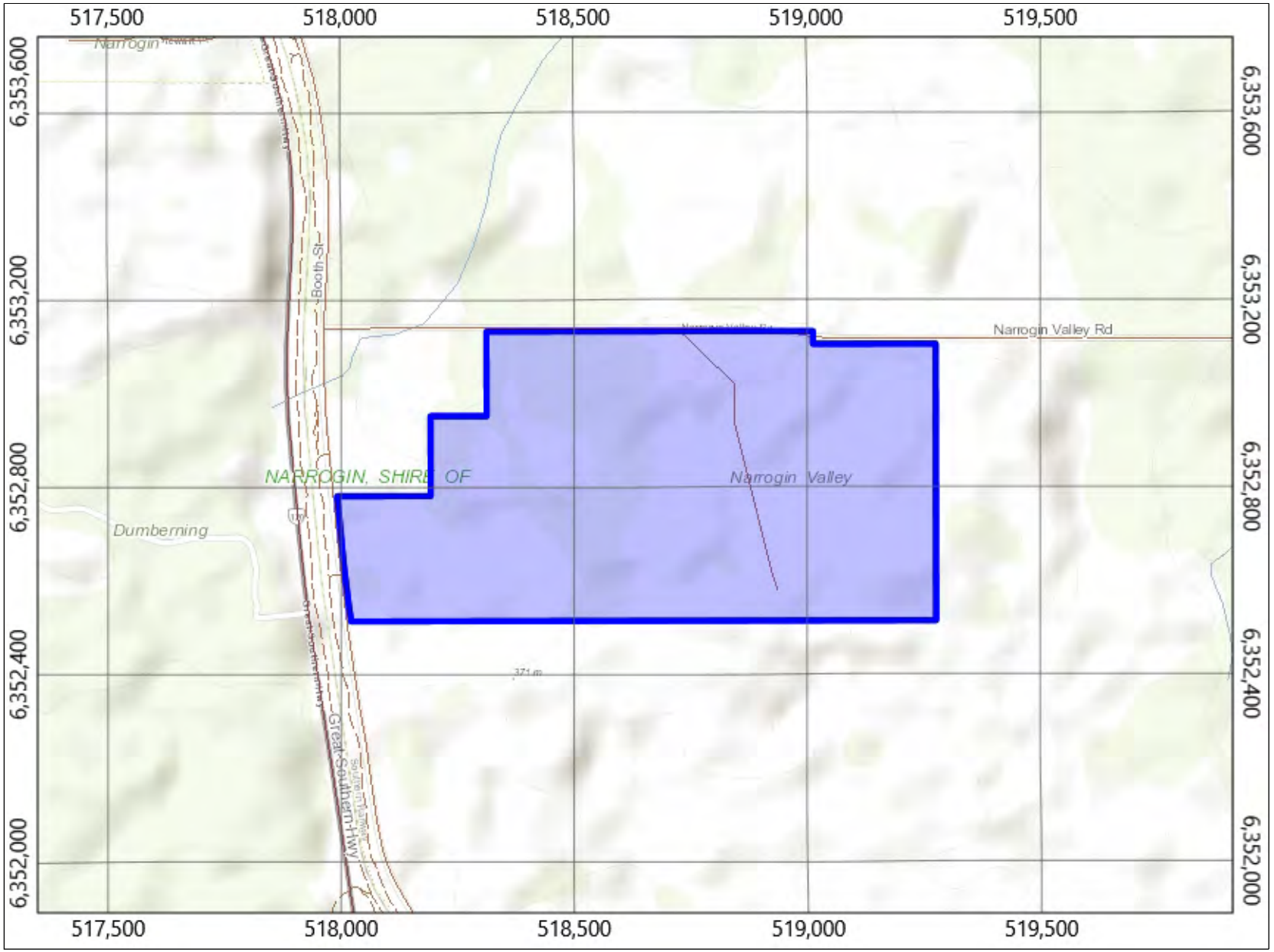

Legend

- Aboriginal Cultural Heritage (ACH) Historic
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

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Aboriginal Cultural Heritage Inquiry System

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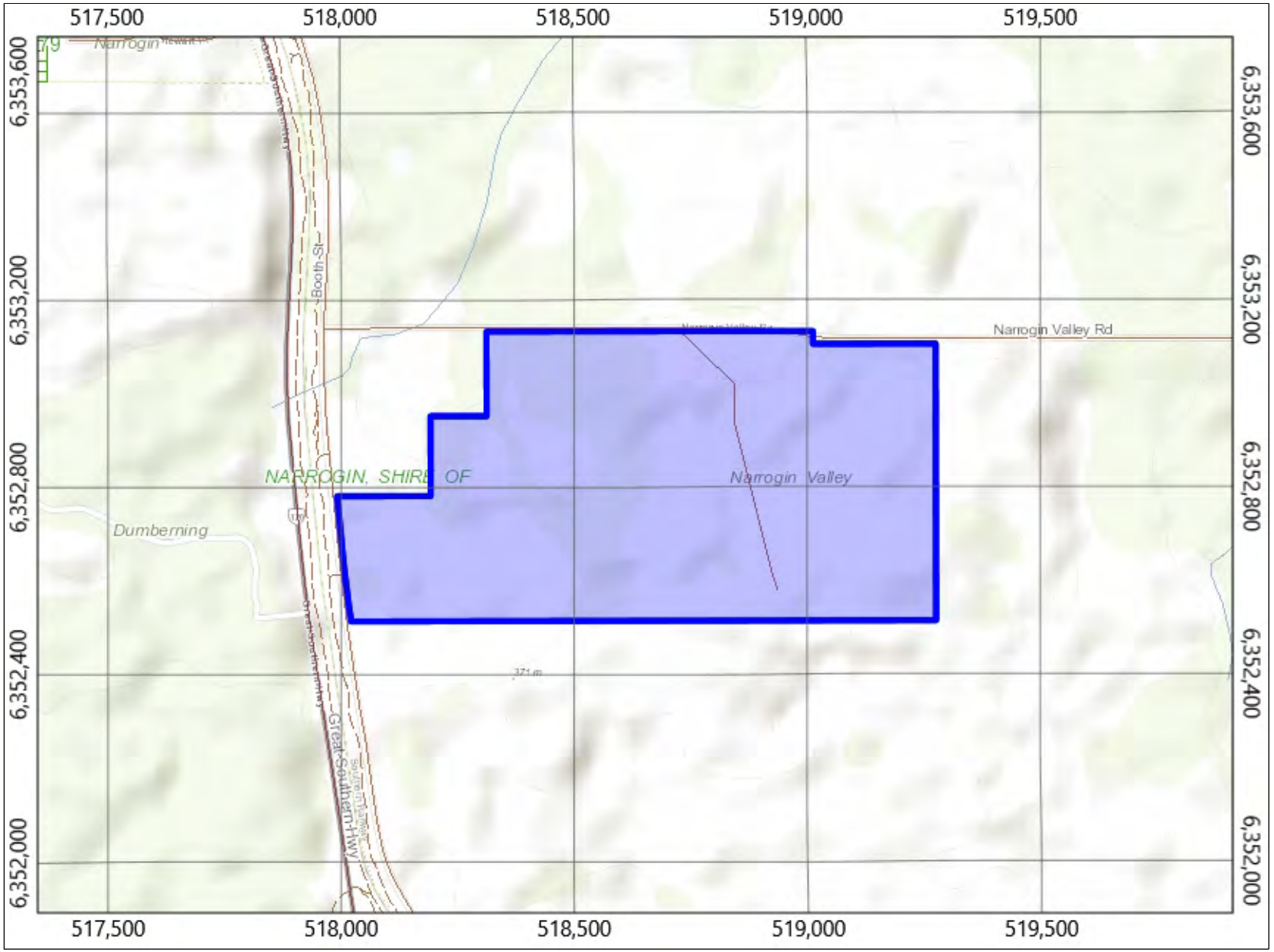

Legend

- Heritage Survey Area
- Search Area
- Aboriginal Community
  - *Permanent*
  - *Seasonal*
  - *Town Based*
- Town
- Road
- River
- Local Government Authority

0.49 kilometres

Map Scale 1 : 14,800

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Appendix G

Acoustic Assessment

Narrogin Battery Energy Storage System

Noise Impact Assessment

Narrogin BESS Development Pty Ltd

9 December 2024

→ The Power of Commitment



Project name		Narrogin BESS					
Document title		Narrogin Battery Energy Storage System | Noise Impact Assessment					
Project number		12638490					
File name		12638490-Narrogin Battery Energy Storage System Noise Impact Assessment					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	H Satari	M Velasco		H Shigeyoshi		06/12/24
S0	0	H Satari	B Hillion		H Shigeyoshi		09/12/24

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Glossary and abbreviated terms

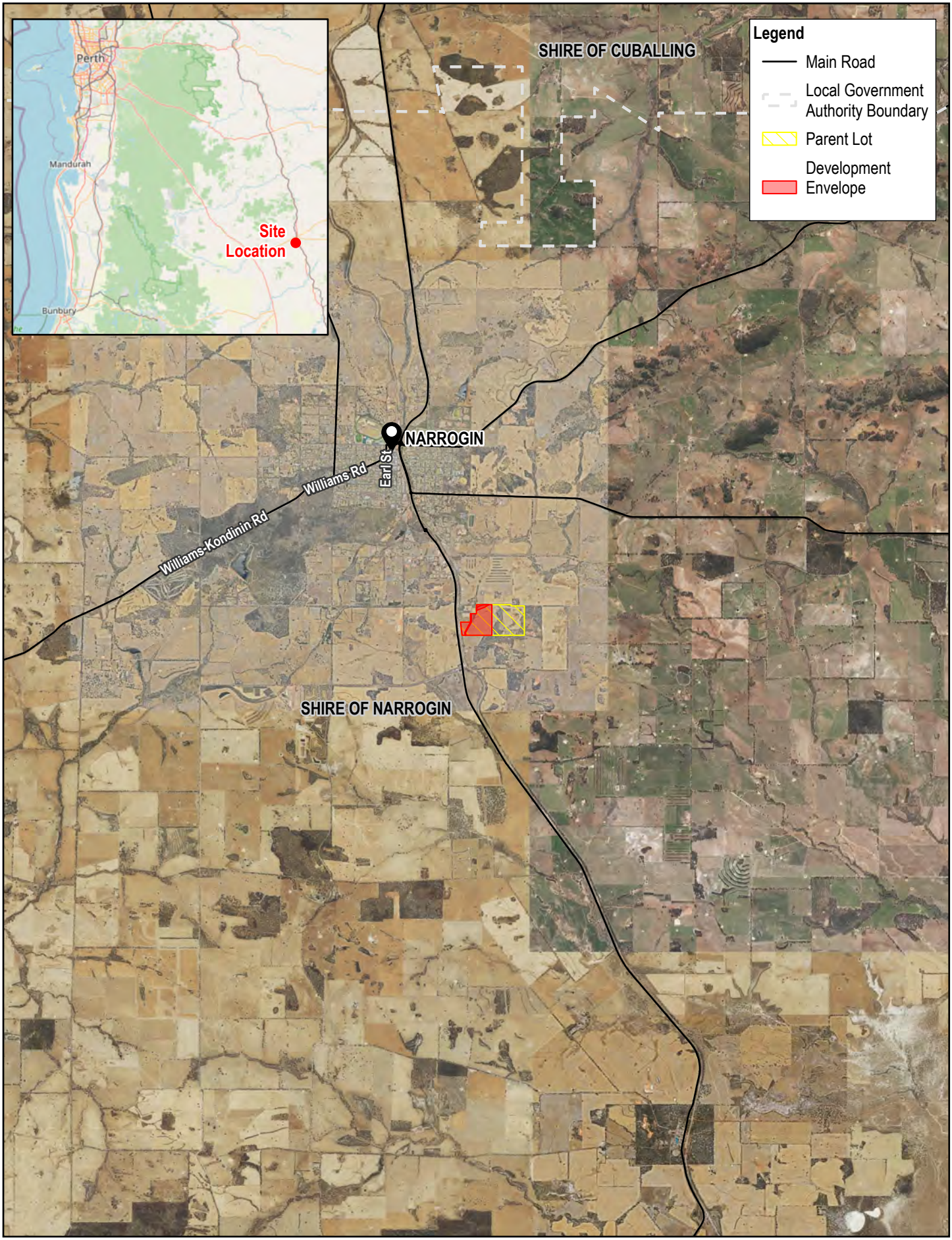
Term	Description
AS	Australian Standard
Ambient noise level	The ambient noise level at a particular location is the overall environmental noise level caused by all noise sources in the area, both near and far, including all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc. Usually assessed as an energy average over a set time period 'T' ($L_{Aeq, T}$).
Background noise level	The background noise level is the minimum repeatable level of noise measured in the absence of the noise under investigation and any other short-term noises such as those caused by all forms of traffic, industry, lawnmowers, wind in foliage, insects, animals, etc.. It is quantified by the noise level that is exceeded for 90 percent of the measurement period 'T' ($L_{A90,T}$). Background noise levels are often determined for the day, evening and night time periods where relevant. This is done by statistically analysing the range of time period (typically 15 minute) measurements over multiple days (often seven days).
BESS	Battery Energy Storage System
dB	Decibel, which is 10 times the logarithm (base 10) of the ratio of a given sound pressure to a reference pressure; used as a unit of sound.
dB(A)	Unit used to measure 'A-weighted' sound pressure levels.
DA	Development Approval
DWER	Department of Water and Environmental Regulation
GHD	GHD Pty Ltd
L_{A1}	A-weighted noise levels that should not be exceeded for more than one percent of the time.
L_{A10}	A-weighted noise levels that should not be exceeded for more than 10 percent of the time.
L_{A90}	A-weighted noise levels that should not be exceeded for more than 90 percent of the time.
$L_{Aeq(time)}$	Equivalent sound pressure level: the steady sound level that, over a specified period of time, would produce the same energy equivalence as the fluctuating sound level actually occurring.
L_{Amax}	A-weighted noise levels that should not be exceeded any time
Mitigation	Reduction in severity.
MW	**Megawatts**
MWh	**Megawatt-hours**
NIA	Noise Impact Assessment
Representative Assessment Period	Regulation 8 requires the assessment period to be between 15 minutes and four hours for the purpose of assessing noise emissions from a source.
Sensitive receptor	A noise modelling term used to describe a map reference point where noise is predicted. A sensitive receptor would be a home, workplace, church, school or other place where people spend time.
Satisfactory design sound level	The level of noise that has been found to be acceptable by most people occupying the environmental space in question and considered to be non-intrusive.
Sound pressure level (SPL or Lp)	The level of sound measured on a sound level meter and expressed in decibels (dB). Where L_p = 10 $\log_{10}$ (P_a/P_o)2 dB (or 20 log10 (P_a/ P_o) dB) where Pa is the rms sound pressure in Pascal and Po is a reference sound pressure conventionally chosen is 20 µPa (20 x 10-6 Pa) for airborne sound. SPL varies with distance from a noise source.
Sound power level (SWL or L_W)	The sound power level of a noise source is the inherent noise of the device. Therefore, sound power level does not vary with distance from the noise source or with a different acoustic environment.
WA	Western Australia

1. Introduction

1.1 Background

Narrogin BESS Development Pty Ltd (South Energy, on behalf of Narrogin BESS Development Pty Ltd) proposes to establish a Battery Energy Storage System (BESS) facility at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the project) in Western Australia (WA) (Figure 1.1). South Energy engaged GHD Pty Ltd (GHD) to prepare this Noise Impact Assessment (NIA) report to support an application for development approval (DA) for the Project.

Stage 1 of the project comprises one 200MW / 800MWh BESS facility, with supporting substation control building, operations, maintenance shed, laydown and facilities area. The BESS is proposed to connect to an existing Western Power substation on the adjacent land parcel at Lot 8 (No. 153) Booth Street, Narrogin Valley. The project may include two (2) subsequent stages, each comprising 200MW / 800MWh BESS facilities. This NIA relates to Stage 1 works only.



Paper Size ISO A4

0 1 2 3 4

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

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Narrogin BESS Development Pty Ltd
South Energy Narrogin BESS

Noise Impact Assessment

Development Envelope

Project No. 12638490
Revision No. 0
Date 04/12/2024

FIGURE 1.1

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1.2 Purpose of this report

This NIA has been prepared to assess the potential environmental noise impacts associated with operation of stage 1 of the Project and to provide in-principle noise mitigation measures where required.

The assumptions in relation to fan speed and associated noise data are as of 9 December 2024. They are expected to evolve as the project progresses which will be reflected in future iterations of this NIA report.

1.3 Scope of works

The scope of works to undertake this environmental noise impact assessment for the Project includes the following key tasks

- A desktop review to identify key environmental noise catchment areas and noise sensitive receptors from aerial and terrestrial photography, and other relevant survey information from the client.
- Undertaking baseline noise monitoring at four selected sensitive receptors over about four weeks, to characterise their relevant existing noise environment and noise contribution from existing industrial activities (if any).
- A review of relevant guidelines for operation of Stage 1 of the Project to define project specific noise criteria.
- Undertaking operational noise modelling based on worst case scenario using the SoundPLAN noise modelling software, to predict noise levels at surrounding areas as a result of the proposed operation of Stage 1 of the Project.
- Assessing the predicted noise levels against assessment criteria for four scenarios taking into account various fan speeds for the proposed equipment (i.e. battery storage units and inverters) during day and night.
- Where exceedances of the assessment criteria are predicted, the provision of in-principle noise mitigation measures in consultation with the client, in order to achieve noise compliance.

1.4 Limitations

This report has been prepared by GHD for Narrogin BESS Development Pty Ltd and its affiliated companies and may only be used and relied on by Narrogin BESS Development Pty Ltd and its affiliated companies for the purpose agreed between GHD and Narrogin BESS Development Pty Ltd and its affiliated companies as set out in Section 1.3 of this report.

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The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sensitive receptor locations. Site conditions at other sensitive receptor locations may be different from the conditions found at the measurement locations.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services, topography, and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

1.5 Assumptions

The following assumptions were made during the preparation of this report:

– All information provided by Narrogin BESS Development Pty Ltd and its affiliated companies, including relevant site location and receptor information, operational parameters for relevant BESS systems and noise modelling study reports undertaken previously, are deemed correct.
– All parameters and other relevant data used in the modelling and assessment are based on best estimates using the information provided by Narrogin BESS Development Pty Ltd and its affiliated companies and other relevant sources.
– Noise propagation was modelled using ISO 9613-2: 1996.

2. Noise criteria

2.1 Regulation and guidelines

The noise emissions from the installed BESS units are governed by the state noise regulations, namely the *Environmental Protection (Noise) Regulations 1997* (the WA Noise Regulations).

Regulation 8 sets out the maximum allowable noise levels ('assigned noise levels') based on different times of day and land use (i.e., noise sensitive premises, commercial- and industrial-type premises), applicable at the premises receiving the noise. The assigned noise levels of various parameters (L_{A10}, L_{A1} and L_{Amax}) are also dependent on influencing factor (IF) calculated in accordance with the WA noise regulations as detailed in Schedule 3 of the WA Noise Regulations, taking into account the amount of industrial and commercial land and the presence of major roads adjacent to the noise receptor.

A summary of the assigned noise levels from Regulation 8 is presented in Table 2.1.

Table 2.1 Assigned noise levels from the WA Noise Regulations

Type of premises receiving noise	Time of day	Assigned noise level. dB(A)		
		L_{A10}	L_{A1}	L_{Amax}
Noise sensitive premises: highly sensitive area (i.e., noise sensitive premises at locations within 15 m of a building directly associated with a noise sensitive use)	7:00 am to 7:00 pm Monday to Saturday ('Day')	45 + IF	55 + IF	65 + IF
	9:00 am to 7:00 pm Sunday and public holidays	40 + IF	50 + IF	65 + IF
	7:00 pm to 10:00 pm all days ('Evening)	40 + IF	50 + IF	55 + IF
	10:00 pm on any day to 7:00 am Monday to Saturday and 9:00 am Sunday and public holidays ('Night')	35 + IF	45 + IF	55 + IF
Noise sensitive premises: any area other than highly sensitive area (i.e., noise sensitive premises at locations further than 15 m from a building directly associated with a noise sensitive use)	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises	All hours	65	80	90

2.1.1 Influencing factor

In this report, influencing factors (IFs) have been calculated and used to determine assigned noise level criteria shown in Table 2.3 for nearest sensitive receptors.

Schedule 3 of the Regulations details the process how to determine the IF on noise sensitive premises, which can be summarised as the following steps:

1. Obtain a council zoning map covering an area up to 500 m from the receiving location.

2. Draw two circles around the receiving point, of 100 m radius and a 450 m radius.
3. Determine the percentage of each circle that is taken up with industrial and commercial zonings. Note that the industrial and commercial areas in the inner circle are also counted in the outer circle.
4. Add up the percentages as follows:
   a. (Percent industrial in small circle + percent industrial in a large circle) x 1/10 = I
   b. (Percent commercial in small circle + percent commercial in large circle) x 1/20 = C

– Determine the transport factor (TF) as follows (Note – TF cannot be more than 6):
   a. Major road (more than 15,000 vehicles/day) in small circle, TF = 6
   b. A major road in a large circle, TF = 2
   c. For each secondary road (6,000 - 15,000 vehicles/day) in small circle, TF = 2

– Add I, C and TF from steps 4 and 5 above to obtain the IF (i.e., IF = I + C + TF), and

5. Fill in the table of assigned levels by adding in the IF to obtain the L_{A10}, L_{A1} and L_{Amax} assigned levels.

2.1.2 Annoying noise characteristics

Regulation 7 also requires that the noise character received at sensitive receptors must be 'free' of annoying characteristics of tonality, modulation and impulsiveness. If these characteristics cannot be reasonably and practicably removed, then a series of adjustments to the measured or calculated received levels are set out, and the adjusted level must comply with the assigned level. The adjustments are set out in Table 2.2Table 2.2 and are further defined in Regulation 9(1).

Table 2.2 Table of adjustments

Adjustment where noise emission is not music (adjustments are cumulative to a maximum of 15 dB)			**Adjustment where noise emission is music**	
Where tonality is present	Where modulation is present	Where impulsiveness is present	Where impulsiveness is not present	Where impulsiveness is present
+5 dB	+5 dB	+10 dB	+10 dB	+15 dB

Tonality is defined in Regulation 9(1) as being present where the difference between the A-weighted sound pressure level in any one third octave band and the arithmetic average of the A-weighted sound pressure levels in the two adjacent one-third octave bands is greater than 3 dB in terms of $L_{Aeq, T}$ where the period T is greater than 10 percent of the representative assessment period, or greater than 8 dB at any time when the sound pressure levels are determined as $L_{A, Slow}$ levels.

– Modulation is defined as a variation in the emission of noise that:
   – Is more than 3 dB $L_{A, Fast}$ or is more than 3 dB $L_{A, Fast}$ in any one third octave band; and
   – Is present for at least 10 percent of the representative assessment period; and
   – Is regular, cyclic and audible

Impulsiveness is defined as present where the difference between L_{Apeak} and $L_{Amax,S}$ is more than 15 dB when determined for a single representative event. Assigned noise levels for noise sensitive premises adjacent to the CBESS site.

The IFs were calculated for 6 nearest noise sensitive receptors, as presented in Table 2.3 and shown Figure 3.1.

Table 2.3 Influencing factor (IF) calculated for noise sensitive receptors

Receptor	Address	Lot	Polygon	IF (dB)
R1	37 Narrogin Valley Road, Narrogin Valley WA 6312	2949	673301	2
R2	123 Mcdougalls Rd, Narrogin Valley WA 6312	1735	673453	0
R3	21 Mellons Road, Narrogin Valley WA 6312	6657	673319	0
R4	35 Nottle Road, Narrogin Valley WA612	4	673304	0
R5	76 Narrogin Valley Road, Narrogin Valley 6312	9	673302	1
R6	18522 Great Southern Highway, Dumberning 6312	21	11847076	2

Plan WA, an online public mapping tool, was accessed on 5 November 2024, and the local planning schemes show the land is predominantly zoned ‘rural’ with no commercial or industrial premises within 450 m of receptors R2, R3 and R4, resulting in IF= 0 for these receptors. The development envelope for the site will be industrial when the Project commences operation, and is within 450m from R1, R5 and R6, resulting in nonzero IFs for these receptors as presented in Table 2.3 and shown in Figure A-2. The assigned noise levels for the noise sensitive receptors are presented in Table 2.4.

Table 2.4 Assigned noise levels at project receptors

Type of premises receiving noise	Time of the day	Assigned noise level (dB)		
		L_{A10}	L_{A1}	L_{Amax}
Receptors R1, and R6 Noise sensitive premises at locations within 15 m of a building directly associated with a noise sensitive use	07.00 to 19.00 hrs Monday to Saturday	47	57	67
	09.00 to 19.00 hrs Sunday and Public holidays	42	52	67
	19.00 to 22.00 hrs All days	42	52	57
	22.00 to 07.00 hours Monday to Saturday and; 22.00 to 09.00 hours on Sundays and Public Holidays	37	47	57
Receptor R5 Noise sensitive premises at locations further than 15 m from a building directly associated with a noise sensitive use	07.00 to 19.00 hrs Monday to Saturday	46	56	66
	09.00 to 19.00 hrs Sunday and Public holidays	41	51	66
	19.00 to 22.00 hrs All days	41	51	56
	22.00 to 07.00 hours Monday to Saturday and; 22.00 to 09.00 hours on Sundays and Public Holidays	36	46	56
Receptor R2, R3 and R4 Noise sensitive premises at locations further than 15 m from a building directly associated with a noise sensitive use	07.00 to 19.00 hrs Monday to Saturday	45	55	65
	09.00 to 19.00 hrs Sunday and Public holidays	40	50	65
	19.00 to 22.00 hrs All days	40	50	55
	22.00 to 07.00 hours Monday to Saturday and; 22.00 to 09.00 hours on Sundays and Public Holidays	35	45	55

3. Baseline noise monitoring

As part of this assessment, unattended baseline ambient noise monitoring was conducted. The purpose of the baseline ambient noise monitoring is to capture samples of the existing noise climate in the direct vicinity of the noise sensitive receptors prior to operation of the BESS.

The baseline noise dataset will enable the following assessments to be undertaken in the future:

– Understand the impacts of any potential noise level increases associated with operational noise from within the proposed Project, with respect to the existing ambient noise.
– Identify the likelihood of noise exceedances resulting from the combination of the existing ambient noise with that of the proposed Project.
– To enable assessment of the likely audibility of noise at the noise sensitive receptors (NSR) from the Project including any tonal, modulation or impulsive components.

3.1 Noise monitoring for compliance assessment

3.1.1 Monitoring locations

The noise loggers were deployed at four locations in direct vicinity of selected noise sensitive residential land where ambient noise levels are expected to be typical of the surrounding setting. Measurement sites and locations are summarised in Table 3.1. Figure 3.1 show the locations of the loggers in the proposed mine development area. Photos with locations of the instruments used during noise measurements are shown in Appendix A. Continuous noise monitoring was performed at each location, with audio recorded at logger location L2.

Table 3.1 Noise monitoring location details

Logger No.	Serial No.	Address	Lot	Polygon No.
L1	98365	37 Narrogin Valley Road, Narrogin Valley WA 6312	2949	673301
L2	63826	123 Mcdougalls Rd, Narrogin Valley WA 6312	1735	673453
L3	36825	21 Mellons Road, Narrogin Valley WA 6312	6657	673319
L4	36824	35 Nottle Road, Narrogin Valley WA612	4	673304

3.1.2 Instruments

Table 3.2 presents the equipment used for the noise monitoring program, along with the monitoring duration for each site. Deployment dates were within the winter months of July and August of 2024.

All noise monitoring instruments were in current National Association of Testing Authorities (NATA) calibration at the time of use. All instruments were field checked and calibrated before and after noise measurements using a Svantek SV-36 calibrator. Except for Logger L1, which stopped working during the monitoring period, no discrepancies equal to or greater than 1 dB were noted throughout the measurement exercise as is required under Section 5.6 of *Australian Standard AS 1055:2018 Acoustics – Description and Measurement of Environmental Noise* (Standards Australia, 2018).

Continuous monitoring was conducted over about four weeks at all four logger locations.

Table 3.2 Noise monitoring equipment details

Logger No.	Model and type	Serial No.	Start date	Finish date
L1	SVAN 958A	98365	26-Jul-24	16-Aug-24
L2	SVAN 977	36826	26-Jul-24	16-Aug-24

Logger No.	Model and type	Serial No.	Start date	Finish date
L3		36825	26-Jul-24	16-Aug-24
L4		36824	26-Jul-24	16-Aug-24



Legend

Noise Loggers

Noise Sensitive Receptors

Development Envelope

Paper Size ISO A4

0 0.375 0.75 1.125 1.5 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA94
Grid: GDA94 / MGA zone 50

GHD

Narrogin BESS Development Pty Ltd
South energy Narrogin BESS

Noise impact assessmnet
Noise Sensitive Receptors and Logger Locations

Project No. **12638490**
Revision No. **0**
Date. **06/12/2024**

FIGURE 3.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12638490\Tech\Noise\QGIS\South Energy - Narrogin noise monitoring.qgz
Print Date: 06/12/2024

Data Source:Google Earth Imagery 2024

Created By: hsatari

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3.2 Meteorological conditions

Adverse meteorological conditions such as high winds and rainfall can contaminate noise monitoring results. Where the wind speed at the microphone height was determined to be greater than 5 m/s, or whenever rainfall occurred, the noise data was excluded from further analysis.

Rainfall and wind speeds during the period of noise measurements were checked based on the nearest Bureau of Meteorology (BoM) automatic weather station (AWS) Wandering (10917).

3.3 Noise monitoring methodology

The noise loggers were set to log overall A-weighted and third-octave band noise levels using the slow time response of the logger. The logger recorded L_{A90}, L_{A10}, L_{A1} and L_{Aeq} noise levels at 15-minute intervals.

- L_{Aeq} is the equivalent continuous sound level over the measurement period.
- L_{A90} is representative of ambient noise as it describes the noise level exceeded for 90 percent of the measurement period.
- L_{A10} is the noise level exceeded for 10 percent of the measurement period and is used to understand received noise level at noise sensitive receptors.
- L_{A1} is the noise level exceeded for one percent of the measurement period.

The noise loggers were calibrated before and after logging with allowable calibration drift as per Schedule 4 of the *Environmental Protection (Noise) Regulations 1997*.

3.4 Noise monitoring results

Graphs presenting daily noise levels for the entire monitoring period are presented for each location in Appendix B. The charts show

- Noise levels for the L_{A90}, L_{A10}, L_{Amax} and L_{Aeq} noise descriptors in 15-minute intervals
- Wind speed and direction
- Excluded areas for non-representative weather conditions

A technical issue at logger L1 meant that the data collected at location L1 was not representative. Notwithstanding this, L1 being at a similar distance to the road as L4, it is expected to have a very similar noise climate (refer to Appendix C for details of noise measured at L4).

Tabulated summary of the L_{A90} is presented in Appendix C. The night-time values were typically between 20 and 30 dB L_{A90} for loggers L2, L3 and L4. The daytime values were typically from 20 to 35 dB L_{A90} for loggers L2, L3 and L4. Both markers are typical of the soundscape in a rural area.

In addition to the noise monitoring graphs, spectrograms are provided in Appendix B which have been calculated based on the audio recorded at logger location L2. The noise analysis based on the spectrograms and audio data features typical noise associated with community activities including rain, dogs, livestock and noise from use of hand tools and trucks.

In general, the results of the baseline noise survey support the absence of industrial activity in the vicinity of the project area. This means that there is no requirement for noise criteria to be set at 5 dB below the assigned noise levels provided in Table 2.4, the noise criteria are therefore set at the assigned levels.

4. Operational noise assessment

Operational noise modelling was undertaken to investigate the noise from the proposed BESS on nearby sensitive receiver locations. The following sections provide a summary of this noise assessment.

4.1 Modelling algorithm

Noise modelling was undertaken using SoundPLAN Version 9.1 software to predict the effects of operational related noise from the Project site.

SoundPLAN is a computer program for the calculation, assessment and prognosis of noise propagation. SoundPLAN calculates environmental noise propagation according to ISO 9613-2: 1996 and other algorithms. Propagation calculations take into account sound intensity losses due to geometrical spreading, terrain effects, atmospheric absorption and ground absorption.

The ISO 9613-2: 1996 algorithm also takes into account the presence of wind conditions, such as 'downwind' conditions, which are favourable to sound propagation. As a result, predicted received noise levels are expected to represent a worst-case scenario, due to the distances involved between source and receivers, enhancement of noise due to weather is expected to have an effect on the closest sensitive receiver locations.

4.2 Modelling scenarios

For Stage 1 of the Project, a given number of equipment items associated with BESS was modelled:

– 233 battery packs,
– 69 inverters and
– 1x 250 MVA substation transformer

As cooling fans associated with the battery packs and inverters tend to dominate in terms of noise emissions, these are critical items in the noise modelling and consequently various fan speeds have been considered – which are described in Table 4.1. The following was modelled for each scenario.

4.2.1 Evening and Sunday Daytime

Scenario A1 assumes normal operation of the Stage 1 battery pack fans and chillers and inverter fans and chillers at 80 percent of maximum speed. This scenario is expected to be typical of Sunday daytime (as the more stringent daytime among week days) and evening time activity.

Scenario B1 is the same as A1 but takes into account the mitigation effect of noise attenuation kits used for the inverters.

These scenarios are assessed against the L_{A10} noise criteria for evening and Sunday daytime (Table 2.4) as it is expected to occur for more than 24 minutes over a typical 4-hour representative assessment period.

4.2.2 Nighttime

Scenario A2 is for a curtailed operation of the inverter fans where the fan and chiller speed is 20 percent slower than normal operation (i.e. 60%) based on outside temperatures generally being lower than 30 degrees Celsius in Narrogin, while the operation of the battery pack fans and chillers was assumed to be normal (i.e. 80%). This scenario is expected to be typical of nighttime operation.

Scenario B2 is the same as A2 but takes into account the mitigation effect of noise attenuation kits used for the inverters.

These scenarios are assessed against the L_{A10} noise criteria for evening and Sunday daytime (Table 2.4) as it is expected to occur for more than 24 minutes over a typical 4-hour representative assessment period.

4.2.3 Day and night temperature

Scenarios A1 and B1 show the inverter fans and chillers operating at a speed which is 80 percent of maximum speed. These scenarios are consistent with a particularly hot day where the fans would be expected to work harder to provide extra cooling to the batteries.

Scenario A2 and B2 assume temperatures at or below 30 degrees Celsius during nighttime for which lower inverter fan and chiller speeds were considered (i.e. 60 percent of maximum speed). This assumption is supported by analysing local temperatures over day and night during summer (December, January and February) of 2022 and 2023 which are summarised in Appendix E. As can be seen form the historical temperature data (data obtained from **www.wunderground.com** assessed on 06/12/2024, station name: IHIGHB13), nighttime temperatures hardly exceed 30 degrees in the area adjacent to the Project.

These scenarios are assessed against the L_{A10} noise criteria as they may occur for more than 24 minutes over a typical 4-hour representative assessment period.

Table 4.1 Scenarios operational parameters

Stage 1 scenarios	Time period	Mitigation	Inverters	Battery packs	250 mVA transformer
A1	Evening peak/ Sunday daytime	N/A	69 inverters operating at 80 % fan speed, 96 dB(A) SWL each	233 battery packs operating at 80 % fan speed, 83 dB(A) SWL each	1 transformer operating at 100% fan speed, 99 dB(A) SWL
A2	Nighttime	N/A	69 inverters operating at 60 % fan speed, 90 dB(A) SWL each	233 battery packs operating at 80 % fan speed, 83 dB(A) SWL each	1 transformer operating at 100% fan speed, 99 dB(A) SWL
B1	Evening peak/ Sunday daytime	Noise attenuation kits for Inverters	69 inverters with attenuating kit operating at 80 % fan speed, 91 dB(A) SWL each	233 battery packs operating at 80 % fan speed, 83 dB(A) SWL each	1 transformer operating at 100% fan speed, 99 dB(A) SWL
B2	Nighttime	Noise attenuation kits for Inverters	69 inverters with attenuating kit operating at 60 % fan speed, 85 dB(A) SWL each	233 battery packs operating at 80 % fan speed, 83 dB(A) SWL each	1 transformer operating at 100% fan speed, 99 dB(A) SWL

4.3 Modelling assumptions

The following assumptions and parameters were adopted for this noise impact assessment. Facility noise was modelled to be operating continuously throughout the day, evening, and night-time period.

A ground absorption coefficient of 0.6 was observed for the rural and sparsely vegetated land (where '0' is non-porous reflective ground and '1' is fully absorbing ground). The hardstands for the BESS area within the development envelope were modelled with a ground attenuation factor of 0. Order of reflection was set to 3.

Noise propagation was modelled using ISO 9613-2: 1996 considering the short distance between the noise sources and the receptors (minimum of 320 m), with meteorological conditions listed in Table 4.2.

Table 4.2 Meteorological conditions for noise modelling

Parameter	Day (7:00 am-7:00 pm)	Night (7:00 pm – 7:00 am)
Wind speed	4 m/s	3 m/s
Temperature	20°C	15°C
Relative humidity	50%	50%

The equipment outlined in Table 4.3, Table 4.4 and Table 4.5 was modelled for this assessment. The quantity of each item of equipment and their location within the site are described in Section 4.2 and shown in Appended Figure A.1 respectively. Noise level data for the inverters and battery pack has been derived from manufacturer datasheets provided by the Client and its subcontractors. The sound power level of the 250 MVA substation transformer was estimated based on *AS/NZ standard IEC 60076.10-2009, part 10: Determination of sound levels*.

Table 4.3 Battery pack sound power level data, dB(A)

Fan speed	Third octave centre frequency band, dB(A) Hz																							Overall dB(A)
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	
80%[1]	53	53	62	66	60	62	70	71	73	70	72	73	74	75	73	71	69	69	67	66	61	58	62	55	83

Note 1: Sound power level noise data was derived from manufacturer datasheets provided by the Client and its subcontractors

Table 4.4 Inverter sound power level data, dB(A)

Fan speed	Side noise	Third octave centre frequency band, dB(A) Hz																							Overall dB(A)
		50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	
80%[1]	Top	74	74	72	73	75	75	76	80	73	69	71	68	68	68	68	65	63	63	63	60	58	56	54	53	86
	Rear	78	82	79	79	81	81	81	85	79	76	78	76	75	76	77	76	73	72	70	67	66	64	61	59	92
	Right	75	72	76	75	73	74	78	79	71	68	71	67	67	69	69	67	65	64	64	64	64	63	63	62	86
	Front	81	81	78	79	78	79	83	87	80	76	80	77	76	78	78	76	73	72	71	69	67	66	64	62	93
	Left	68	71	72	73	71	74	73	72	68	66	69	68	73	69	72	66	65	65	62	59	58	56	54	50	83
	Total	**84**	**85**	**83**	**84**	**84**	**85**	**87**	**90**	**83**	**80**	**83**	**80**	**80**	**81**	**82**	**80**	**77**	**76**	**75**	**72**	**71**	**70**	**68**	**66**	**96**
80%with attenuation kit [1]	Top	71	73	71	74	73	68	71	78	71	64	65	63	65	64	65	61	58	57	58	54	52	51	49	47	83
	Rear	69	71	73	73	74	76	76	78	70	66	68	65	67	65	67	67	65	62	59	55	55	56	51	49	84
	Right	73	68	71	73	73	70	70	73	68	61	62	64	65	63	65	64	59	57	56	54	53	51	49	48	82
	Front	75	75	74	75	73	74	76	81	73	67	70	66	67	66	66	65	62	60	60	57	56	55	52	50	86
	Left	70	70	70	71	68	69	71	71	64	60	62	65	71	61	63	62	60	61	59	57	55	54	52	49	80
	Total	**79**	**79**	**79**	**80**	**80**	**80**	**81**	**85**	**77**	**71**	**74**	**72**	**75**	**71**	**72**	**71**	**69**	**67**	**66**	**63**	**61**	**61**	**58**	**56**	**91**
60%[1]	Top	68	68	66	67	69	69	70	74	67	63	65	62	62	62	62	59	57	57	57	54	52	50	48	47	80
	Rear	72	76	73	73	75	75	75	79	73	70	72	70	69	70	71	70	67	66	64	61	60	58	55	53	86
	Right	69	66	70	69	67	68	72	73	65	62	65	61	61	63	63	61	59	58	58	58	58	57	57	56	80
	Front	75	75	72	73	72	73	77	81	74	70	74	71	70	72	72	70	67	66	65	63	61	60	58	56	87
	Left	62	65	66	67	65	68	67	66	62	60	63	62	67	63	66	60	59	59	56	53	52	50	48	44	77
	Total	**78**	**79**	**77**	**78**	**78**	**79**	**81**	**84**	**77**	**74**	**77**	**74**	**74**	**75**	**76**	**74**	**71**	**70**	**69**	**66**	**65**	**64**	**62**	**60**	**90**
60% with attenuation kit [1]	Top	65	67	65	68	67	62	65	72	65	58	59	57	59	58	59	55	52	51	52	48	46	45	43	41	77
	Rear	63	65	67	67	68	70	70	72	64	60	62	59	61	59	61	61	59	56	53	49	49	50	45	43	78
	Right	67	62	65	67	67	64	64	67	62	55	56	58	59	57	59	58	53	51	50	48	47	45	43	42	76
	Front	69	69	68	69	67	68	70	75	67	61	64	60	61	60	60	59	56	54	54	51	50	49	46	44	80

Fan speed	Side noise	Third octave centre frequency band, dB(A) Hz																							Overall dB(A)
		50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	
	Left	64	64	64	65	62	63	65	65	58	54	56	59	65	55	57	56	54	55	53	51	49	48	46	43	74
	Total	**73**	**73**	**73**	**74**	**74**	**74**	**75**	**79**	**71**	**65**	**68**	**66**	**69**	**65**	**66**	**65**	**63**	**61**	**60**	**57**	**55**	**55**	**52**	**50**	**85**

Note 1: Sound power level noise data was derived from manufacturer datasheets provided by the Client and its subcontractors

Table 4.5 Other equipment sound power levels, dB(A)

Fan speed	Third octave centre frequency band, dB(A) Hz																								Overall dB(A)
	50 Hz	63 Hz	80 Hz	100 Hz	125 Hz	160 Hz	200 Hz	250 Hz	315 Hz	400 Hz	500 Hz	630 Hz	800 Hz	1 kHz	1.25 kHz	1.6 kHz	2 kHz	2.5 kHz	3.15 kHz	4 kHz	5 kHz	6.3 kHz	8 kHz	10 kHz	
Substation transformer (250 MVA)[1]	55	57	67	82	72	75	87	83	93	89	90	89	88	88	87	85	83	81	79	75	71	68	64	59	99

Note 1: Sound power level noise data for transformers is derived from AS/NZ standard IEC 60076.10-2009, part 10: Determination of sound levels

4.4 Tonality

The distance between the BESS noise sources and the closest noise-sensitive receptor is 320m. At this distance, based on previous experience with BESS projects, there is a high likelihood that tonality would be present however, it should be confirmed through noise monitoring during the testing and commissioning phase. To account for this, a +5 dB adjustment has been applied to the predicted noise levels (section 4.5).

4.5 Predicted noise levels

Predicted noise levels from the proposed BESS facility are provided in Table 4.6 and noise contours are presented in Appendix D Figures D1 to D4 for different scenarios of fan speed for both battery packs and inverters. As outlined above, a +5 dB adjustment due to tonality has been applied to the predicted noise.

Table 4.6 Predicted sound pressure levels at modelled receivers – Stage 1

Scenario No.		Noise sensitive receptor					
		R1	R2	R3	R4	R5	R6
A1	Predicted L_{A10}, dB	42	25	26	33	45	44
	Adjustment for Tonality	+5	+5	+5	+5	+5	+5
	Assessable level	47	30	31	38	50	49
	Criteria (Day)	**42**	**40**	**40**	**40**	**41**	**42**
	Exceedance	**+5**	-10	-9	-3	**+9**	**+7**
A2	Predicted L_{A10}, dB	37	20	21	28	39	39
	Adjustment for Tonality	+5	+5	+5	+5	+5	+5
	Assessable level	42	25	26	33	44	44
	Criteria (Night)	**37**	**35**	**35**	**35**	**36**	**37**
	Exceedance	**+5**	-10	-9	-2	**+8**	**+7**
B1	Predicted L_{A10}, dB	38	21	22	28	40	40
	Adjustment for Tonality	5	5	5	5	5	5
	Assessable level	43	26	27	33	45	45
	Criteria (Day)	**42**	**40**	**40**	**40**	**41**	**42**
	Exceedance	**+1**	-14	-13	-7	**+4**	**+3**
B2	Predicted L_{A10}, dB	34	17	19	25	36	37
	Adjustment for Tonality	5	5	5	5	5	5
	Assessable level	39	22	24	30	41	42
	Criteria (Night)	**37**	**35**	**35**	**35**	**36**	**37**
	Exceedance	**+2**	-13	-11	-5	**+5**	**+5**

4.6 Discussion

NIA noise levels provided in Table 4.6 show non-compliances for noise sensitive receptors R1, R5 and R6 which are located 660m, 460m and 320m respectively away from the BESS noise sources. The exceedances are within 5 dB for scenarios B1 and B2 for which noise attenuation kits have been assumed for the inverters. This shows that in case tonality is proven to be absent in the future (i.e. after noise commissioning), noise compliance can be expected to be achieved at all noise sensitive receptors during both daytime and nighttime. Nevertheless, it should be noted that worst-case assumptions have been made for the modelling and the scenarios considered as part of this NIA report.

In-principle mitigations are outlined in section 5 to mitigate the noise levels.

5. In principle mitigations

Some in-principle options to mitigate BESS noise impact are provided in Table 5.1. This includes measures such as reducing the battery pack fan and chiller speed between 10:00 pm and 7:00 am (9:00 am Sunday and public holidays) and fitting attenuation to the inverters, which has been summarised in Table 5.1 for consideration. It is noted that South Energy is also considering the use of different battery and inverter equipment as part of noise mitigation.

Further mitigated scenarios using absorptive noise barriers may be considered once acoustics commissioning has taken place. Noise barriers are expected to be effective especially for R5, and R6 by interrupting the line of sight between sources and receptors.

Table 5.1 In-principle noise mitigation measure options for Battery Pack unit and/or Inverters

Mitigation option		Rationale and implementation	Relative cost and performance
Source or path noise control	Fan and air intake attenuators	Source control – Direct treatment of noise emissions. The attenuators are to be designed specifically to achieve desired noise reduction. It may have some impact on the battery pack/inverter fan system performance.	Medium cost Performance depends on attenuator design specifications
Management measures	Reduce fan speed of battery pack during hot days and night	Lower source noise emissions Lower cooling fan and chiller speed via software control	Low cost and effective in reducing noise emissions
Management measures	Installation of absorptive noise walls	Lower noise level received at the most affected receptor locations	High cost and effective in reducing received noise levels at at the most affected receptor locations

Should the Project proceed to operation, it is expected that noise commissioning and mitigation modelling will be undertaken to further ascertain the modelling scenarios and confirm which, if any, mitigation measures are required to achieve compliance with the WA Noise Regulations.

6. Conclusions

GHD has been commissioned by South Energy, on behalf on Narrogin BESS development Pty Ltd, to undertake a noise compliance assessment study for the proposed BESS facility at the project site. Stage 1 of the project comprises one 200MW / 800MWh BESS facility, with supporting substation control building, operations and maintenance shed and laydown and facilities area. The BESS is proposed to connect to an existing Western Power substation on the adjacent land parcel at Lot 8 (No. 153) Booth Street, Narrogin Valley. The project may include two (2) subsequent stages, each comprising 200MW / 800MWh BESS facilities). This report summarised the results of the NIA for Stage 1.

A preliminary environmental noise survey has been conducted using four noise loggers deployed at four selected noise sensitive receptor locations in the vicinity of the project development envelope.

– Results of long-term unattended baseline noise monitoring showed no existing industrial activities in the vicinity of the Project development envelope, so no adjustment was applied to the assigned noise levels.
– The outcome of the noise modelling study indicates that:
  - Four scenarios were modelled by considering various fan speeds for the proposed equipment battery storage units and inverters during day and night.
  - For nighttime scenarios, a 20 percent fan speed reduction for inverter's normal operation was considered given the nighttime lower temperature observed in the historical data during summer over the last two years.
  - Additional noise mitigation in the form of noise attenuation kits for the inverter have been considered for the modelling and their installation may be required, pending results of noise commissioning tests.
  - A +5 dB adjustment was applied to the predicted noise levels due to the short distance between the noise sources under study (BESS) and the nearest noise sensitive receptor, (minimum of 320m). The tonality assumption may be disproved by the results of noise commissioning tests in future.
  - The modelling results for scenarios B1 and B2 that use noise attenuation kits for the inverters, showed that noise exceed the criteria as follows:
    – +1 dB during Sunday daytime, +2 dB during nighttime at R1,
    – +4 dB during Sunday daytime, +5 dB during nighttime at R5 and,
    – +3 dB during Sunday daytime, +5 dB during nighttime at R6.

    These noise sensitive receptors are located respectively 660m, 460m and 320m from the BESS noise sources.
  - The exceedances are within 5 dB for scenarios B1 and B2 which shows that in case tonality is disproved after noise commissioning tests, noise compliance can be expected to be achieved at all noise sensitive receptors during both daytime and nighttime, subject to noise attenuation kits being fitted to inverters.
  - It should be noted that worst-case assumptions have been made for the modelling both from a noise propagation and meteorological condition point of view and the scenarios considered. In addition, in-principal mitigations are outlined in section 5 to mitigate the noise levels including installation of noise barriers, should noise commissioning confirm tonality at receptors.

7. References

Bureau of Meteorology. *Latest Weather Observation for Collie East*. Website: http://www.bom.gov.au/products/IDW60801/IDW60801.95621.shtml

Australian Standard AS 60076 Part 10: 2009 Power Transformers – Determination of Sound Levels (IEC 60076-10, Ed.1 (2001) MOD)

Australian Standard AS 1055:2018 *Acoustics – Description and Measurement of Environmental Noise* (Standards Australia, 2018)

The Western Australian Planning Commission (WAPC), *Position Statement: Renewable energy facilities*, March 2020

Western Australia Environmental Protection Act 1986 (EP Act) *Environmental Protection (Noise) Regulations 1997*, Government of Western Australia

Appendix A

Site information and zoning



Legend

Development Envelope — Battery Packs — Inverters — Transformer (Stage 1)

Paper Size ISO A4

0 0.1 0.2 0.3 0.4 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA94
Grid: GDA94 / MGA zone 50

N

GHD

Narrogin BESS Development Pty Ltd
South energy Narrogin BESS

Noise impact assessmnet
Project Layout

Project No. **12638490**
Revision No. **0**
Date. **06/12/2024**

FIGURE A.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12638490\Tech\Noise\QGIS\South Energy - Narrogin noise monitoring.qgz
Print Date: 06/12/2024

Data Source:Google Earth Imagery 2024

Created By: hsatari

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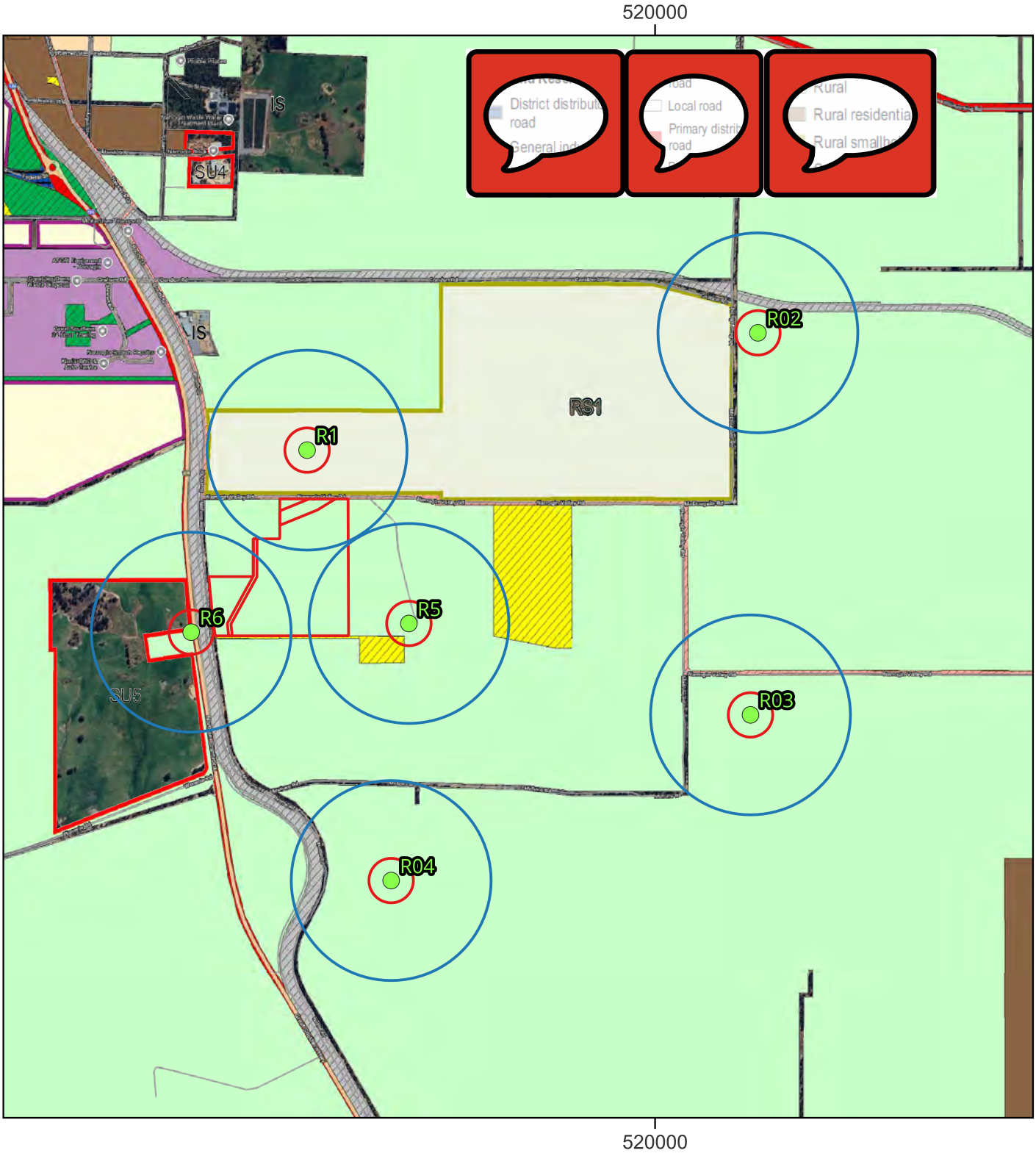

Legend

Noise Sensitive Receptors | Development Envelope | 100m circles | 450m circles

Paper Size ISO A4

0 0.25 0.5 0.75 1 km

Map Projection: Transverse Mercator
Horizontal Datum: GDA94
Grid: GDA94 / MGA zone 50

N

GHD

Narrogin BESS Development Pty Ltd
South energy Narrogin BESS

Noise impact assessmnet
Local Planning Scheme - Zones and Reserves (DPLH-071)

Project No. **12638490**
Revision No. **0**
Date. **06/12/2024**

FIGURE A.2

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Print Date: 06/12/2024

Data Source:Google Earth Imagery 2024

Created By: hsatari

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Site equipment photographs

Description	Maps and photographs
Project layout and four monitoring locations	

Description	Maps and photographs
Logger 2 – 123 Mcdougalls Rd, Narrogin Valley WA 6312	
Site photo of logger 2	

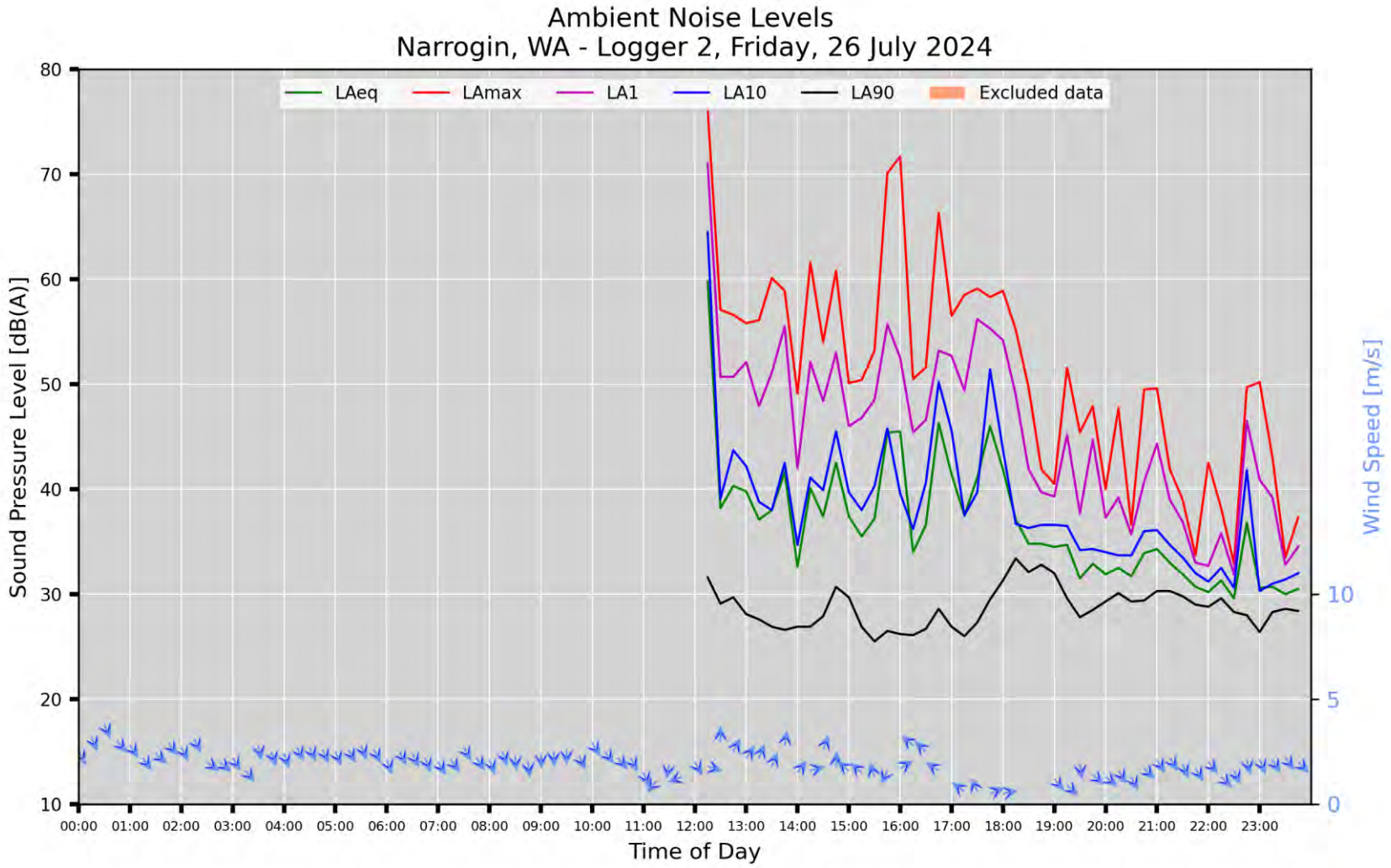
Description	Maps and photographs
Logger 3– 21 Mellons Road, Narrogin Valley WA 6312	
Site photo of logger 3	

Description	Maps and photographs
Logger 4 – 35 Nottle Road, Narrogin Valley WA612	
Site photo of logger 4	

Appendix B

Unattended noise measurement graphs

Logger 2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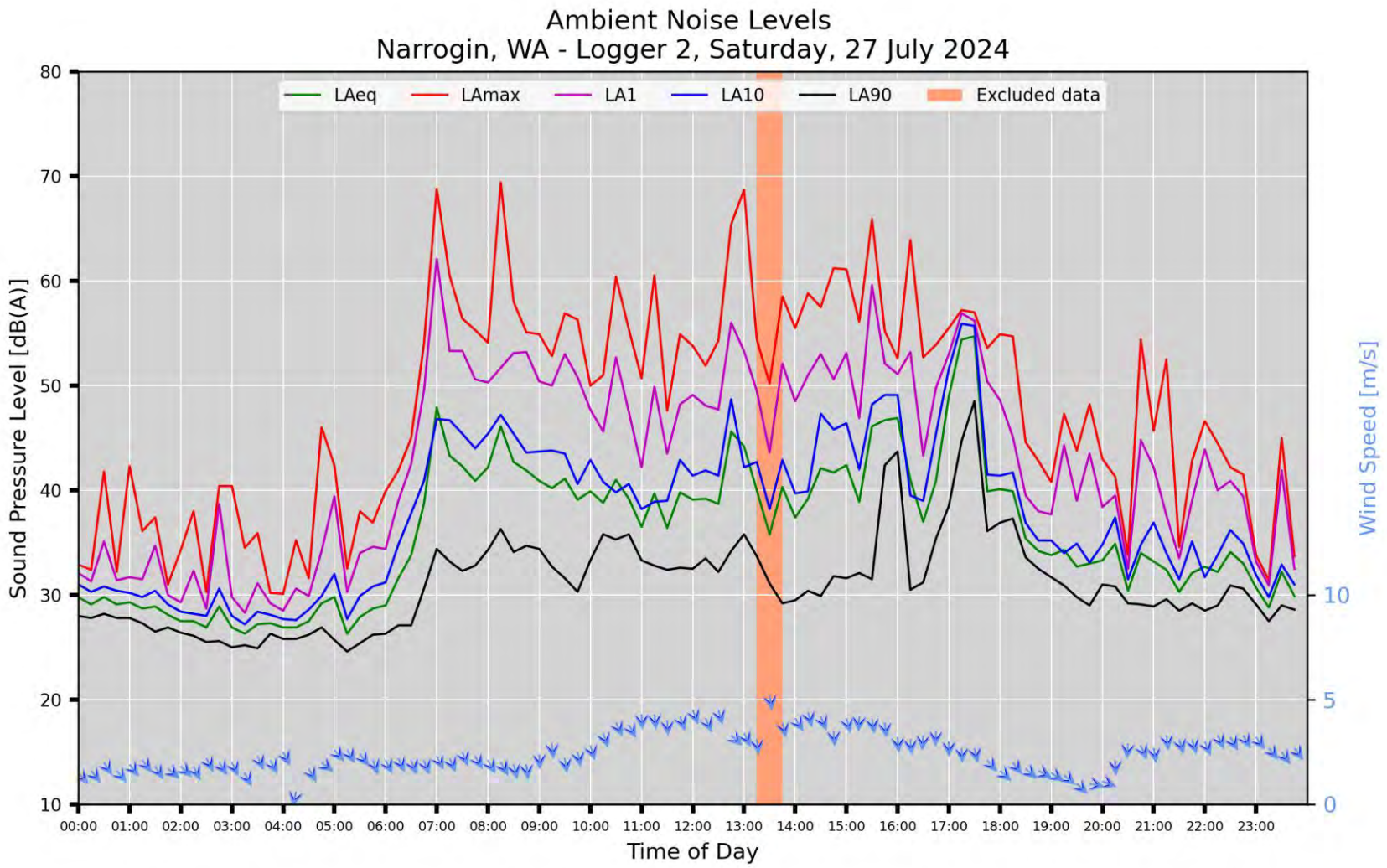
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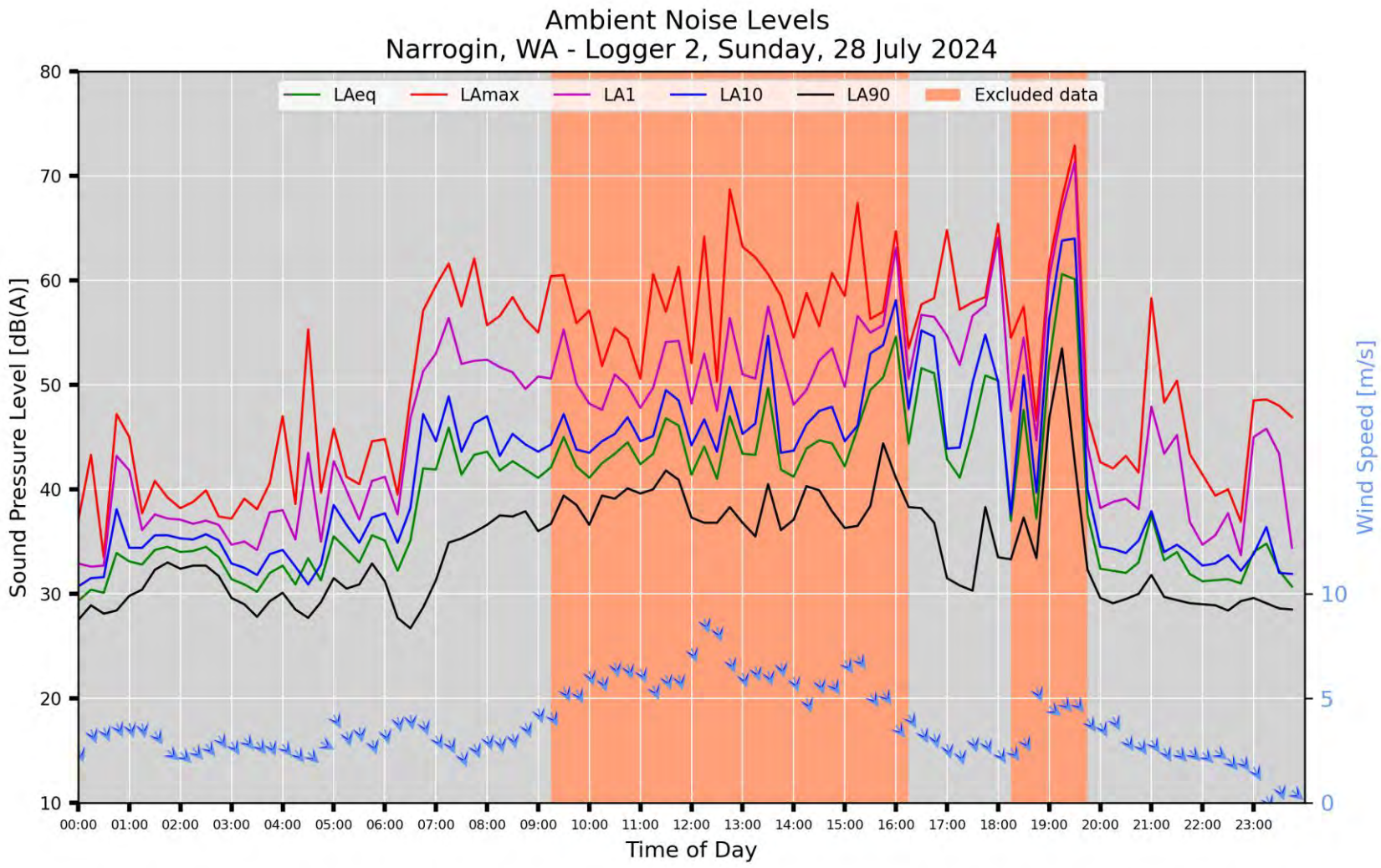
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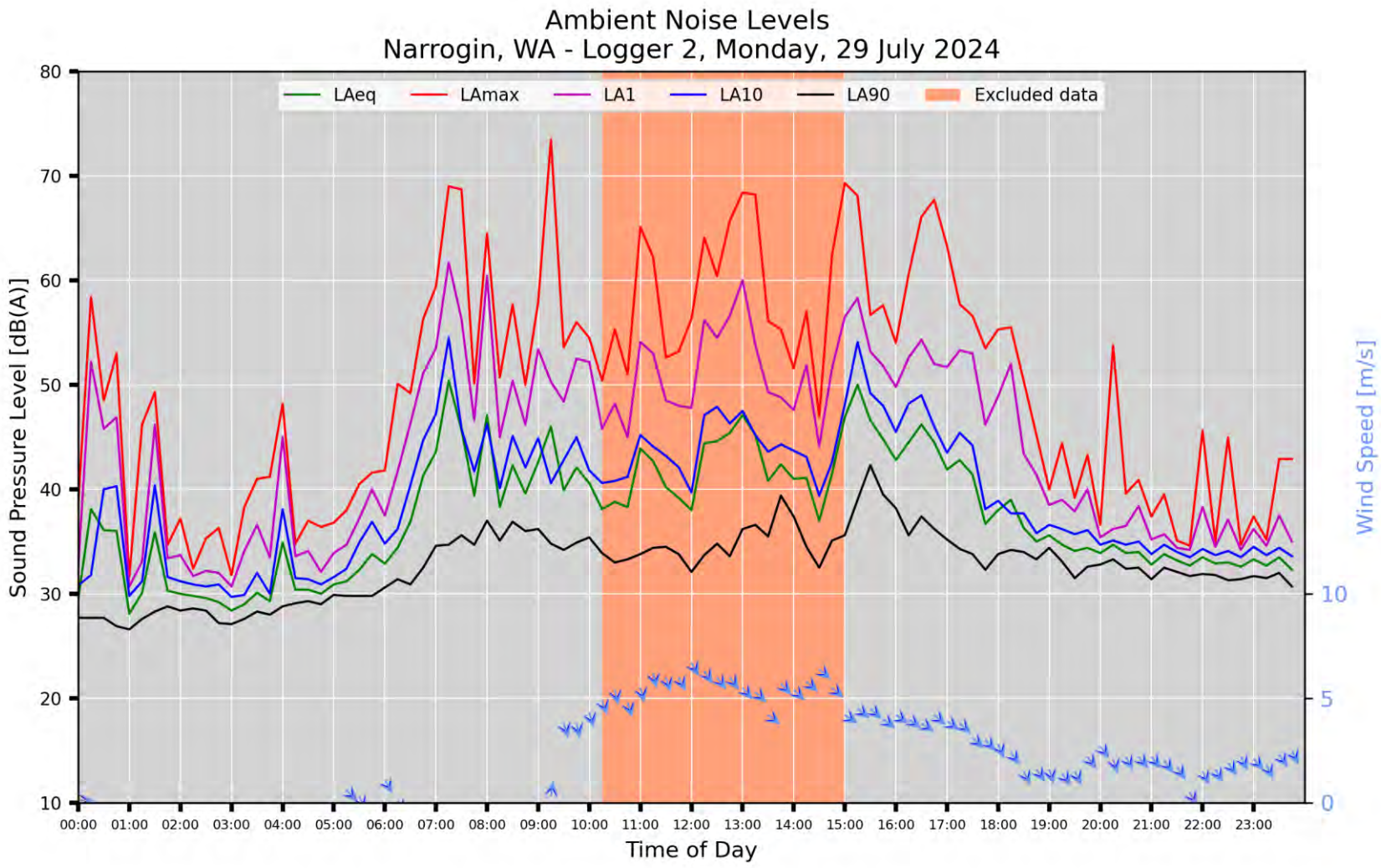
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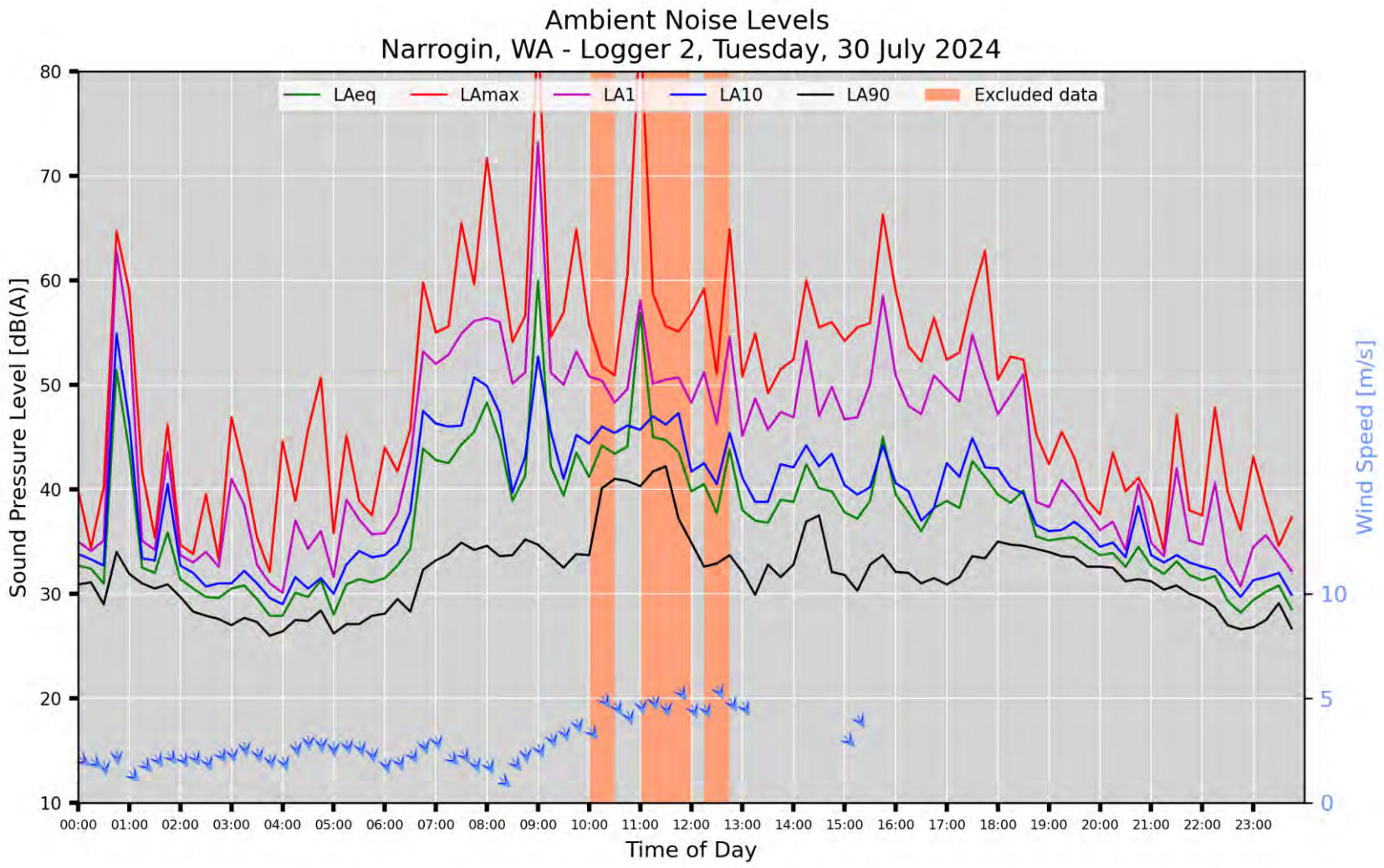
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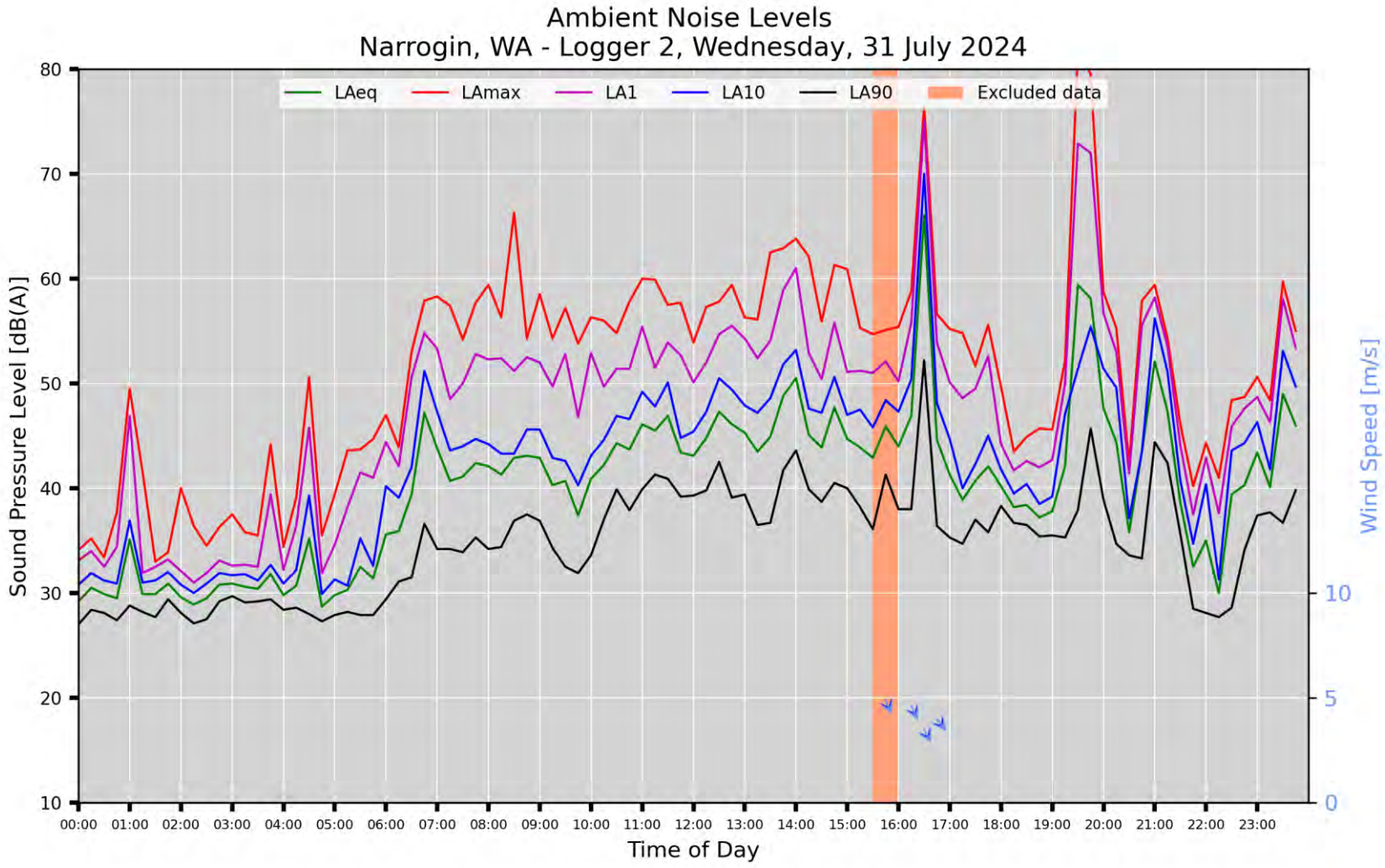
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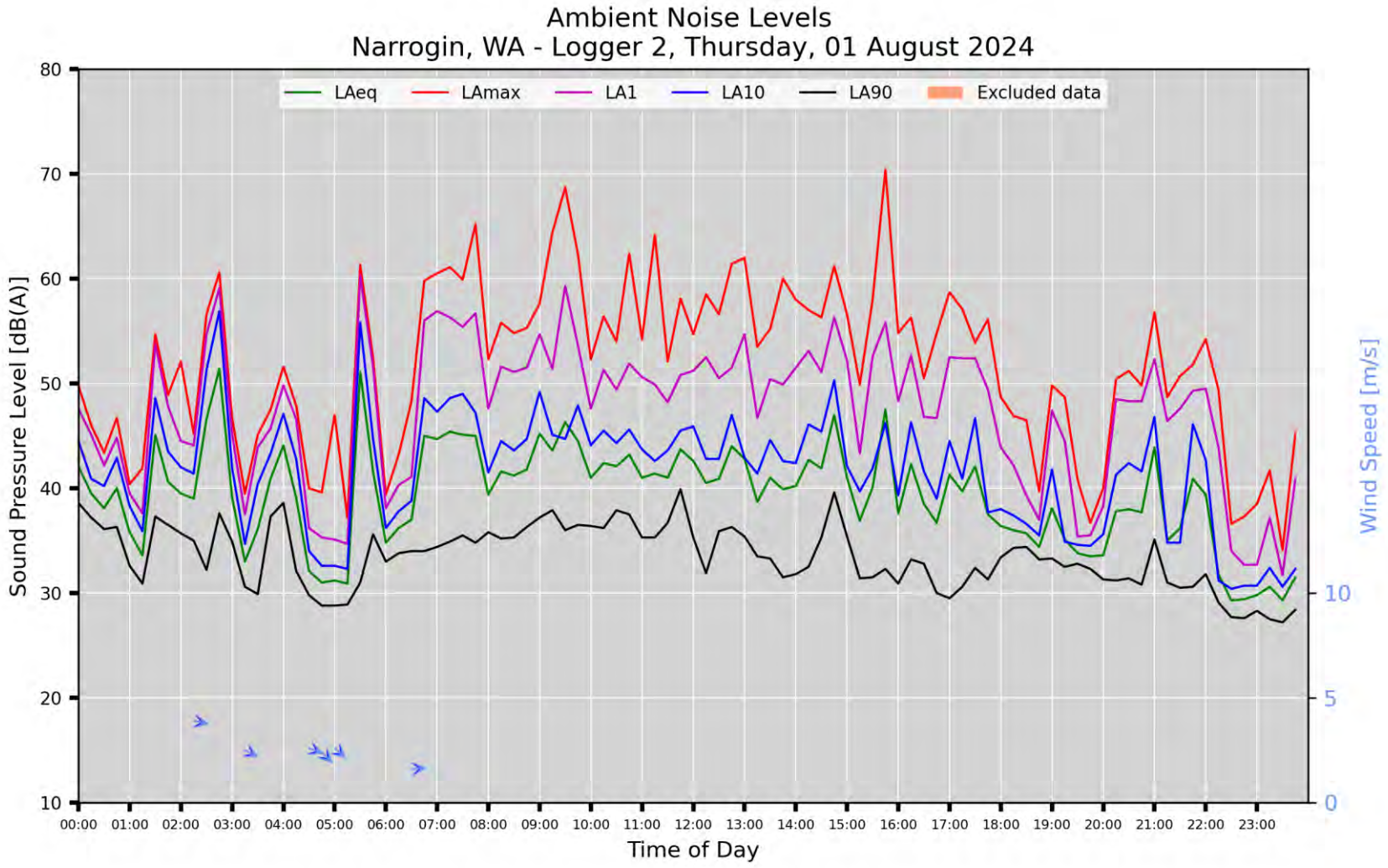
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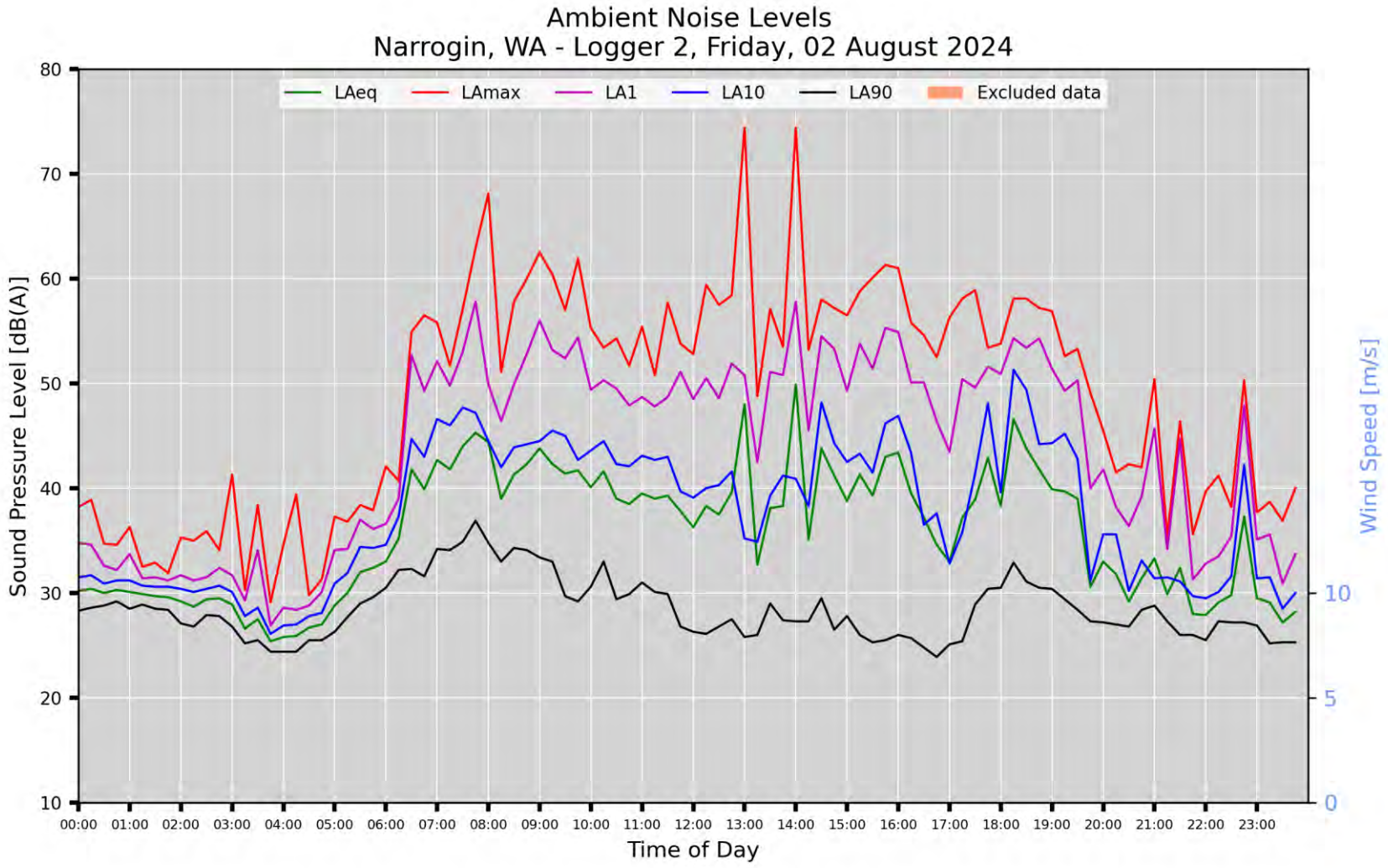
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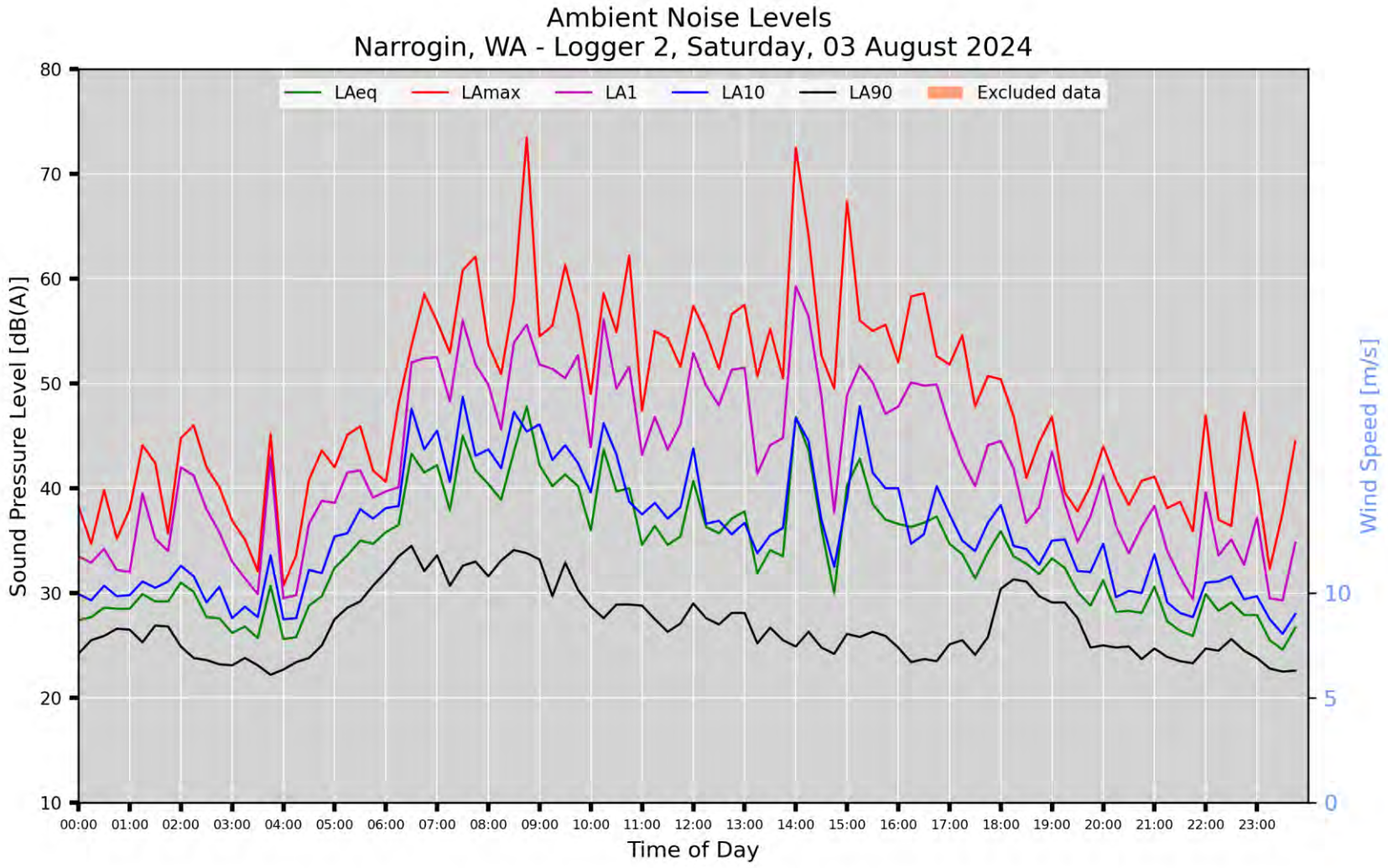
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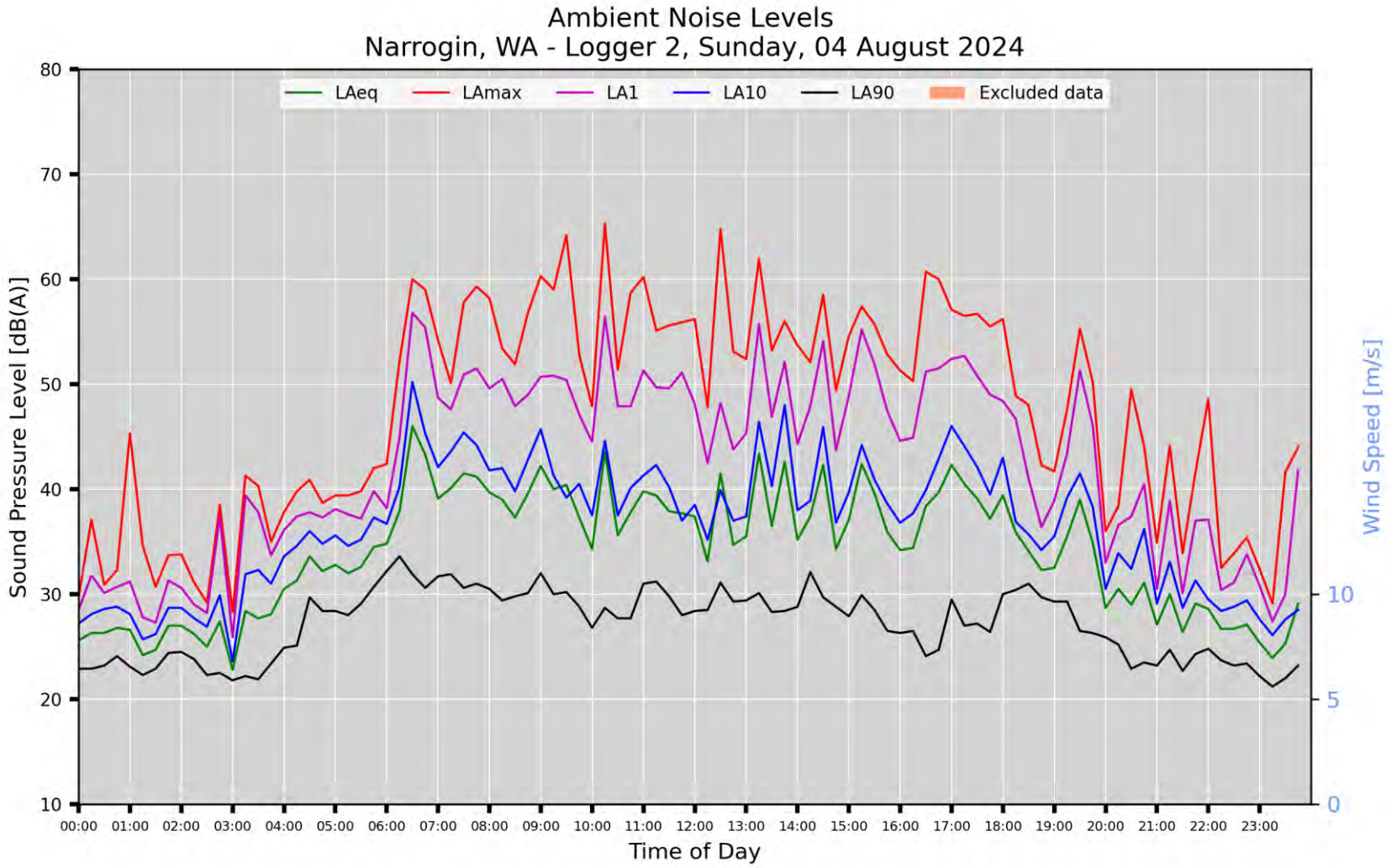
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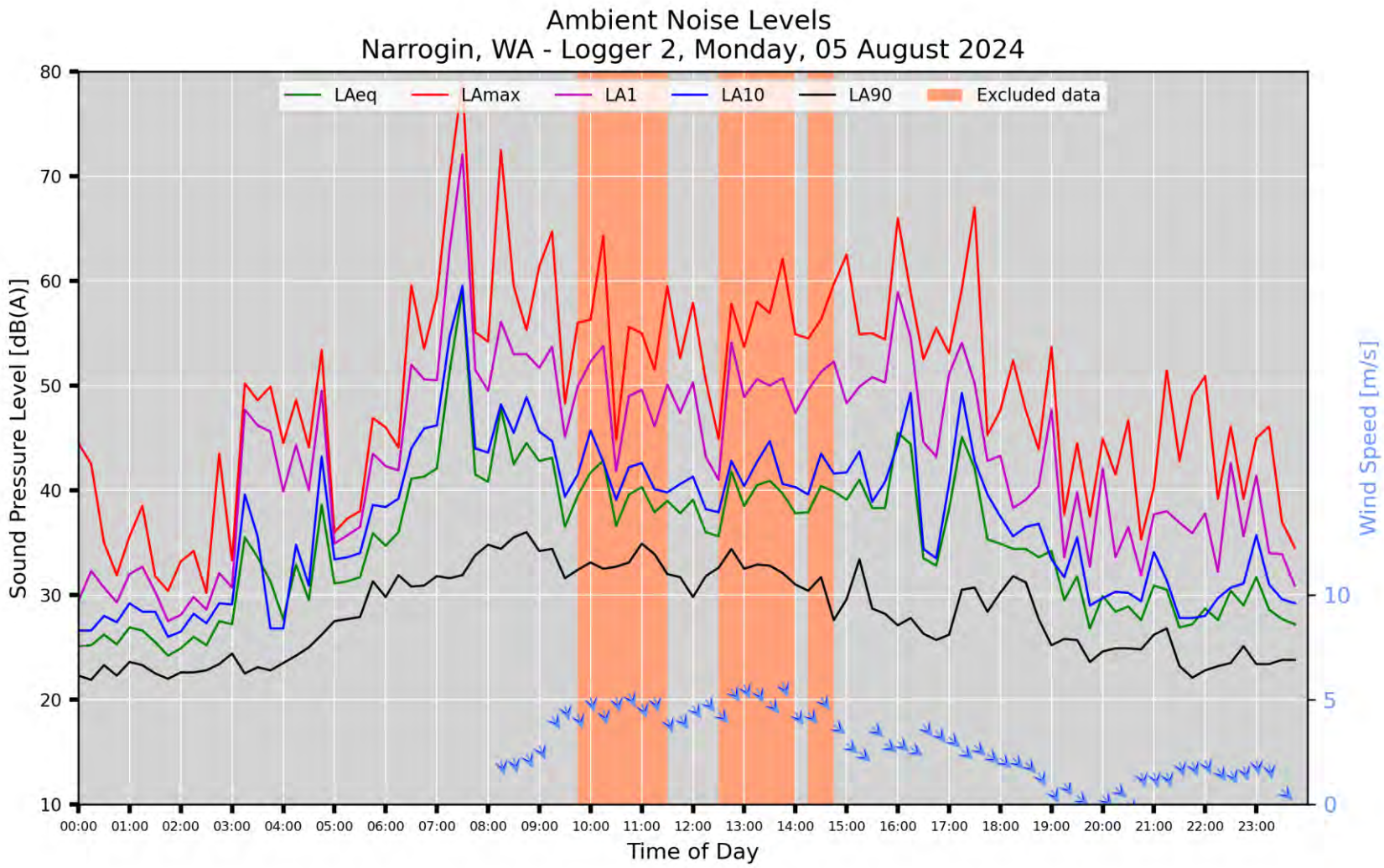
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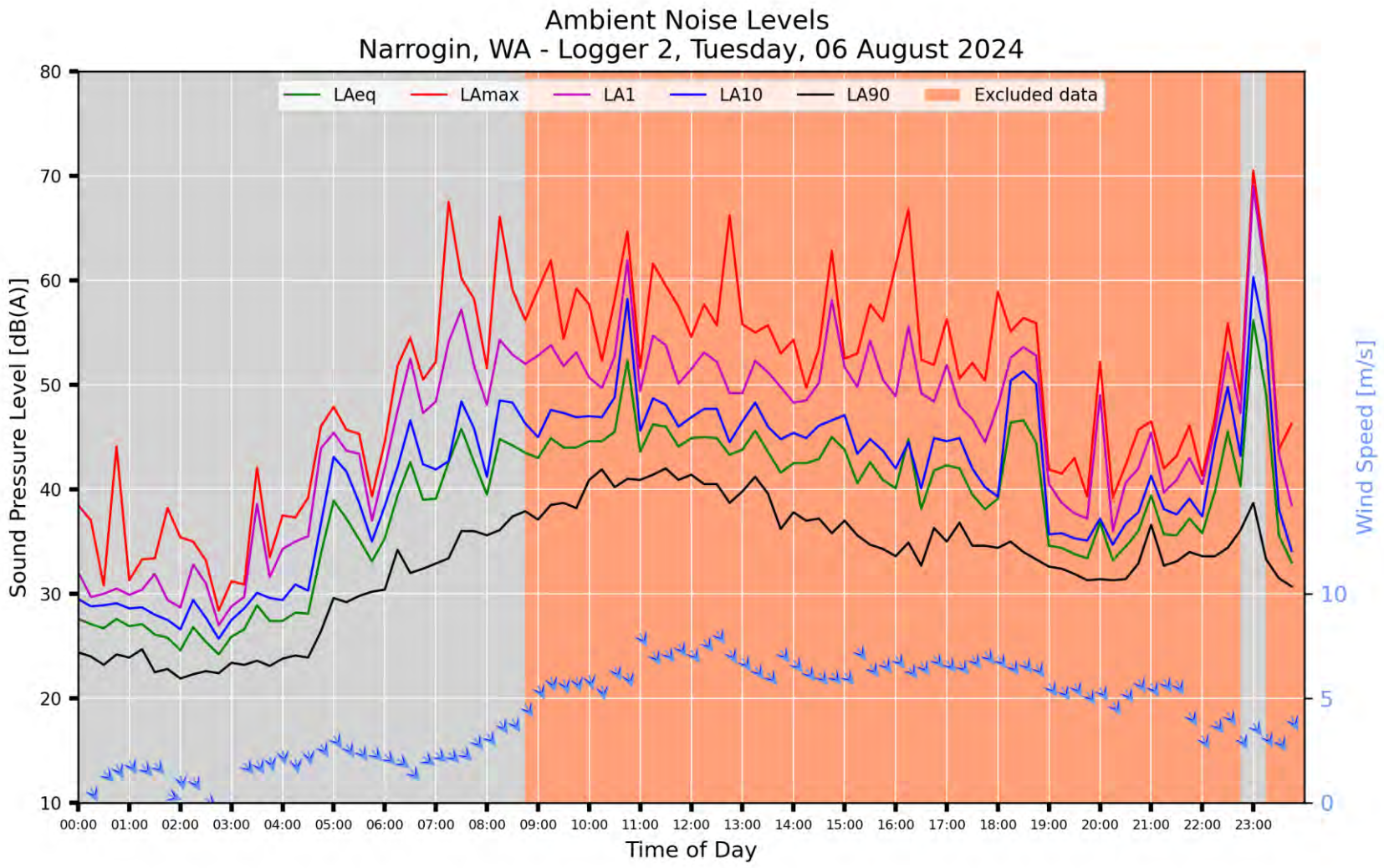
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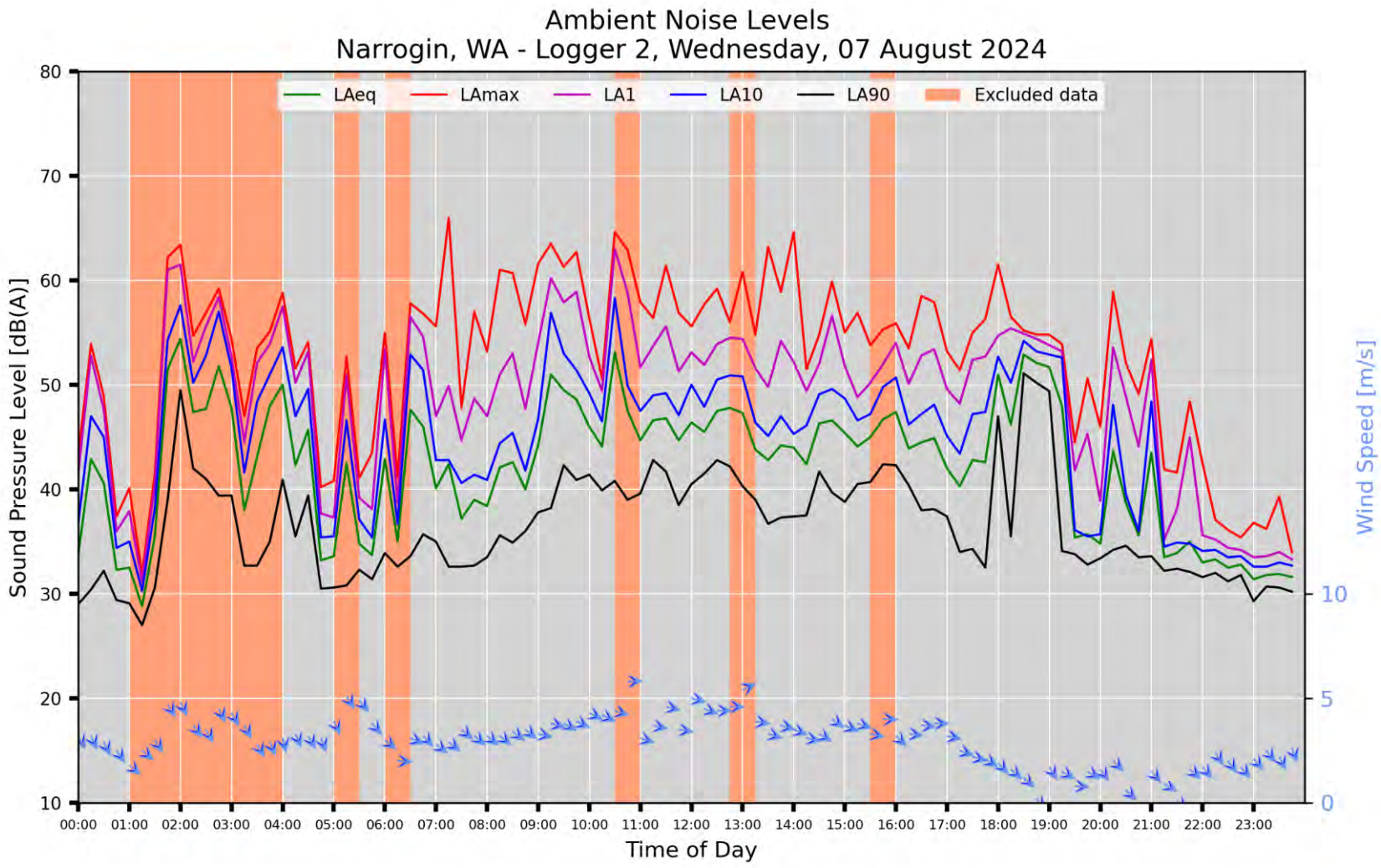
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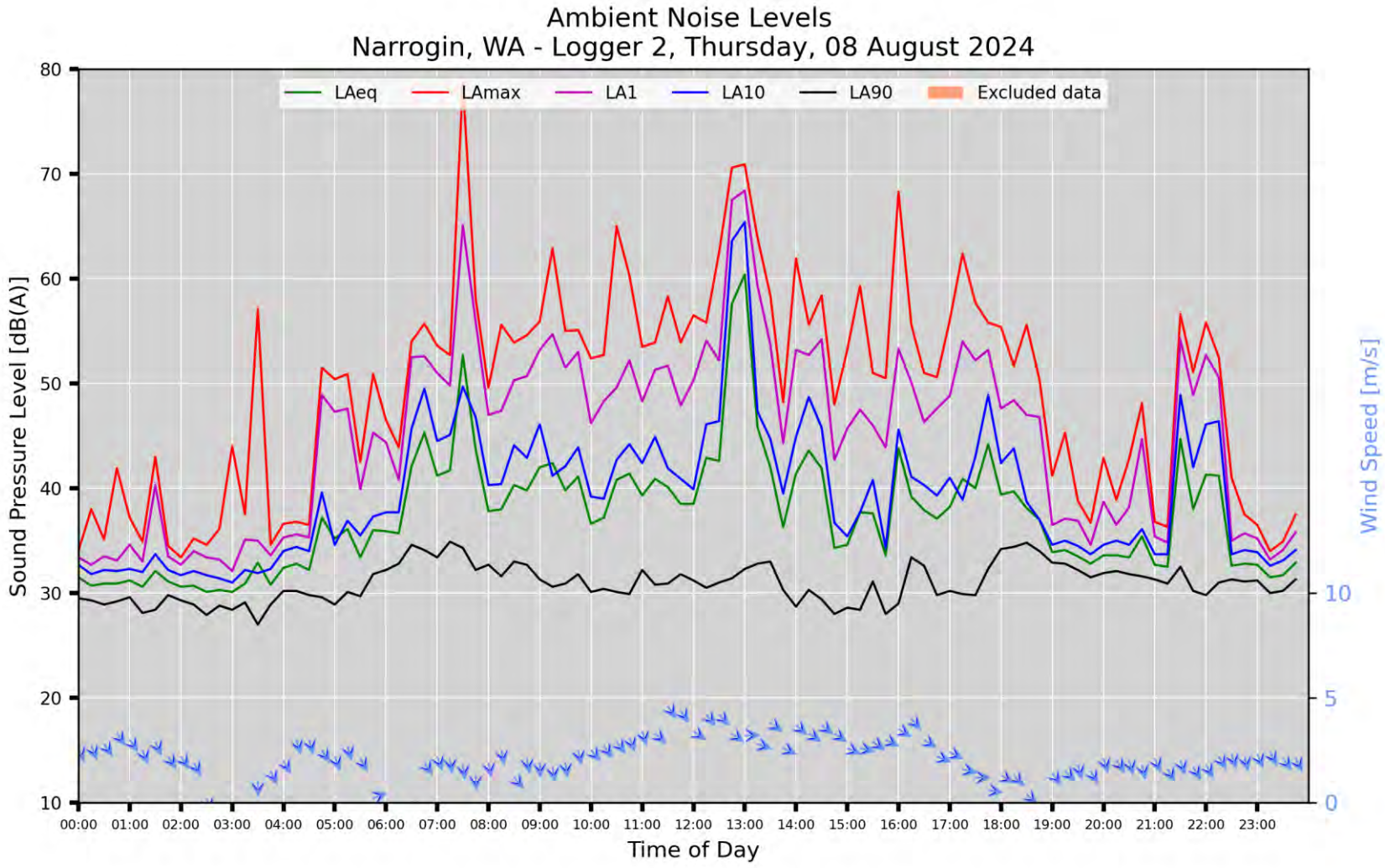
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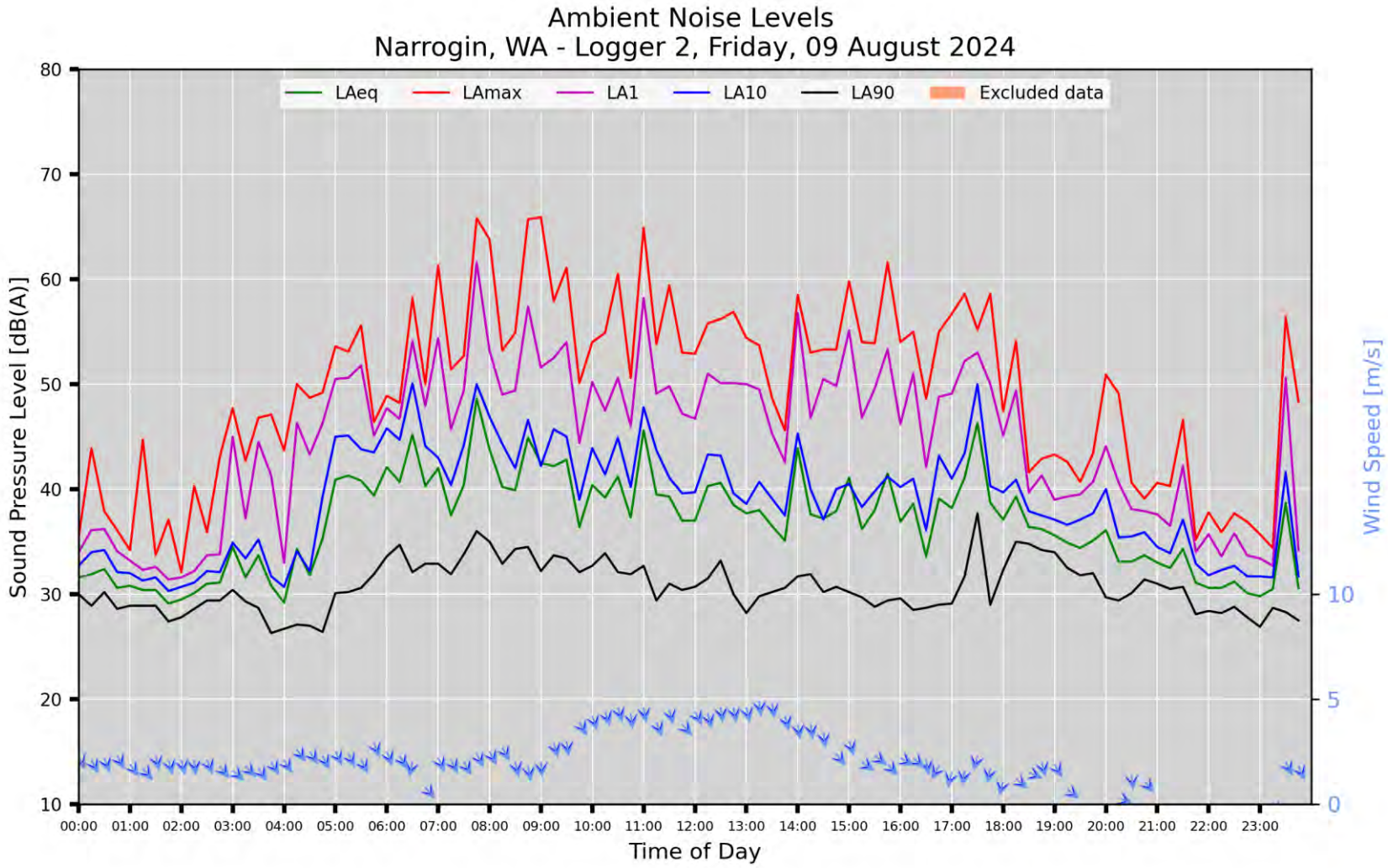
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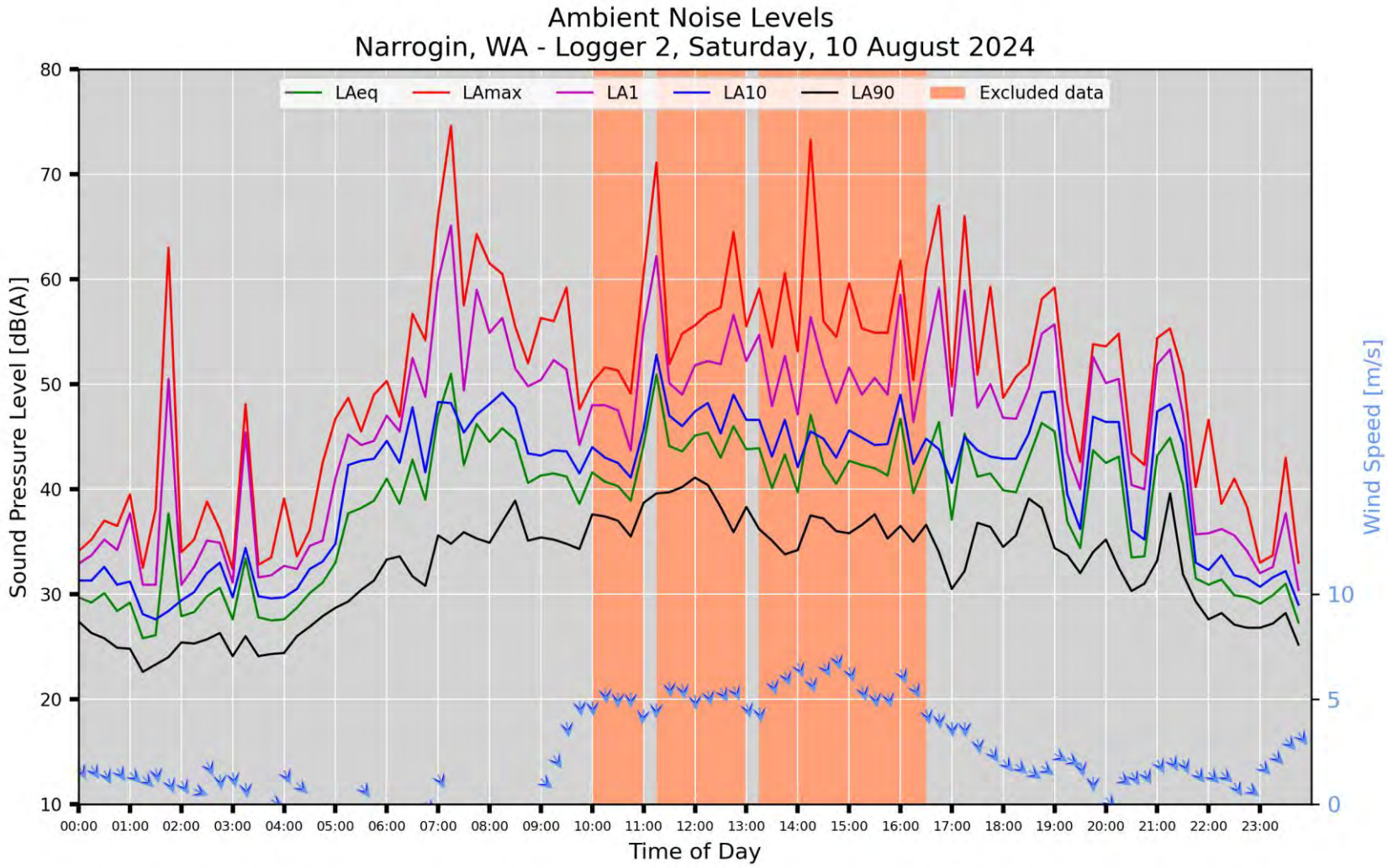
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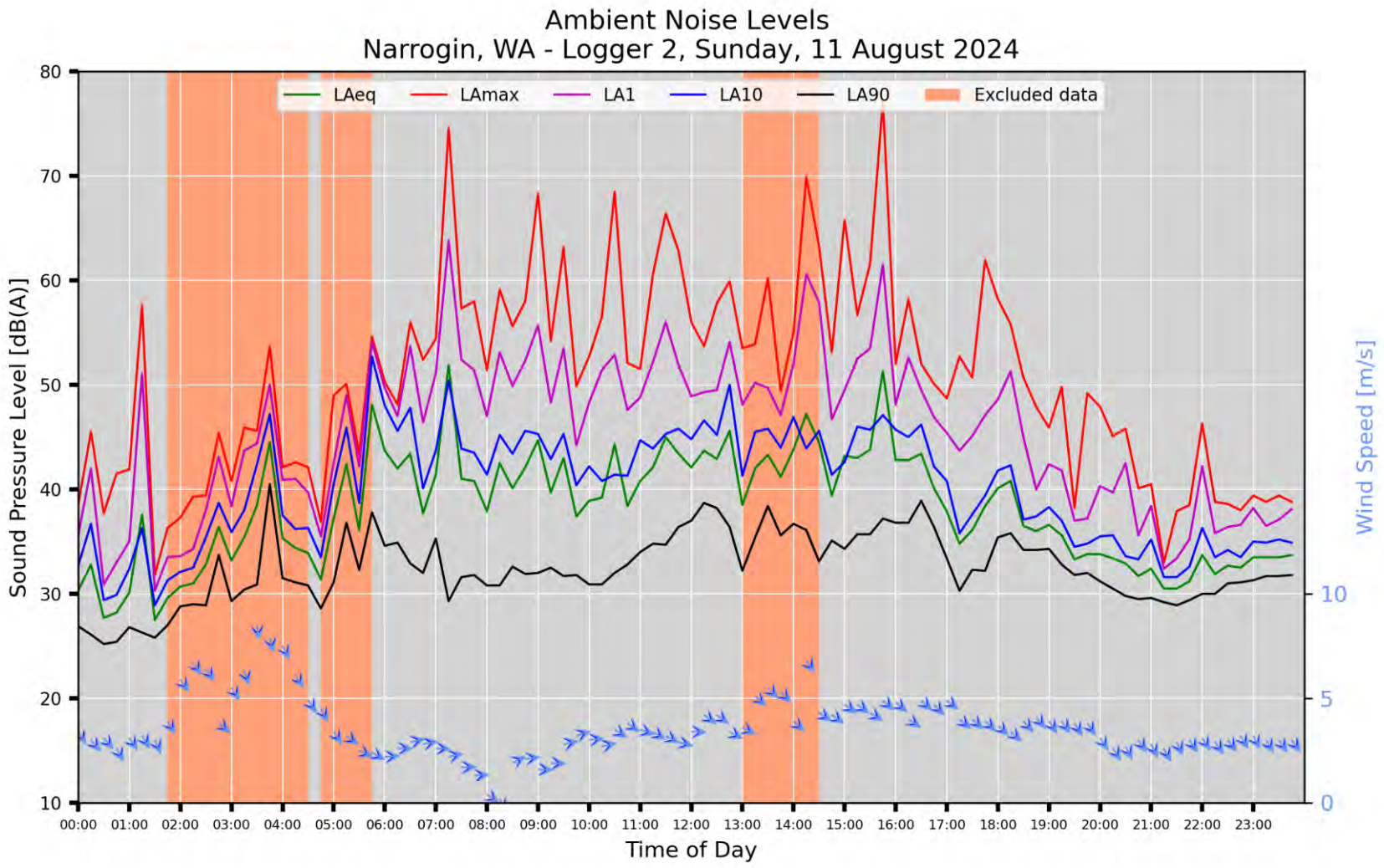
21:00
22:00
23:00


Ambient Noise Levels
Narrogin, WA - Logger 2, Sunday, 11 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
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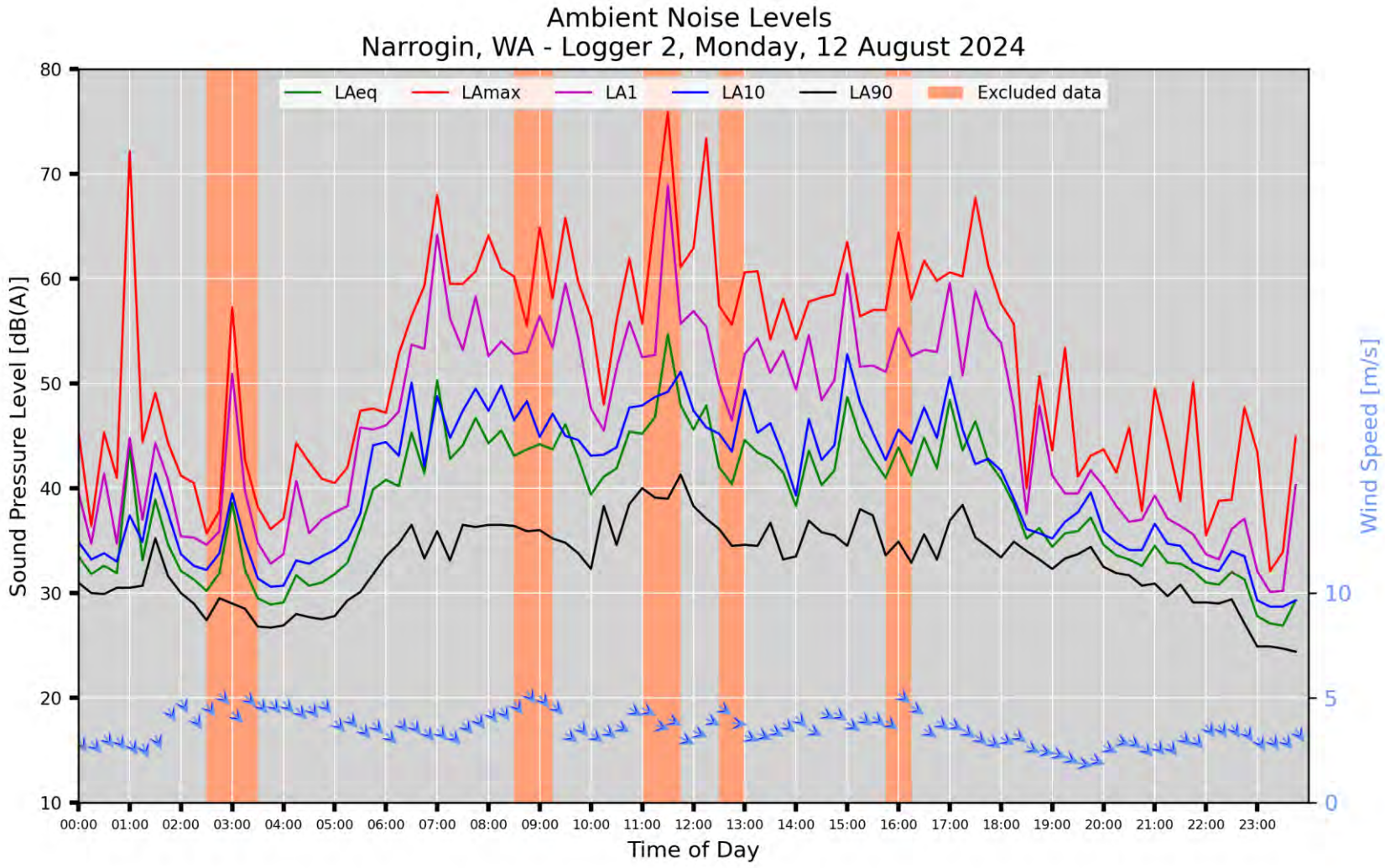
23:00


Ambient Noise Levels
Narrogin, WA - Logger 2, Monday, 12 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
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13:00
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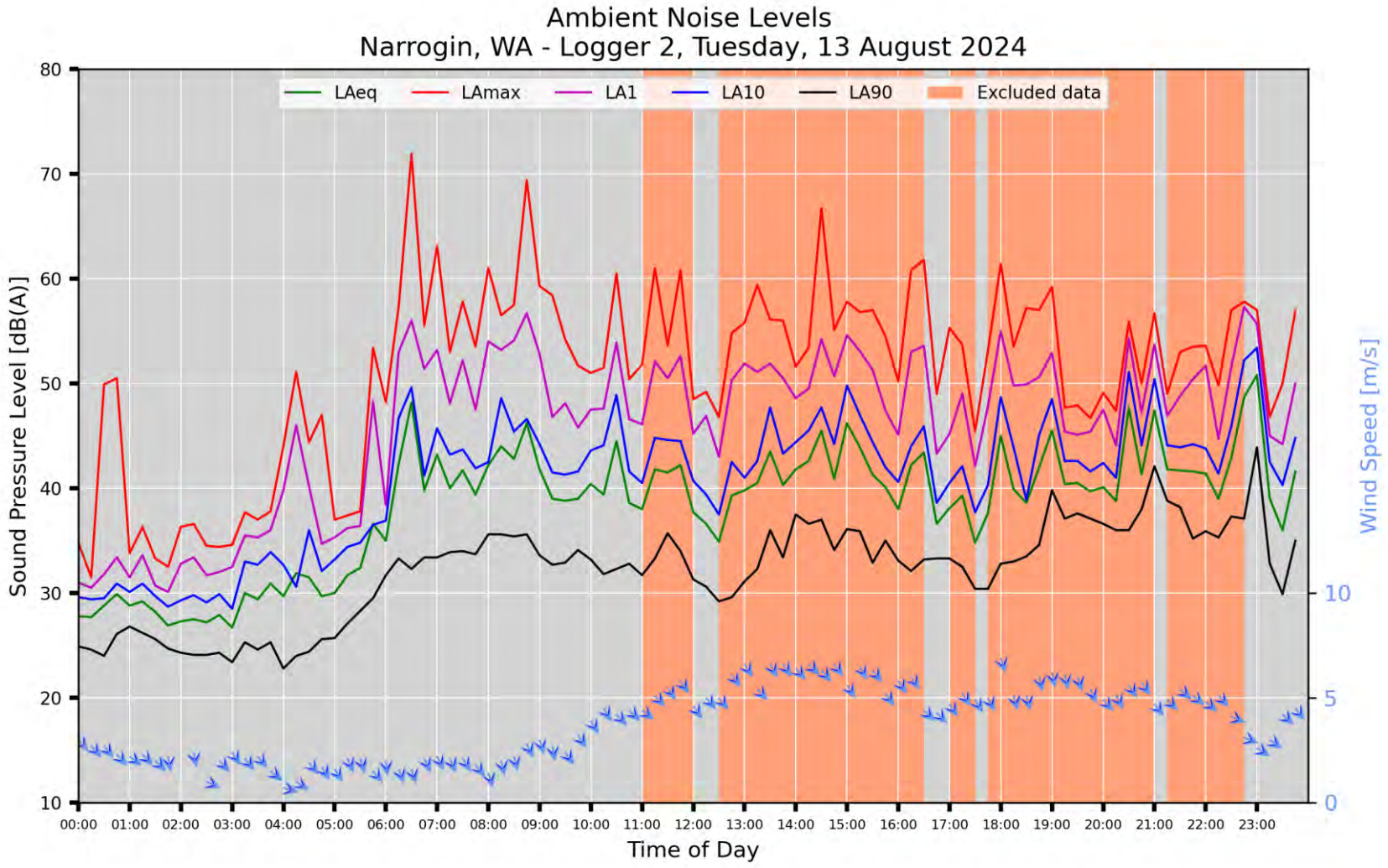
Ambient Noise Levels
Narrogin, WA - Logger 2, Tuesday, 13 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
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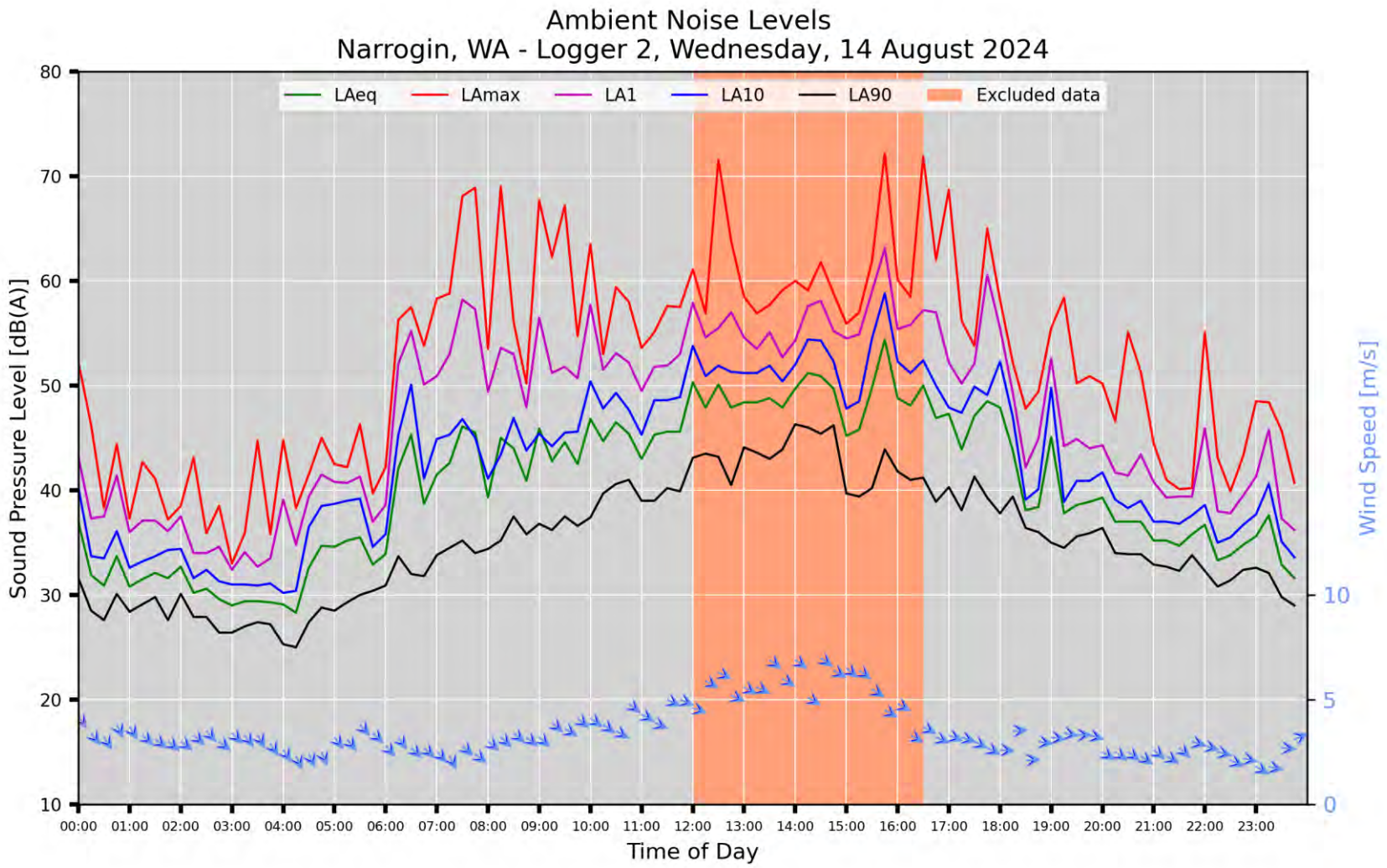
23:00


Ambient Noise Levels
Narrogin, WA - Logger 2, Wednesday, 14 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
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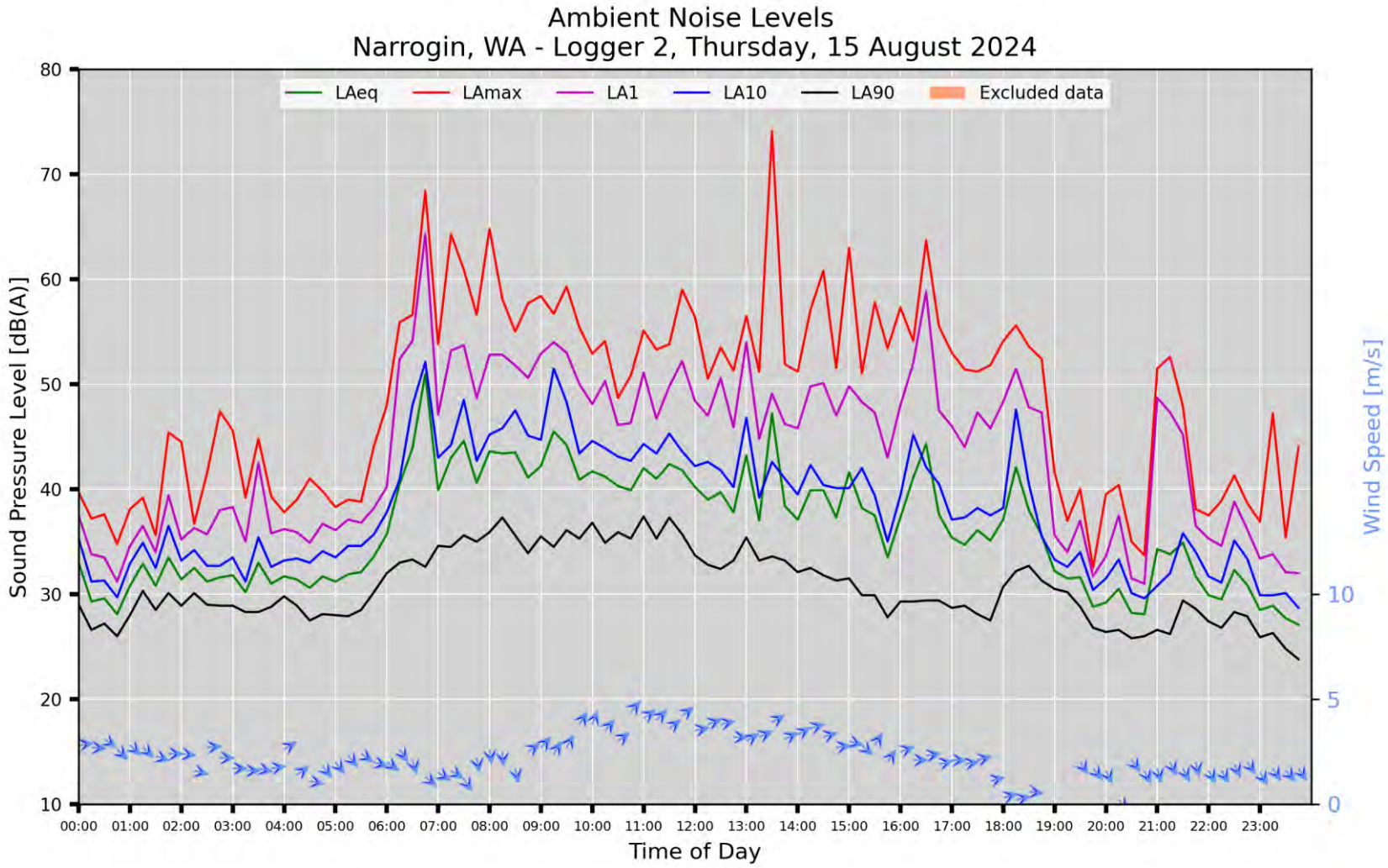
Ambient Noise Levels
Narrogin, WA - Logger 2, Thursday, 15 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
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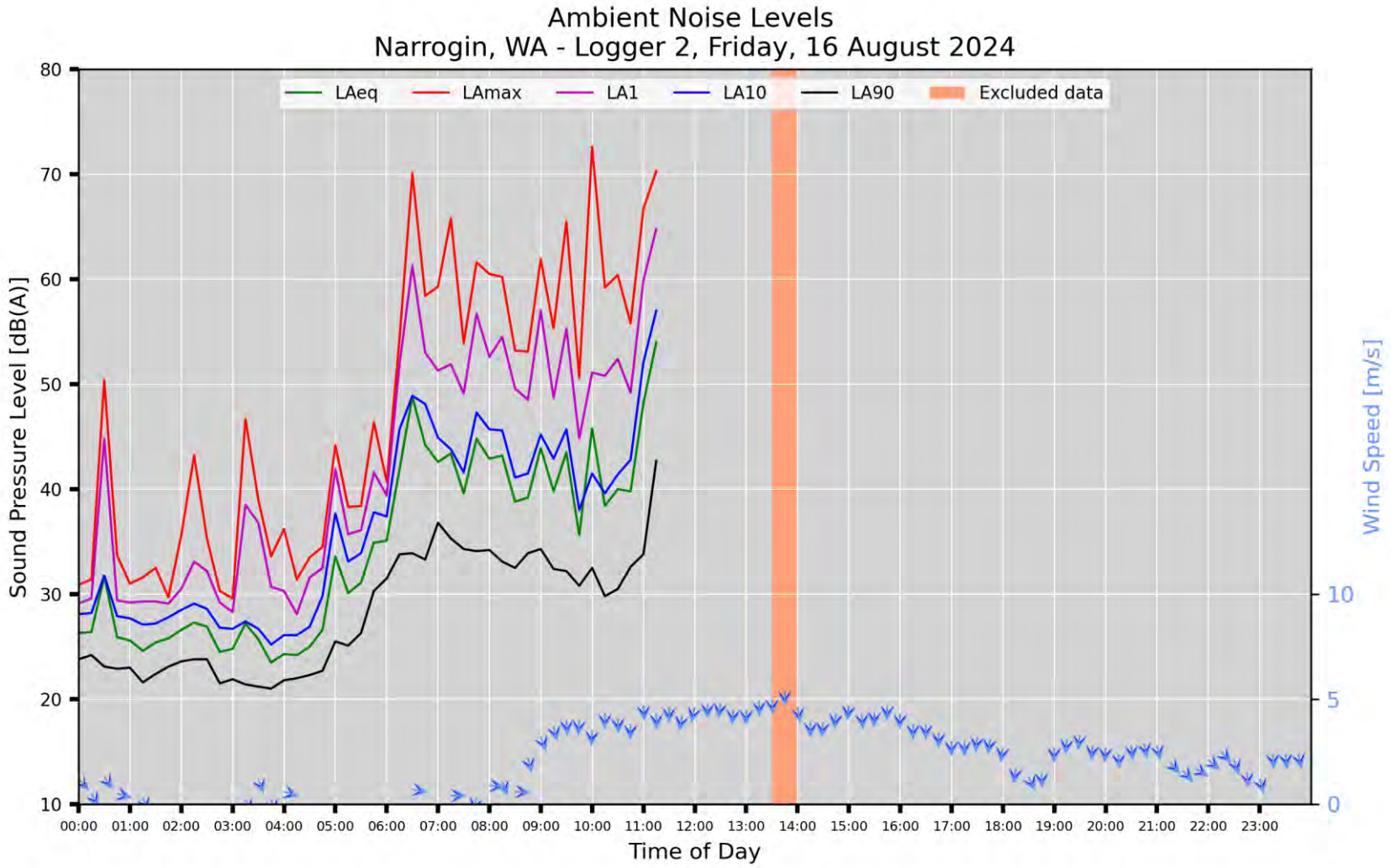
23:00


Ambient Noise Levels
Narrogin, WA - Logger 2, Friday, 16 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
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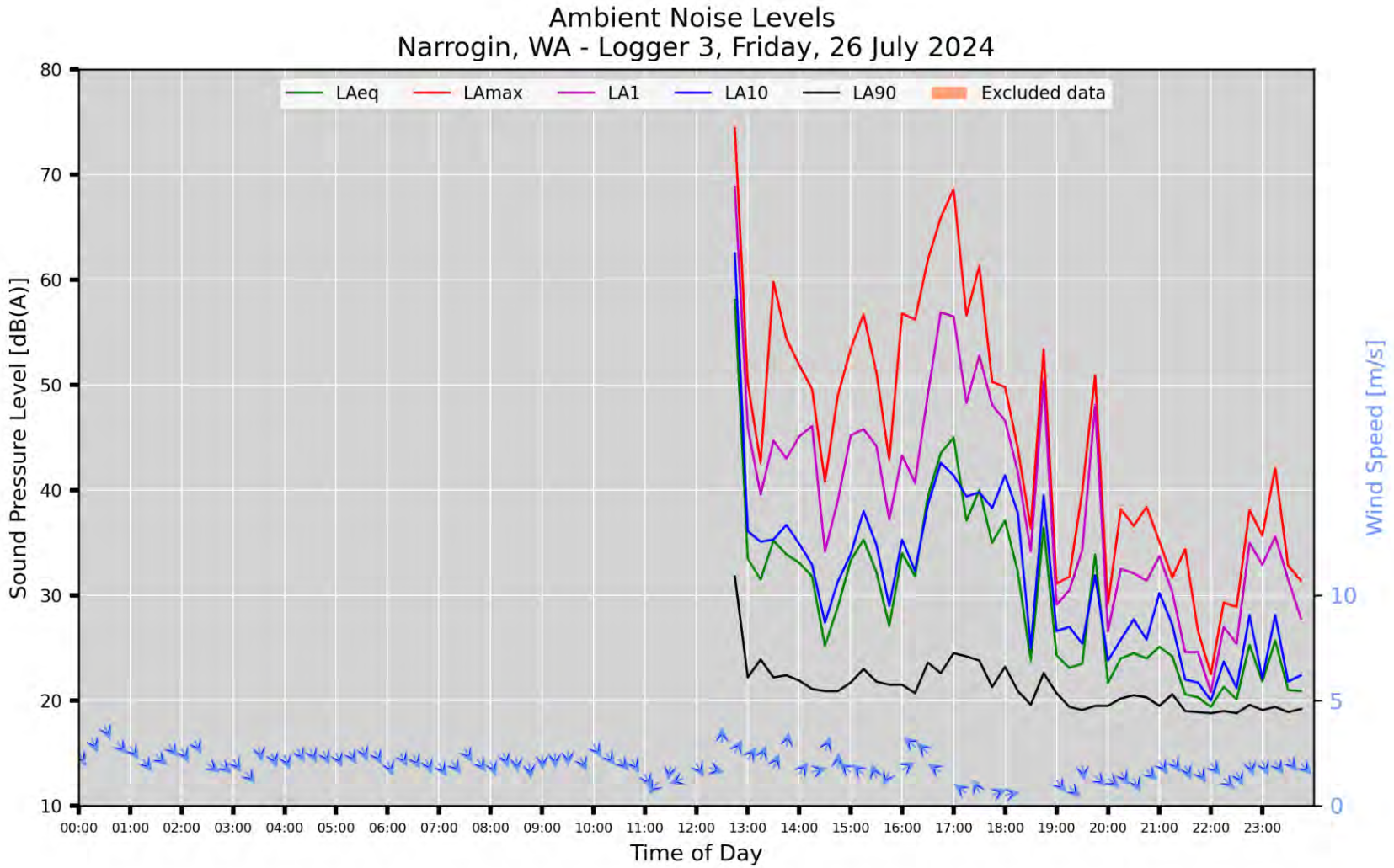
23:00

Logger 3


Ambient Noise Levels
Narrogin, WA - Logger 3, Friday, 26 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
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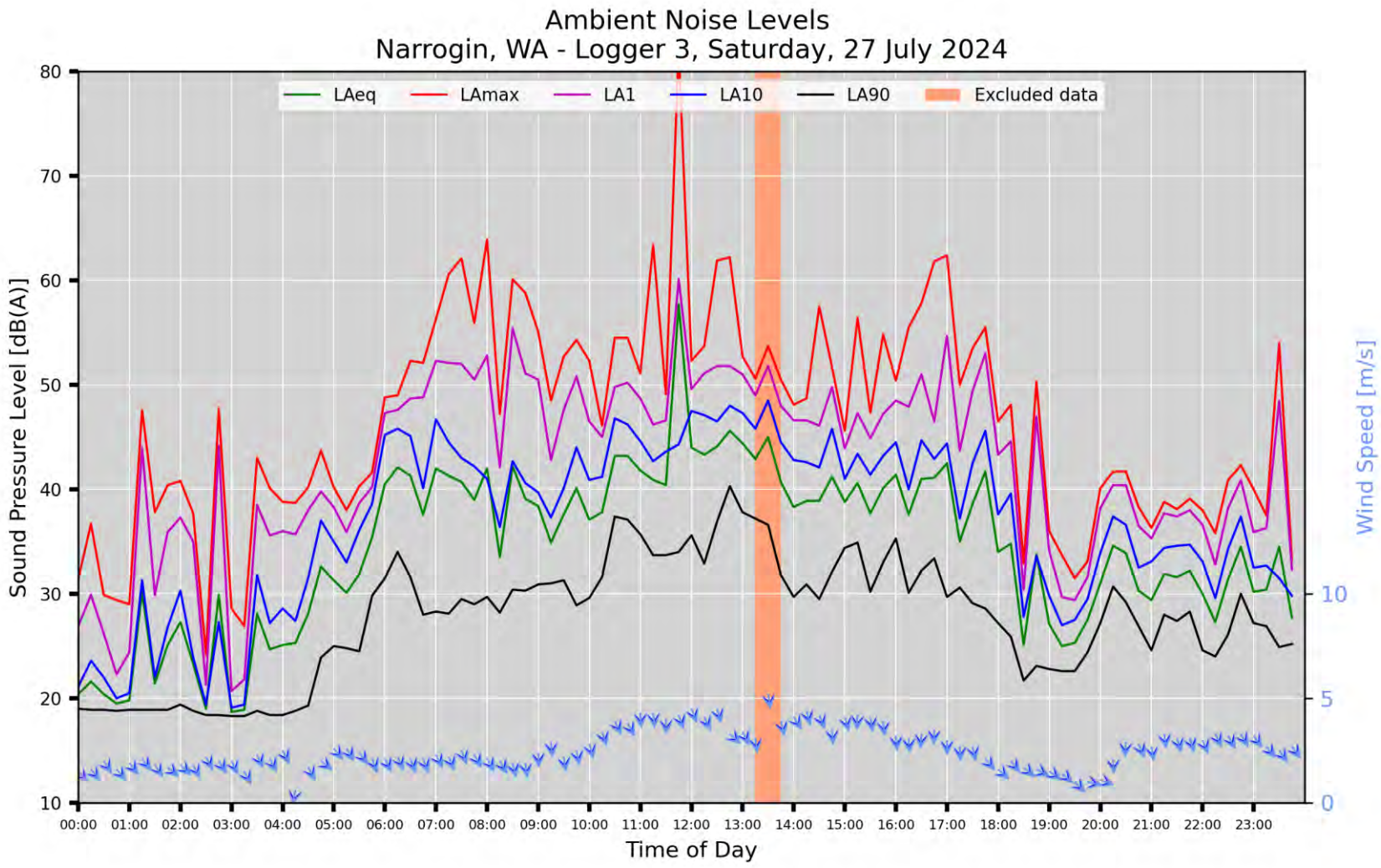
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Saturday, 27 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
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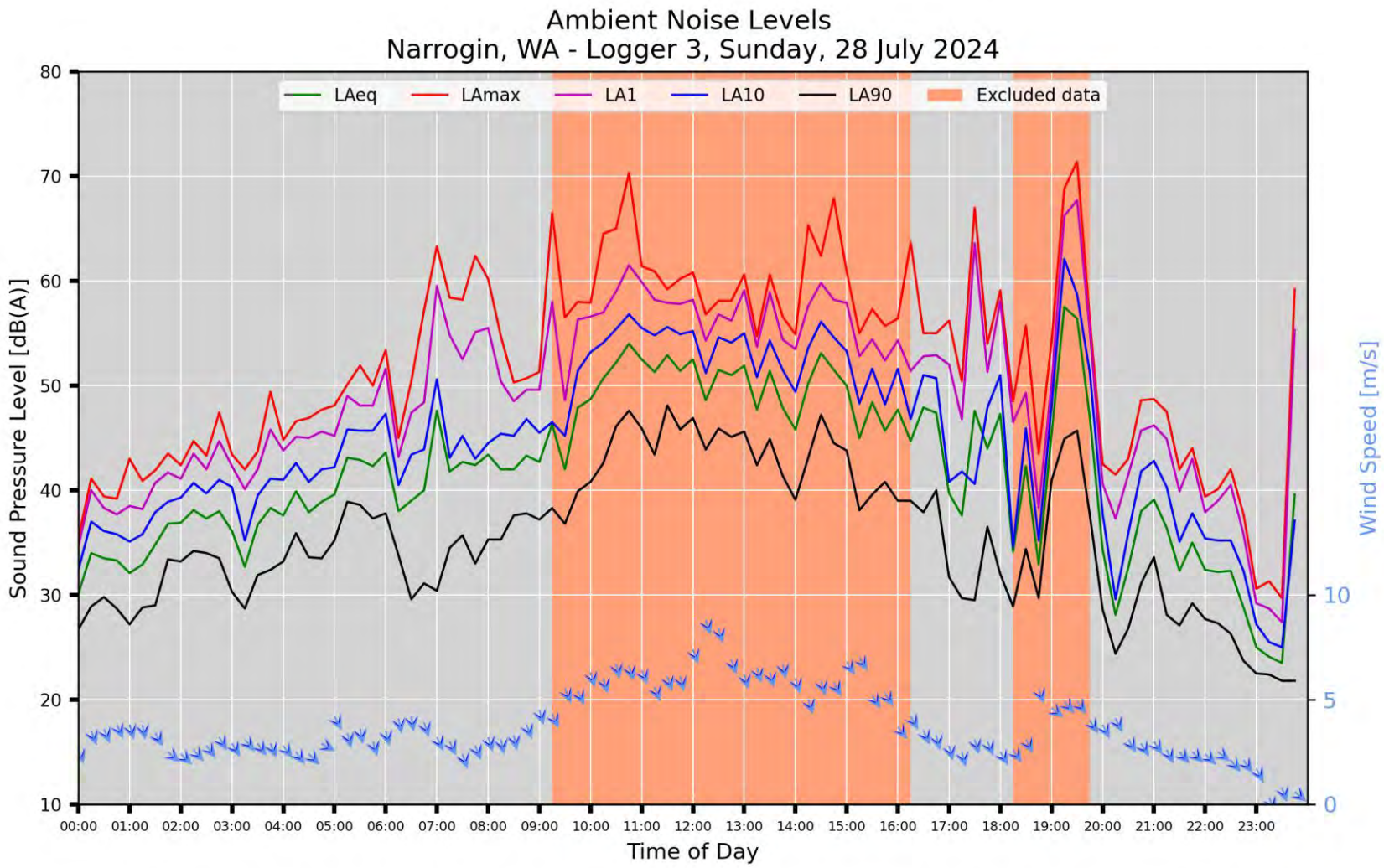
Ambient Noise Levels
Narrogin, WA - Logger 3, Sunday, 28 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
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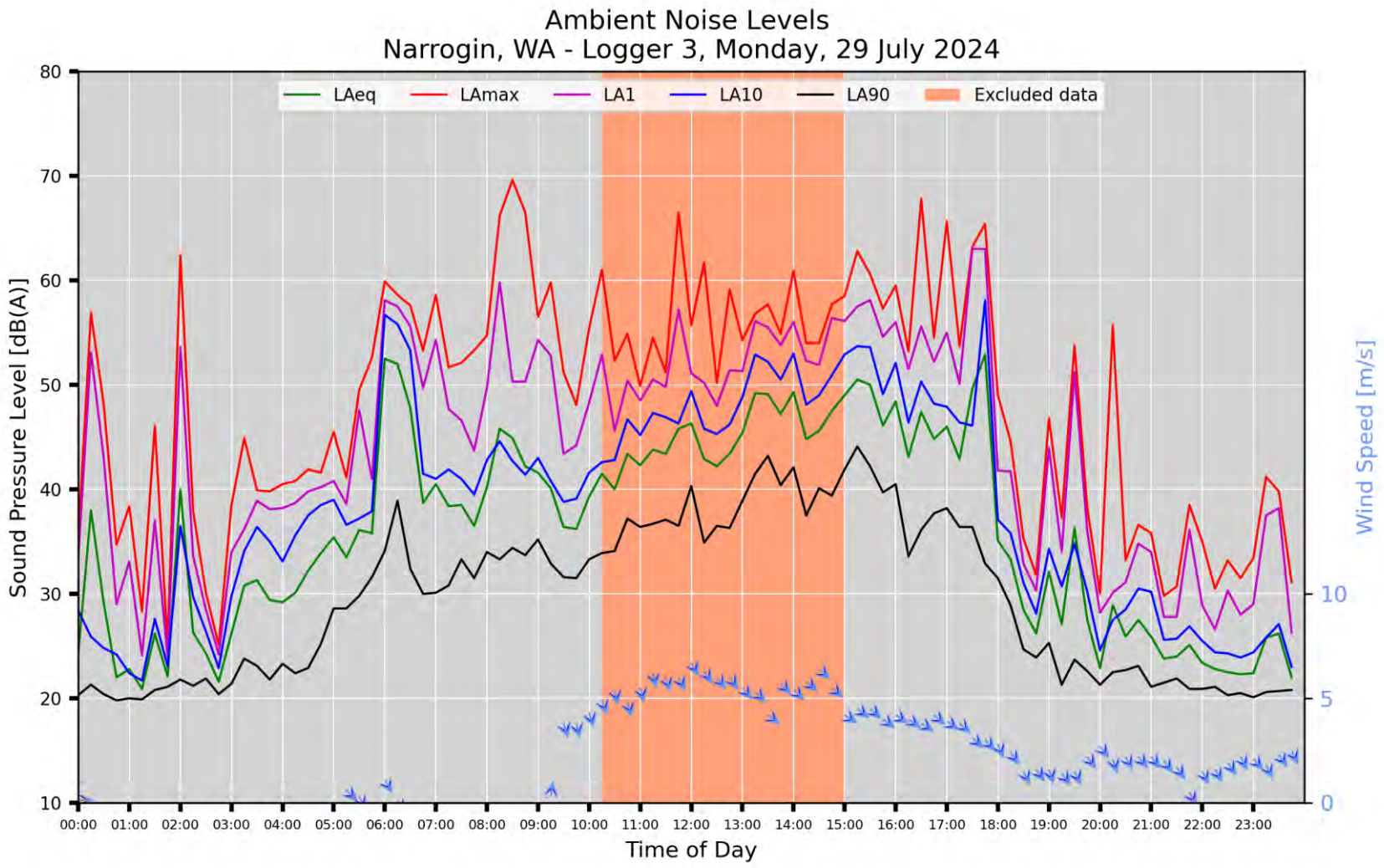
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Monday, 29 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
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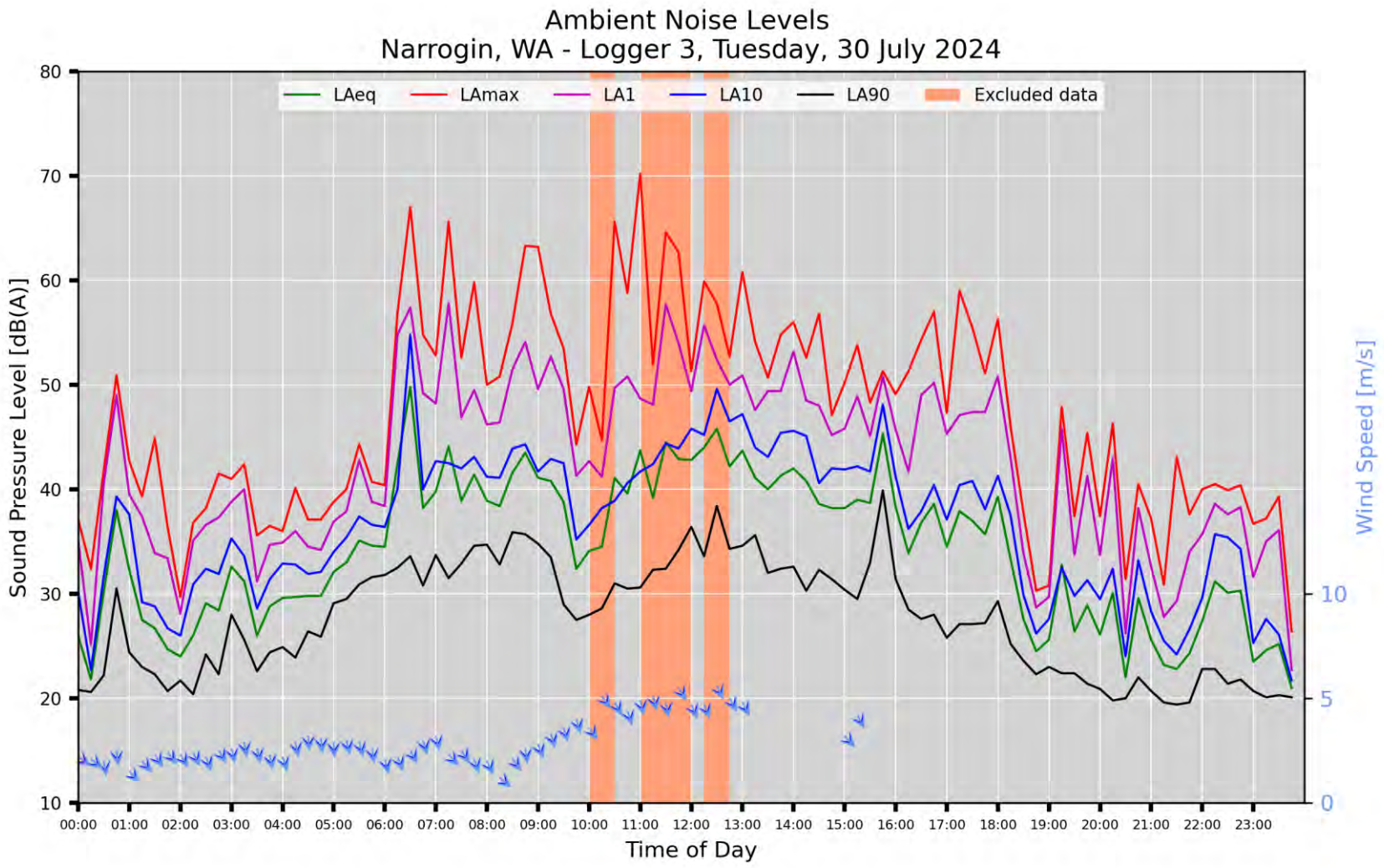
Ambient Noise Levels
Narrogin, WA - Logger 3, Tuesday, 30 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
0
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00:00
01:00
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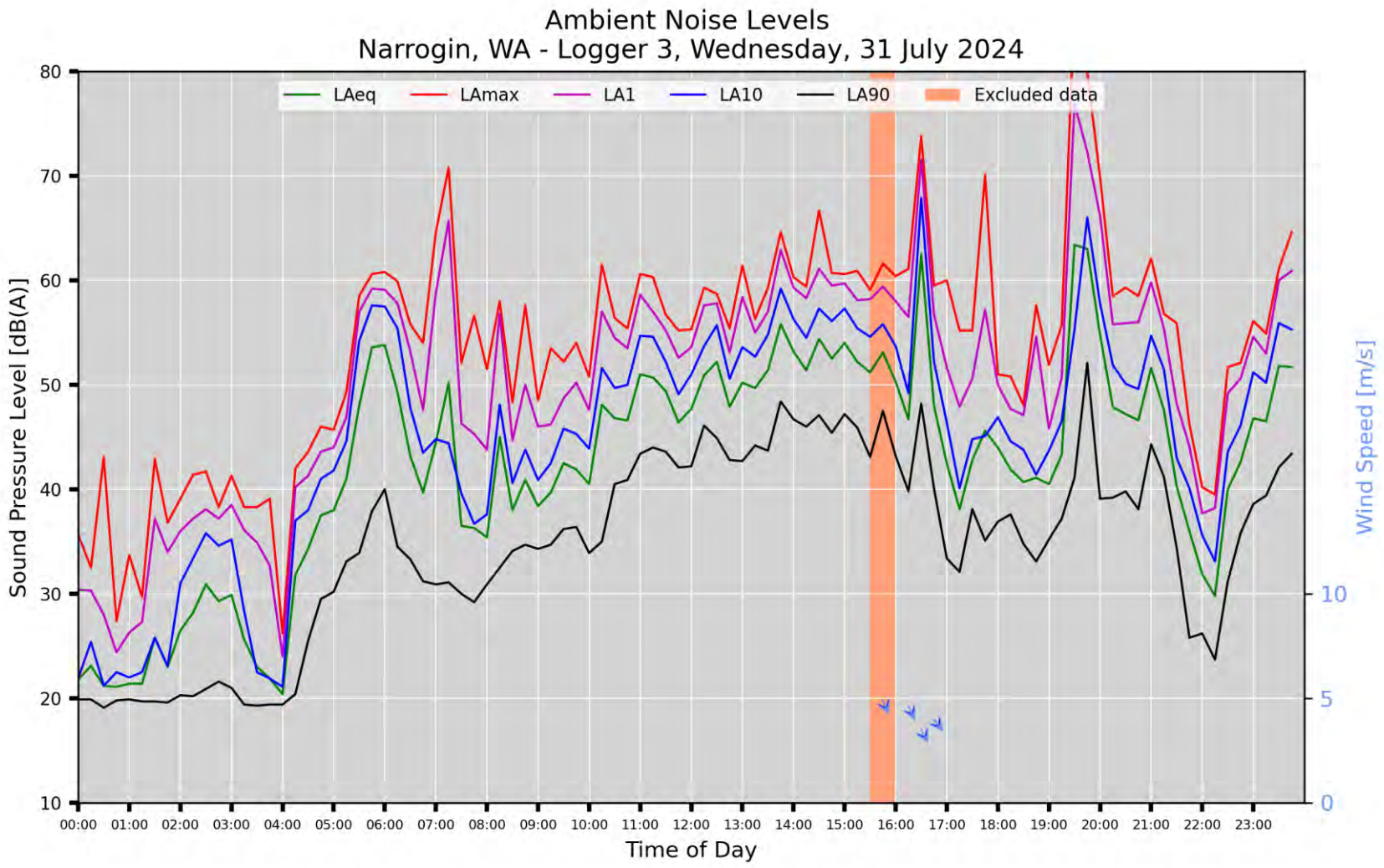
Ambient Noise Levels
Narrogin, WA - Logger 3, Wednesday, 31 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
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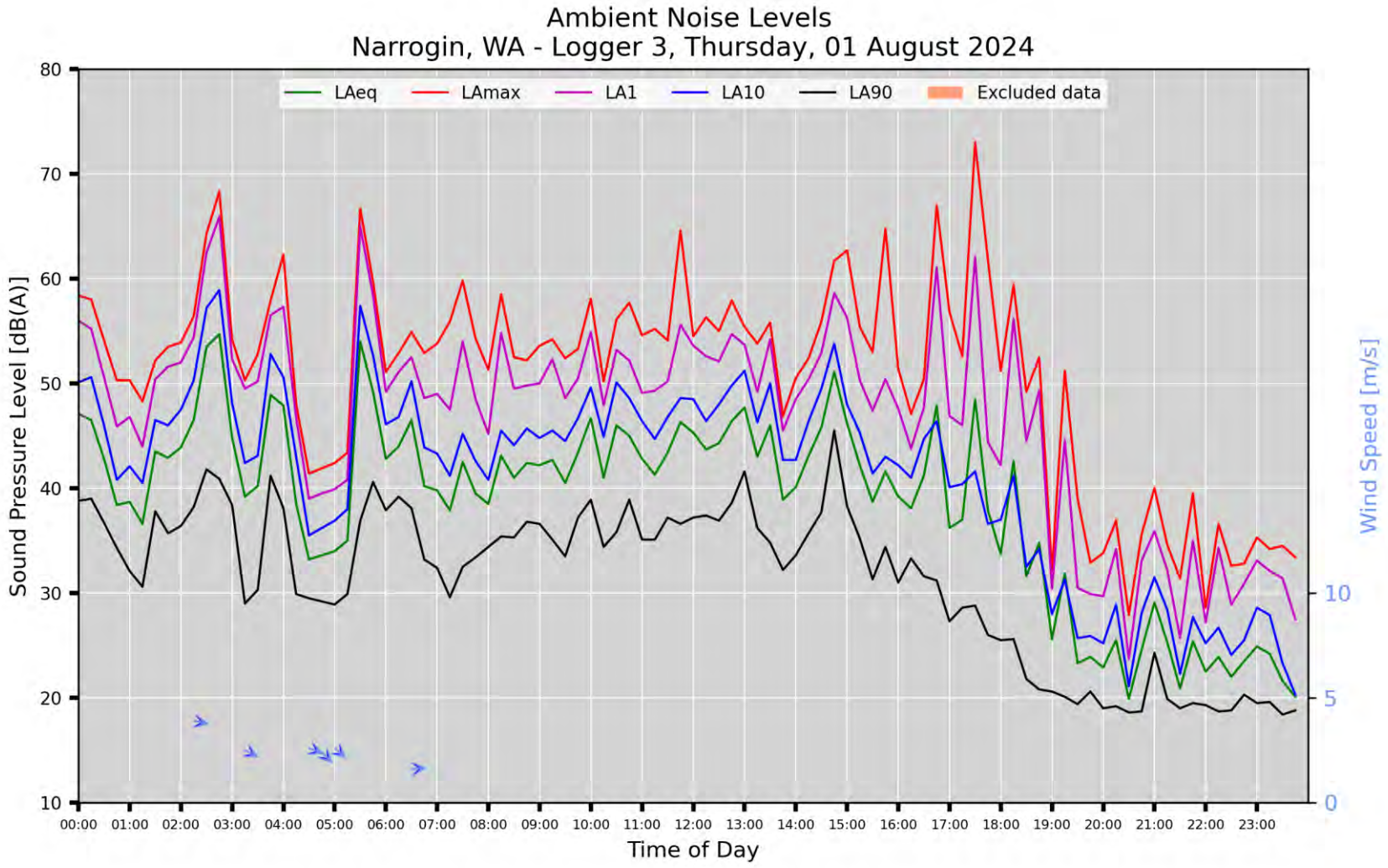
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Thursday, 01 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
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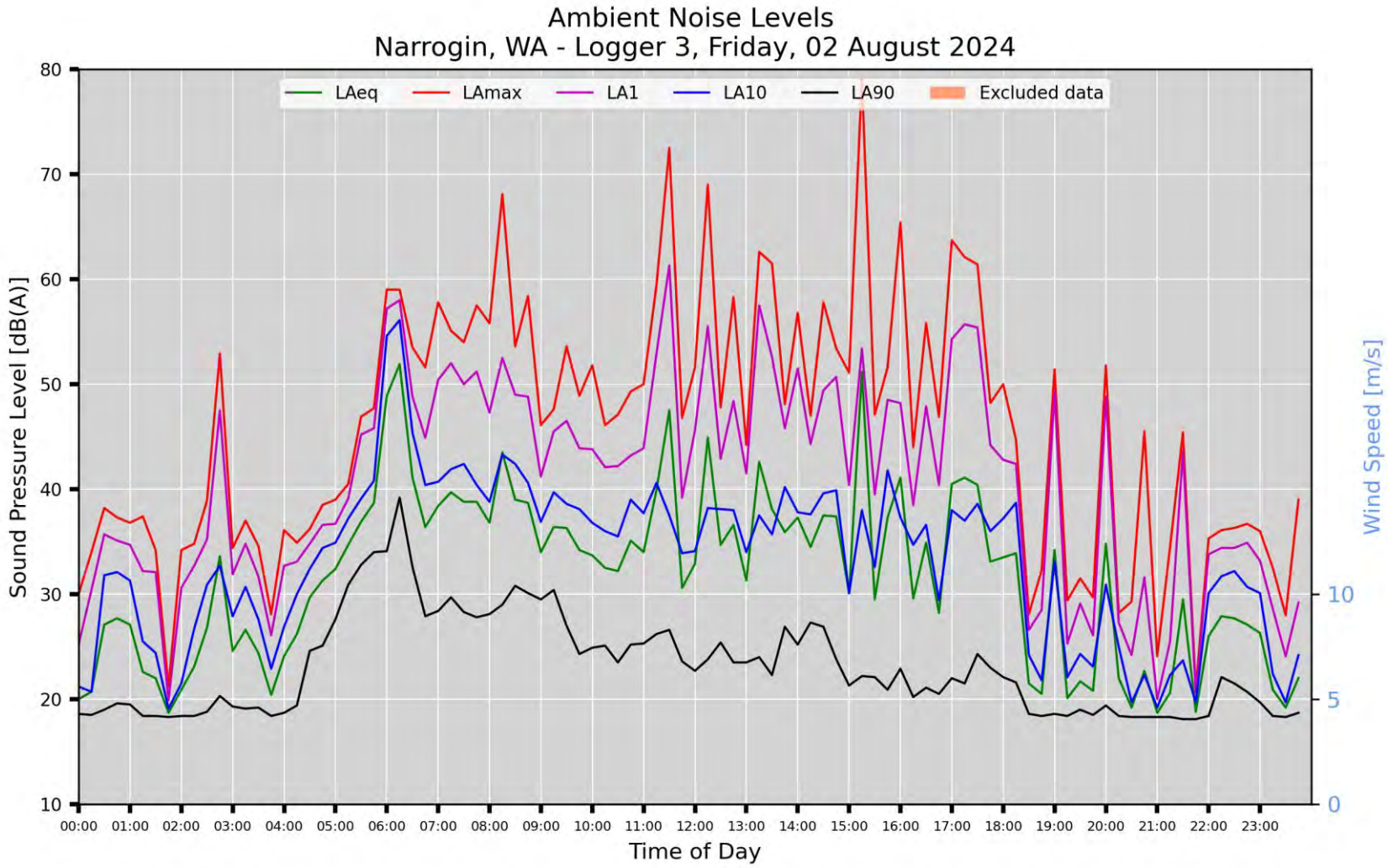
Ambient Noise Levels
Narrogin, WA - Logger 3, Friday, 02 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
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40
30
20
10
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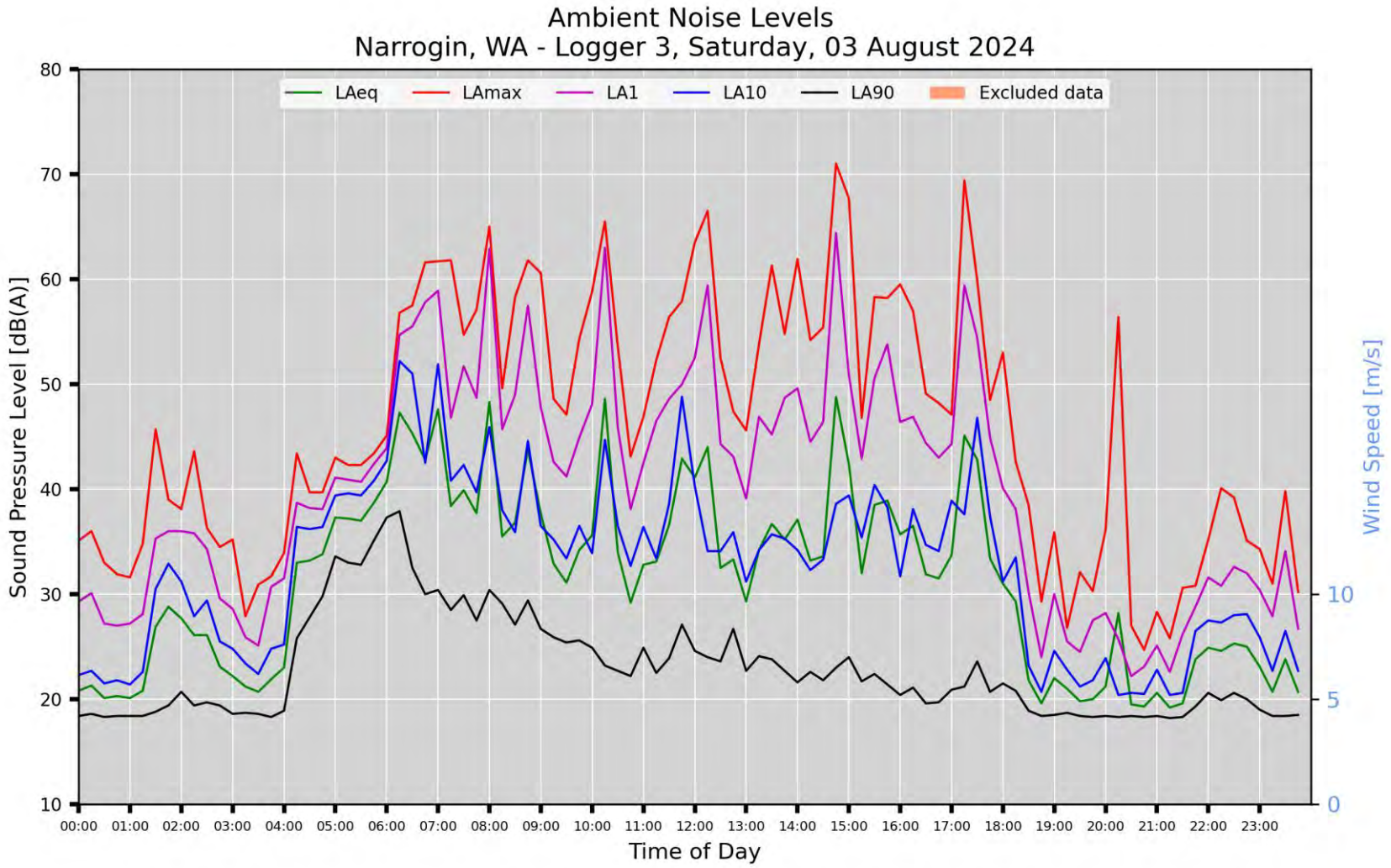
Ambient Noise Levels
Narrogin, WA - Logger 3, Saturday, 03 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
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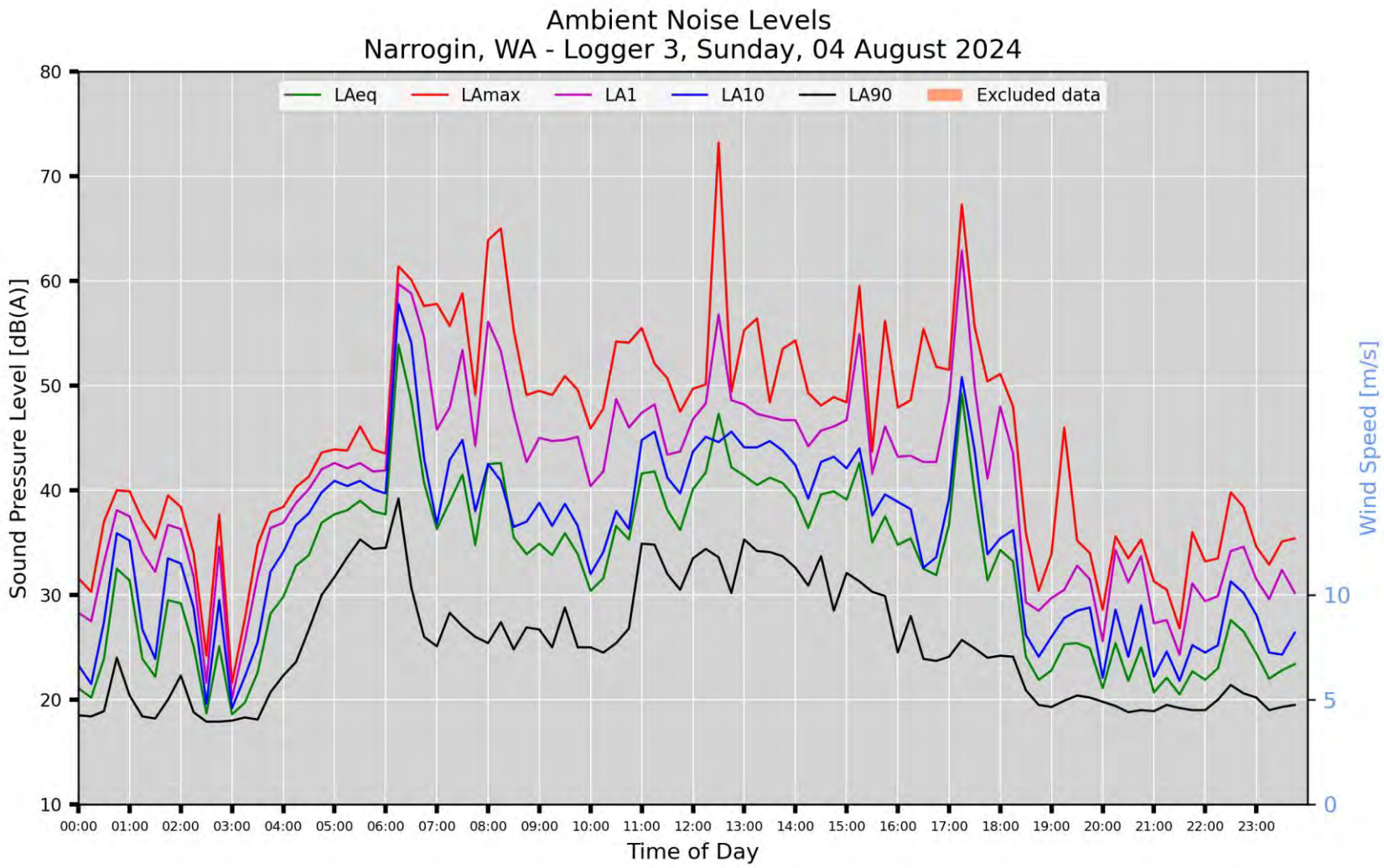
22:00
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Sunday, 04 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
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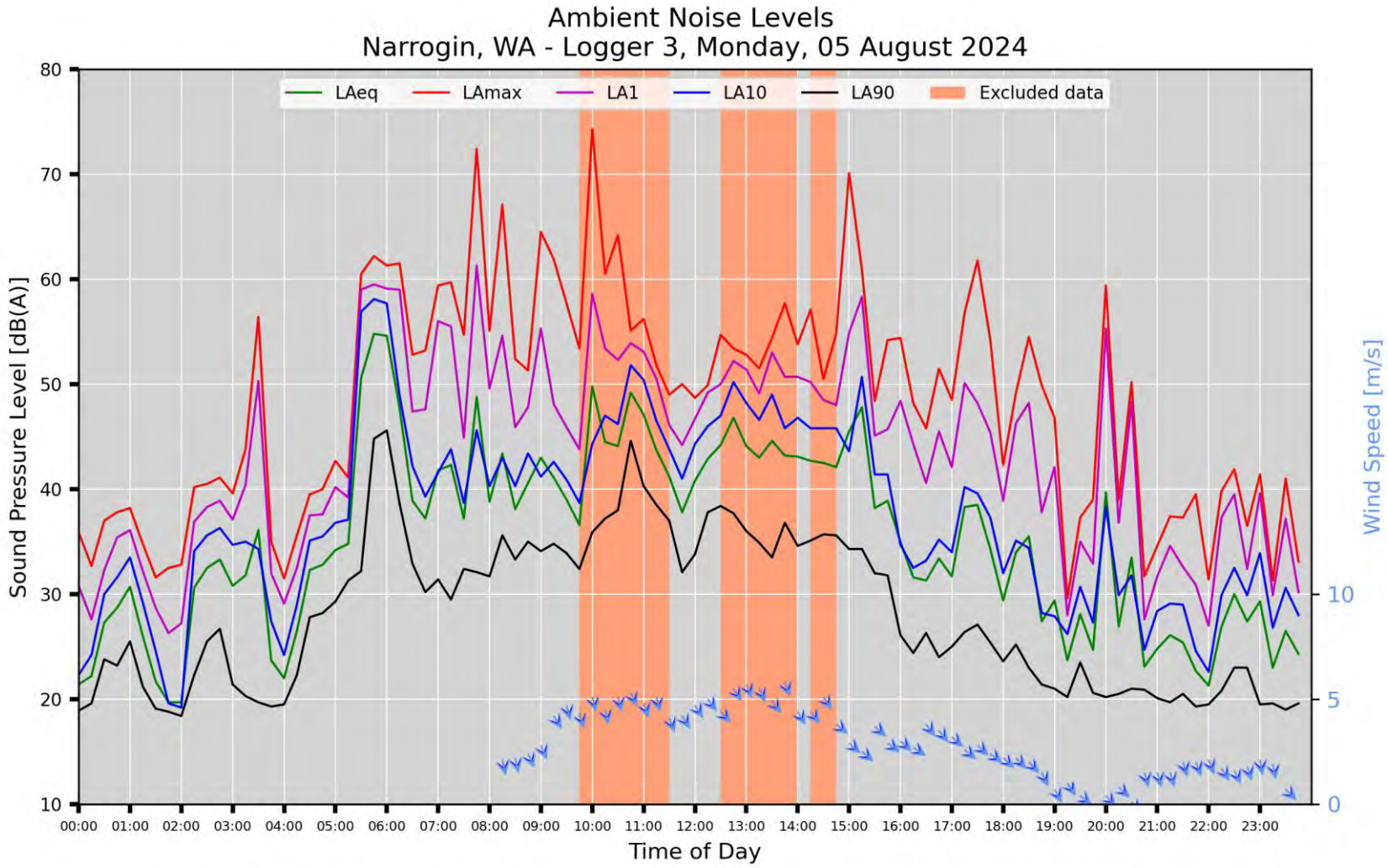
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Monday, 05 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
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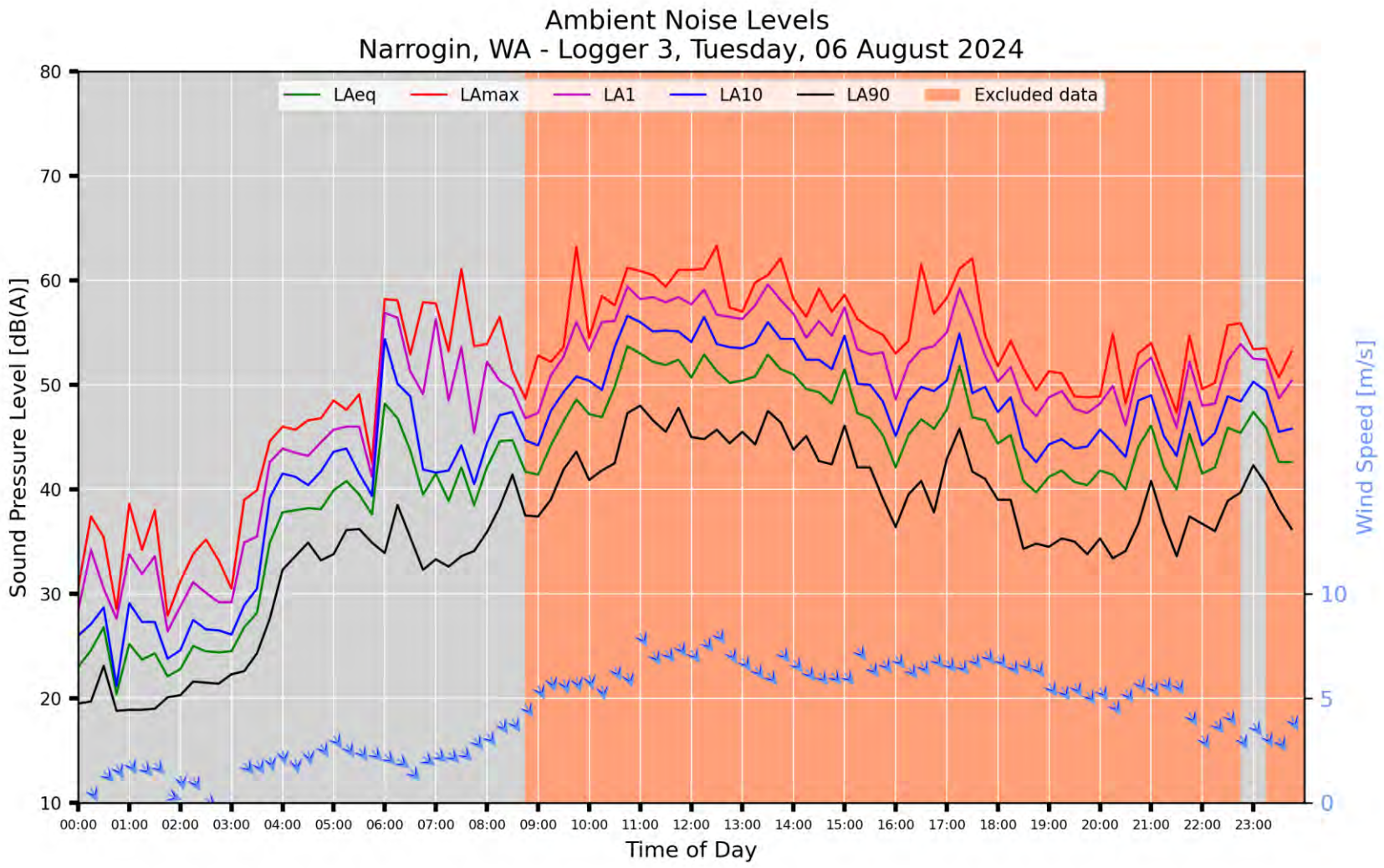
22:00
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Tuesday, 06 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
0
5
10
00:00
01:00
02:00
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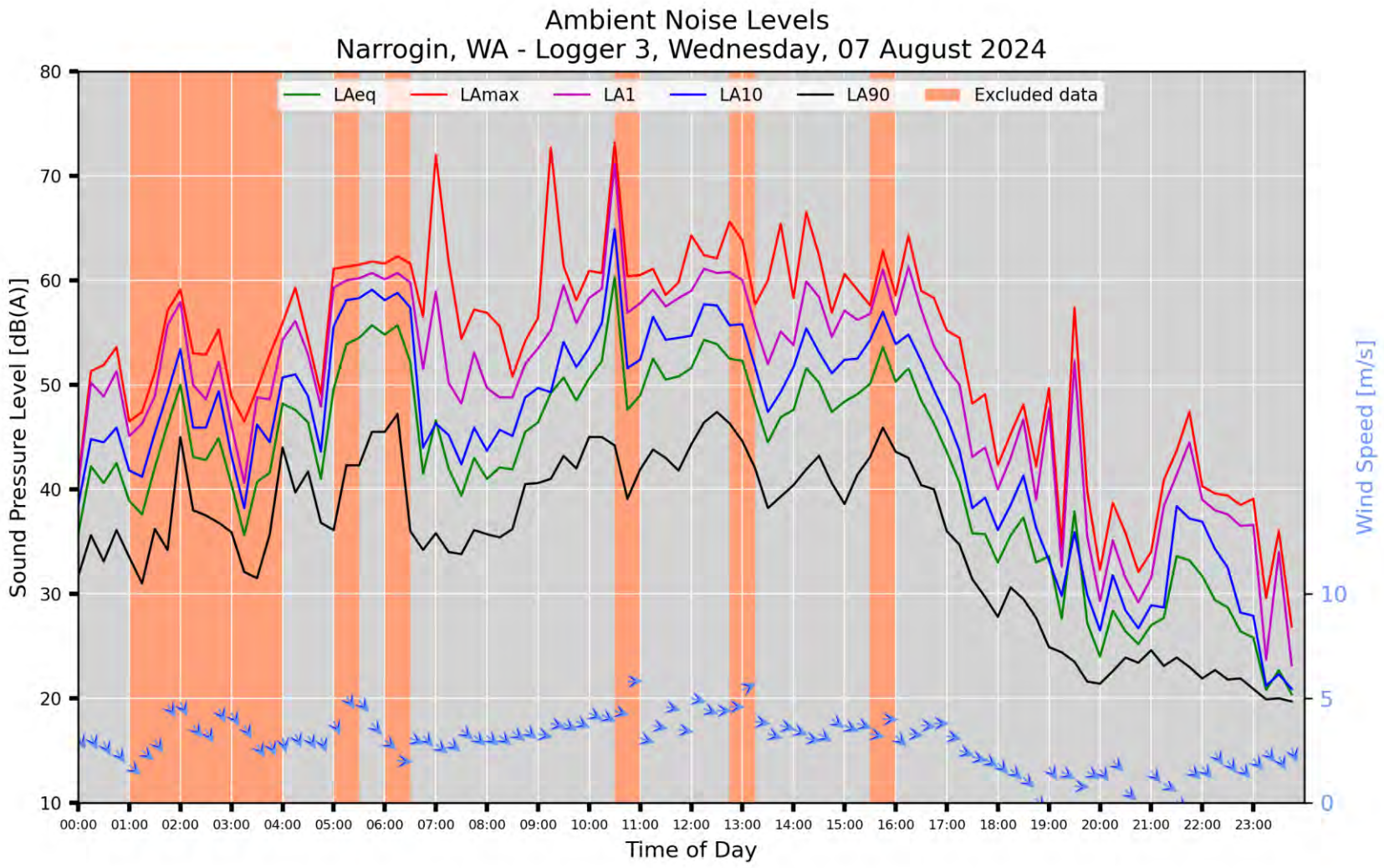
Ambient Noise Levels
Narrogin, WA - Logger 3, Wednesday, 07 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
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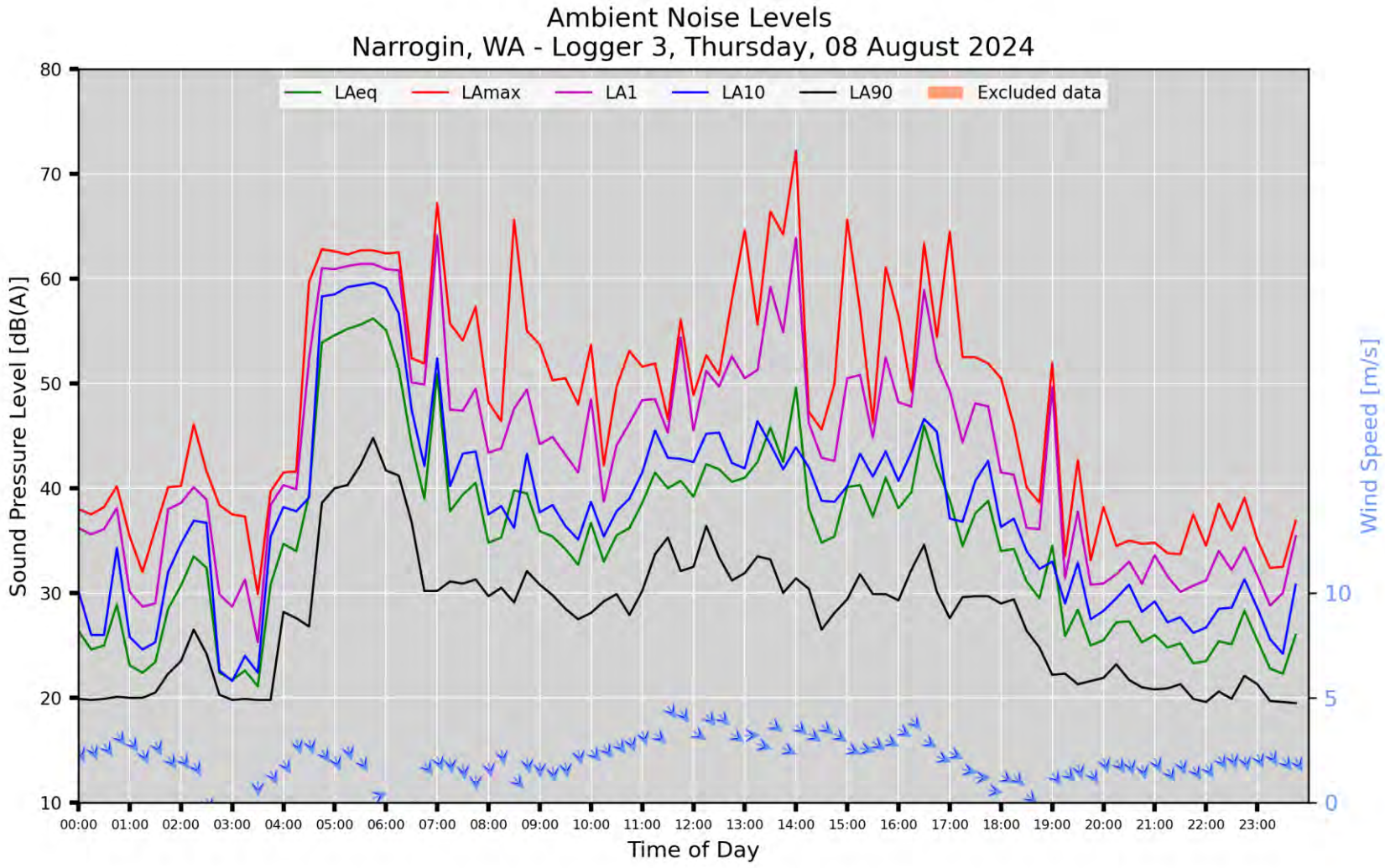
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Thursday, 08 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
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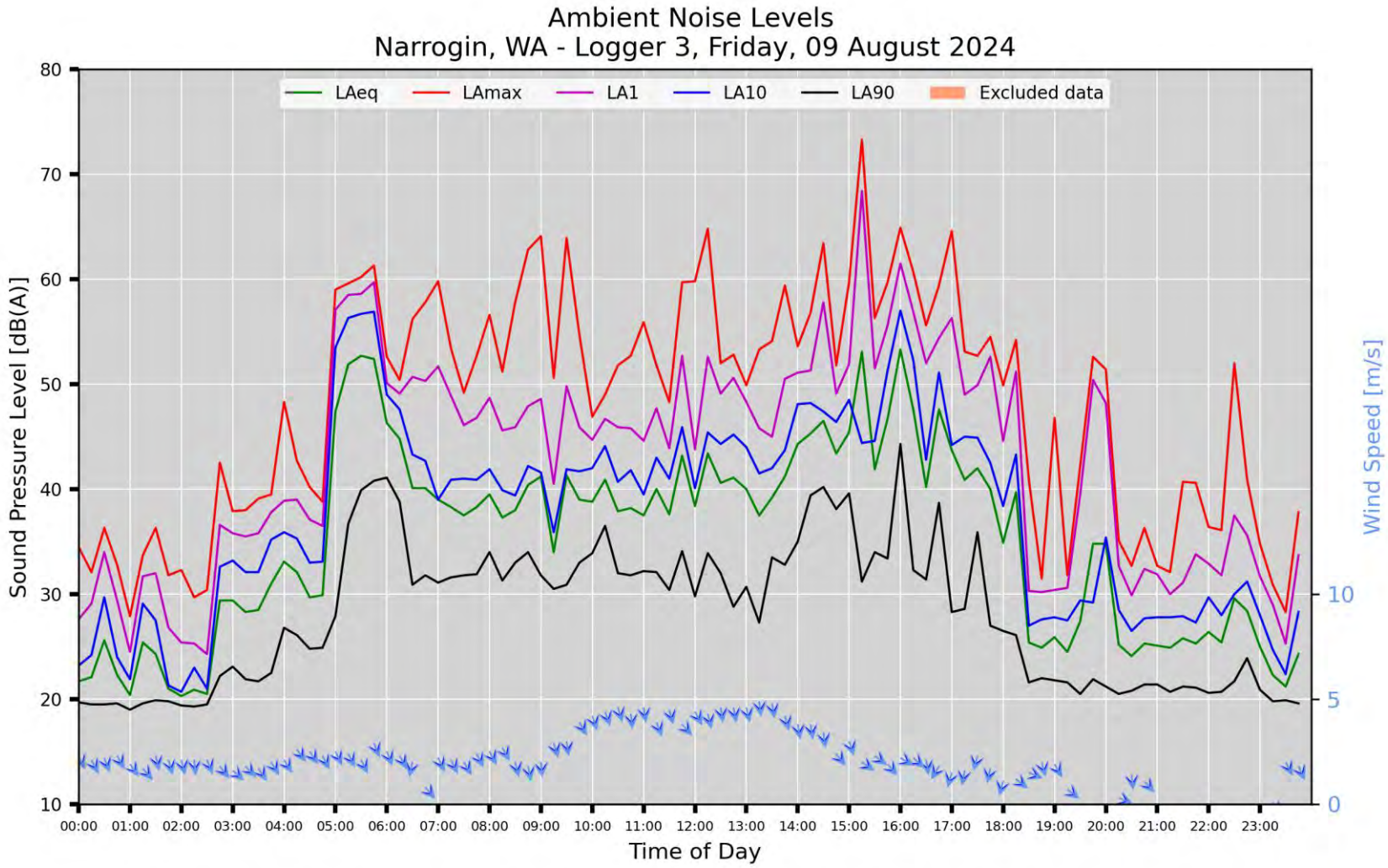
23:00


Ambient Noise Levels
Narrogin, WA - Logger 3, Friday, 09 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
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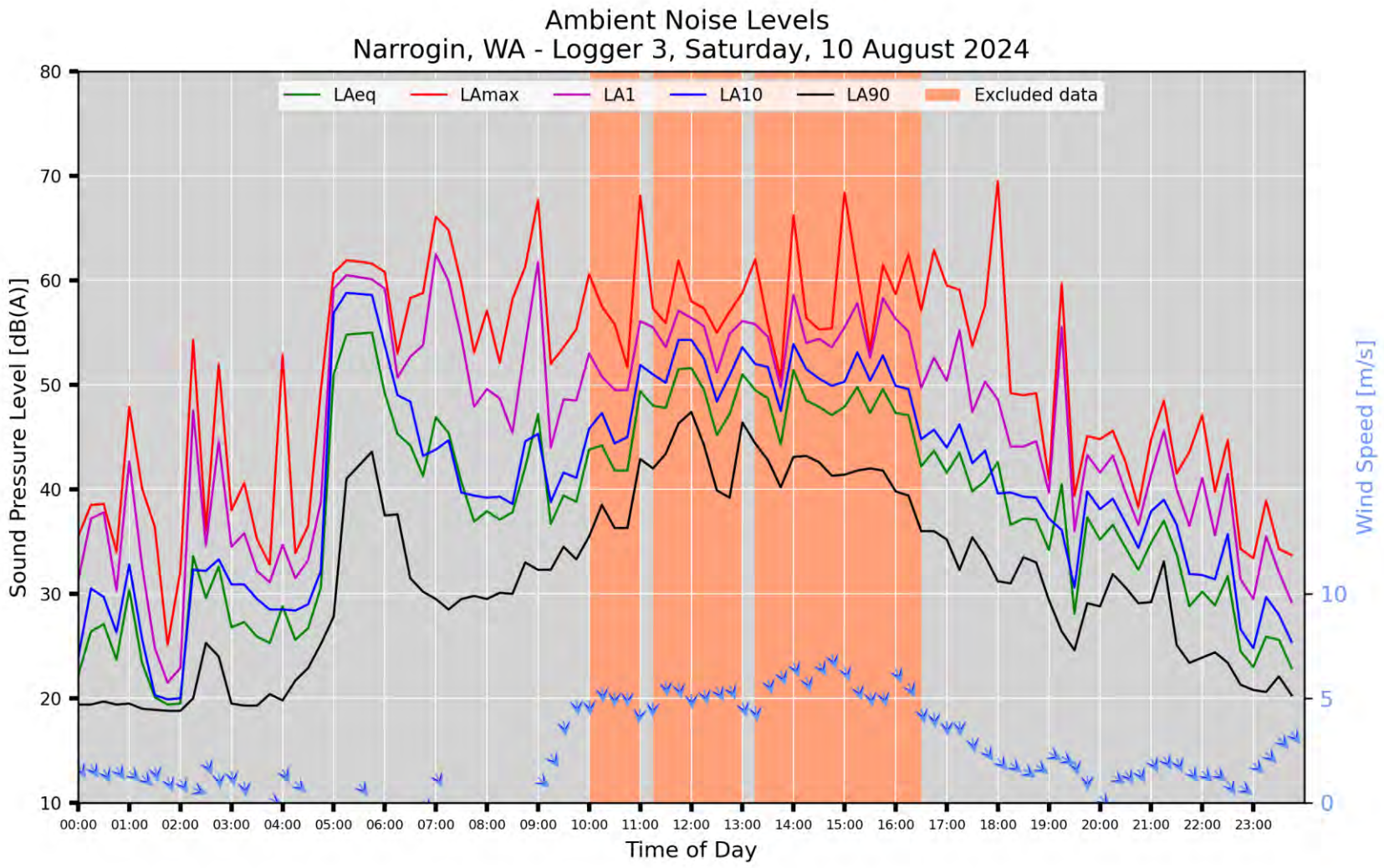
Ambient Noise Levels
Narrogin, WA - Logger 3, Saturday, 10 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
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01:00
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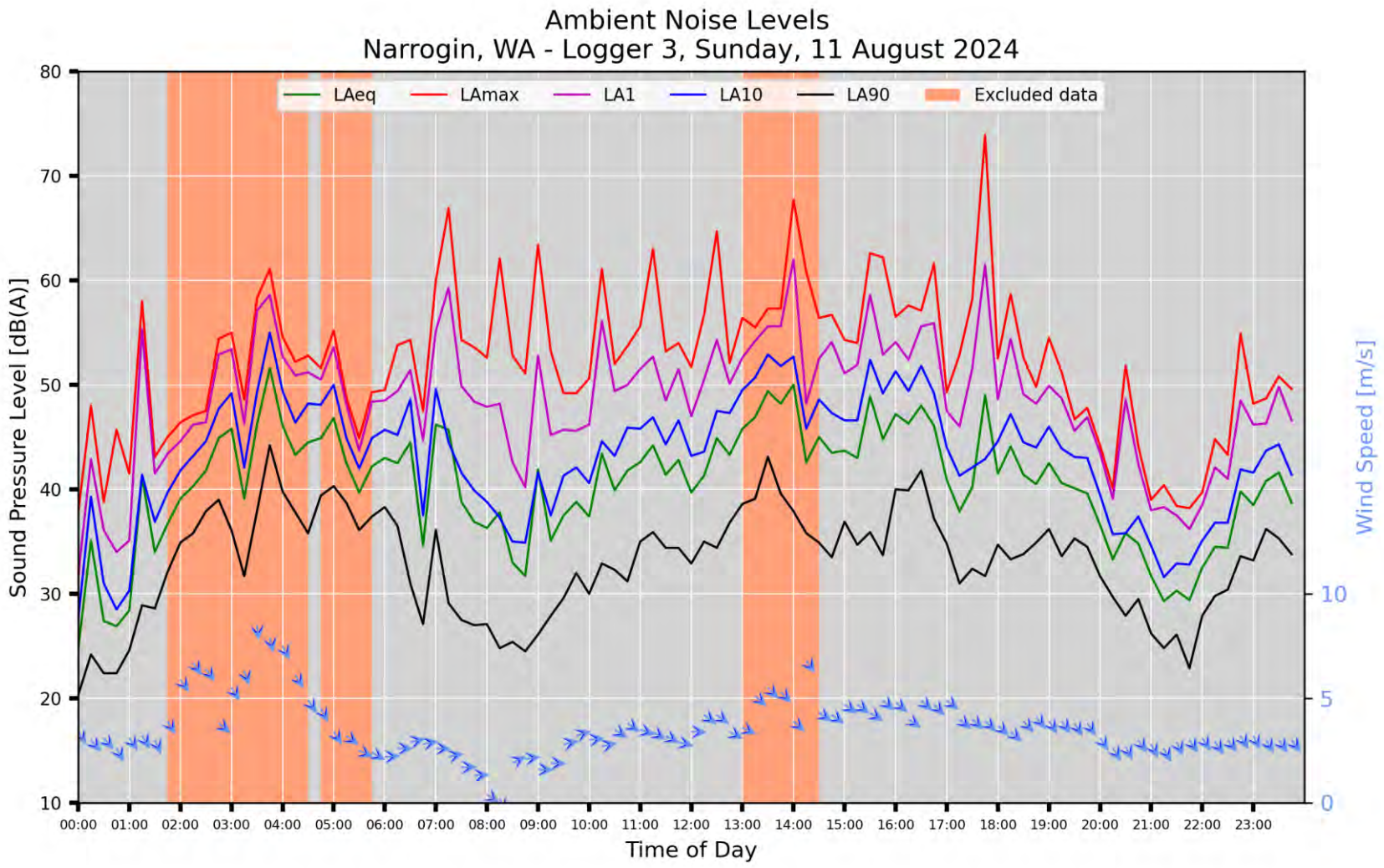
Ambient Noise Levels
Narrogin, WA - Logger 3, Sunday, 11 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
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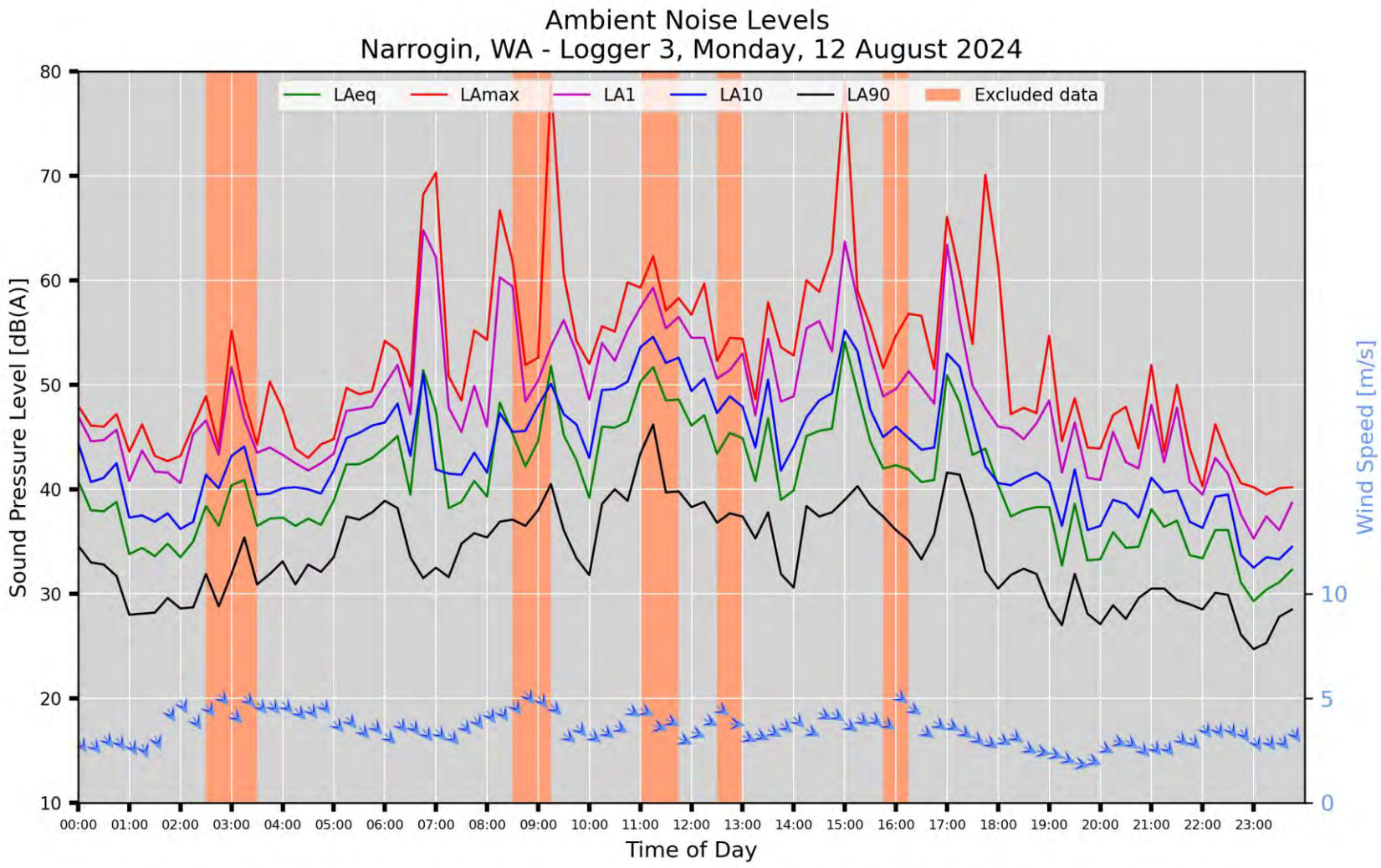
Ambient Noise Levels
Narrogin, WA - Logger 3, Monday, 12 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
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01:00
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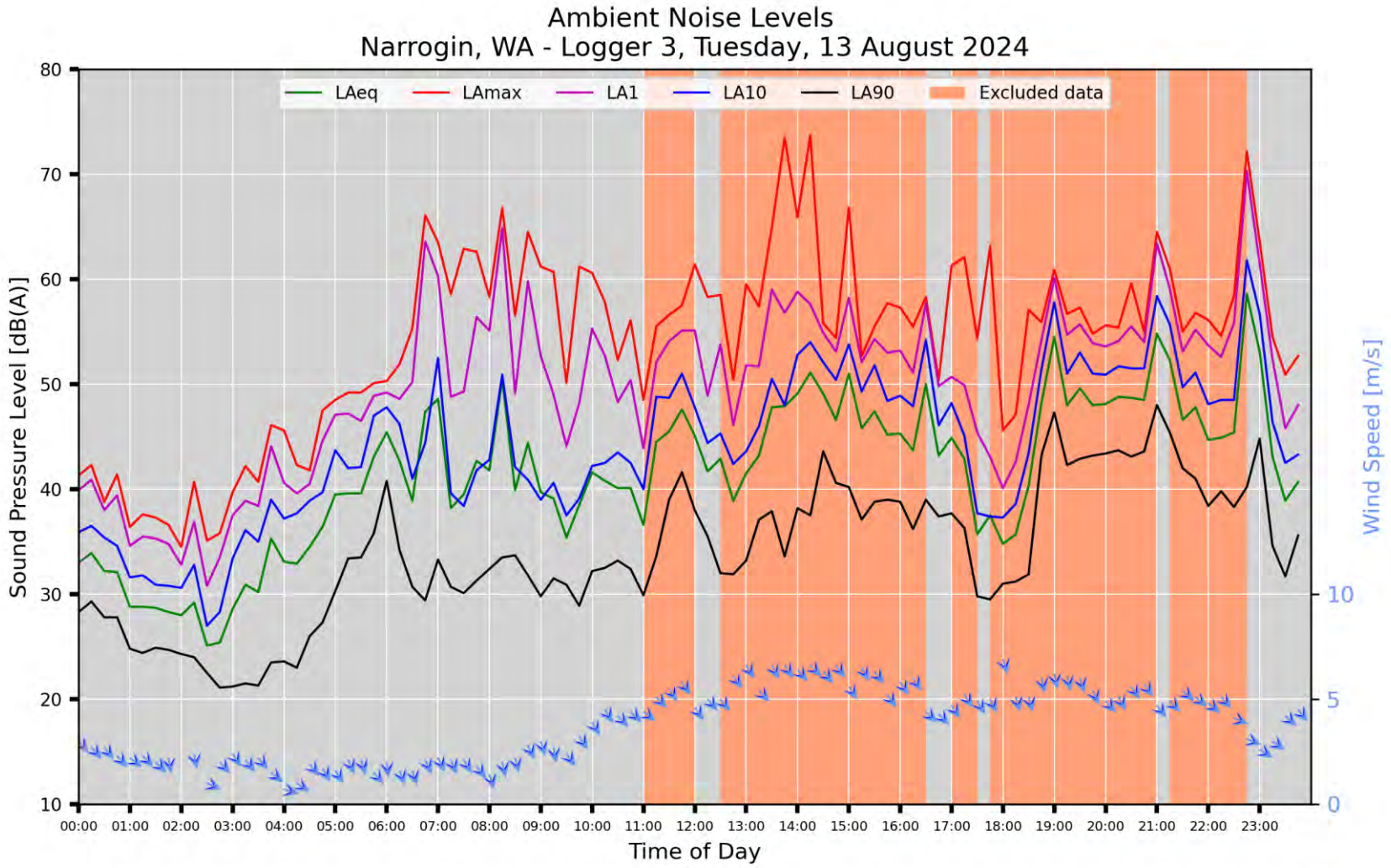
Ambient Noise Levels
Narrogin, WA - Logger 3, Tuesday, 13 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
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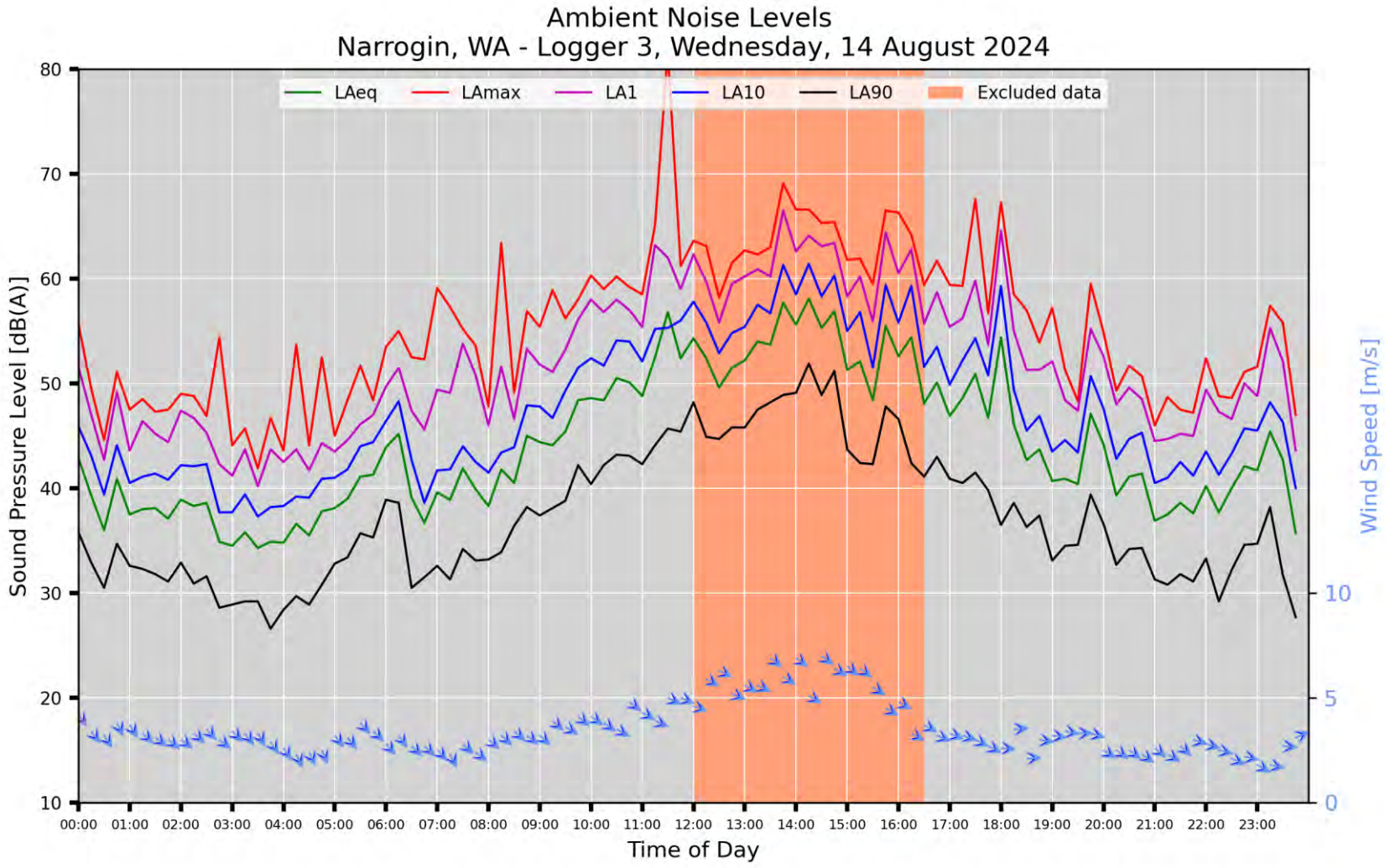
Ambient Noise Levels
Narrogin, WA - Logger 3, Wednesday, 14 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
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04:00
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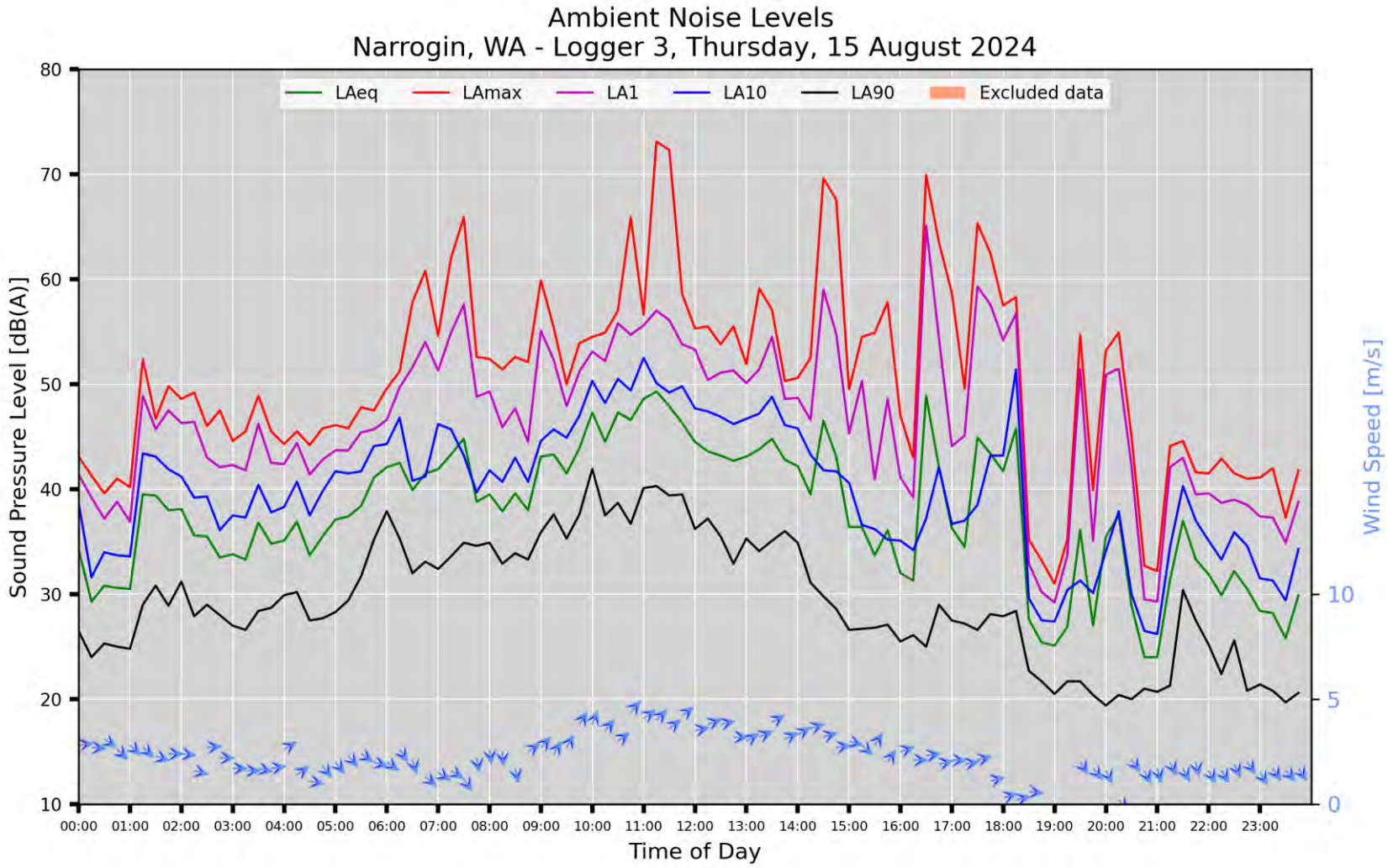
Ambient Noise Levels
Narrogin, WA - Logger 3, Thursday, 15 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
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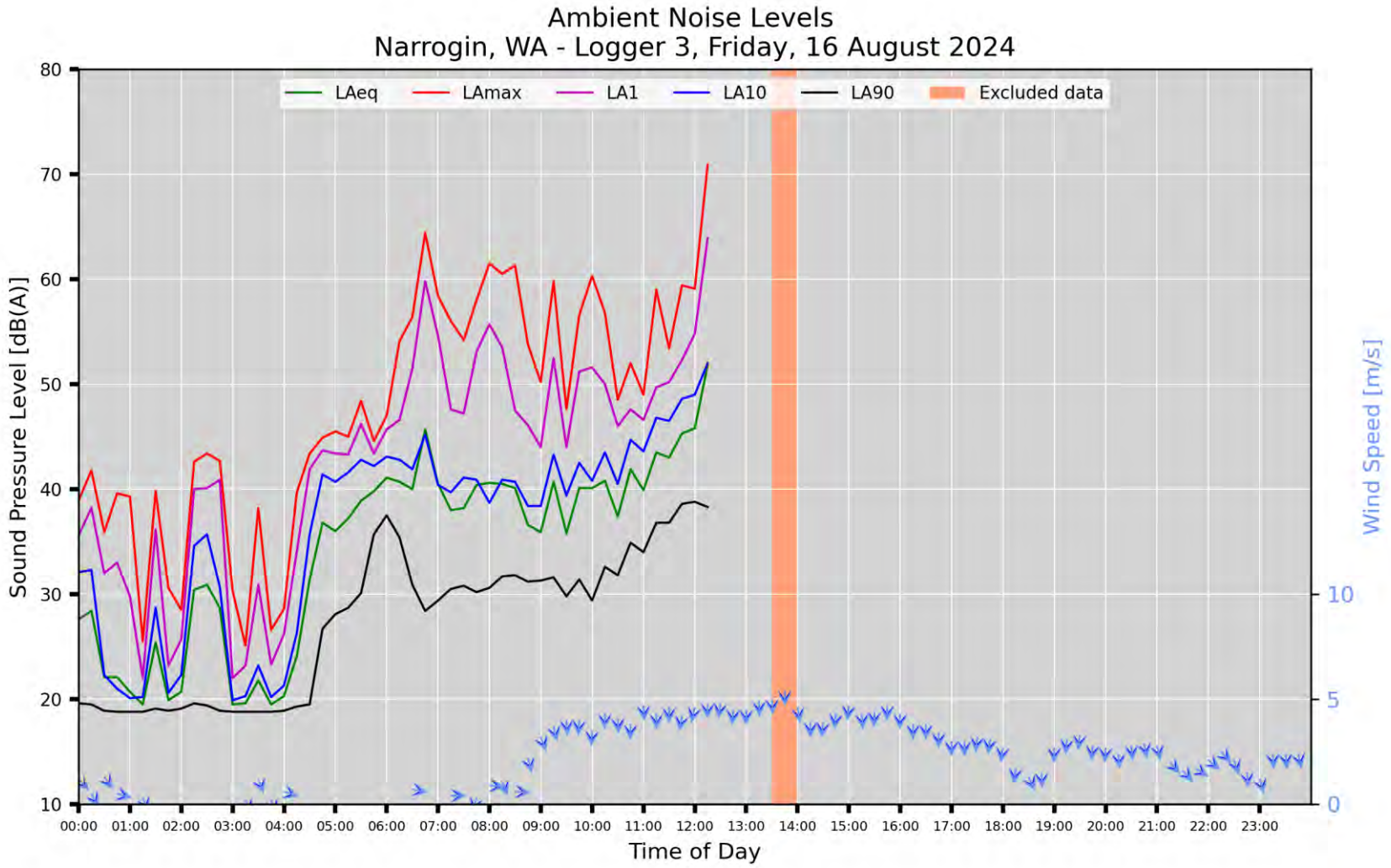
Ambient Noise Levels
Narrogin, WA - Logger 3, Friday, 16 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
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01:00
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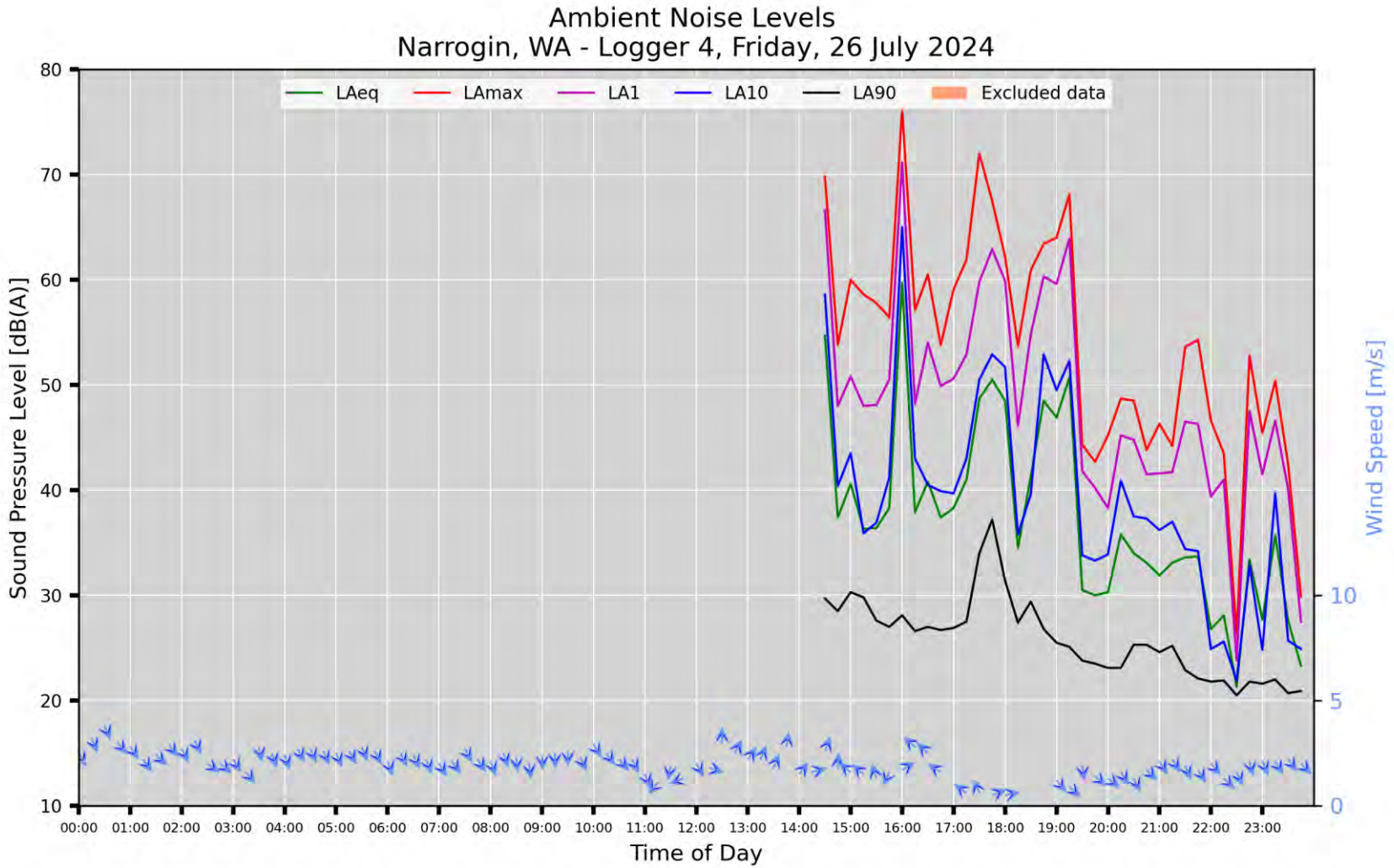
Logger 4


Ambient Noise Levels
Narrogin, WA - Logger 4, Friday, 26 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
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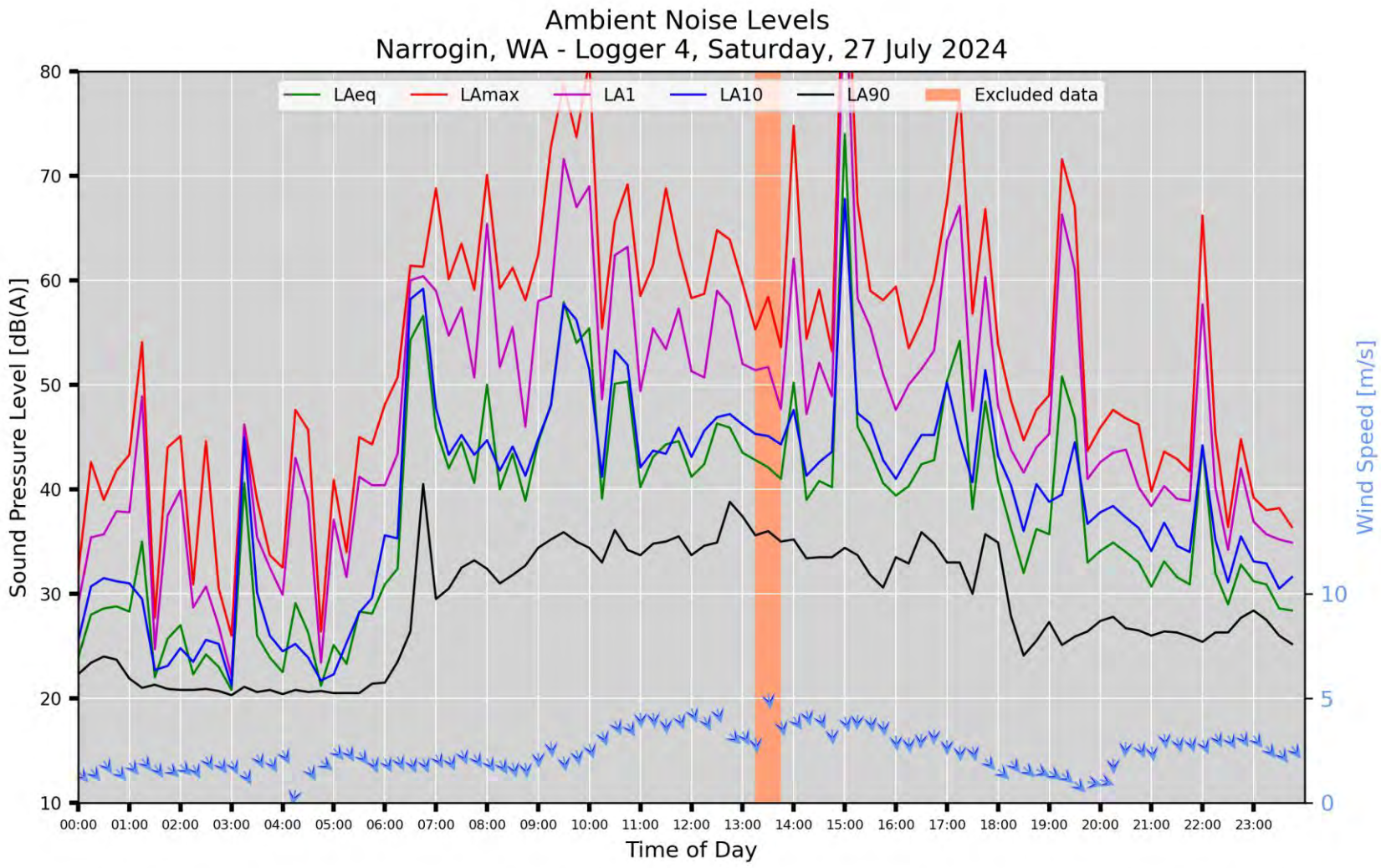
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Saturday, 27 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
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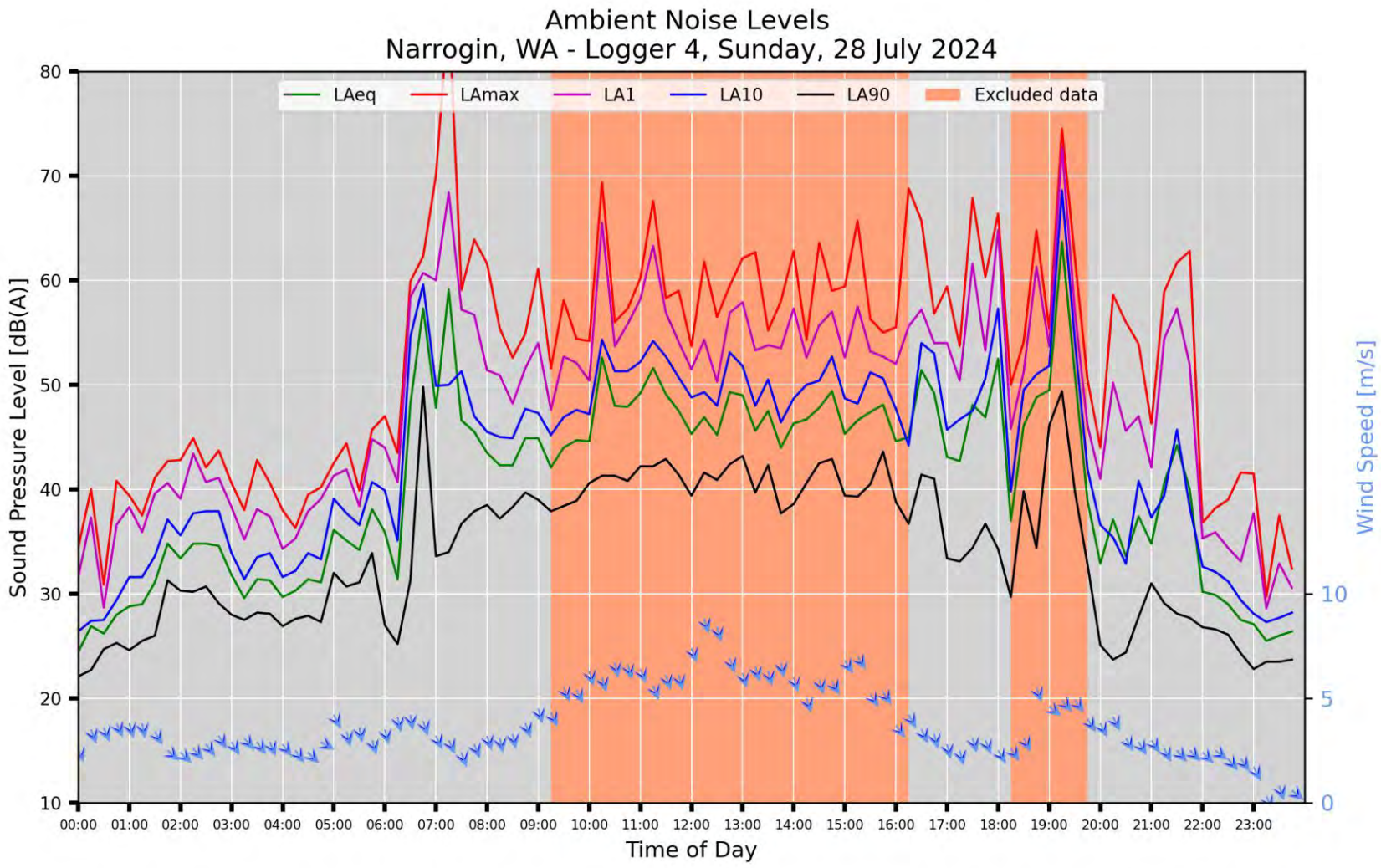
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Sunday, 28 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
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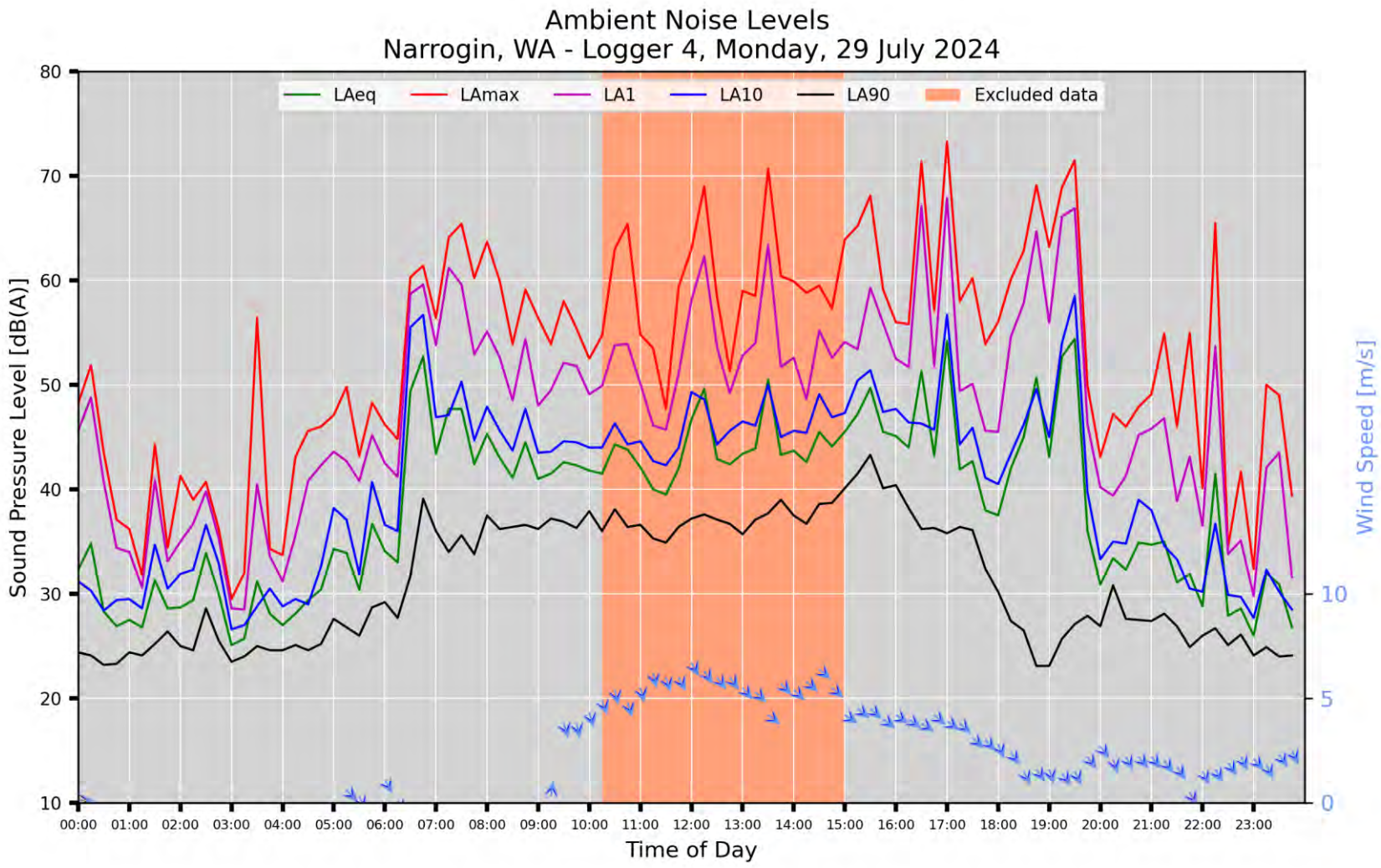
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Monday, 29 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
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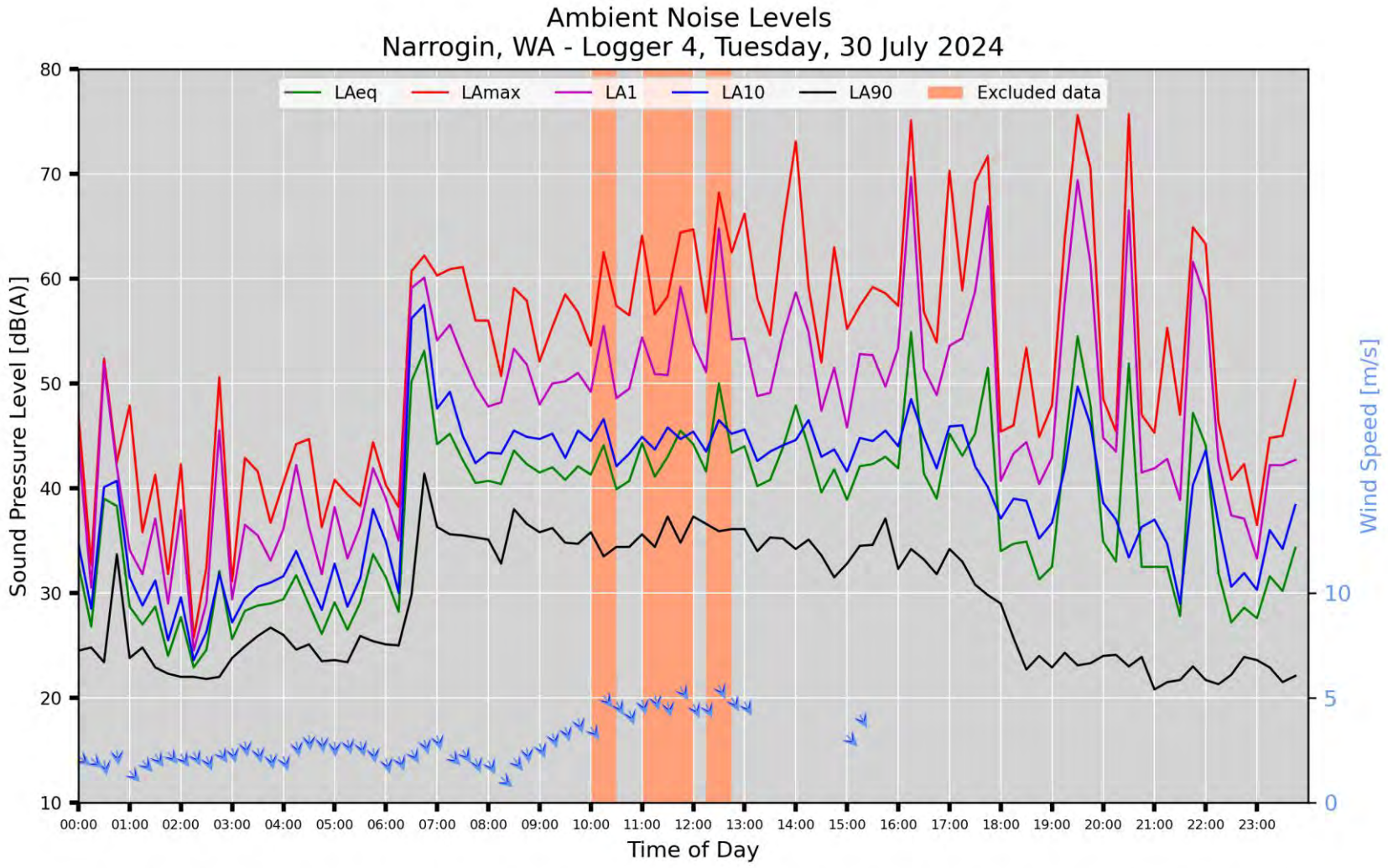
Ambient Noise Levels
Narrogin, WA - Logger 4, Tuesday, 30 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
0
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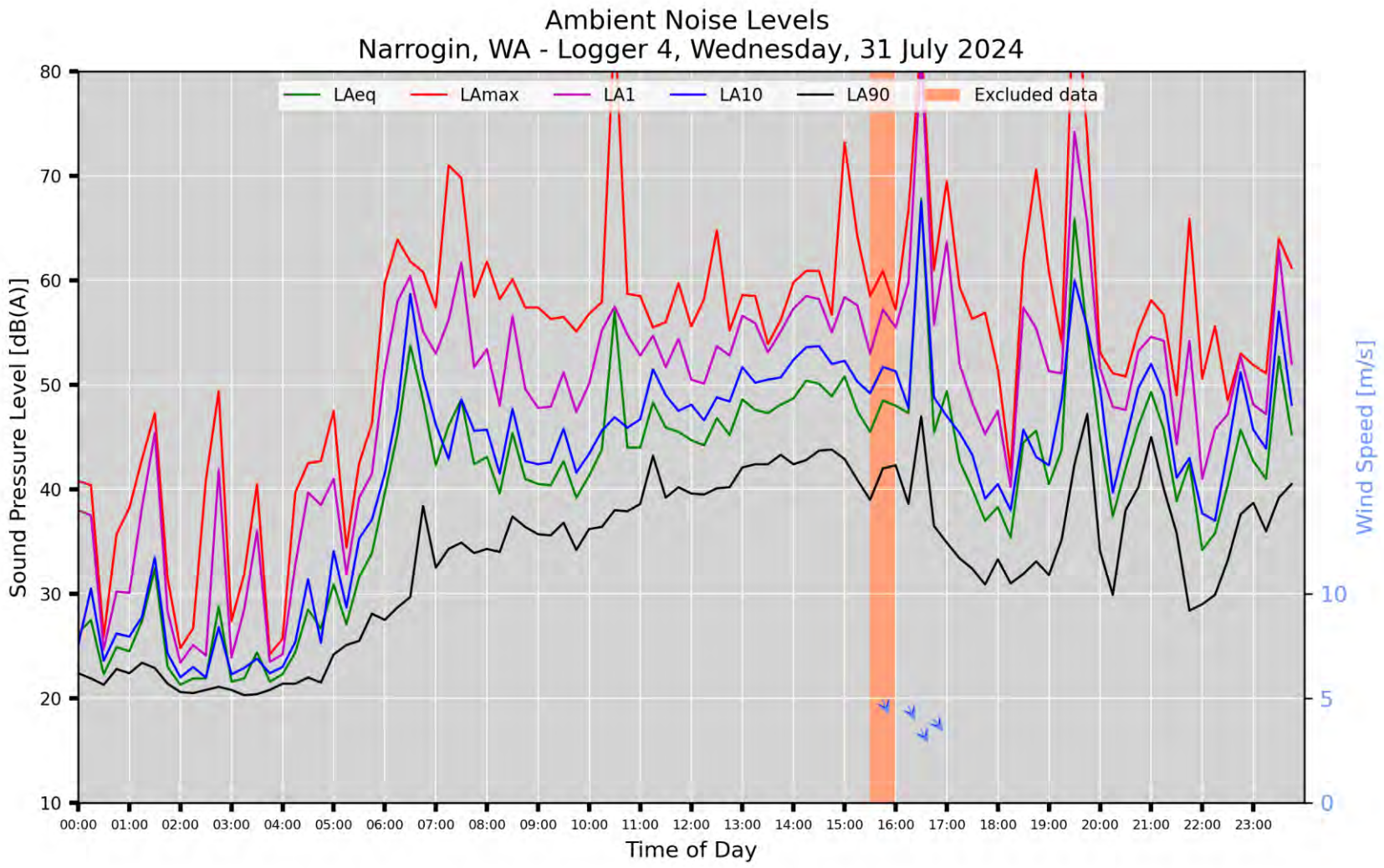
Ambient Noise Levels
Narrogin, WA - Logger 4, Wednesday, 31 July 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
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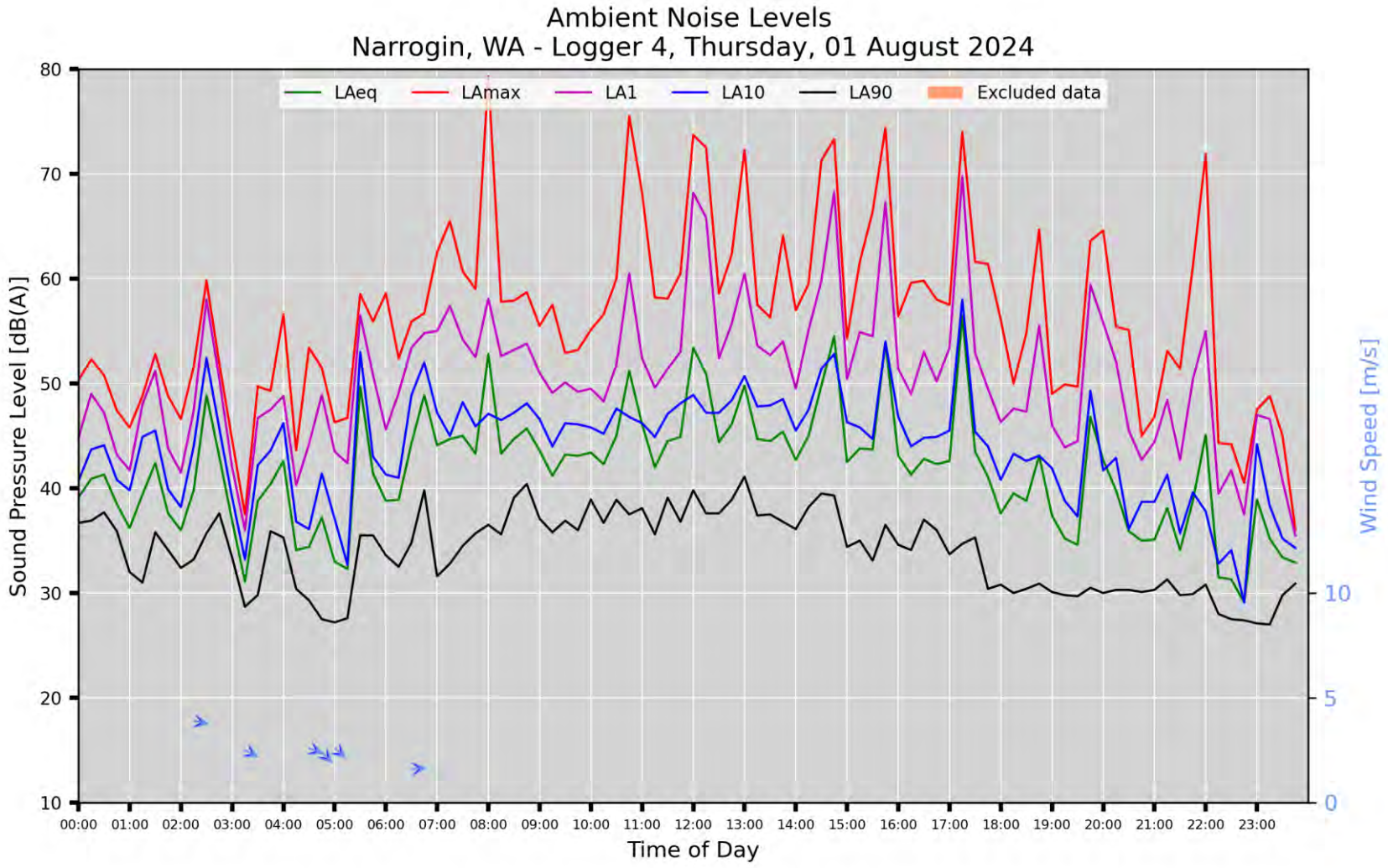
Ambient Noise Levels
Narrogin, WA - Logger 4, Thursday, 01 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
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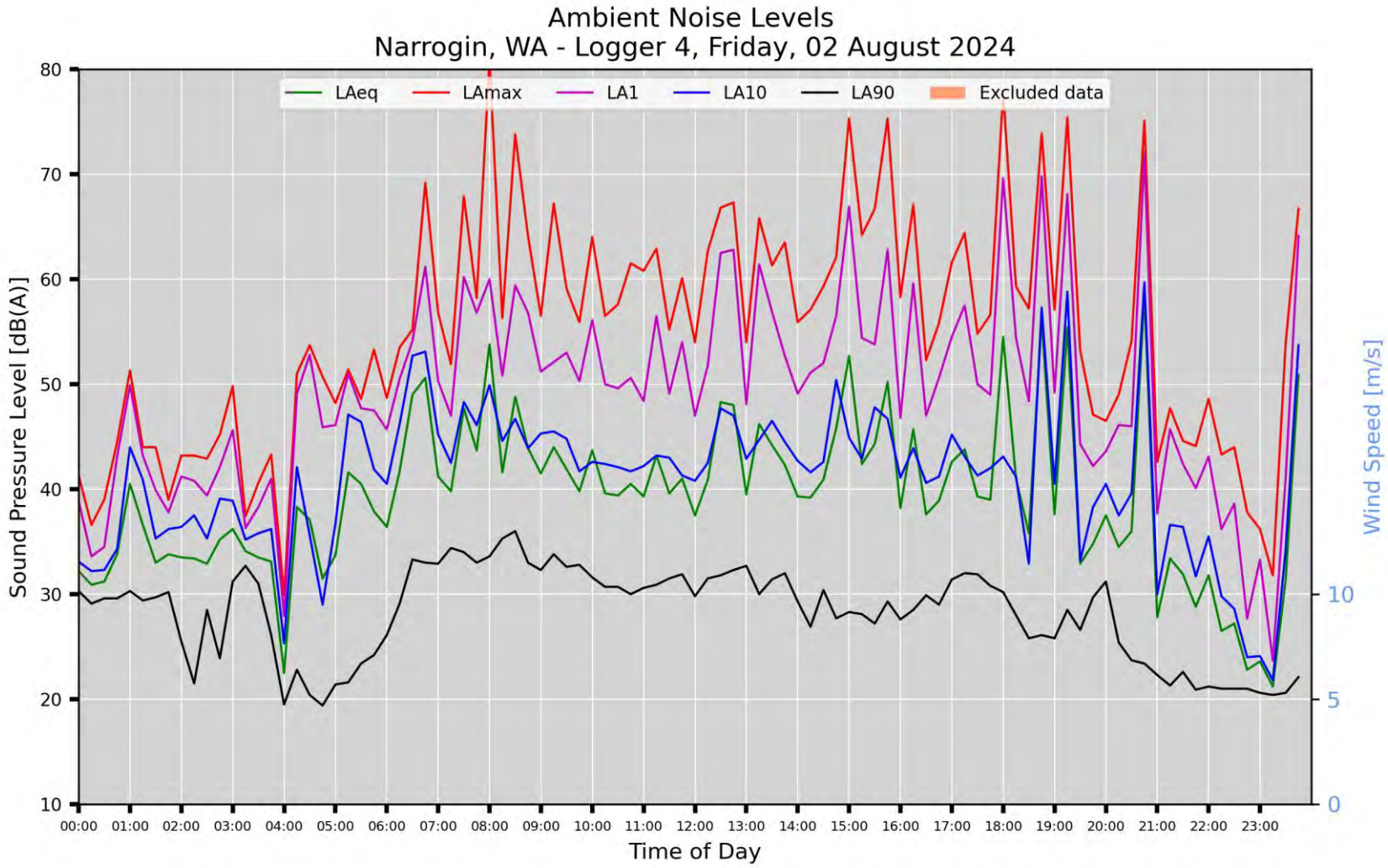
Ambient Noise Levels
Narrogin, WA - Logger 4, Friday, 02 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
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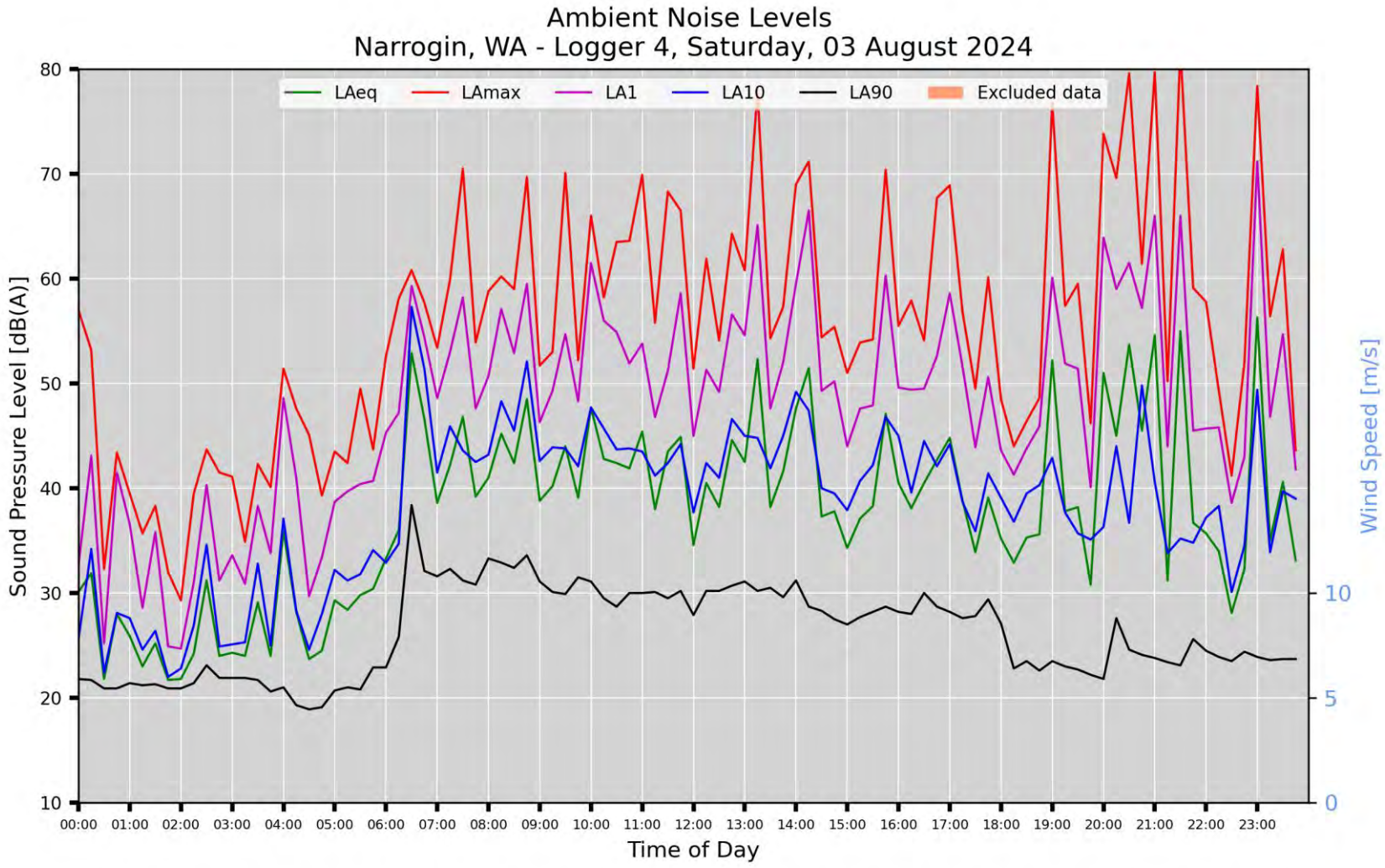
Ambient Noise Levels
Narrogin, WA - Logger 4, Saturday, 03 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
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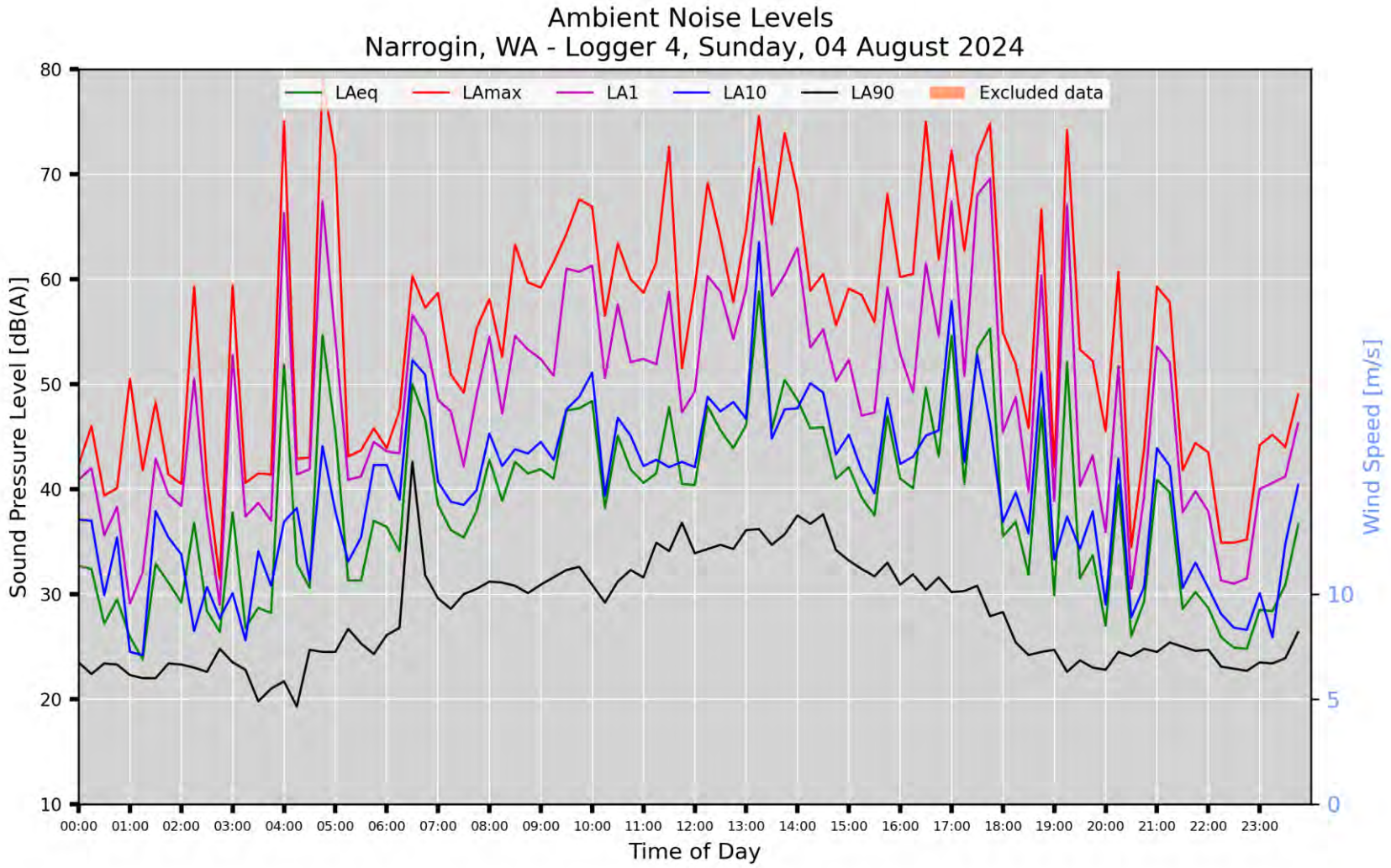
Ambient Noise Levels
Narrogin, WA - Logger 4, Sunday, 04 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
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20
10
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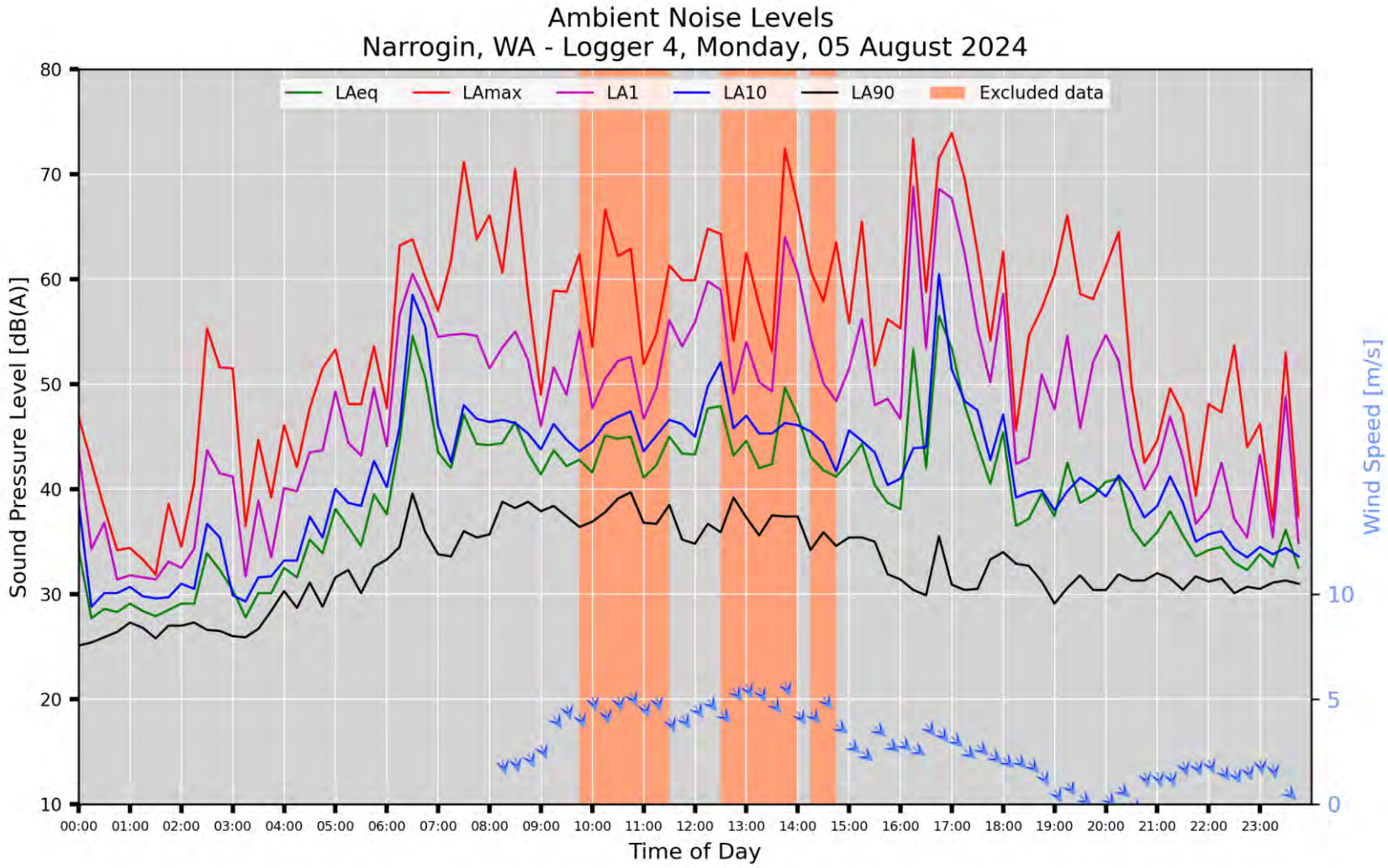
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Monday, 05 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
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01:00
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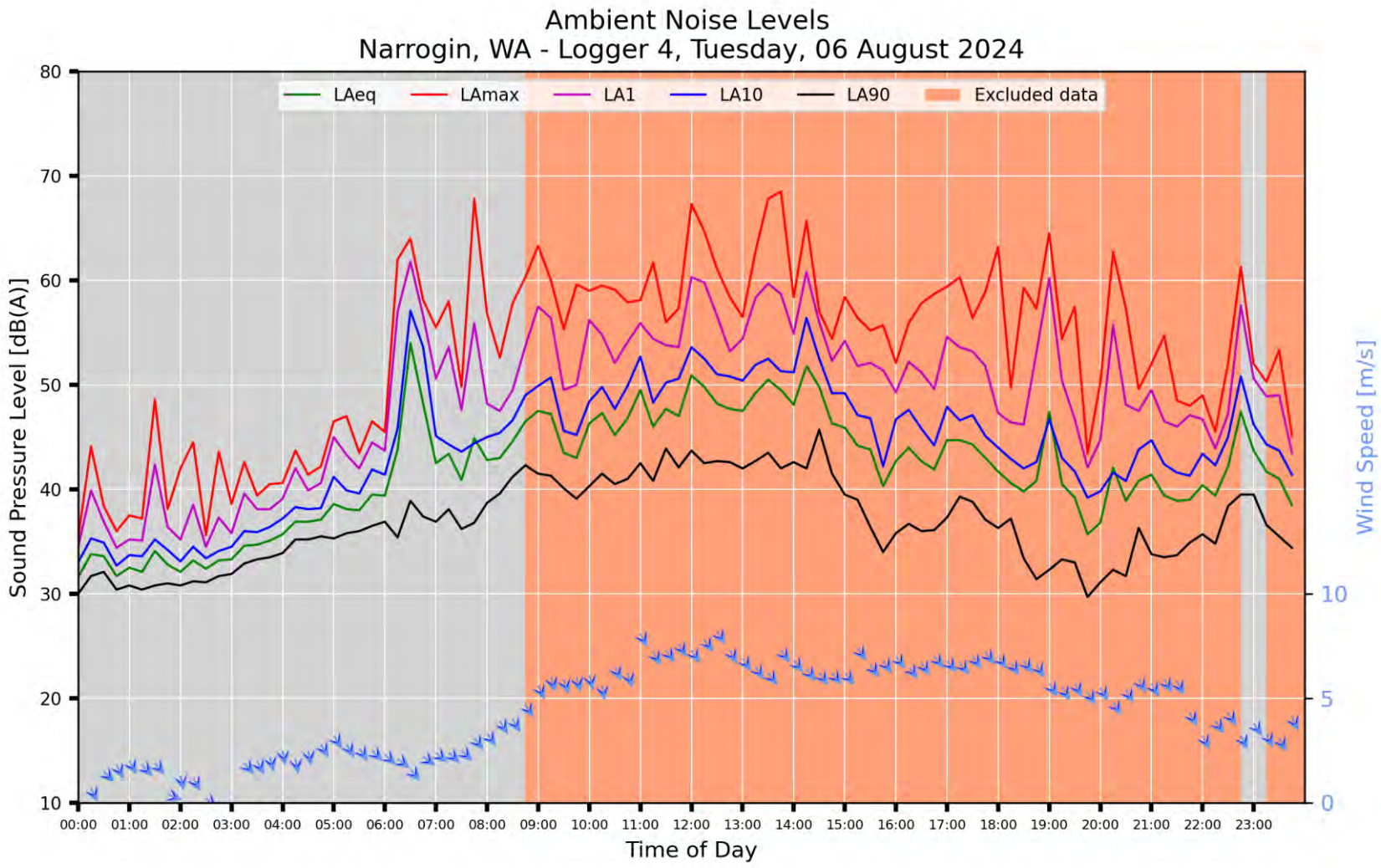
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Tuesday, 06 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
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00:00
01:00
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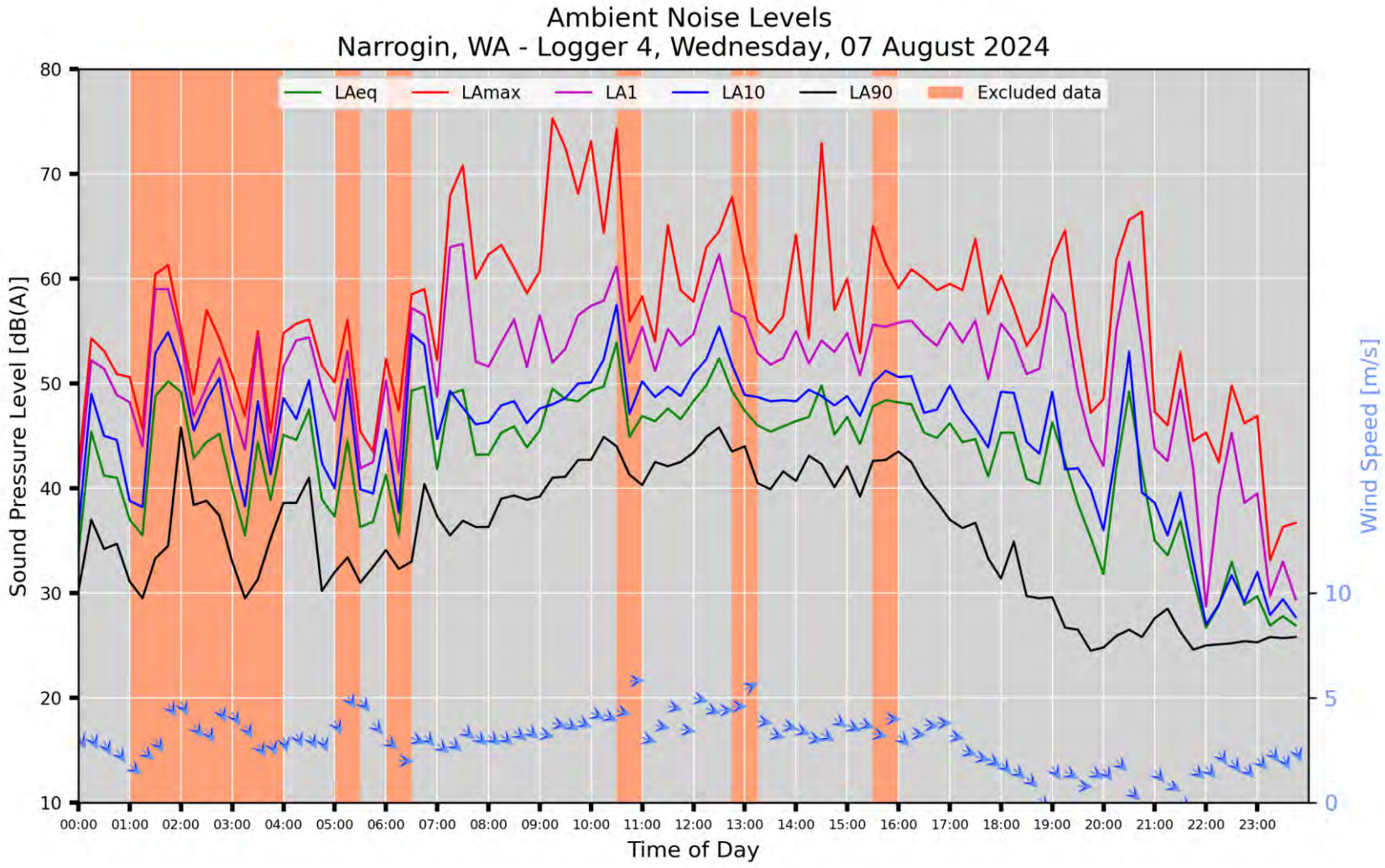
Ambient Noise Levels
Narrogin, WA - Logger 4, Wednesday, 07 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
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00:00
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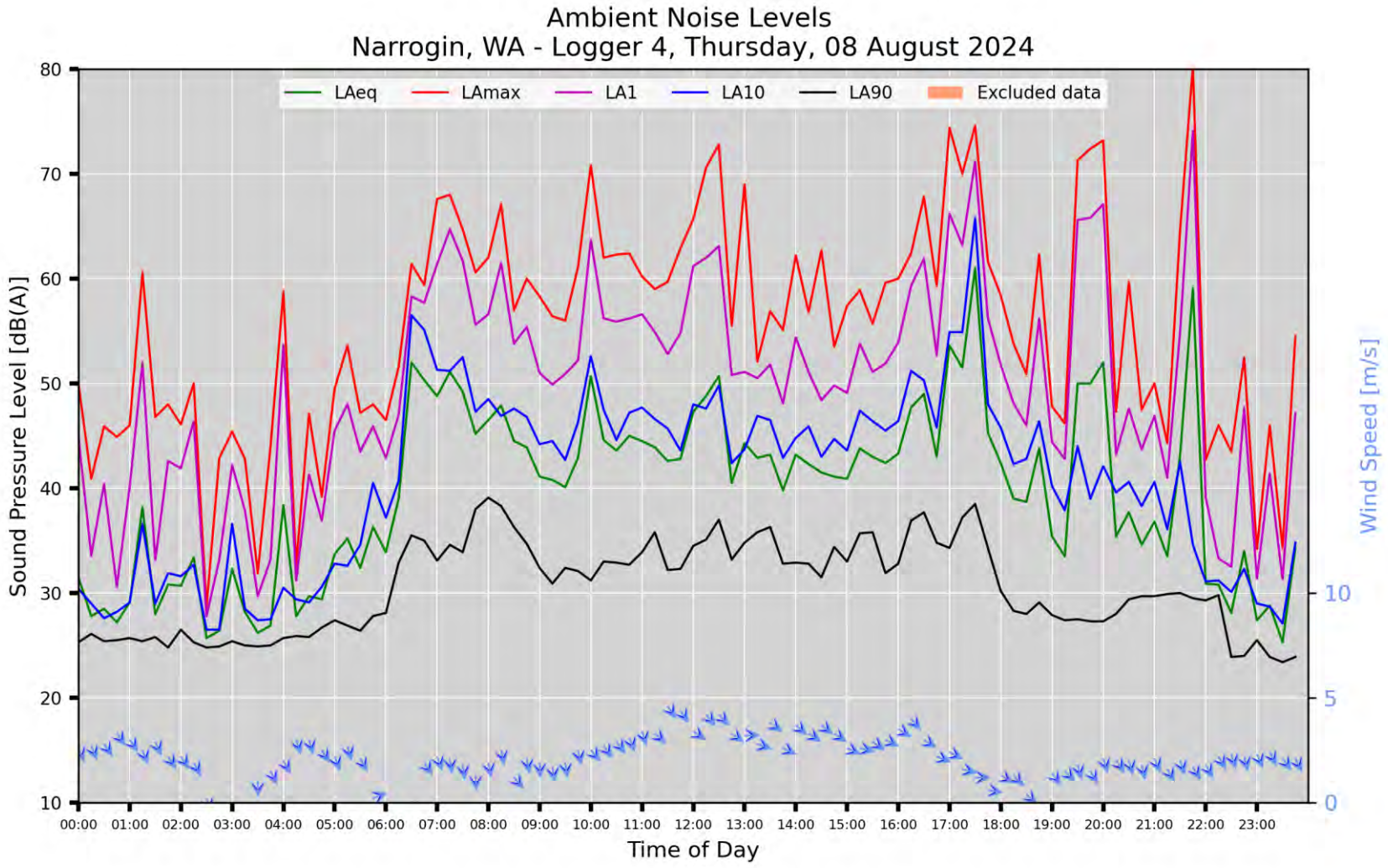
Ambient Noise Levels
Narrogin, WA - Logger 4, Thursday, 08 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
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20
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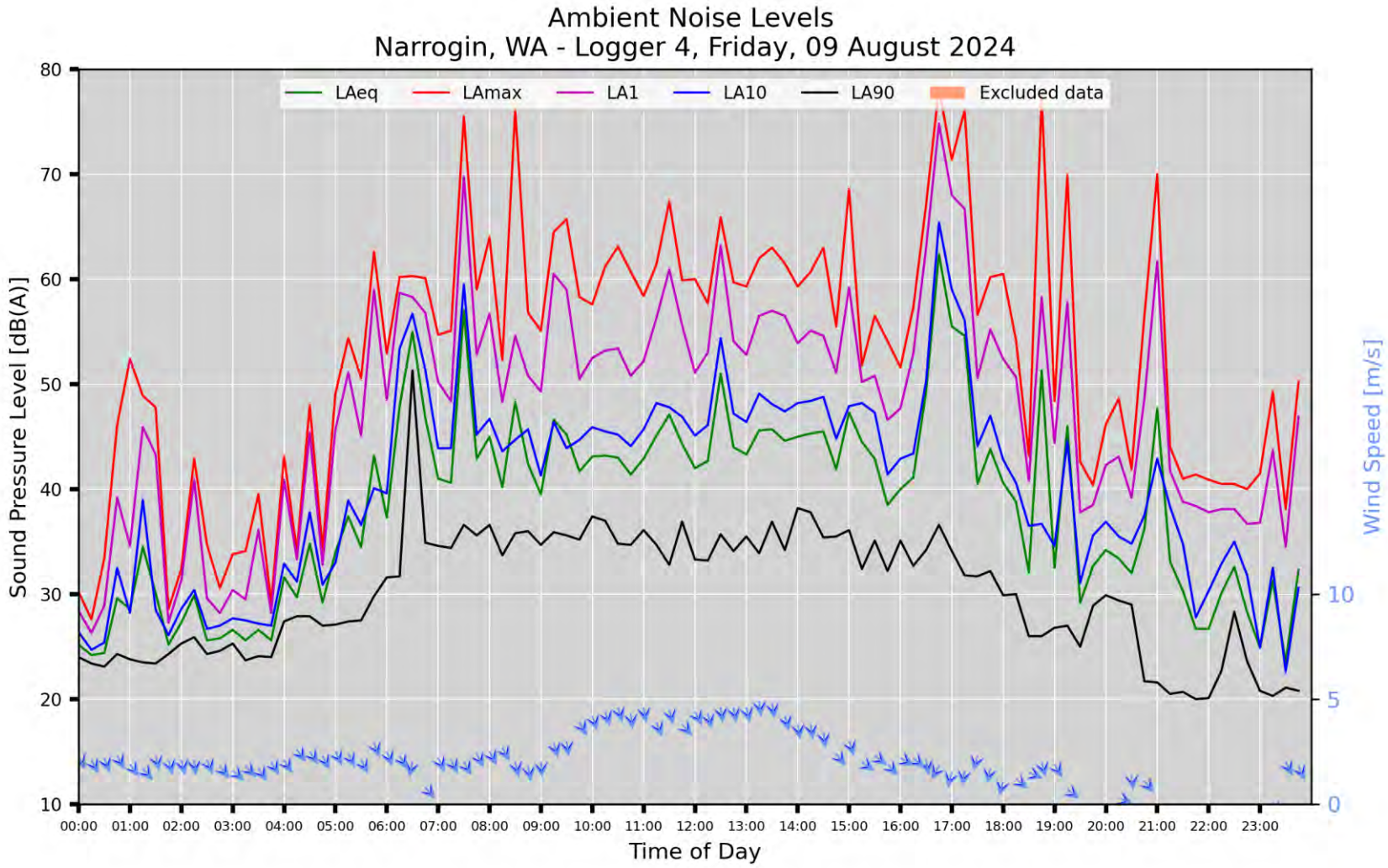
Ambient Noise Levels
Narrogin, WA - Logger 4, Friday, 09 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
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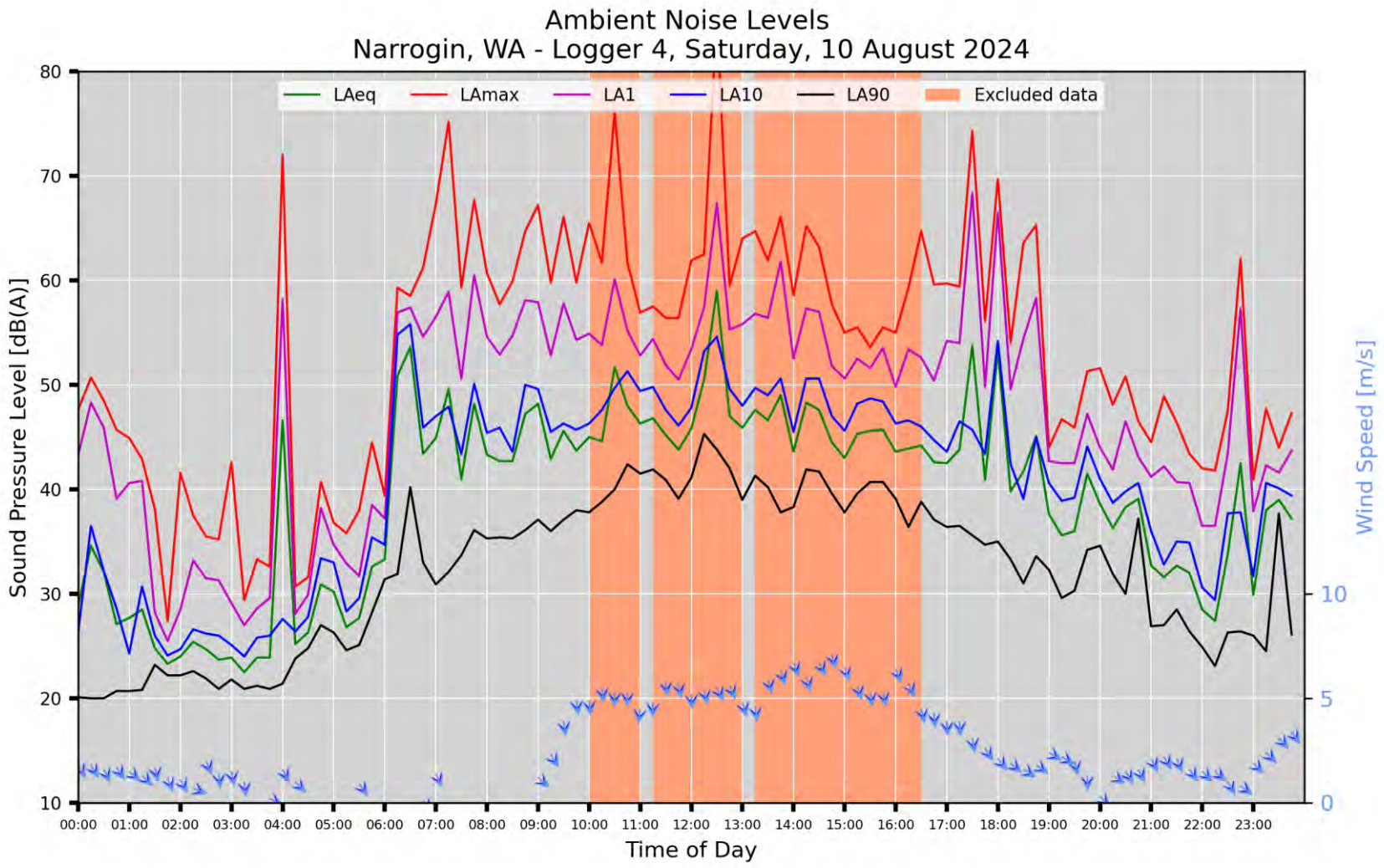
Ambient Noise Levels
Narrogin, WA - Logger 4, Saturday, 10 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
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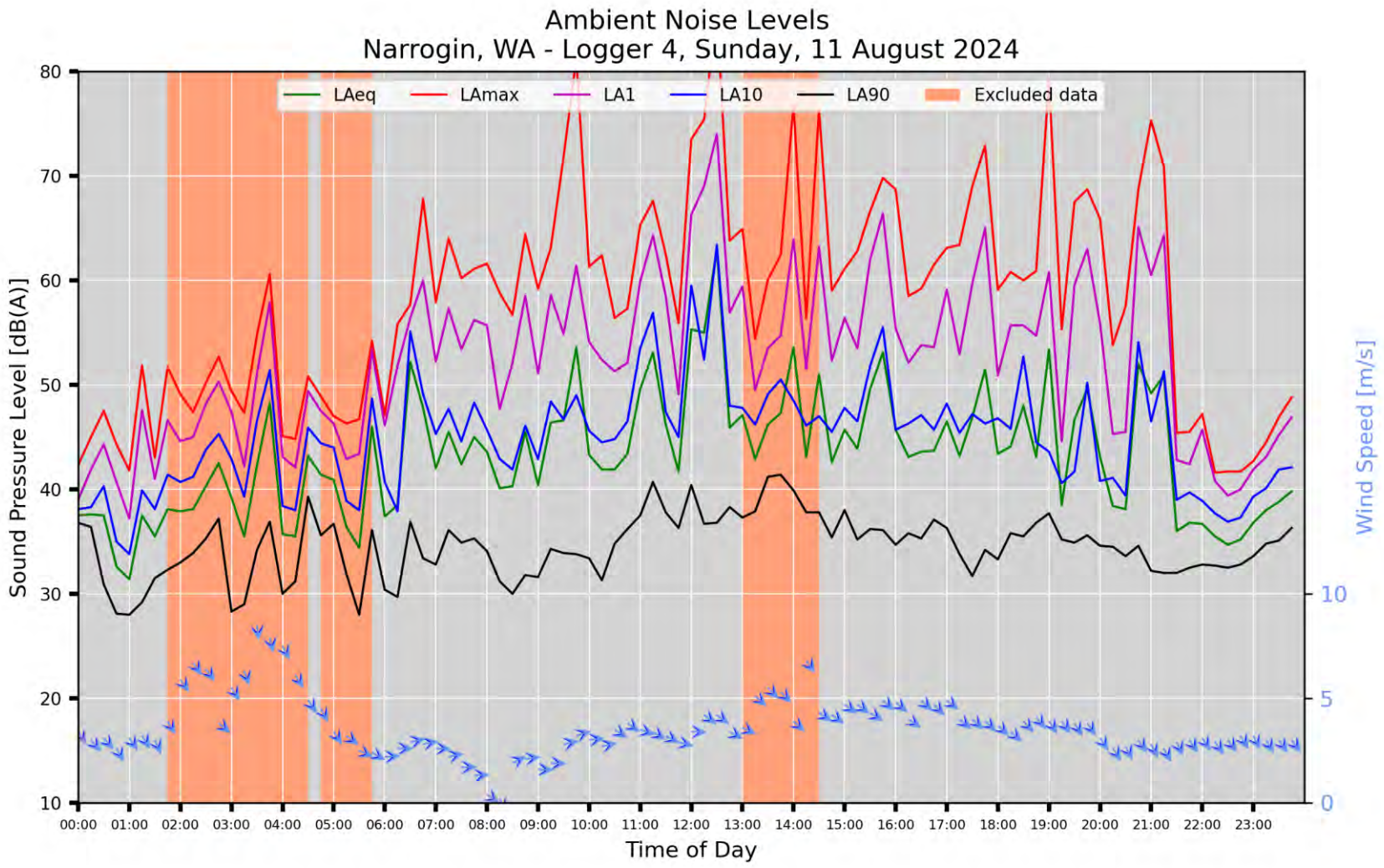
Ambient Noise Levels
Narrogin, WA - Logger 4, Sunday, 11 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
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40
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10
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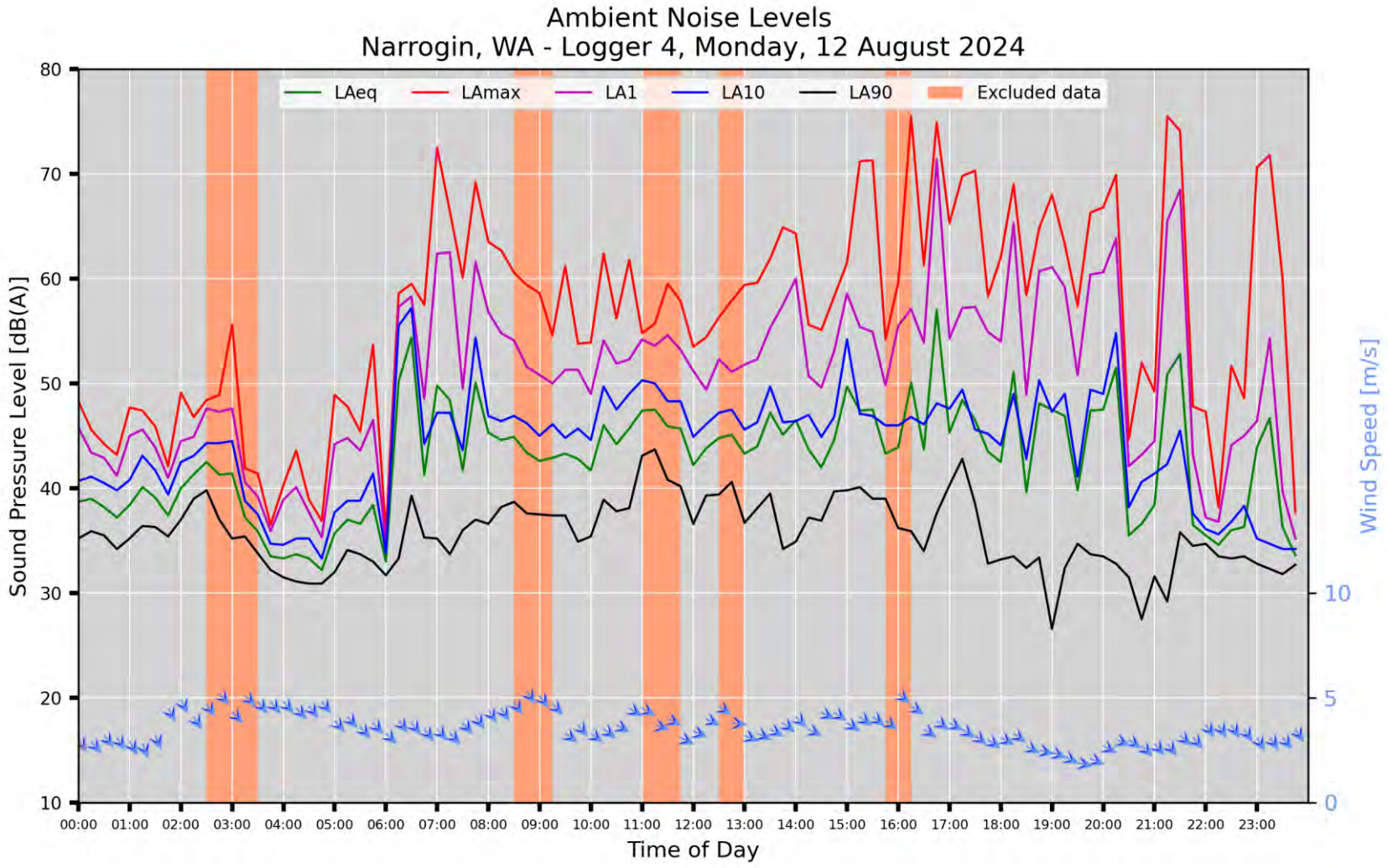
Ambient Noise Levels
Narrogin, WA - Logger 4, Monday, 12 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
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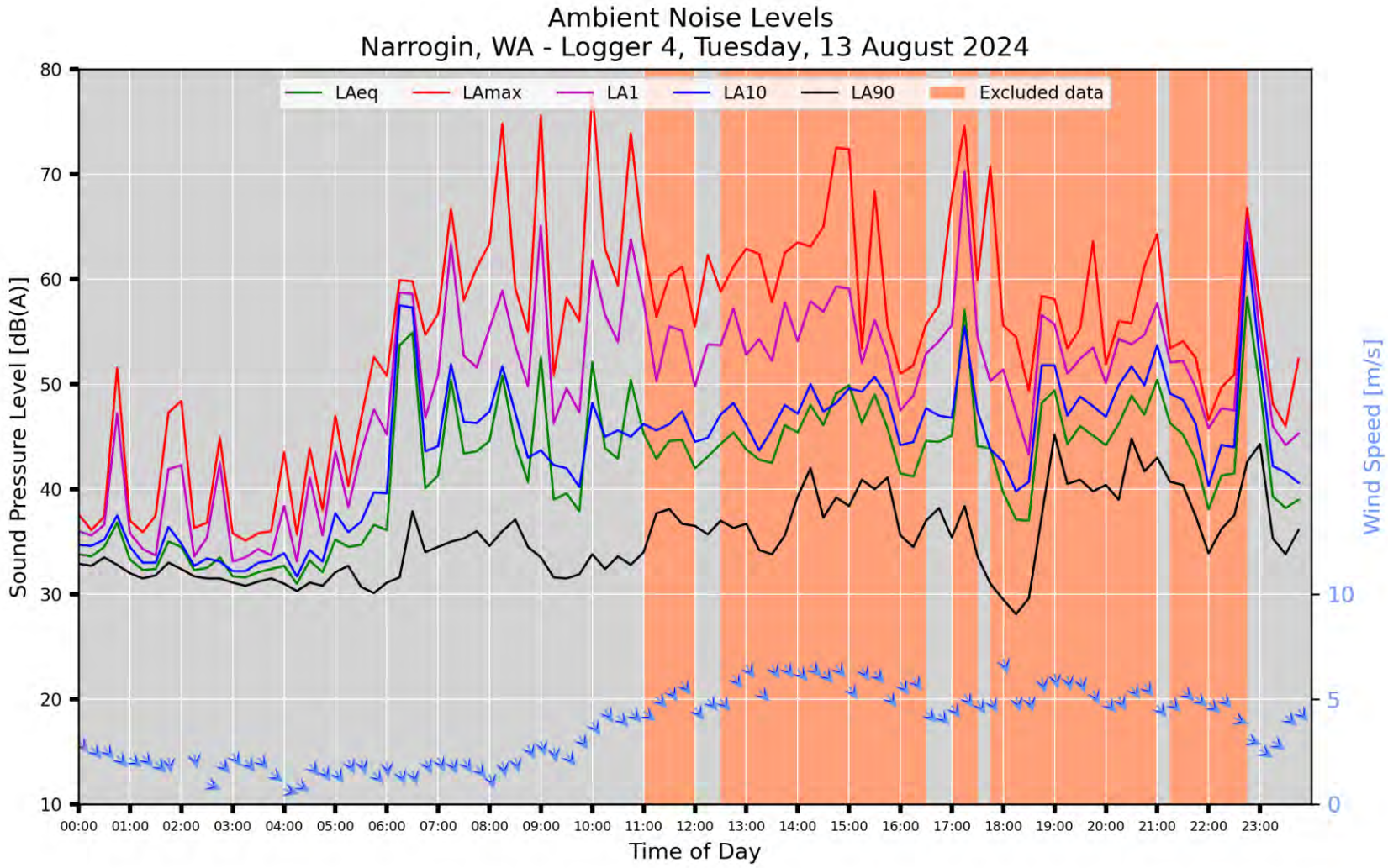
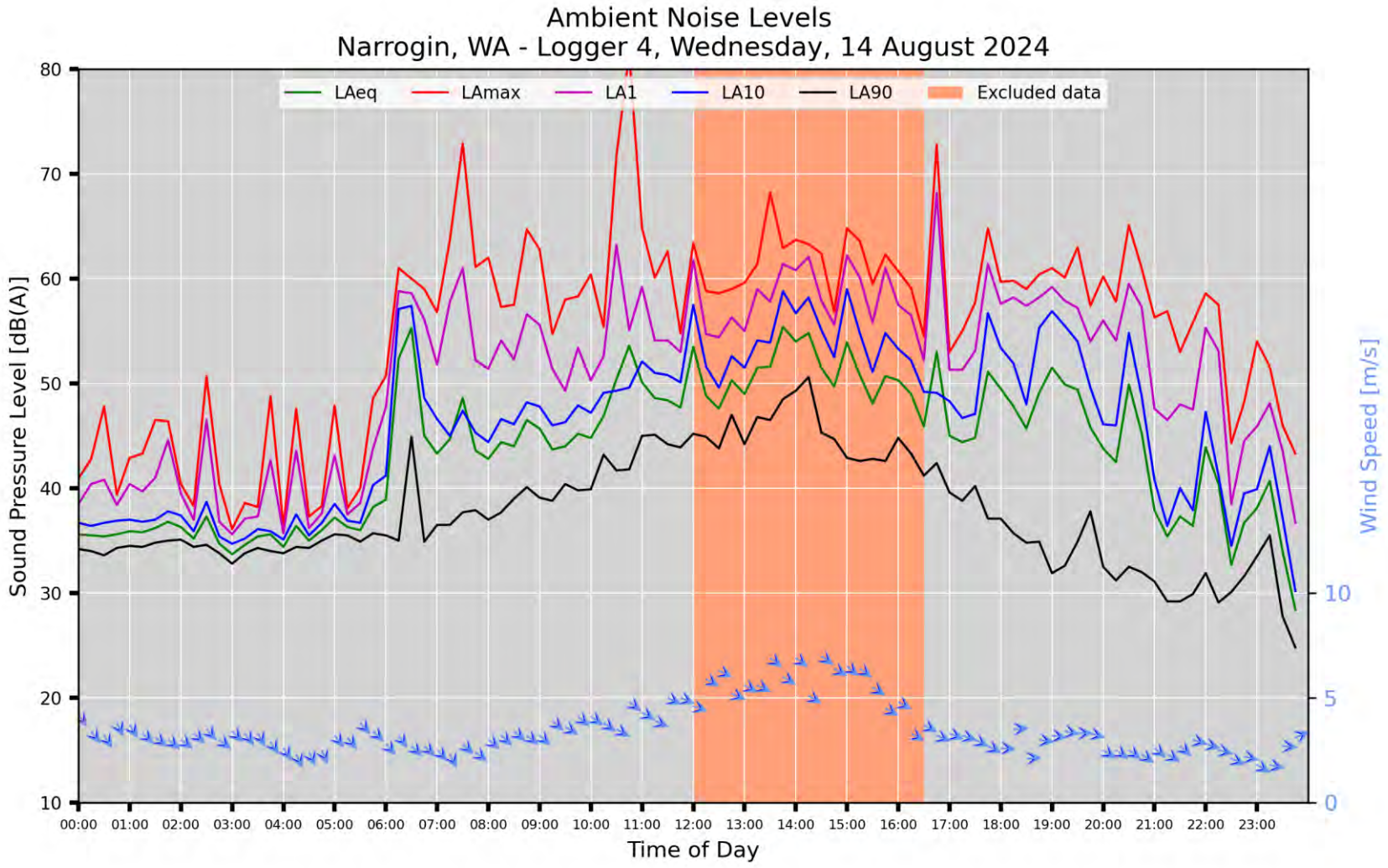
21:00
22:00
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Tuesday, 13 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
0
5
10
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Wednesday, 14 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
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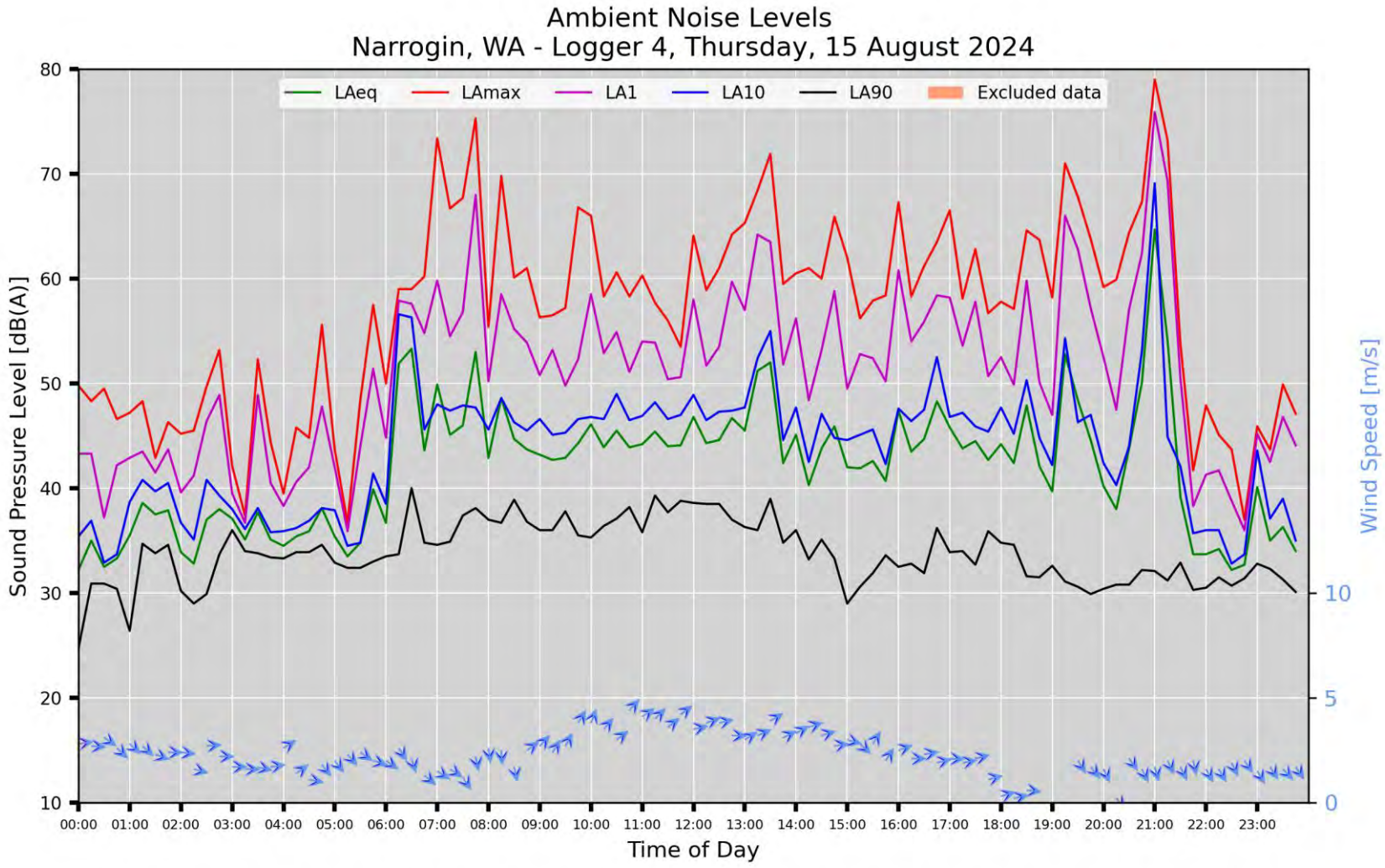
23:00


Ambient Noise Levels
Narrogin, WA - Logger 4, Thursday, 15 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
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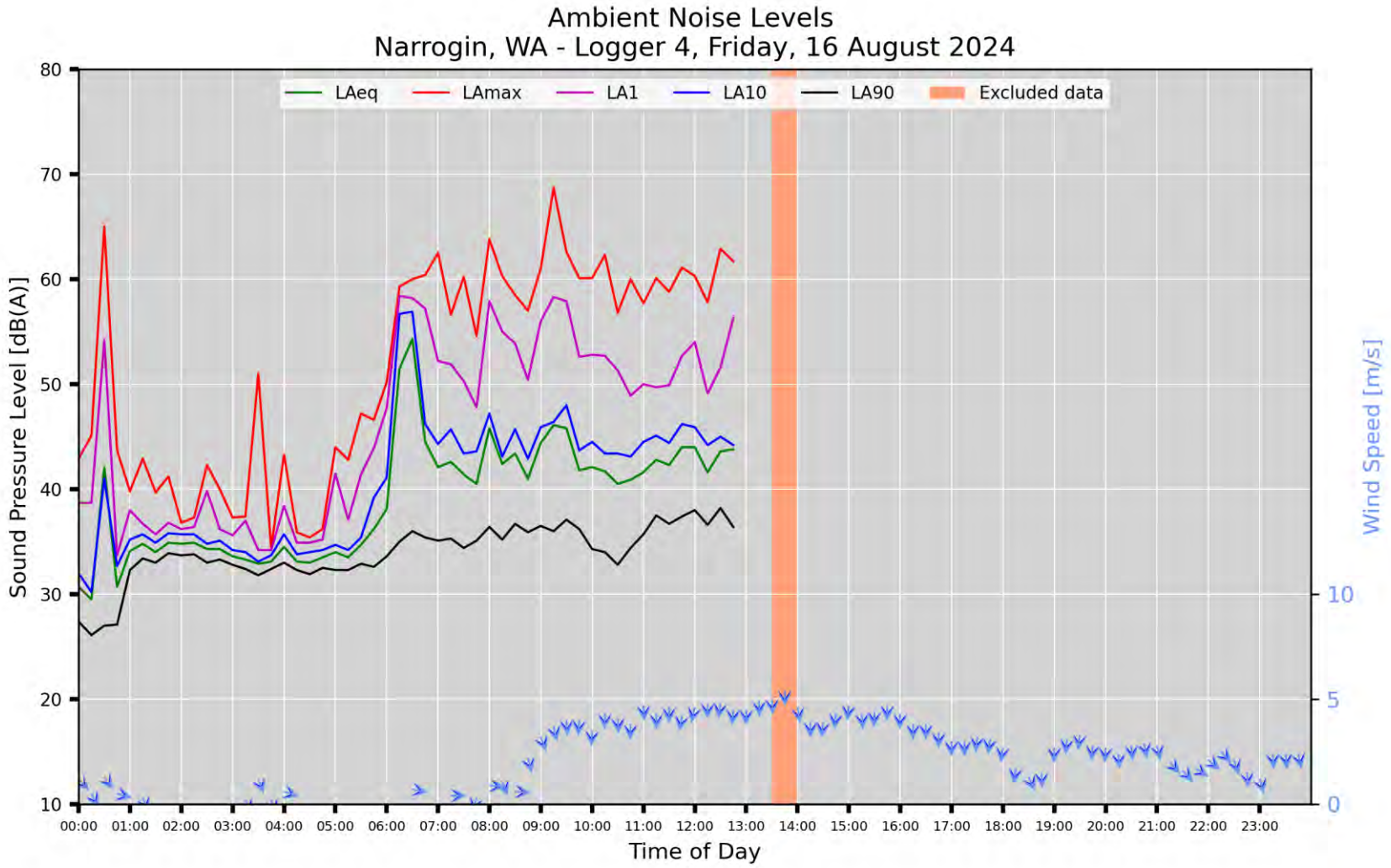
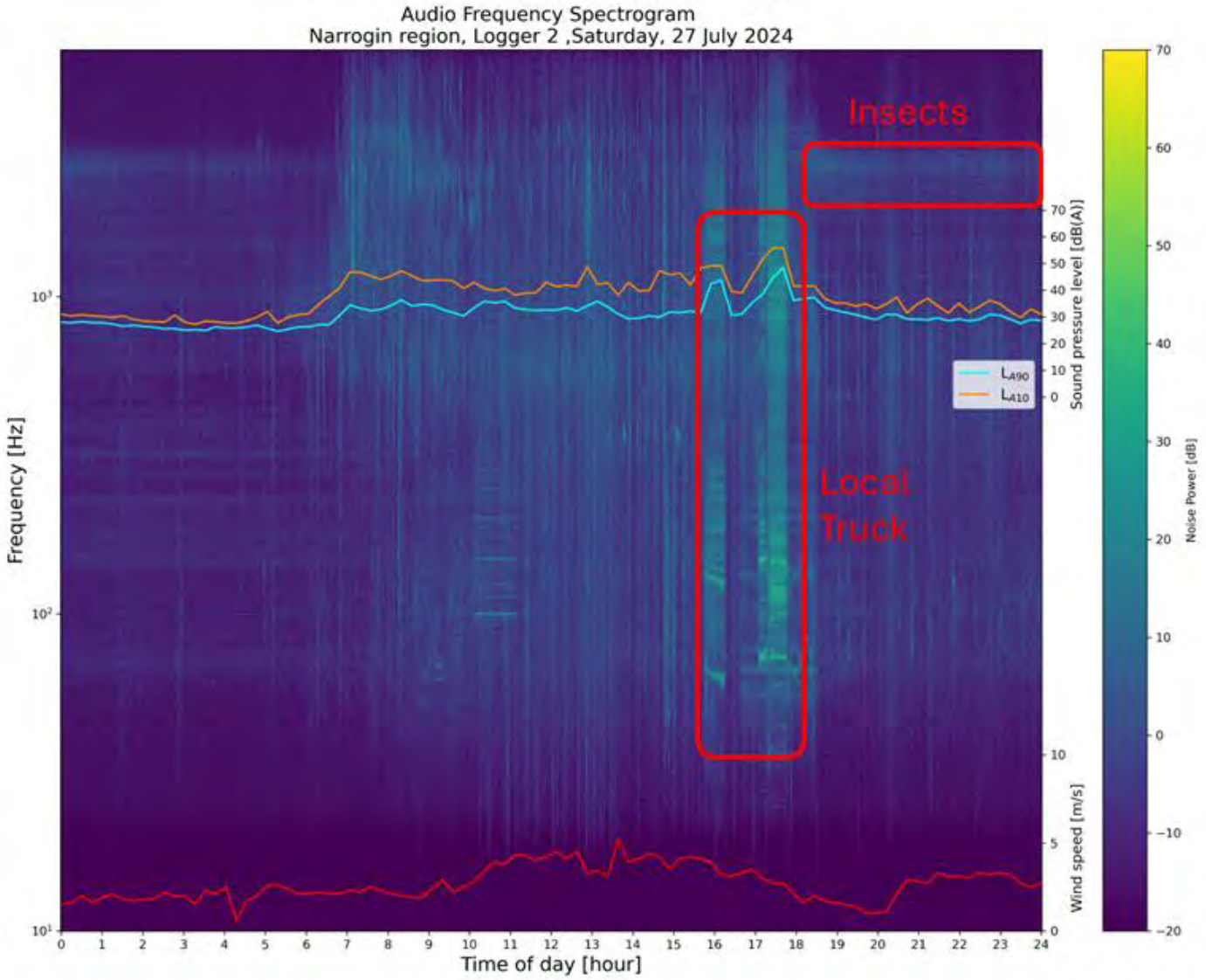
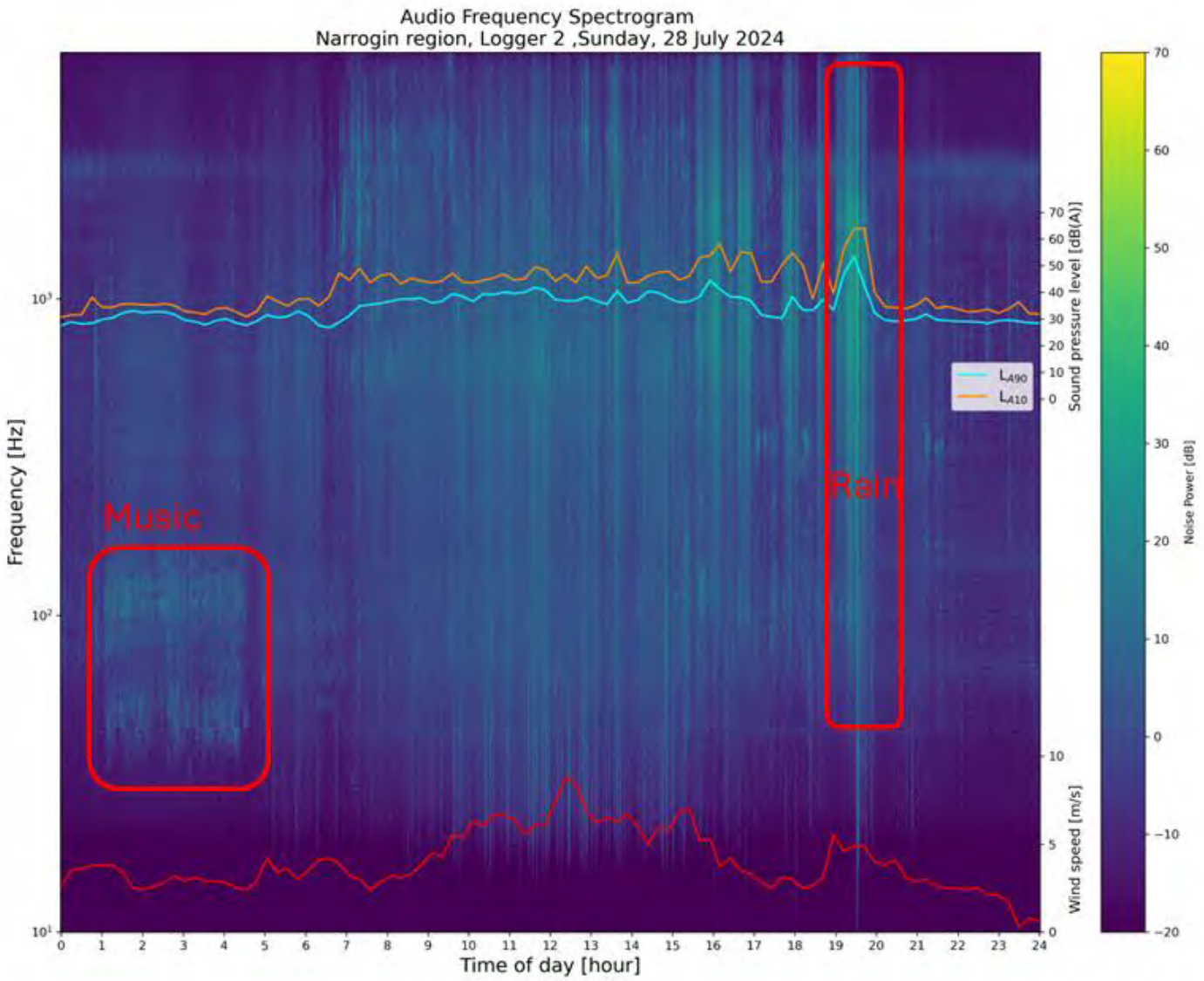
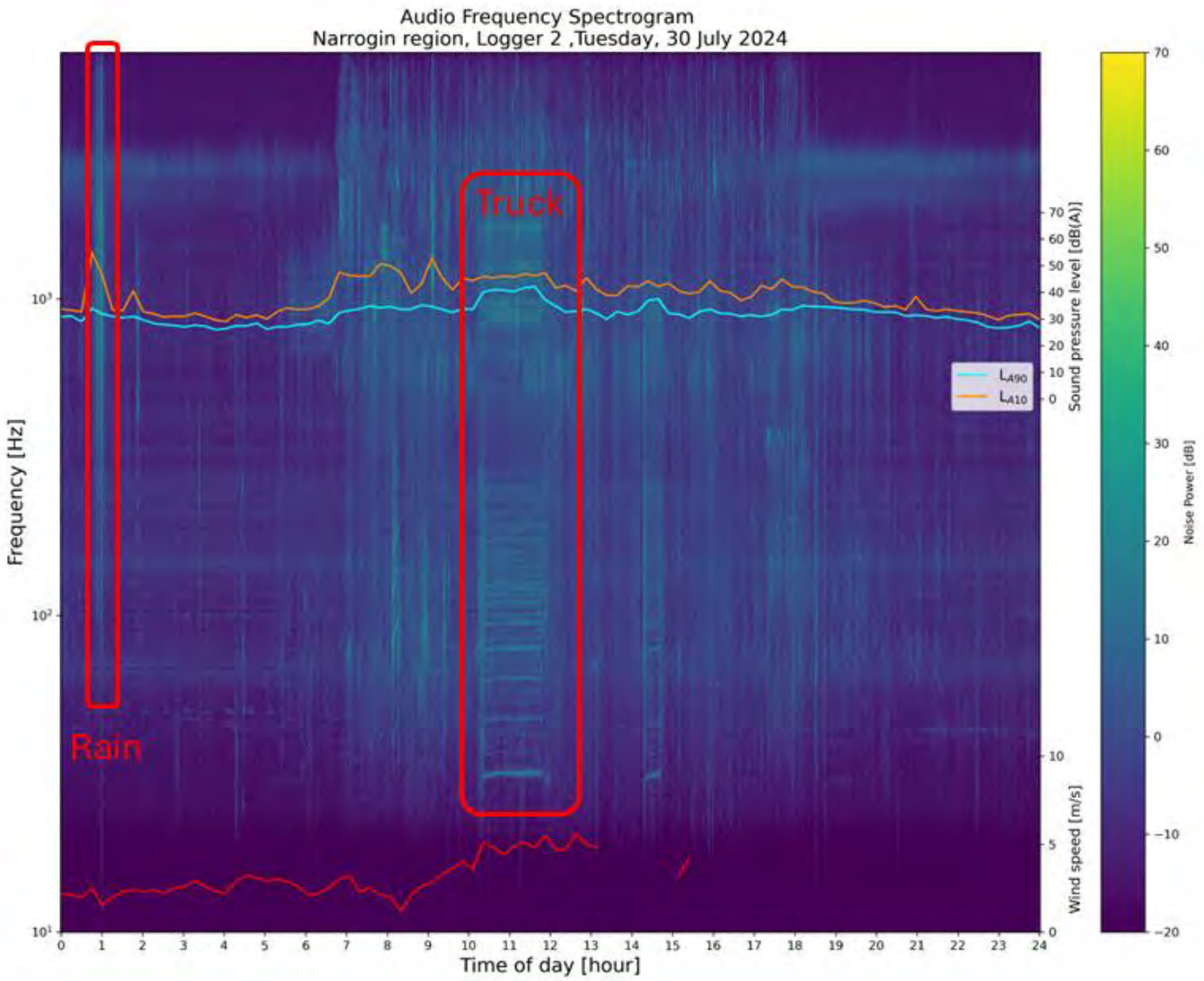
21:00
22:00
23:00

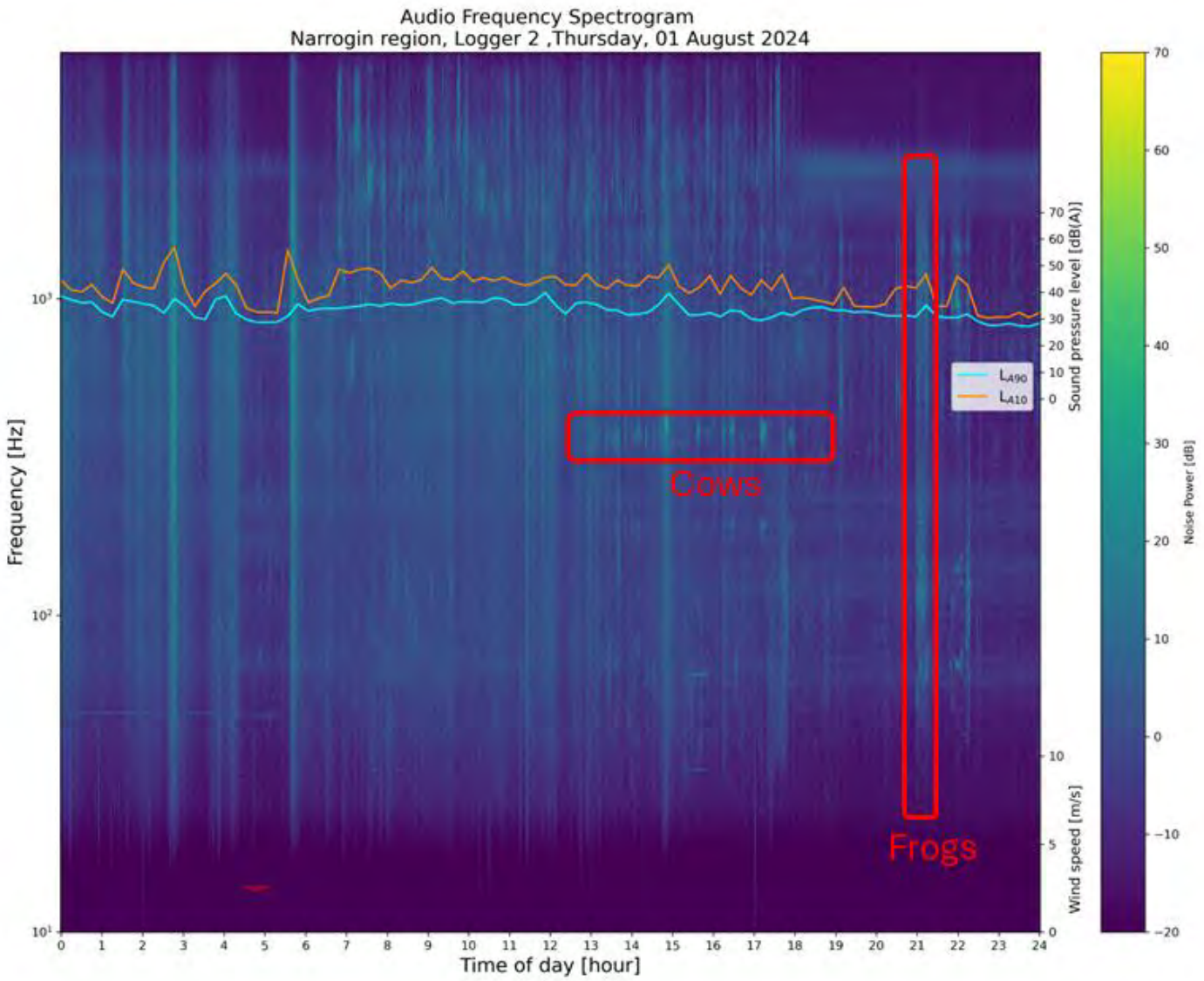

Ambient Noise Levels
Narrogin, WA - Logger 4, Friday, 16 August 2024
LAeq
LAmax
LA1
LA10
LA90
Excluded data
Sound Pressure Level [dB(A)]
Wind Speed [m/s]
Time of Day
80
70
60
50
40
30
20
10
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
07:00
08:00
09:00
10:00
11:00
12:00
13:00
14:00
15:00
16:00
17:00
18:00
19:00
20:00
21:00
22:00
23:00

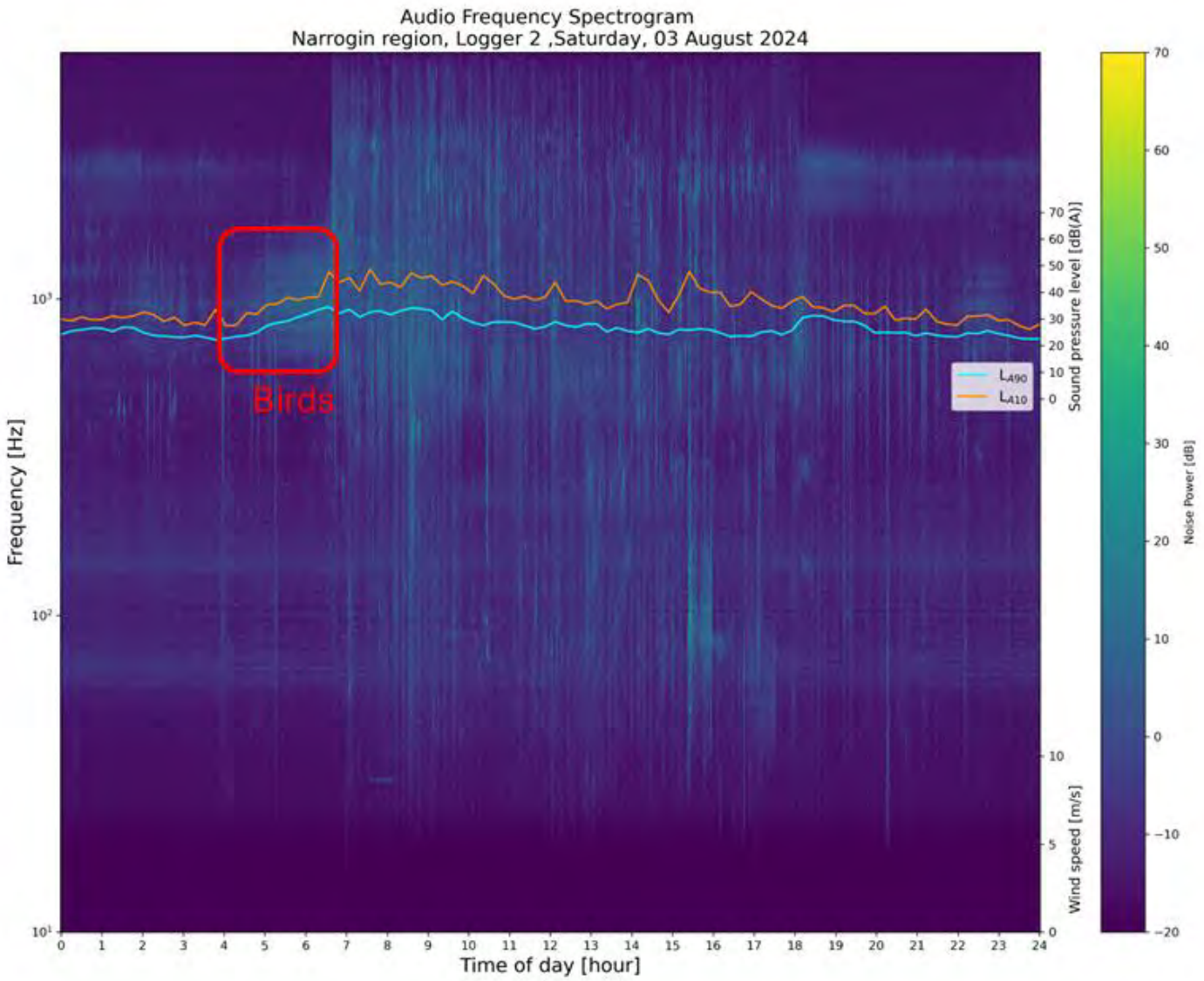
Spectrograms calculated from audio recorded at logger 2

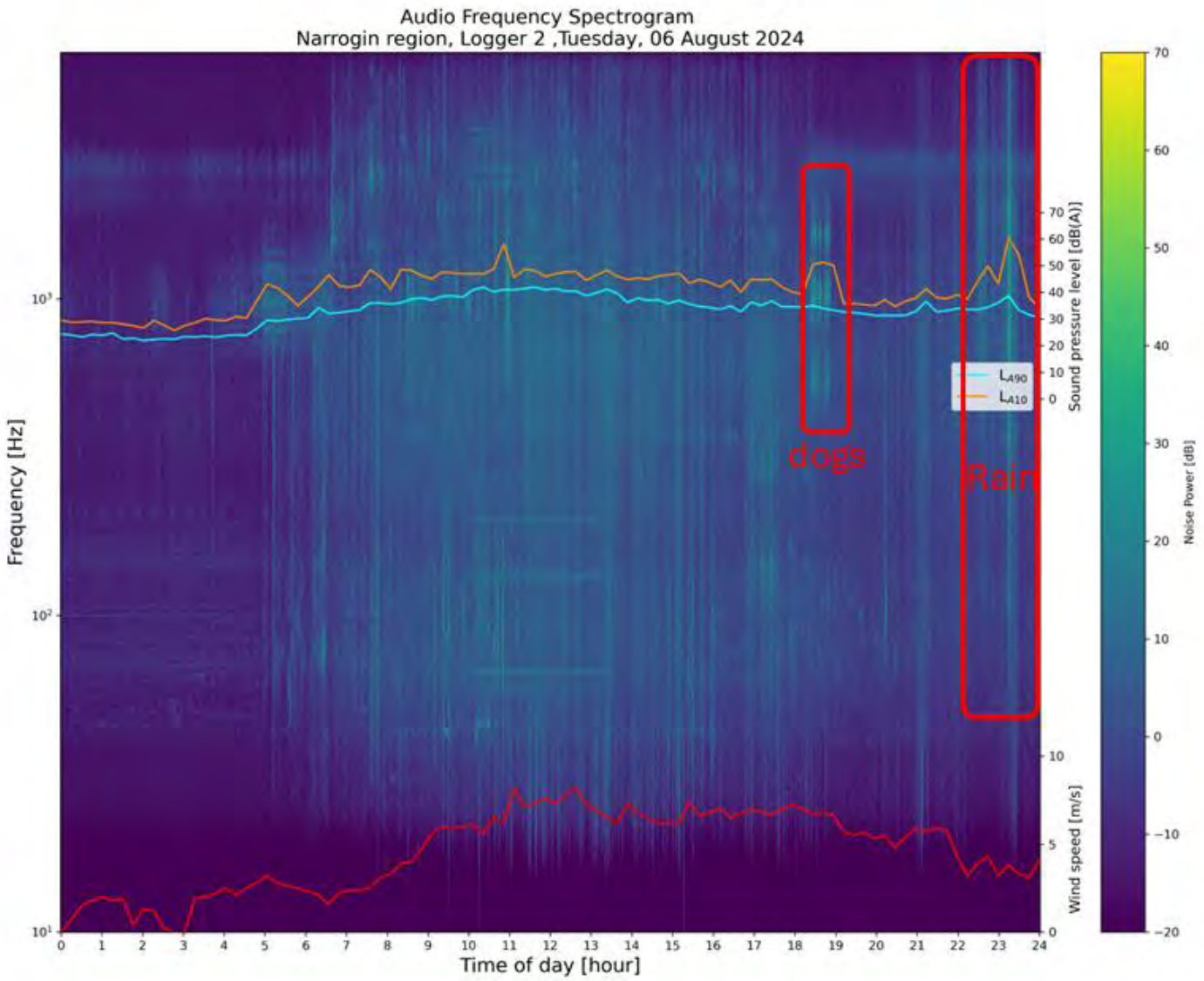

Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Saturday, 27 July 2024
Insects
Local Truck
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
LA90
LA10

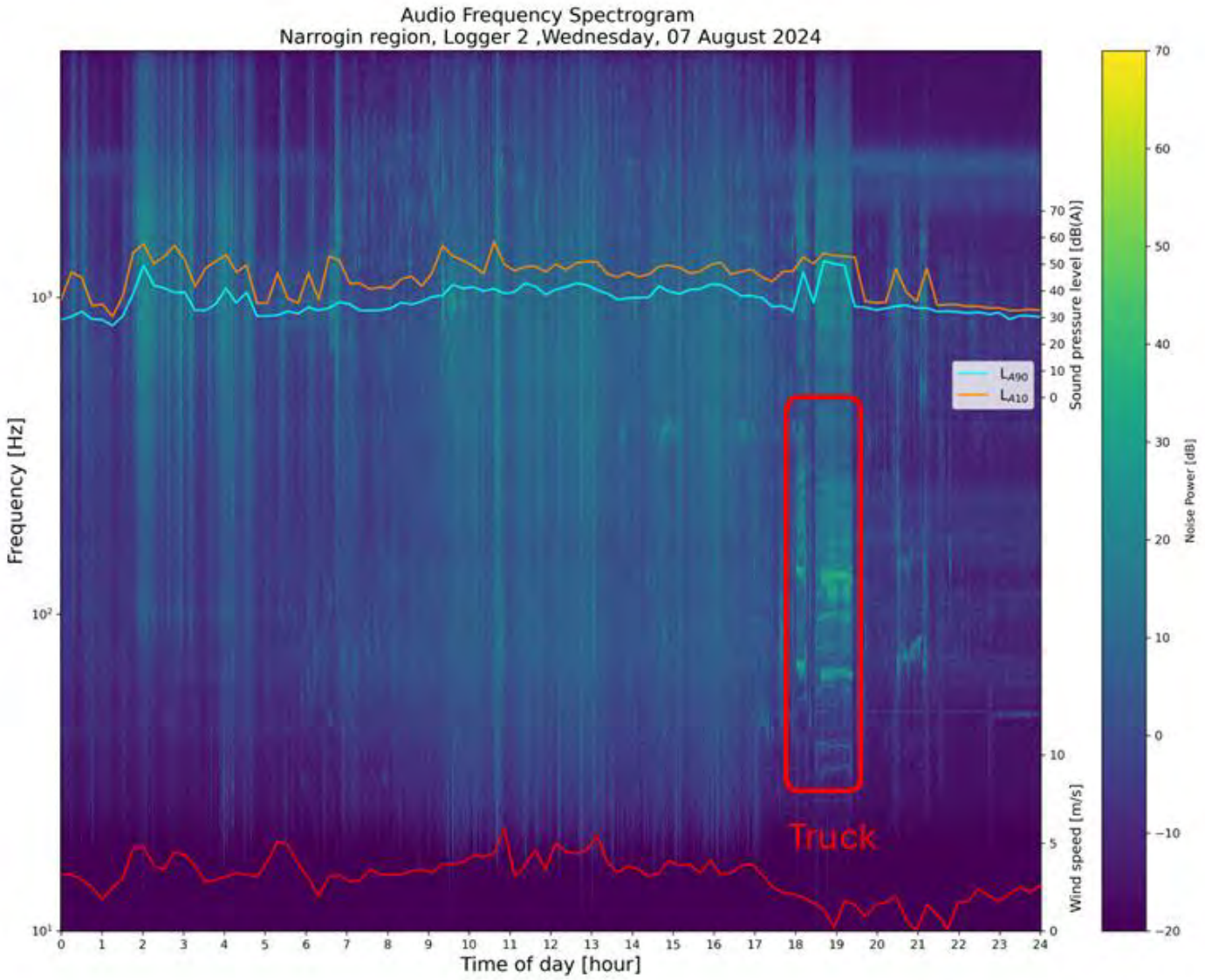

Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Sunday, 28 July 2024
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
LA90
LA10
Music
Rain

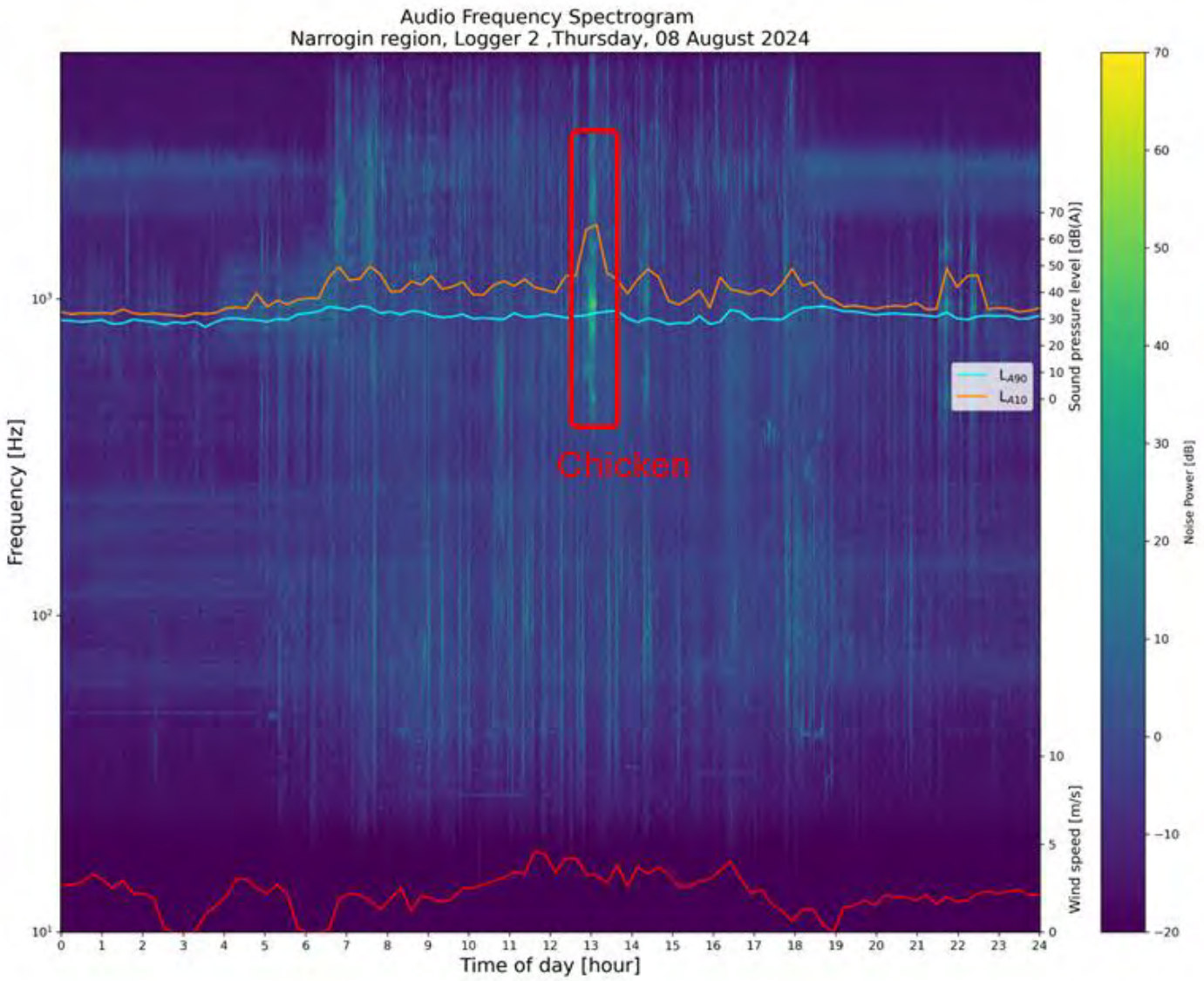

Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Tuesday, 30 July 2024
Truck
Rain
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
L_{A90}
L_{A10}


Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Thursday, 01 August 2024
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
L_{A90}
L_{A10}
Cows
Frogs


Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Saturday, 03 August 2024
Birds
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
L_{A90}
L_{A10}


Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Tuesday, 06 August 2024
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
L_{A90}
L_{A10}
dogs
Rain


Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Wednesday, 07 August 2024
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
L_{A90}
L_{A10}
Truck


Audio Frequency Spectrogram
Narrogin region, Logger 2 ,Thursday, 08 August 2024
Chicken
Frequency [Hz]
Time of day [hour]
Sound pressure level [dB(A)]
Wind speed [m/s]
Noise Power [dB]
L_{A90}
L_{A10}

Appendix C

Unattended noise monitoring summary tables

Table C.1 Unattended noise monitoring at logger location L2

	L_{A10}			L_{A90}		
Date	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**
Friday-26-Jul-24	40	34	30	26	29	25
Saturday-27-Jul-24	43	34	35	30	29	28
Sunday-28-Jul-24	46	34	32	30	29	27
Monday-29-Jul-24	44	35	33	34	32	27
Tuesday-30-Jul-24	42	34	32	32	30	27
Wednesday-31-Jul-24	46	48	42	34	29	29
Thursday-1-Aug-24	44	38	31	31	31	25
Friday-2-Aug-24	43	31	31	25	26	23
Saturday-3-Aug-24	39	31	32	24	24	22
Sunday-4-Aug-24	40	33	29	26	23	22
Monday-5-Aug-24	42	30	30	26	23	23
Tuesday-6-Aug-24	46	35	43	33	31	29
Wednesday-7-Aug-24	47	36	33	34	32	28
Thursday-8-Aug-24	42	35	34	29	30	27
Friday-9-Aug-24	41	36	32	29	28	24
Saturday-10-Aug-24	45	42	36	34	29	25
Sunday-11-Aug-24	43	35	35	32	29	27
Monday-12-Aug-24	45	35	32	33	29	24
Tuesday-13-Aug-24	42	44	35	30	39	26
Wednesday-14-Aug-24	48	39	34	35	32	28
Thursday-15-Aug-24	42	32	29	29	26	22
Typical (50th percentile)	**43**	**35**	**32**	**30**	**29**	**26**

Table C.2 Unattended noise monitoring at logger location L3

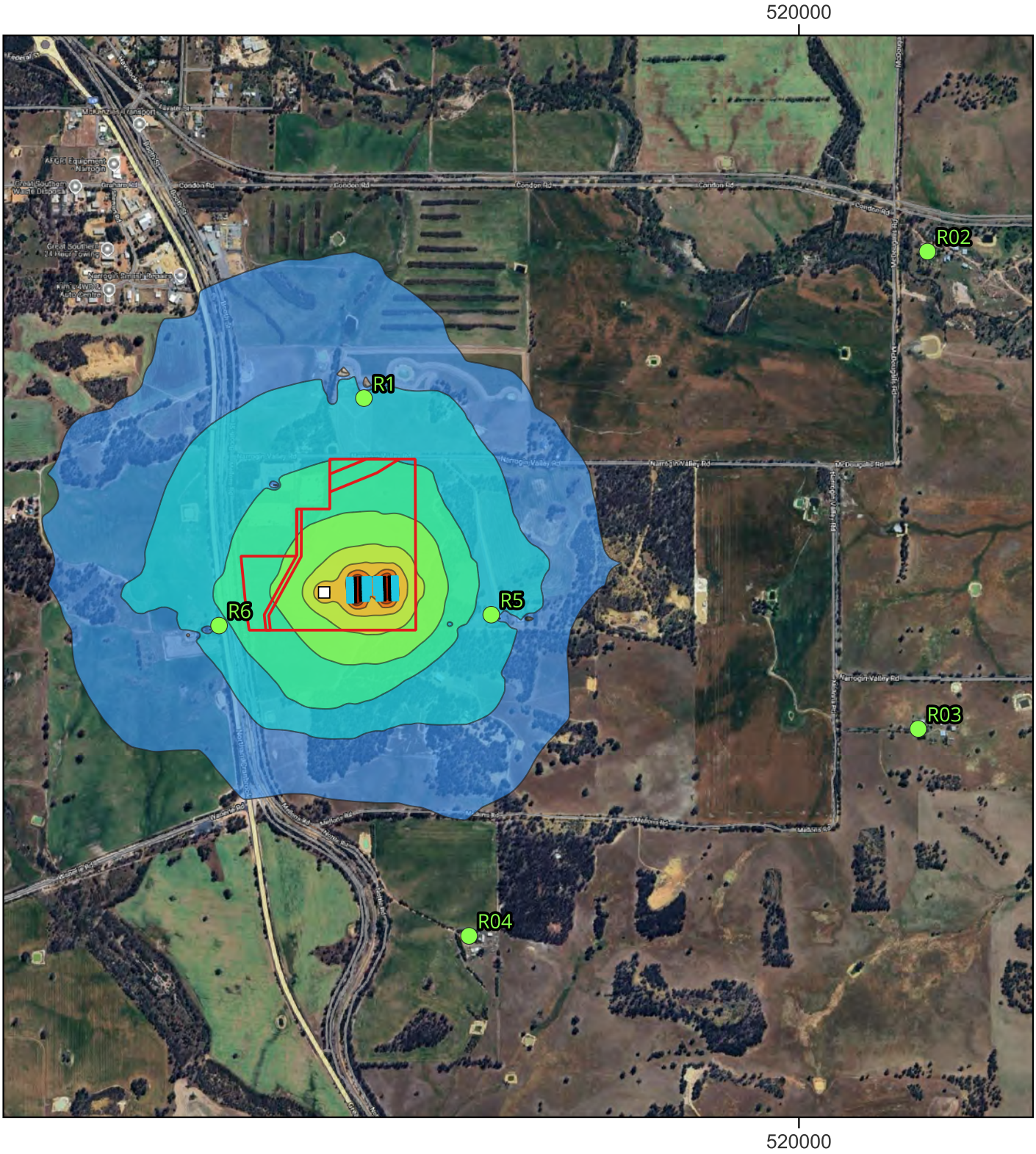
	L_{A10}			L_{A90}		
Date	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**
Friday-26-Jul-24	36	26	27	21	19	18
Saturday-27-Jul-24	43	34	41	27	23	27
Sunday-28-Jul-24	47	38	35	29	24	20
Monday-29-Jul-24	43	28	32	29	21	21
Tuesday-30-Jul-24	42	30	34	26	20	19
Wednesday-31-Jul-24	50	51	46	32	26	29
Thursday-1-Aug-24	45	27	29	26	19	18
Friday-2-Aug-24	38	23	30	21	18	18
Saturday-3-Aug-24	36	22	35	20	18	18
Sunday-4-Aug-24	39	25	33	24	19	19
Monday-5-Aug-24	41	29	30	24	20	19
Tuesday-6-Aug-24	44	45	49	33	33	33
Wednesday-7-Aug-24	51	30	34	30	22	20
Thursday-8-Aug-24	41	28	31	28	20	20
Friday-9-Aug-24	43	28	30	27	21	19
Saturday-10-Aug-24	43	37	37	30	24	21
Sunday-11-Aug-24	46	36	41	31	25	29
Monday-12-Aug-24	46	39	36	32	28	22
Tuesday-13-Aug-24	42	56	42	30	45	29
Wednesday-14-Aug-24	52	44	41	33	31	27
Thursday-15-Aug-24	43	33	32	26	20	19
Typical (50th percentile)	**43**	**30**	**34**	**28**	**21**	**20**

Table C.3 Unattended noise monitoring at logger location L4

	L_{A10}			L_{A90}		
Date	**Day**	**Evening**	**Night**	**Day**	**Evening**	**Night**
Friday-26-Jul-24	43	35	26	27	22	21
Saturday-27-Jul-24	45	37	35	30	25	25
Sunday-28-Jul-24	48	38	31	30	24	24
Monday-29-Jul-24	46	35	31	27	26	22
Tuesday-30-Jul-24	44	38	30	29	22	21
Wednesday-31-Jul-24	47	49	44	32	29	29
Thursday-1-Aug-24	46	39	36	31	30	21
Friday-2-Aug-24	43	37	28	27	21	20
Saturday-3-Aug-24	43	37	38	27	22	22
Sunday-4-Aug-24	45	34	32	25	23	23
Monday-5-Aug-24	45	40	35	30	30	30
Tuesday-6-Aug-24	45	42	45	36	32	30
Wednesday-7-Aug-24	49	40	30	33	25	25
Thursday-8-Aug-24	46	39	30	30	27	23
Friday-9-Aug-24	46	36	28	30	20	20
Saturday-10-Aug-24	46	39	41	32	26	26
Sunday-11-Aug-24	47	41	40	33	32	32
Monday-12-Aug-24	47	41	35	33	29	31
Tuesday-13-Aug-24	46	49	37	32	41	34
Wednesday-14-Aug-24	48	46	38	37	29	29
Thursday-15-Aug-24	47	44	35	32	30	27
Typical (50th percentile)	**46**	**39**	**35**	**31**	**26**	**25**

Appendix D

Noise contours



Legend

- Development Envelope
- Noise Sensitive Receptors
- Battery Packs
- Transformer (Stage 1)
- Inverters

Noise Contours dB, LA10 (+5 dB due to tonality)

- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80

Paper Size ISO A4

0 0.25 0.5 0.75 1 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA94
Grid: GDA94 / MGA zone 50

GHD

Narrogin BESS Development Pty Ltd
South energy Narrogin BESS

Noise impact assessmnet
Noise Contours (dB LA10 + 5 dB)
Scenario A1 - Daytime

Project No. **12638490**
Revision No. **0**
Date. **06/12/2024**

FIGURE D.1

Document Path: \\ghdnet\ghd\AU\Perth\Projects\61\12638490\Tech\Noise\QGIS\South Energy - Narrogin noise monitoring.qgz
Print Date: 06/12/2024

Data Source:Google Earth Imagery 2024

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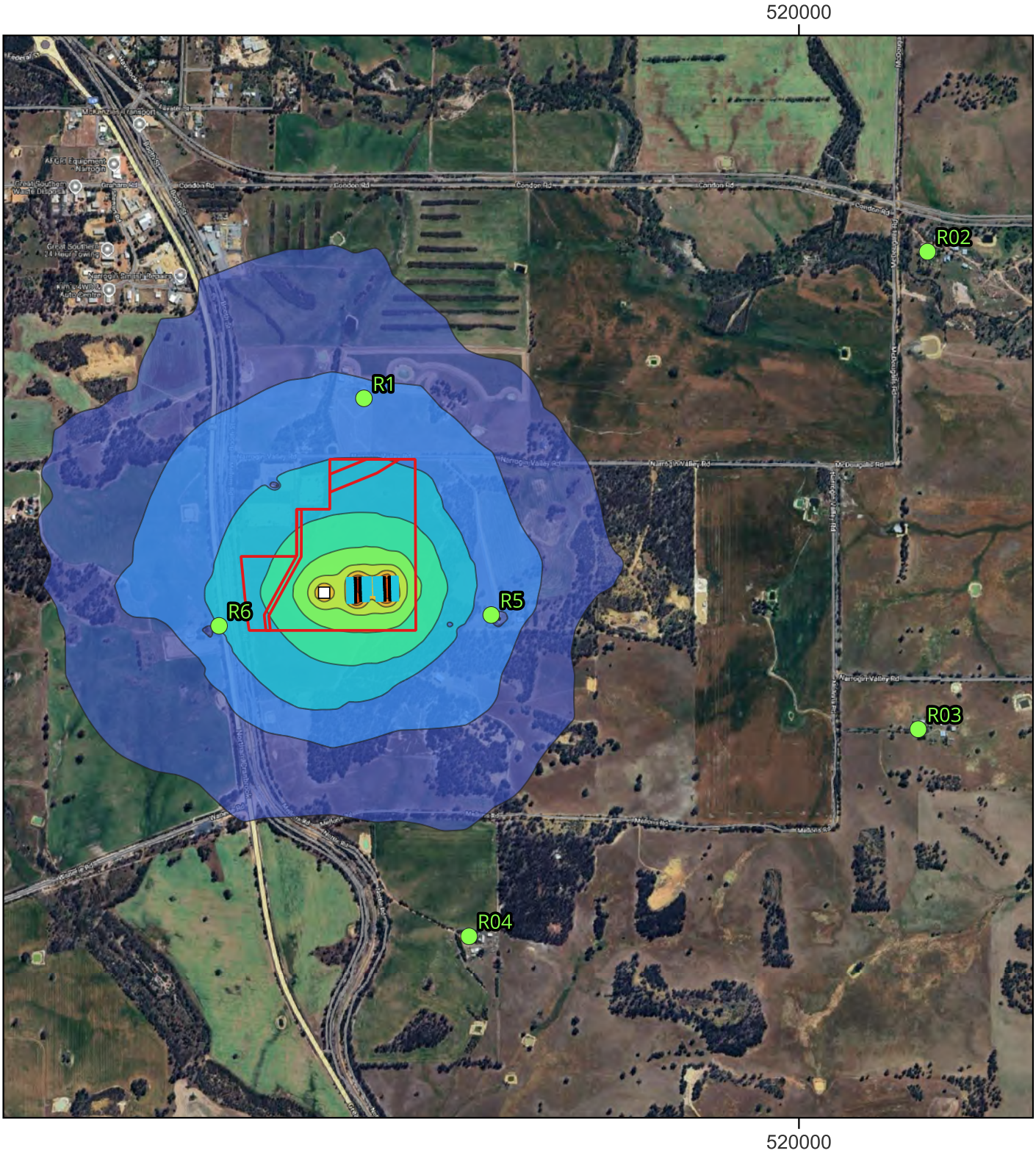

Legend

- Development Envelope
- Noise Sensitive Receptors
- Battery Packs
- Transformer (Stage 1)
- Inverters

Noise Contours dB, LA10 (+5 dB due to tonality)

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80

Paper Size ISO A4

0 0.25 0.5 0.75 1 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA94
Grid: GDA94 / MGA zone 50

GHD

Narrogin BESS Development Pty Ltd
South energy Narrogin BESS

Noise impact assessmnet
Noise Contours (dB LA10 + 5 dB)
Scenario A2 - Nighttime

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Revision No. **0**
Date. **06/12/2024**

FIGURE D.2

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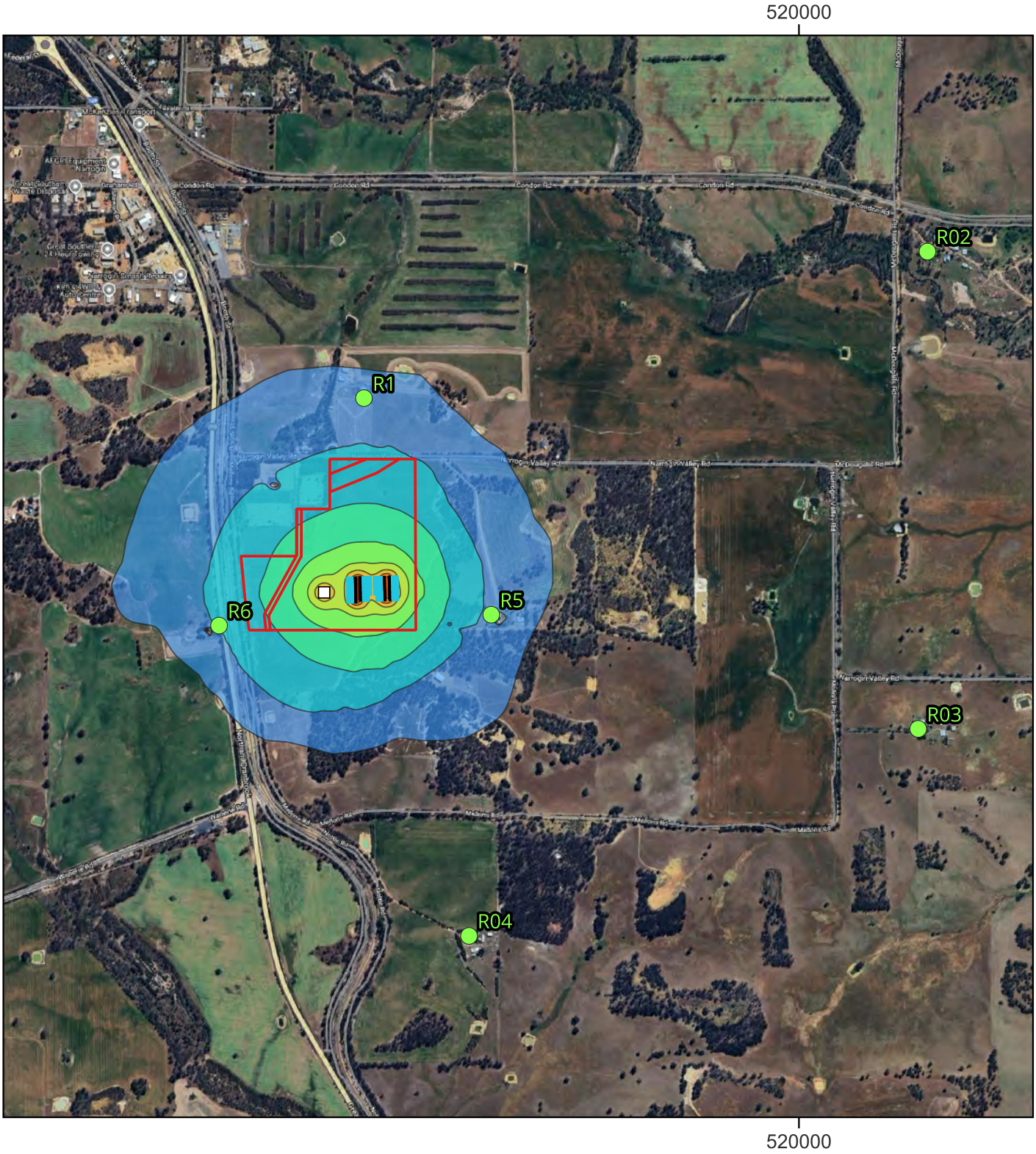

Legend

- Development Envelope
- Noise Sensitive Receptors
- Battery Packs
- Transformer (Stage 1)
- Inverters

Noise Contours dB, LA10 (+5 dB due to tonality)

- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80

Paper Size ISO A4

0 0.25 0.5 0.75 1 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA94
Grid: GDA94 / MGA zone 50

GHD

Narrogin BESS Development Pty Ltd
South energy Narrogin BESS

Noise impact assessmnet
Noise Contours (dB LA10 + 5 dB)
Scenario A3 - Daytime

Project No. **12638490**
Revision No. **0**
Date. **06/12/2024**

FIGURE D.3

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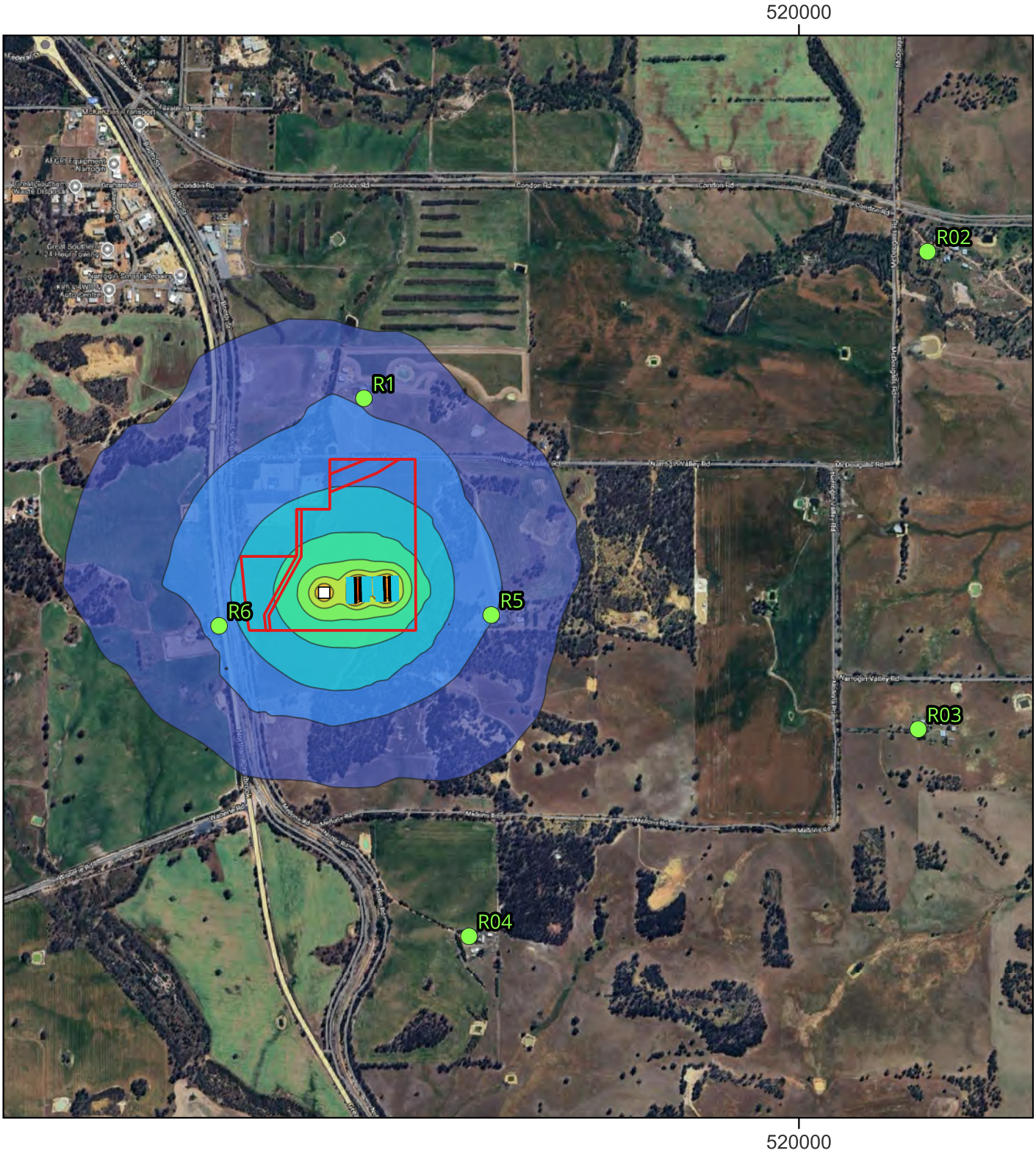

Legend

- Development Envelope
- Noise Sensitive Receptors
- Battery Packs
- Transformer (Stage 1)
- Inverters

Noise Contours dB, LA10 (+5 dB due to tonality)

- 35 - 40
- 40 - 45
- 45 - 50
- 50 - 55
- 55 - 60
- 60 - 65
- 65 - 70
- 70 - 75
- 75 - 80

Paper Size ISO A4

0 0.25 0.5 0.75 1 km

N

Map Projection: Transverse Mercator
Horizontal Datum: GDA94
Grid: GDA94 / MGA zone 50

GHD

Narrogin BESS Development Pty Ltd
South energy Narrogin BESS

Noise impact assessmnet
Noise Contours (dB LA10 + 5 dB)
Scenario A4 - Nighttime

Project No. **12638490**
Revision No. **0**
Date. **06/12/2024**

FIGURE D.4

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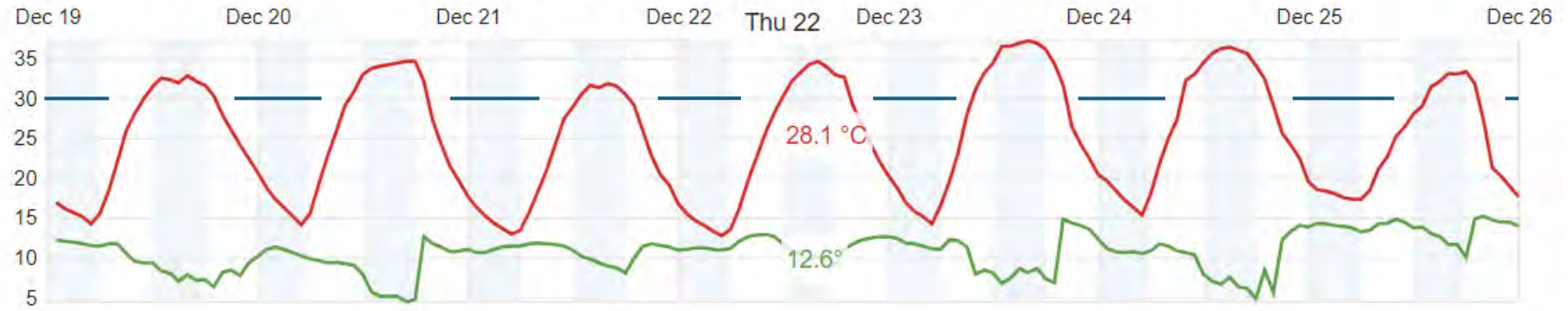
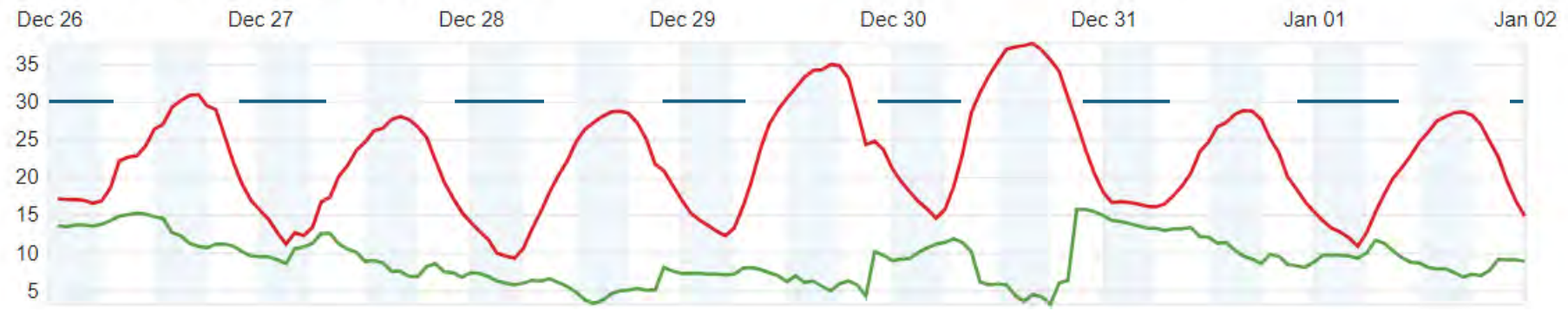
Appendix E

Historical temperature graphs

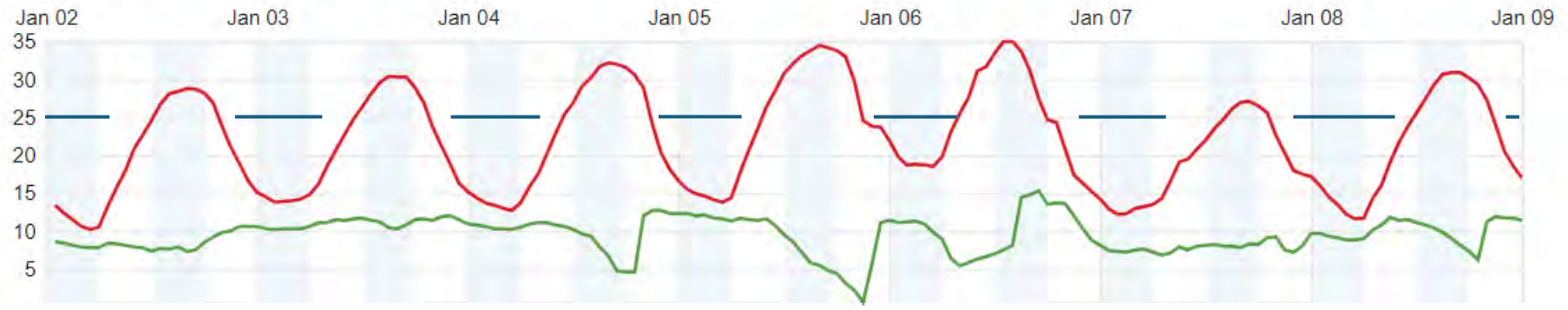
December 19, 2022 - December 25, 2022



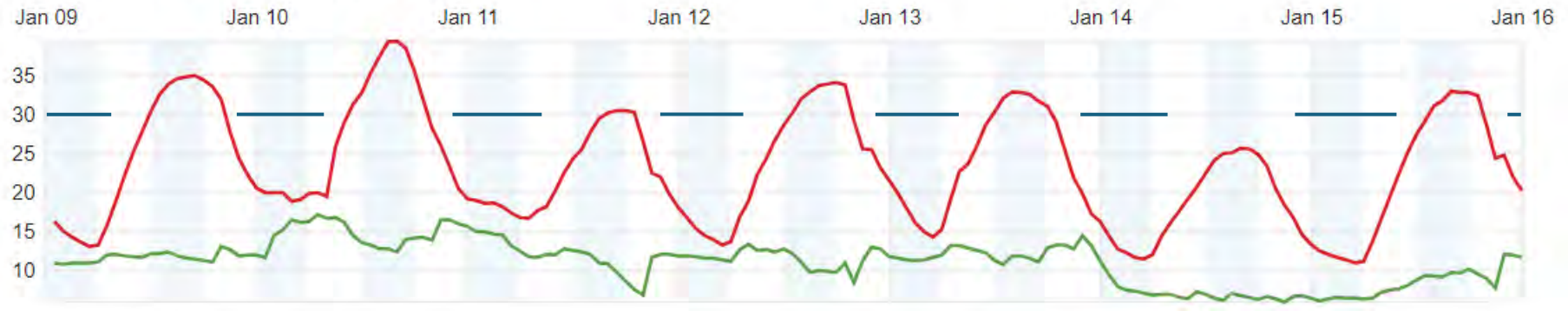
December 26, 2022 - January 1, 2023



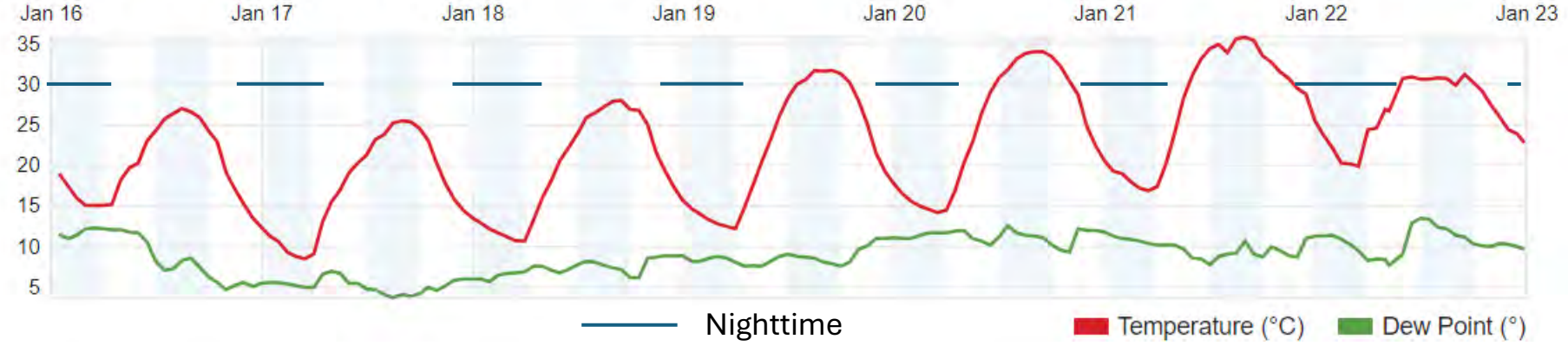
January 2, 2023 - January 8, 2023



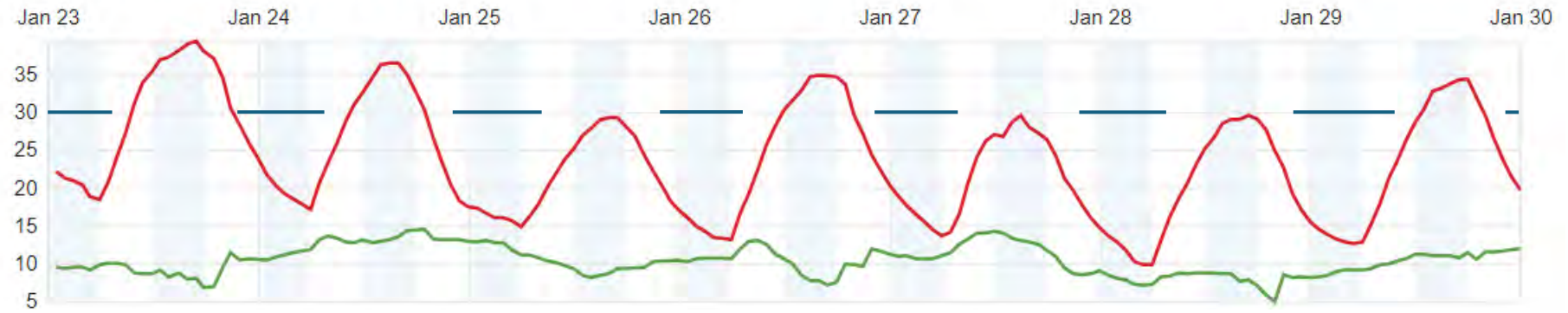
January 9, 2023 - January 15, 2023



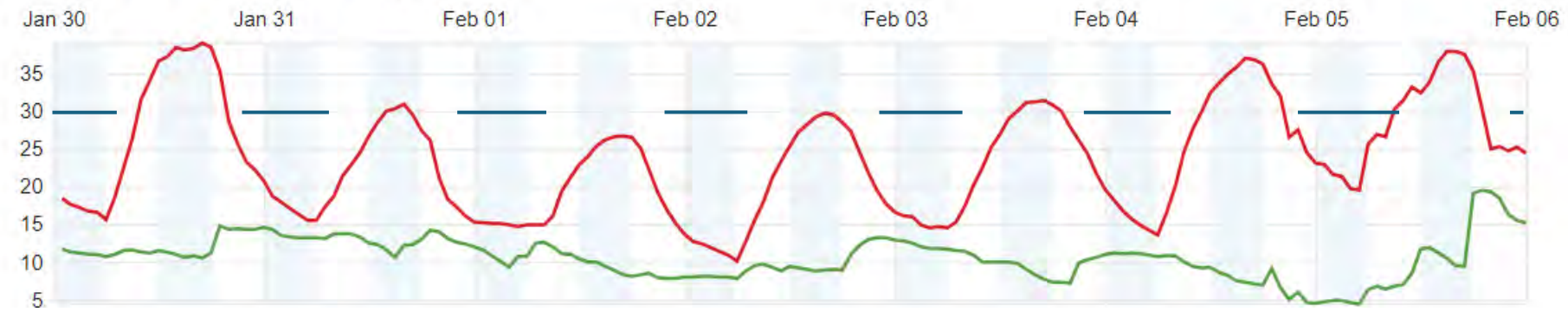
January 16, 2023 - January 22, 2023



January 23, 2023 - January 29, 2023



January 30, 2023 - February 5, 2023



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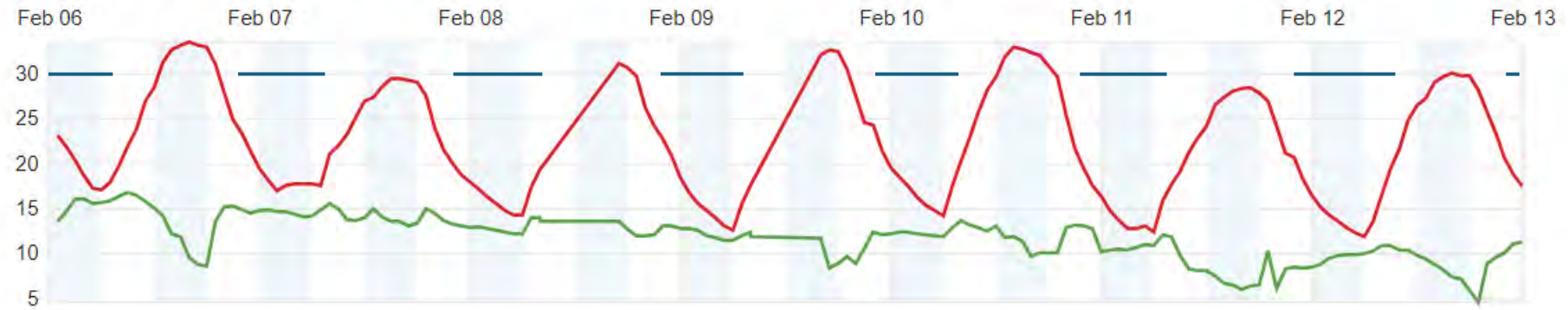

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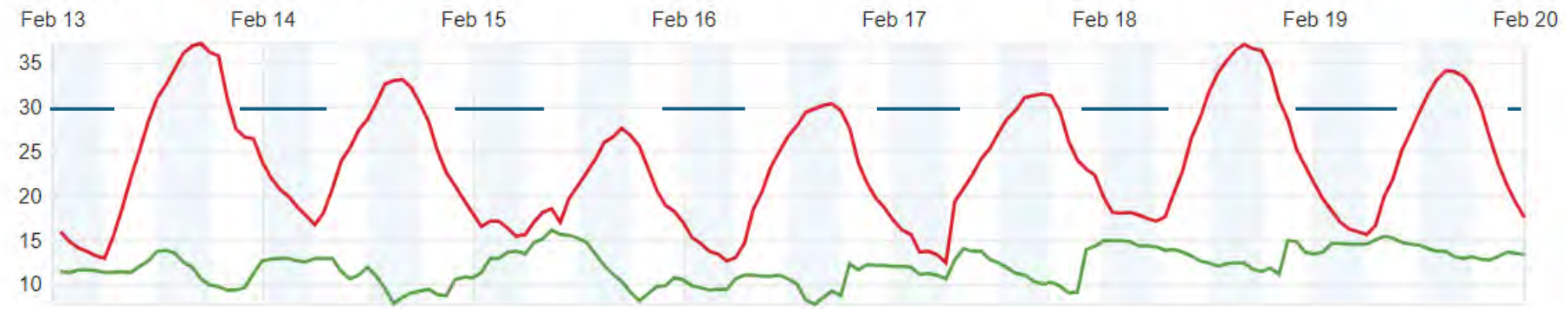

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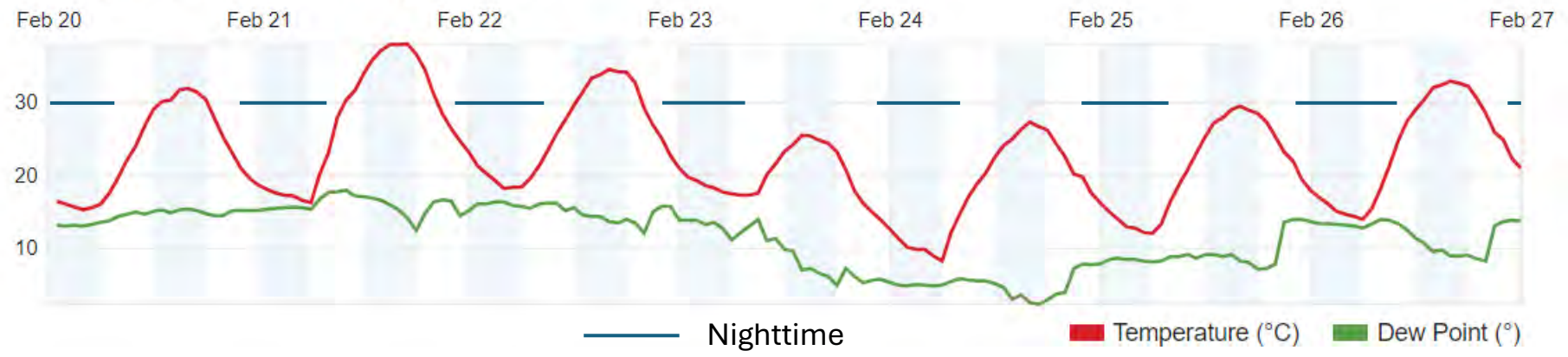

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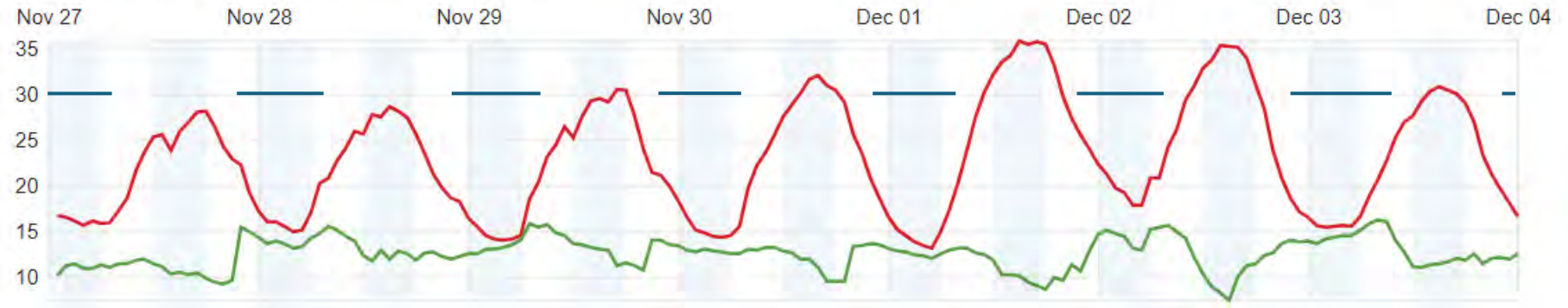

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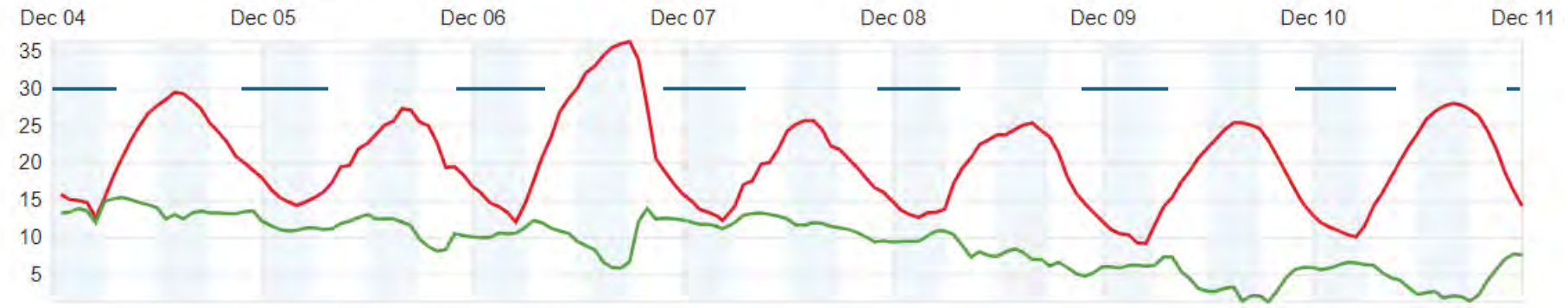

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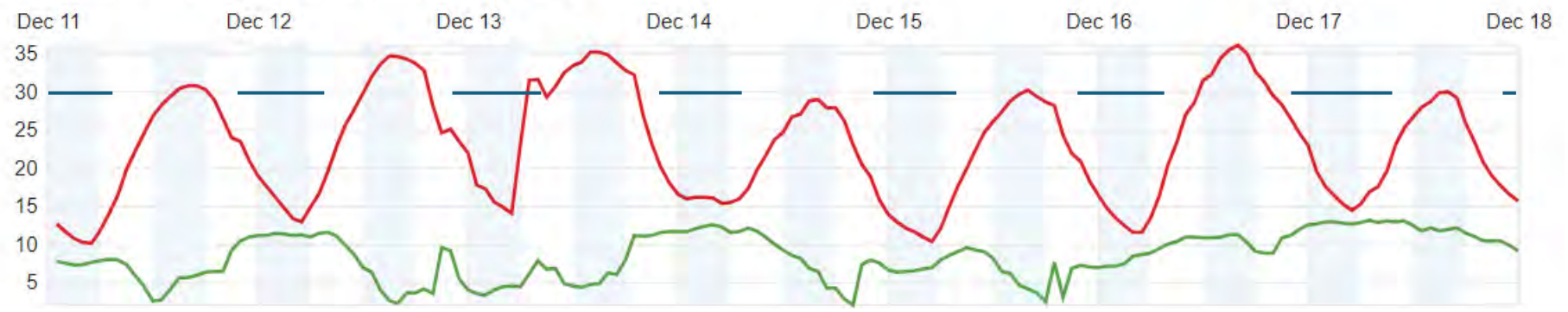

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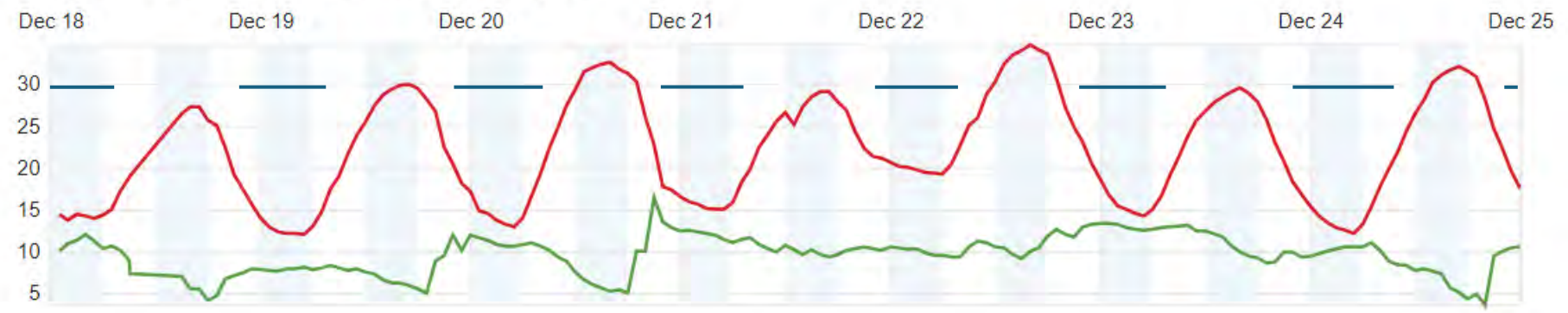

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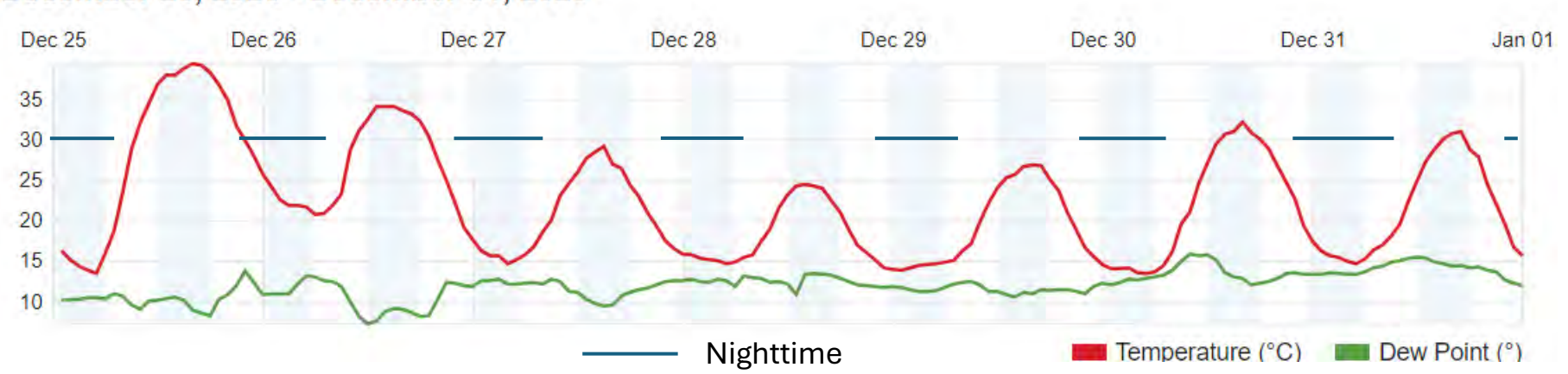

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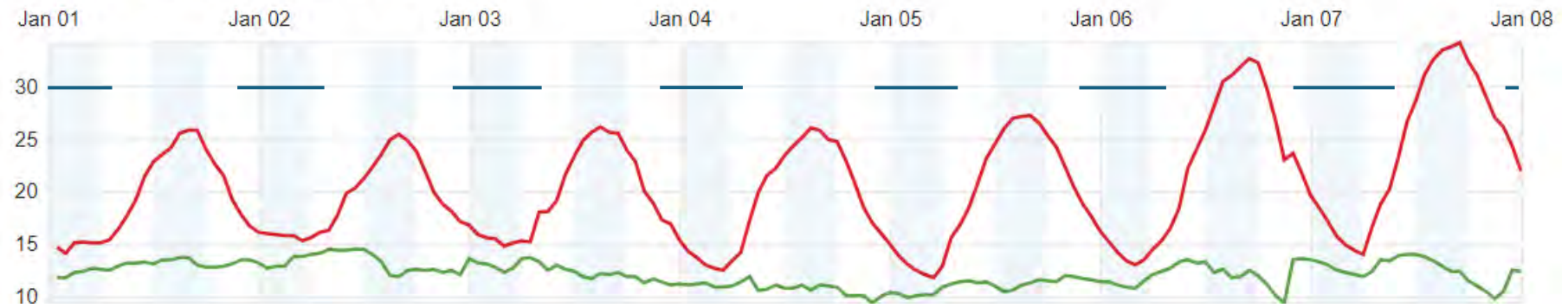

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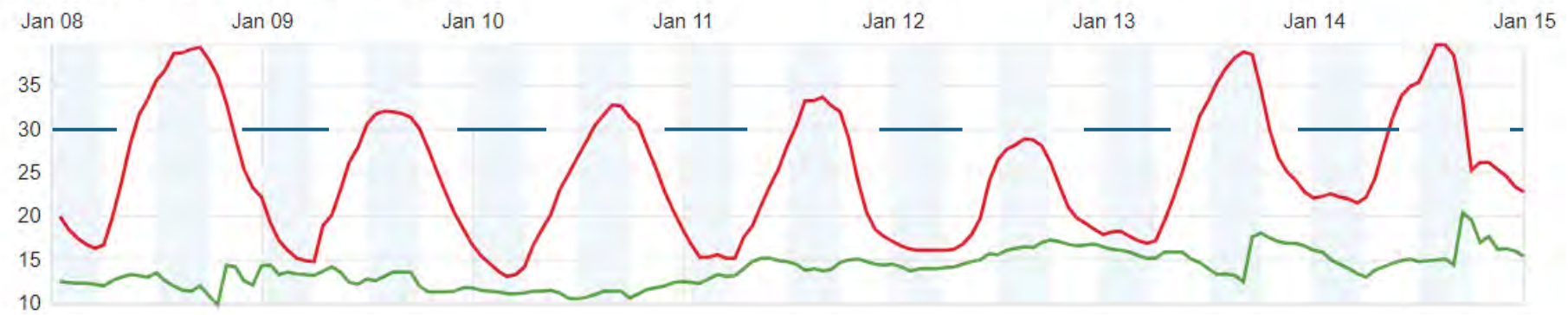

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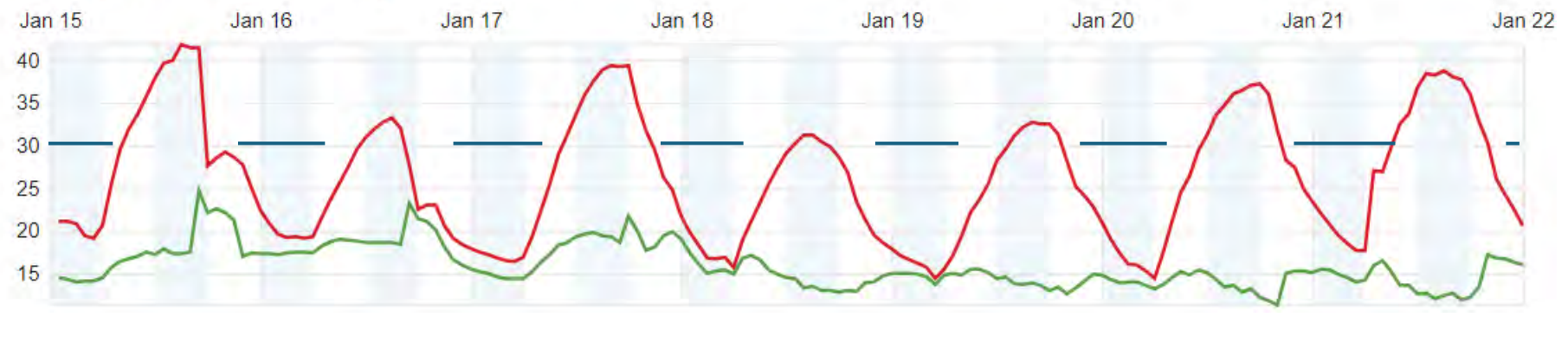

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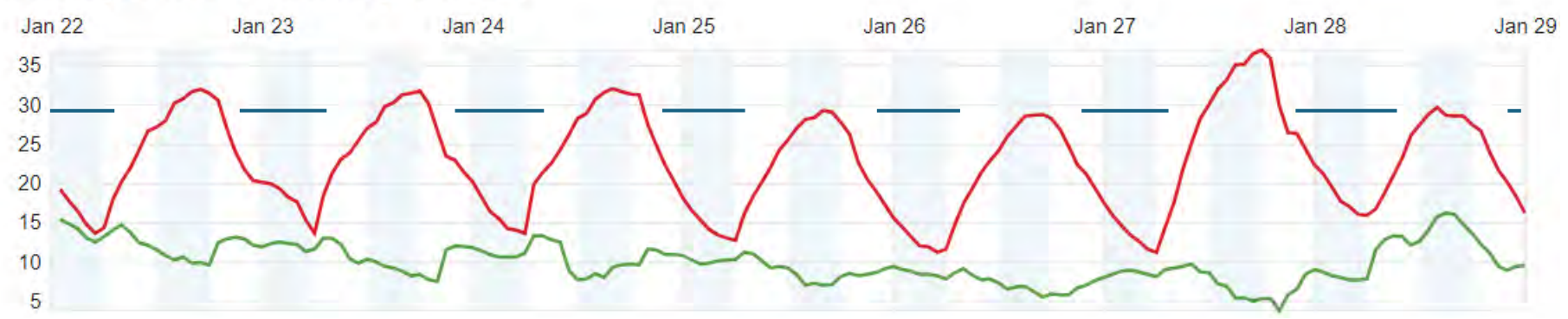

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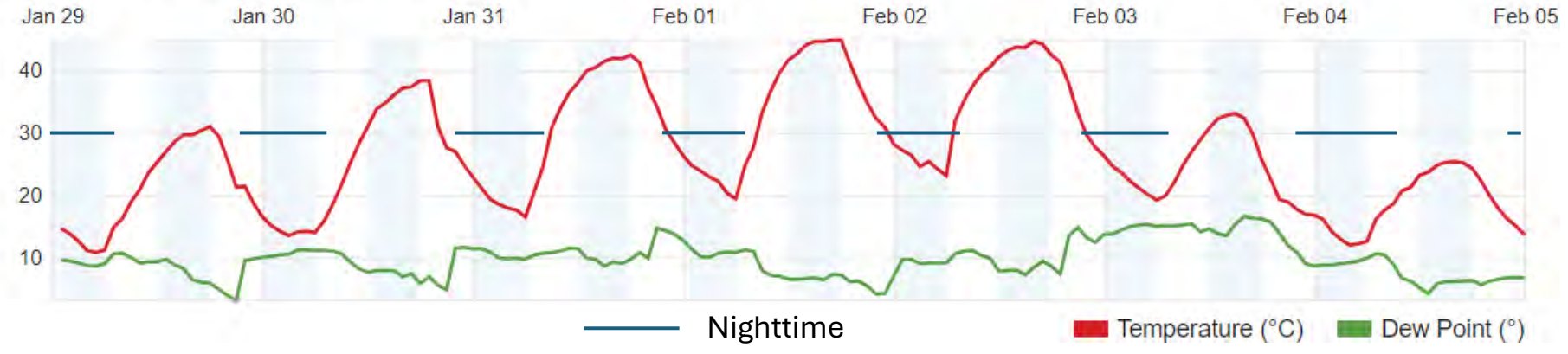

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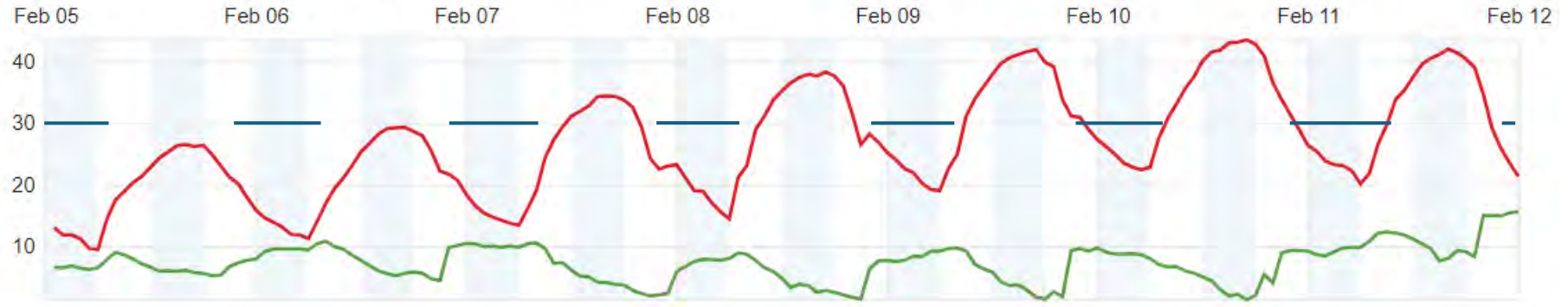

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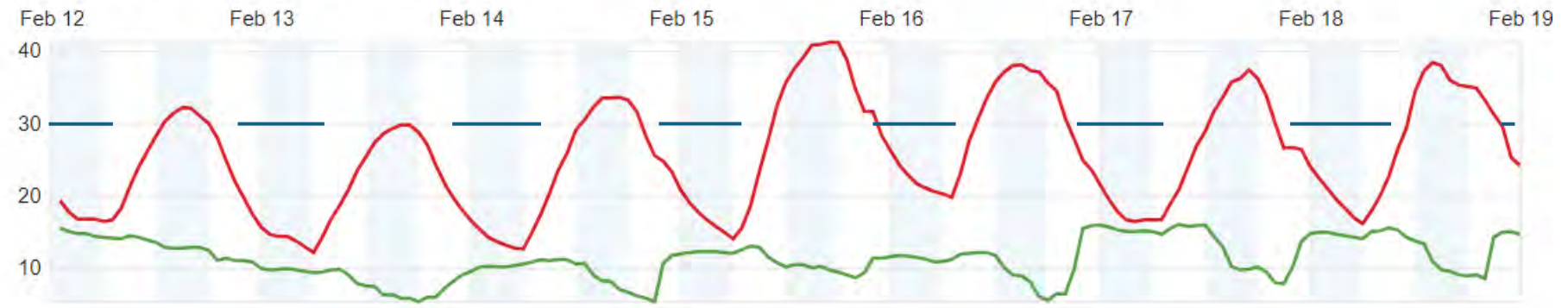

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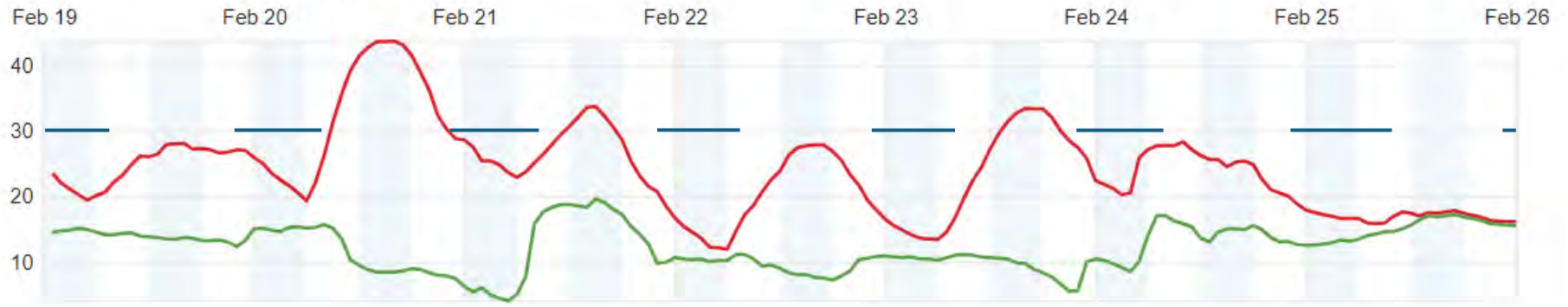

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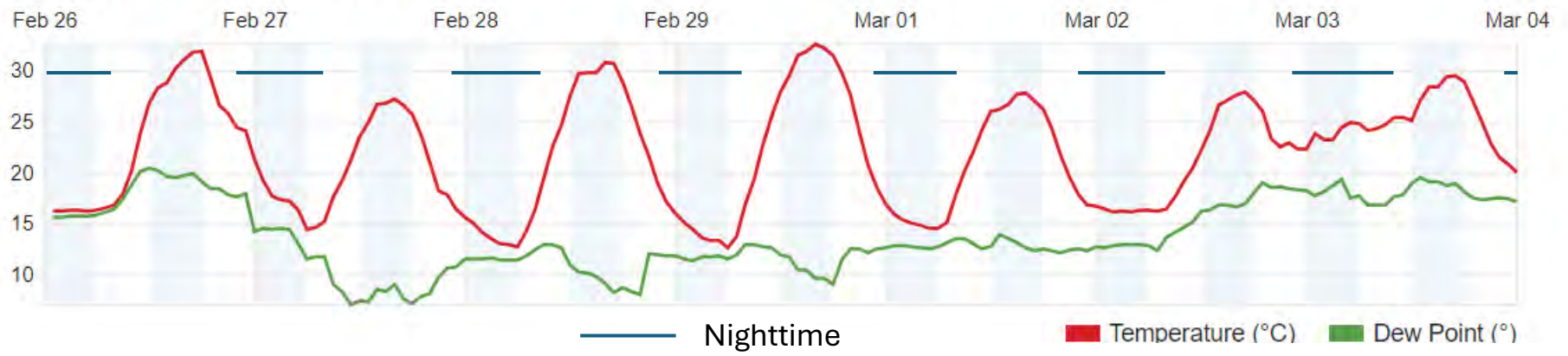



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Appendix H

Artistic Impressions



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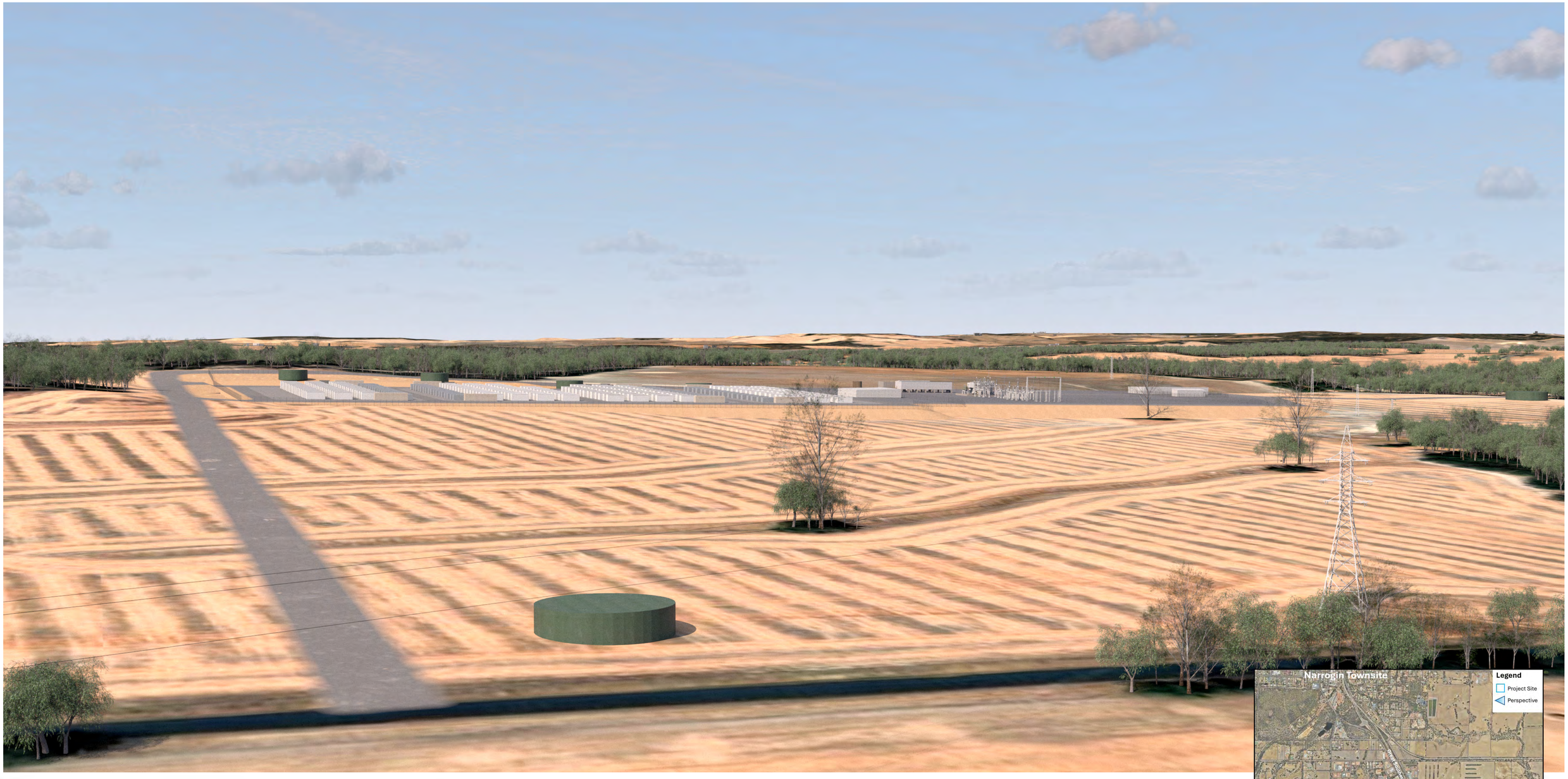
Artistic Impression #2:
From Great Southern Hwy, Facing East



South Energy

Artistic Impression #1:
Narrogin Townsite, Facing northwest



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Artistic Impression #3:
From behind Narrogin Valley Road, Facing southwest



South Energy

Artistic Impression #4:
Facing Southwest

Appendix I

Certificates of Title

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1702	**85**

RECORD OF CERTIFICATE OF TITLE

UNDER THE TRANSFER OF LAND ACT 1893

The person described in the first schedule is the registered proprietor of an estate in fee simple in the land described below subject to the reservations, conditions and depth limit contained in the original grant (if a grant issued) and to the limitations, interests, encumbrances and notifications shown in the second schedule.

BGRoberts

REGISTRAR OF TITLES

REGISTRAR OF TITLES WESTERN AUSTRALIA

LAND DESCRIPTION:

LOT 9 ON DIAGRAM 67821

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

ROY KENNETH JOHN MCLEOD OF 76 NARROGIN VALLEY ROAD NARROGIN VALLEY WA 6312
(T O633796) REGISTERED 8/2/2021

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. C768618 EASEMENT TO THE STATE ENERGY COMMISSION OF WESTERN AUSTRALIA. SEE SKETCH ON VOL 1702 FOL 085. REGISTERED 11/5/1984.
2. N461592 EASEMENT BENEFIT FOR WATER PIPE PURPOSES. SEE SKETCH ON DEPOSITED PLAN 409154. REGISTERED 18/10/2016.
3. O633797 MORTGAGE TO NATIONAL AUSTRALIA BANK LTD REGISTERED 8/2/2021.
4. P808481 CAVEAT BY NARROGIN PTY LTD AS TO PORTION ONLY LODGED 1/12/2023.

Warning: A current search of the sketch of the land should be obtained where detail of position, dimensions or area of the lot is required. Lot as described in the land description may be a lot or location.

----------END OF CERTIFICATE OF TITLE----------

STATEMENTS:

The statements set out below are not intended to be nor should they be relied on as substitutes for inspection of the land and the relevant documents or for local government, legal, surveying or other professional advice.

SKETCH OF LAND:	1702-85 (9/D67821)
PREVIOUS TITLE:	1653-150
PROPERTY STREET ADDRESS:	76 NARROGIN VALLEY RD, NARROGIN VALLEY.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF NARROGIN

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Application D88600 WESTERN AUSTRALIA VOL. 1702 FOL. 085

Volume 1653 Folio 150

CERTIFICATE OF TITLE

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

I certify that the person described in the First Schedule hereto is the registered proprietor of the undermentioned estate in the undermentioned land subject to the easements and encumbrances shown in the Second Schedule hereto.

N. J. Smyth

REGISTRAR OF TITLES

Dated 14th August, 1985

ESTATE AND LAND REFERRED TO

Estate in fee simple in portion of Williams Location 5251 and being Lot 9 the subject of Diagram 67821, delineated and coloured green on the map in the Third Schedule hereto, limited however to the natural surface and therefrom to a depth of 60.96 metres.

FIRST SCHEDULE (continued overleaf)

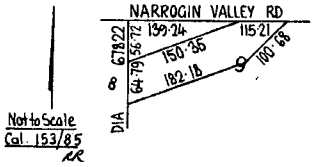
Murray Bevan Nottle, Farmer and Linda Michelle Nottle, Married Woman, both of Post Office Box 483, Narrogin, as joint tenants.

SECOND SCHEDULE (continued overleaf)

1. ~~MORTGAGE G166271 to The Commercial Savings Bank of Australia Ltd. Registered 29.6.81 at 9.15 o'c.~~ Discharged D777079 9.6.88

2. ~~MORTGAGE G222612 to The Commercial Bank of Australia Ltd. Registered 25.9.81 at 9.17 o'c.~~ Discharged F194590 20.5.93

3. ~~MORTGAGE G546079 to Westpac Banking Corporation. Registered 10.5.83 at 9.00 o'c.~~ Discharged D777078 9.6.88



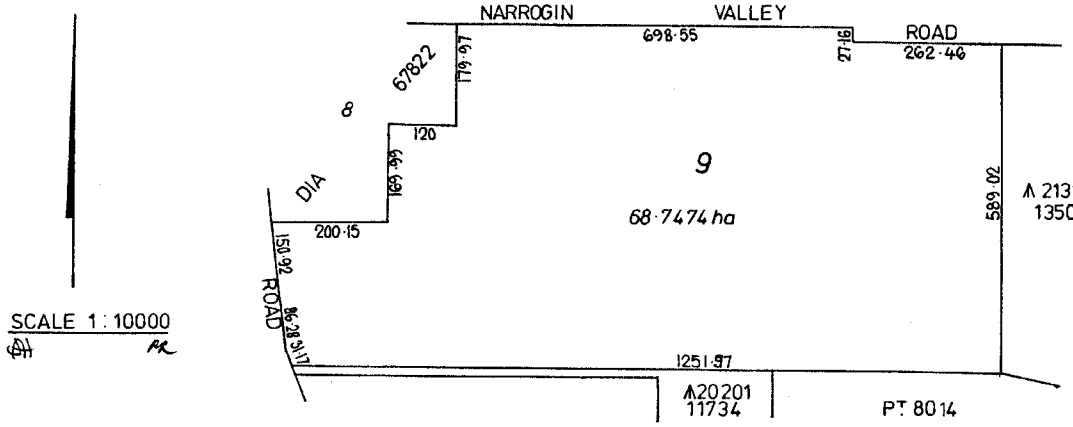
4. TRANSFER C768618. The right to enter upon the portion of the within land coloured blue on the map in the margin for the purpose of constructing, maintaining and using electricity equipment in, upon and across the said portion of the within land as set out in the said Transfer is granted to The State Energy Commission of Western Australia. Registered 11.5.84 at 2.11 o'c.

5. ~~MORTGAGE G928532 to Commonwealth Development Bank of Australia. Registered 28.12.84 at 9.11 o'c.~~ Discharged D881428 22.9.88 Checker 14

N. J. Smyth

REGISTRAR OF TITLES

THIRD SCHEDULE



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LT. 37

FIRST SCHEDULE (continued)

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REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	REGISTERED	TIME	SEAL	INITIALS

SECOND SCHEDULE (continued)

NOTE: RULING THROUGH AND SEALING WITH THE OFFICE SEAL INDICATES THAT AN ENTRY NO LONGER HAS EFFECT. ENTRIES NOT RULED THROUGH MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

INSTRUMENT NATURE	INSTRUMENT NUMBER	PARTICULARS	REGISTERED	TIME	SEAL	INITIALS	CANCELLATION	NUMBER	REGISTERED OR LODGED	SEAL	INITIALS
Mortgage	F194591	to Westpac Banking Corporation.	20.5.93	9.29			Discharged	F366670	16.11.93		
Mortgage	F366671	to R&I Bank of Western Australia Ltd.	16.11.93	8.00							

CERTIFICATE OF TITLE VOL. 1702 085

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Appendix J

Ecological site assessment

Narrogin BESS Feasibility Study – Ecological site assessment.

Narrogin BESS Development Pty Ltd

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DOCUMENT TRACKING

Project Name	Narrogin BESS Feasibility Study – Ecological site assessment
Project Number	23PER6905
Project Manager	**Jeff Cargill**
Prepared by	**Maitland Ely**
Reviewed by	Jeff Cargill
Approved by	Jeff Cargill
Status	Final
Version Number	V3
Last saved on	7 August 2024

This report should be cited as 'Eco Logical Australia 2024. Narrogin BESS Feasibility Study – Ecological site assessment. Prepared for South Energy.

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from South Energy

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Template 2.8.1

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Abbreviations

Abbreviation	Description
ATA	Atlas of Living Australia
AVW	Avon Wheatbelt
AVW02	Katanning Subregion
DBH	Diameter at Breast Height
BAM Act	State Biosecurity and Agriculture Management Act 2007
BC Act	State *Biodiversity Conservation Act 2016*
BoM	Bureau of Meteorology
DAWE	Department of Agriculture, Water and the Environment
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DBCA	Department of Biodiversity, Conservation and Attractions
DPaW	Department of Parks and Wildlife
DPIRD	Department of Primary Industries and Regional Development
DEWHA	Department of the Environment, Water, Heritage and the Arts
DWER	Department of Water and Environmental Regulation
ELA	Eco Logical Australia
EN	Endangered
EPA	Environmental Protection Authority
EP Act	State *Environmental Protection Act 1986*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
ESA	Environmentally Sensitive Area
IBRA	Interim Biogeographic Regionalisation for Australia
mm	Millilitres
MNES	Matter of National Environmental Significance
OS	Other specially protected species
PDWSA	Public Drinking Water Source Area
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
SZRD	Southern Zone of Rejuvenated Drainage
TEC	Threatened Ecological Community
VU	Vulnerable
WAH	Western Australian Herbarium
WAM	Western Australian Museum
WoNS	Weed of National Significance

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Executive Summary

South Energy, on behalf of Narrogin BESS Development Pty Ltd, is seeking a site assessment to identify environmental constraints associated with a potential solar farm location. The survey area includes mostly existing cleared areas (>95% of the total area), however some remnant vegetation (native trees over weeds) and plantation areas were also present. The Narrogin BESS survey area is 30.1 ha in area and is located between Booth St and Narrogin Valley Rd, approximately 4 km south of the Narrogin townsite.

A desktop assessment was undertaken to assess the potential presence of significant flora species and ecological communities listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the State *Biodiversity Conservation Act 2016* (BC Act) and by Department of Biodiversity, Conservation and Attractions (DBCA). The field survey was conducted on 16 November 2023 in accordance with the Environmental Protection Authority *Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment* (2016). Broad vegetation types were described from three relevés established across the survey area.

A total of 23 taxa from 9 families and 18 genera were recorded across the survey area. No Threatened species listed under the EPBC Act or the BC Act, or Priority listed species by DBCA were recorded within the survey area. Post survey, all conservation significant flora species identified during the desktop search were considered unlikely to occur within the survey area. Sixteen of the 23 flora species recorded were weed species, none of which are listed as WoNS or Declared Pests under the *State Biosecurity and Agriculture Management Act 2007* (BAM Act).

No intact native vegetation types were mapped within the survey area, with vegetated portions comprising either remnant native trees over weeds or plantation. Cleared areas covered 29.31 ha (97.37%) of the survey area. Following the field survey, no ecological communities listed as Threatened under the EPBC Act or the BC Act, or Priority by DBCA, were inferred to occur within the survey area.

A total of 14 vertebrate fauna species (two introduced) were recorded within the survey area, comprising 10 birds, three mammals and one reptile. Post survey, two conservation significant fauna species identified during the desktop search were considered as having potential to occur within the survey area, namely Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. The remaining species were considered unlikely to occur or does not occur. Two introduced (feral) fauna species were recorded within the survey area, namely European Rabbit, and Red Fox, both listed as a Declared Pest s22(2) under the BAM Act.

No primary or secondary signs of Carnaby's Cockatoo or Forest Red-tailed Black Cockatoo were recorded during the field survey. The survey area comprises 0.12 ha of Moderate, 0.005 ha of Low and 0.67 ha of Nil foraging value for Carnaby's Cockatoo, and 0.75 ha of Moderate and 0.04 ha of Low foraging value for the Forest Red-tailed Black Cockatoo. A total of 5 potentially suitable breeding trees were recorded within the survey area. Recorded tree species included Marri (*Corymbia calophylla*), Wandoo (*Eucalyptus wandoo* subsp. *wandoo*) and River red gum (*Eucalyptus camaldulensis*). All five trees had a nest and/or hollow rank of four (i.e., tree lacking suitable hollows or broken branches that might have large hollows, a tree with mainly intact branches and a spreading crown).

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1. Introduction

1.1. Project background

Eco Logical Australia (ELA) was engaged by South Energy, on behalf of Narrogin BESS Development Pty Ltd, to undertake a Reconnaissance Flora and Vegetation survey, Basic fauna survey and Targeted black cockatoo habitat assessment near the town of Narrogin, Western Australia.

South Energy is seeking a site assessment to identify environmental constraints associated with a potential solar farm location. The survey area includes mostly existing cleared areas, however some remnant vegetation and/or plantation areas may also be present. The Narrogin BESS survey area is 30.1 ha in area and is located between Booth St and Narrogin Valley Rd, approximately 4 km south of the Narrogin townsite (Figure 1).

This technical report summarises results of the desktop assessment and field survey and defines the flora, vegetation, fauna and black cockatoo habitat of the survey area, as well as significance of the survey area in terms of conservation values.

1.2. Scope of works

The purpose of this project was to provide an assessment of environmental values of the survey area to identify environmental constraints associated with a potential solar farm location. This technical report addresses the items in the Scope of Works listed below:

- Undertaking an initial desktop assessment to determine environmental values and conservation significant flora, habitat, vegetation or other environmental features relating to the survey area;
- Undertaking a field survey to assess values pertaining to flora, vegetation, fauna and black cockatoo habitat;
- Preparation of a technical flora, vegetation, fauna and black cockatoo habitat survey report for the survey area; and
- Providing all spatial/mapping data collected during the survey.

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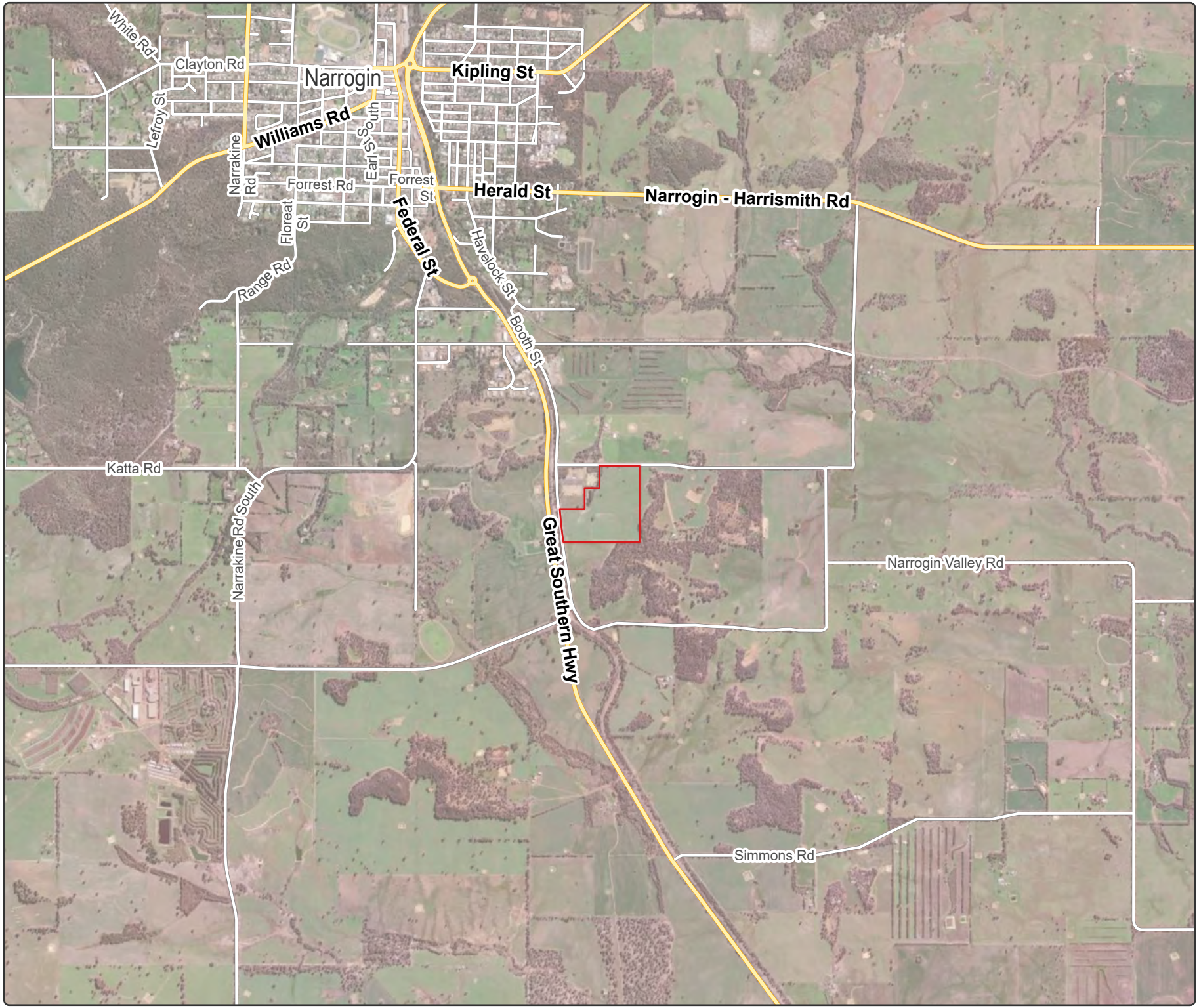

Legend

Survey area



Figure 1: Project overview

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Kilometres

Datum/Projection:
GDA 1994 MGA Zone 50

23PER6905-JP Date: 21/02/2024

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2. Environmental setting

2.1. Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) currently classifies 89 bioregions across Australia, based on a range of biotic and abiotic factors such as climate, vegetation, fauna, geology and landform (Thackway and Cresswell 1995; Department of Agriculture, Water and the Environment [DAWE] 2012). These bioregions are currently further refined into 419 sub-regions representing more localised and homogenous geomorphological units in each bioregion (DAWE 2012). IBRA divides Western Australia into 26 biogeographic regions and 53 subregions based on dominant landscape characteristics of climate, lithology, geology, landform and vegetation.

The survey area is located in the Avon Wheatbelt (AVW), and more specifically within the Katanning Subregion (AVW02). Vegetation within this subregion is described as including 'woodland of Wandoo [*Eucalyptus wandoo*], York Gum [*E. loxophleba*] and Salmon Gum [*E. salmonophloia*] with Jam [*Acacia acuminata*] and Casuarina [*Casuarinaceae* spp.], with the Eucalyptus woodlands being of high floristic diversity (Beecham 2001).

2.2. Climate

The Avon Botanical District is characterised by a dry, warm Mediterranean climate with cool winters and hot, dry summers, with rain falling in winter (Beard 1990).

Based on climate data from the nearby Bureau of Meteorology (BoM) Narrogin weather station (approximately 5 km away; station number 010614; rainfall data 1891 to 2023), the survey area receives an annual average rainfall of 488.6 mm (BoM 2024a; Figure 2). Most of the rainfall occurs during the months of May, June, July and August. Mean maximum air temperatures at the Narrogin weather station range from 14.7°C in July to 31.1°C in January, and mean minimum temperatures range from 5.2°C in August to 14.4°C in February.

In the 12 months preceding the field survey, Narrogin weather station received a total of 361.2 mm of rainfall which is below the long-term average for the area (488.6 mm). A total of 102.8 mm was recorded in the three months prior to the November field survey, which is lower than the long-term average for the same period (144.6 mm; Figure 2).

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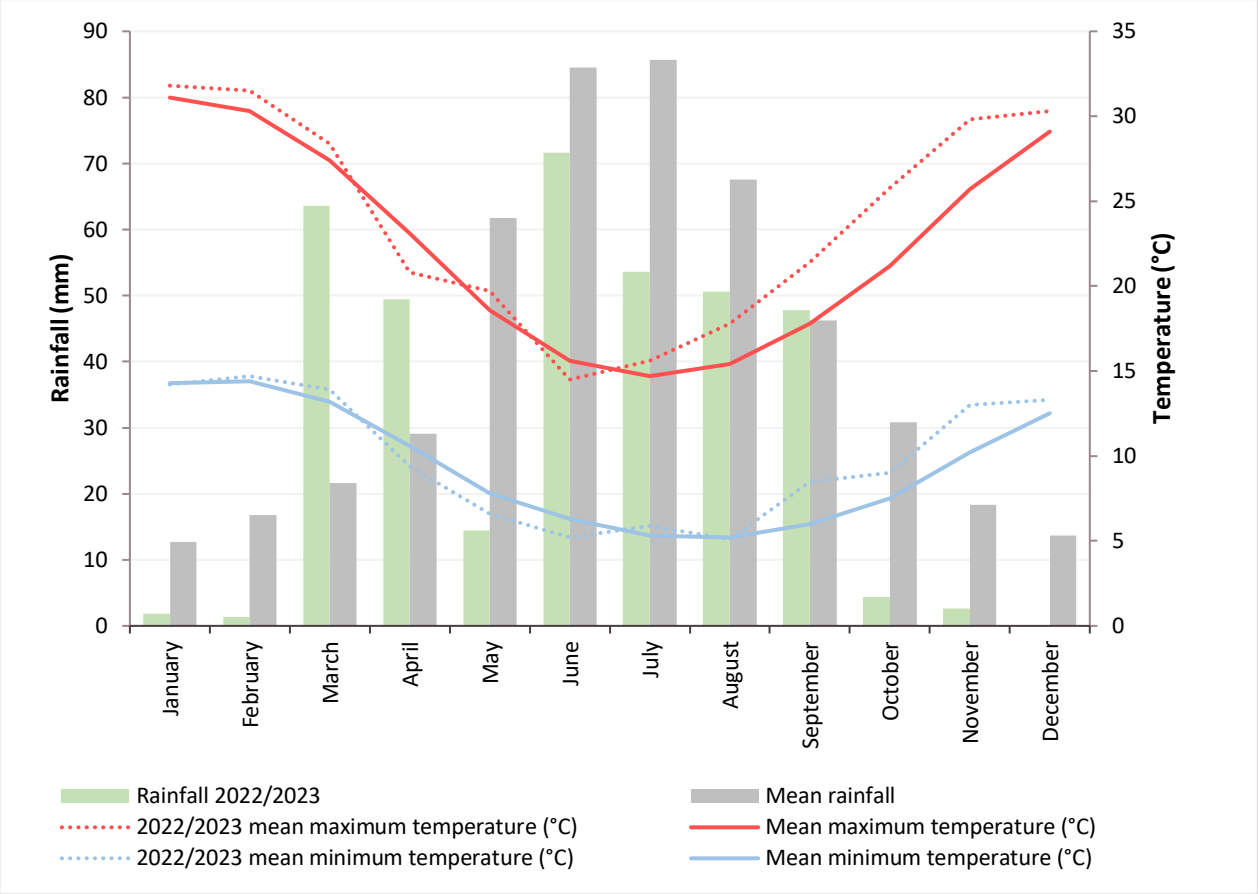


Figure 2: Climate data for the Narrogin BESS survey area

Short term (2022 – 2023) and long term (1913 – 2023) average rainfall data, short term (2022-2023) and long term (1913-2023) average minimum and maximum temperature data for Narrogin weather station (station number #010614).

2.3. Geology, landforms and soils

Soil-landscape mapping prepared by the Department of Primary Industries and Regional Development (DPIRD), provides an inventory and condition survey of lands at a 1: 250,000 scale (DPIRD 2022). The survey area is situated within the Southern Zone of Rejuvenated Drainage (SZRD). The SZRD generally comprises an erosional surface of gently undulating rises to low hills with continuous stream channels that flow in most years. Colluvial processes are active with soils formed in colluvium or in-situ from weathered rock (Sawkins, 2010). The SZRD has been divided into landscape systems and subsystems. Within the SZRD, the survey area is situated on soils of the Dellyanine Landsystem (Figure 3). The Dellyanine Landsystem consists of low hills and rises with grey deep sandy duplex soils and common granite outcrops flanked by red loamy soil, gritty brown deep sands and sandy duplex soils.

2.4. Regional vegetation

Vegetation type and extent have been mapped at a regional scale by Beard (1981) who categorised vegetation into broad vegetation associations. Based on this mapping at a scale of 1:1,000,000, the DPIRD has compiled a list of vegetation extent and types across Western Australia (Shepherd *et al*. 2002).

Two vegetation associations occur across the survey area; Narrogin_1023 and Narrogin_947 (DPIRD 2019a; Table 1, Figure 4). The Narrogin_1023 vegetation associations has less than 30% of its pre-European extent remaining within the Katanning subregion (DBCA 2019).

Table 1: Beard's (1981) vegetation associations of the survey area

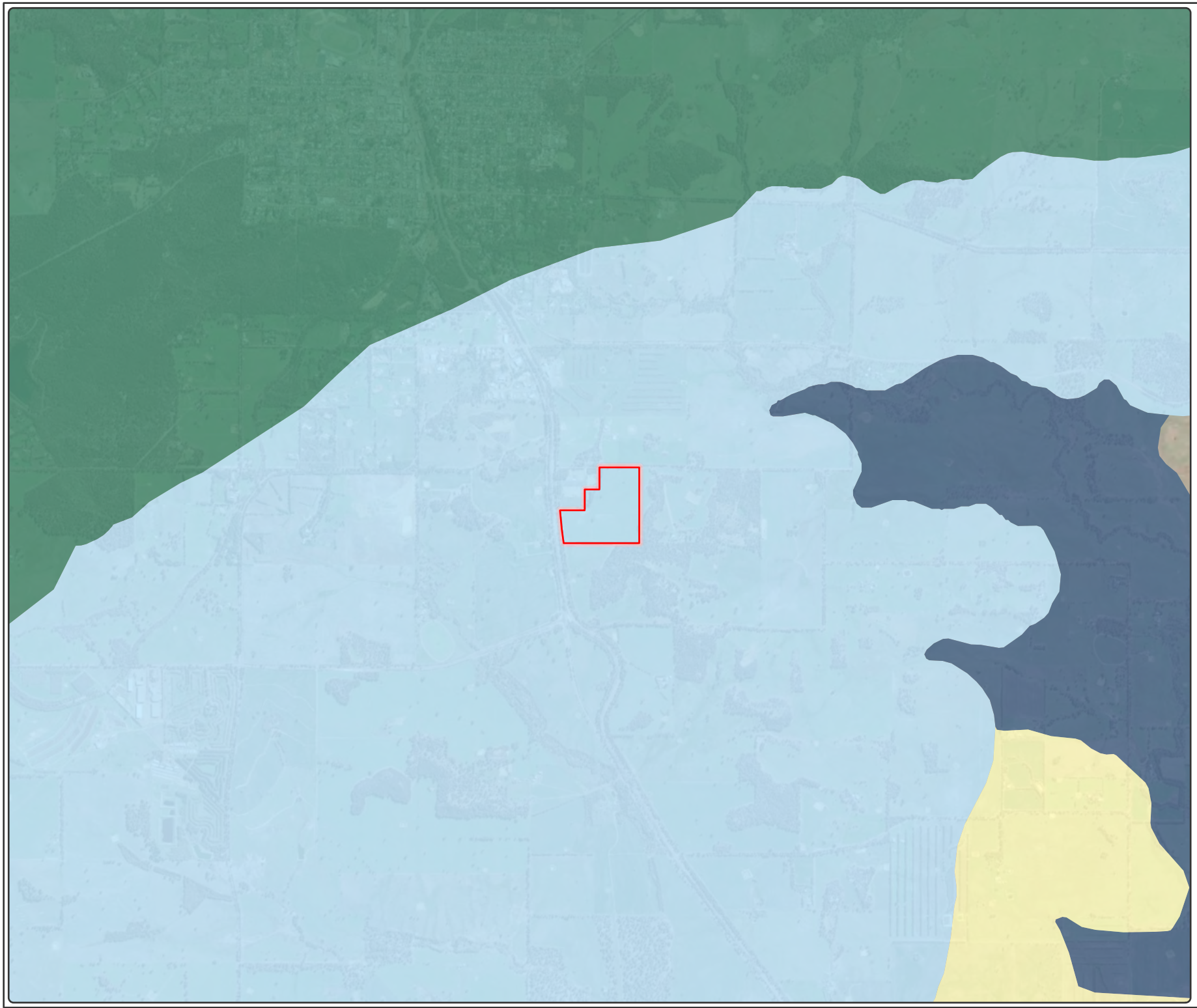
Vegetation association	Description	Pre-European extent in IBRA subregion (ha)	Current extent in IBRA subregion (ha)	% Remaining in IBRA subregion
Narrogin_1023	Medium woodland; York gum, wandoo and salmon gum.	188,722	31,301	16.59
Narrogin_947	Medium woodland; powderbark & mallet	19,239	7,714	40.10

2.5. Hydrology

The survey area is located in the upper portion of the Narrogin Brook Catchment. No minor or major tributaries occur within the survey area. (DWER 2018a, b). The survey area does not lie within a Public Drinking Water Source Area (DWER 2022). There are no Groundwater Dependent Ecosystems or Inflow Dependent Ecosystems within or in the direct vicinity of the survey area, with such features restricted to defined creeklines throughout the local area (BoM 2024b).

2.6. Areas of conservation significance

Environmentally Sensitive Areas (ESAs) are defined in the *Environmental Protection (Environmentally Sensitive Areas) Notice 2005* under s51B of the *Environmental Protection Act 1986* (EP Act). ESAs include areas declared as World Heritage, included on the Register of the National Estate, defined wetlands, Bush Forever sites, vegetation containing rare (Threatened) flora and/or TECs. Seven ESAs occur within 5 km of the survey area (DWER 2024). The nearest DBCA managed lands are Unnamed WA20985 Nature Reserve (approx. 5 km SSW) and Unnamed Parkland R31732 (approx. 5 km NW; DBCA 2022a; Figure 5). There are no nationally or internationally important wetlands within 20 km of the survey area (DBCA 2018).



Legend

Survey area

Land systems

- Arthur River System
- Dellyanine System
- Narrogin System
- Whinbin System

Figure 3: Land system mapping

0 0.25 0.5 1

Kilometres

Datum/Projection:
GDA 1994 MGA Zone 50

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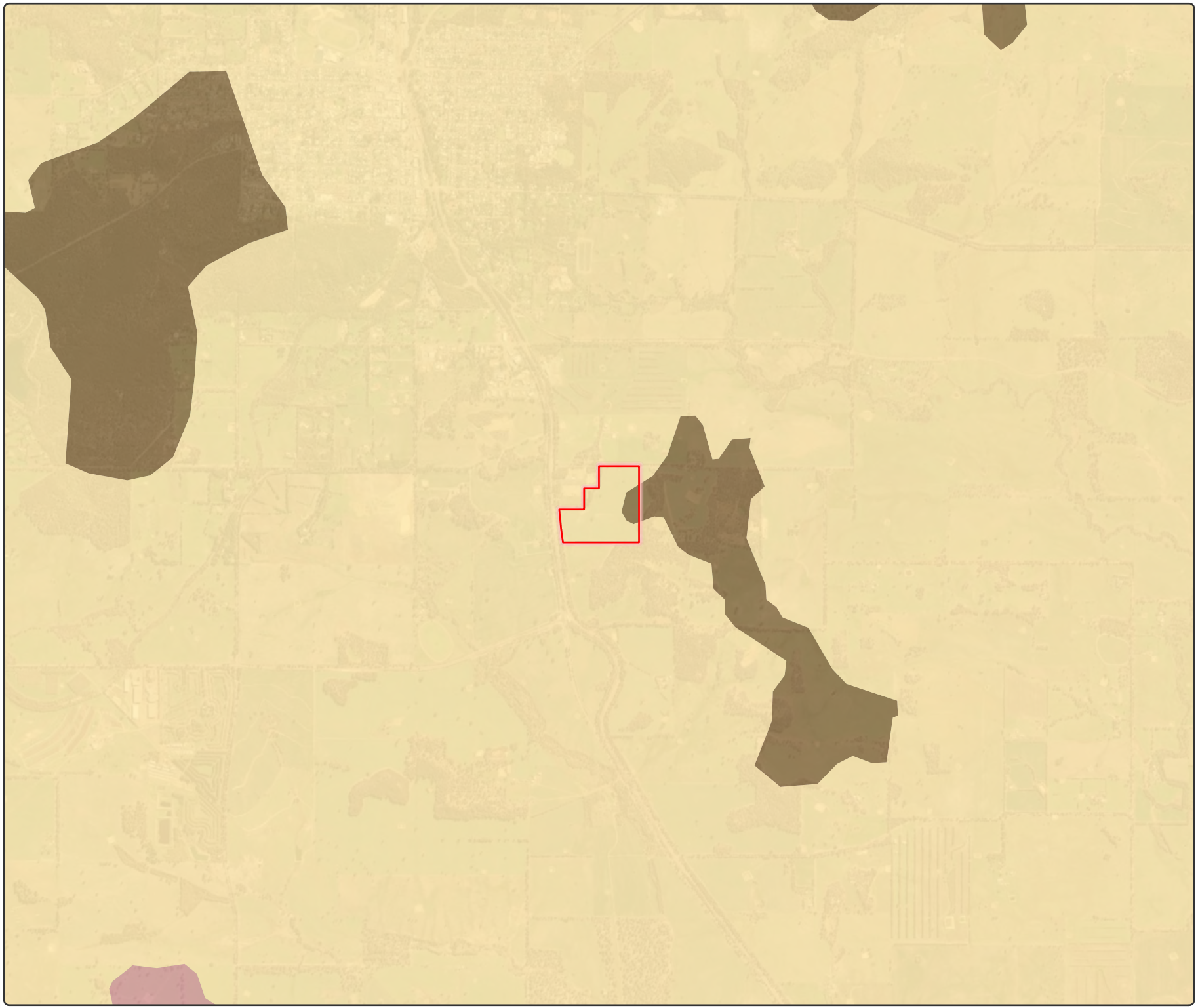
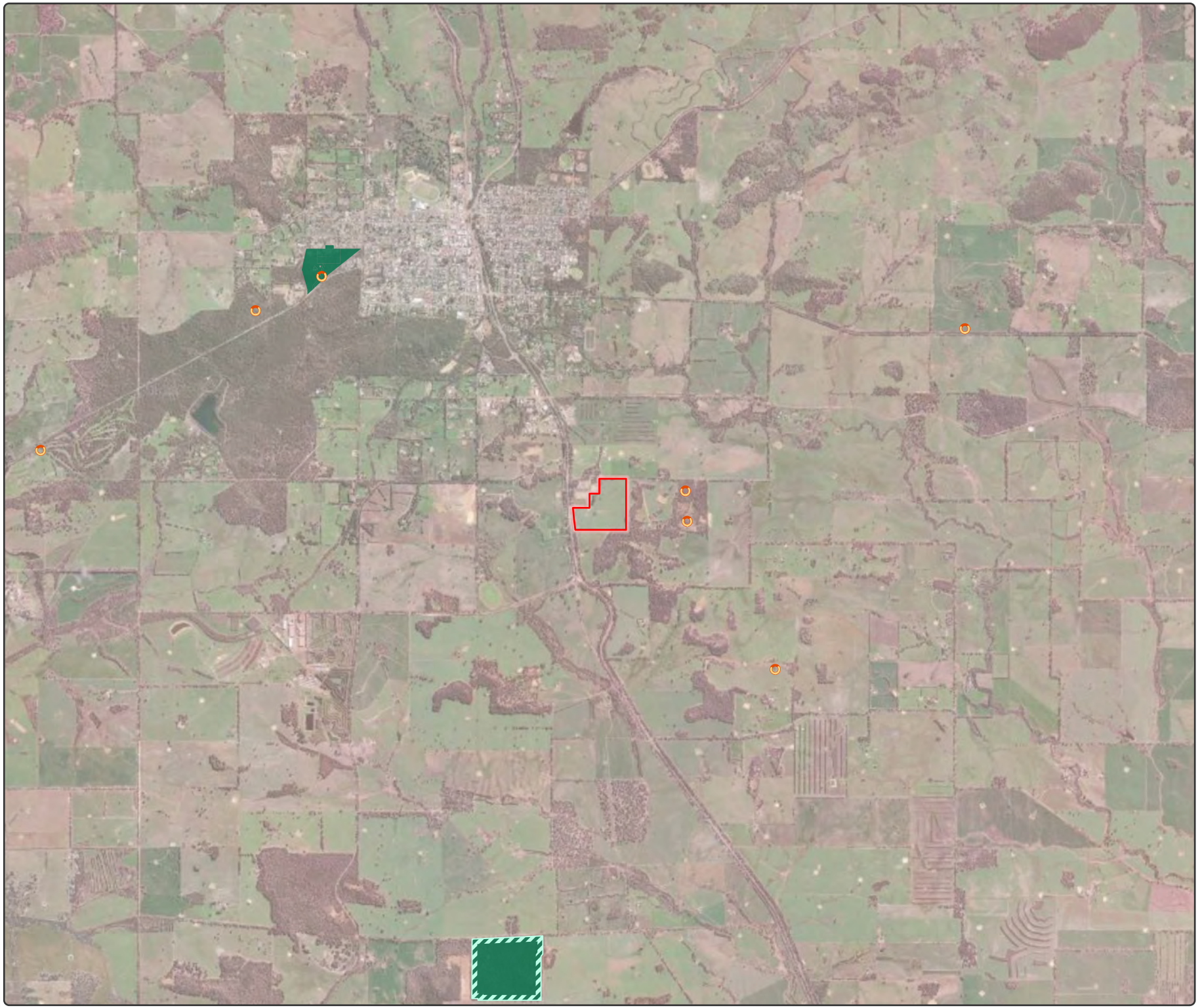


Figure 4: Pre-European vegetation



Legend

- Survey area
- Environmentally Sensitive Area (ESA) (DWER 2020b)
- DBCA Legislated Lands and Waters (DBCA 2021a)
- Reserves (DWER)

Figure 5: Environmentally Sensitive Areas

0 0.5 1 2

Kilometres

Datum/Projection:
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3. Methodology

3.1. Desktop review

An initial desktop assessment prior to the field survey was undertaken to determine environmental values and conservation significant flora, vegetation or other environmental features (such as riparian areas, wetlands) relating to the survey area.

3.1.1. Database searches

The following Commonwealth and State databases were searched for information relating to conservation significant flora, fauna and ecological communities in order to inform the field survey. Applied search buffers used are considered suitable based on flora and fauna expected to occur within the survey area (Table 2). Databases utilised were considered adequate given that the survey area itself is >95% cleared, with the remainder comprising either remnant trees over weeds or plantation.

Table 2: Database searches undertaken for the survey area

Database	Reference	Buffer (km)
Commonwealth EPBC Act PMST for Matters of National Environmental Significance (MNES), including any Threatened species and ecological communities listed under the EPBC Act.	DCCEEW 2024	10
Birdlife Australia black cockatoo roosting and nesting database	Birdlife 2023	10
Atlas of Living Australia database search	ALA 2024	10

Additionally, Commonwealth and State government spatial datasets for land system mapping, hydrology and regional vegetation mapping were reviewed, as described in sections 2.3, 2.4 and 2.5.

3.1.2. Likelihood of occurrence assessment

An assessment of the likelihood of potential conservation significant species (including Threatened and Priority flora and fauna species) and ecological communities being present within the survey area (where relevant) was carried out. The assessment is based on specific likelihood of occurrence criteria. The criteria include factors such as location of previous records in relation to the survey area, suitable landforms, soils and habitat that appear to be present based on the desktop review and aerial imagery.

Conservation codes, categories and criteria for flora and fauna protected under the EPBC Act and the BC Act are provided in Appendix A (DBCA 2020, DBCA 2022d, e). Criteria used for this assessment are presented in Appendix B.

3.2. Field survey

3.2.1. Survey team and timing

The field survey was conducted by Jeff Cargill (Principal Ecologist) on 16 November 2023. Field staff had valid scientific licences to conduct flora and vegetation surveys and to take Threatened and Priority flora in WA at the time of the survey (refer to Table 3). No licences were required for the Basic Fauna or Targeted black cockatoo survey.

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The survey timing was consistent with the Environmental Protection Authority (EPA) recommendations for undertaking Detailed and flora and vegetation survey in the South-west climatic region i.e. Spring (September to November; EPA 2016).

Table 3: Survey team

Staff	Licence
Dr Jeff Cargill	Flora scientific collection licence: FB62000026-2 Declared Rare Flora (DRF) permit: TFL 2223-0115

3.2.2. Reconnaissance flora and vegetation survey

A Reconnaissance flora and vegetation survey was undertaken across the survey area in accordance with EPA *Technical Guidance for flora and vegetation* (EPA 2016).

The survey involved the use of relevés (EPA 2016). A total of three relevés were established across the survey area (Figure 6). Dominant vegetation types were described, with respect to dominant species, structure and overall condition. The following data were recorded within each relevé:

- Site details (site name, number, observer/s, date and location);
- A photograph at each relevé;
- Broad vegetation type survey based on an assessment of the dominant flora species for the three traditional strata (upper, mid and ground) and mapping extent; and
- Vegetation condition in accordance with the Keighery (1994) vegetation condition scale, as provided in the EPA Technical Guidance (EPA 2016).

Where relevant, opportunistic sampling of species not recorded within the relevés was undertaken to supplement the existing list of species recorded from within the survey area. Additionally, any encountered Declared Pests listed under the *State Biosecurity and Agriculture Management Act 2007* (BAM Act) or Weeds of National Significance (WoNS) were recorded and mapped.

3.2.3. Flora identification and nomenclature

Flora species able to be identified in the field were recorded, and specimens of unfamiliar species were collected for later identification. All collections were assigned a unique collecting number. For conservation significant identified in the field, the following was recorded:

- A colour photograph;
- GPS location;
- Population size estimate;
- Location of population boundaries;
- Associated habitat/landscape element;
- Time and date observed;
- Observer details; and
- A voucher specimen suitable for use as a reference specimen (if appropriate to do so for conservation significant flora).

Flora specimen identification following the field survey was undertaken by ELA taxonomic specialists at the Western Australian Herbarium (WAH). Suitable material that meets WAH specimen lodgement requirements, such as flowering material and range extensions, will be submitted along with Threatened and Priority Report forms to DBCA, as required by conditions of collection licences issued under the BC Act.

Nomenclature used for the flora species within this report follows the WA Plant Census as available on FloraBase (WAH 1998-).

3.2.4. Basic fauna survey

The Basic fauna survey was conducted in accordance the EPA Technical Guidance: Terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020).

The Basic fauna survey involved personnel walking transects through the survey area, delineating and mapping fauna habitats and recording opportunistic sightings of fauna.

Fauna habitats were assessed for their ability to support and sustain populations of fauna, along with an assessment of the likelihood of occurrence of conservation significant fauna species. The habitat characteristics and fauna database records used in assessing likelihood of occurrence for fauna included:

- Vegetation type, structure and condition;
- Soil and landform type;
- Extent and connectivity of bushland;
- Fauna species habitat preferences;
- Proximity of conservation significant fauna records; and
- Signs of species presence.

Opportunistic recordings of fauna species were made at all times during the field survey. These included visual sightings of active fauna such as reptiles and birds; records of bird calls; and signs of species presence such as tracks, diggings, burrows, scats and any other signs of fauna activity. Nomenclature used for the vertebrate fauna species within this report follows the Western Australian Museum (WAM) Checklist of the Vertebrates of Western Australia (WAM 2024).



Legend

- Survey area
- GPS transect
- Relevé

Figure 6: Survey effort

0 25 50 100

Metres

Datum/Projection:
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3.2.5. Targeted black cockatoo habitat assessment

A Targeted black cockatoo habitat assessment was undertaken in accordance with the *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black cockatoo* (DAWE 2022). Consideration was given to *Survey guidelines for Australia's threatened birds* (DEWHA 2010).

Three species of black cockatoo occur in the south-west of Western Australia:

- Carnaby's Cockatoo (*Zanda latirostris*; listed as Endangered [EN] under the EPBC Act and the BC Act);
- Baudin's Cockatoo (*Zanda baudinii*; listed as EN under the EPBC Act and the BC Act); and
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*; listed as Vulnerable [VU] under the EPBC Act and the BC Act).

Broad scale maps are available for the modelled distribution of all three species of black cockatoo (DAWE 2022). The survey area occurs outside the modelled distribution of Baudin's Cockatoo and as such this species was not considered in the current report. The survey area occurs within the known breeding range of Carnaby's Cockatoo, and the easternmost modelled distribution of 'may occur' for Forest Red-tailed Black Cockatoo; as such both species were considered as having the potential to occur.

The Targeted survey involved personnel walking meandering transects through vegetated areas. A comprehensive assessment and mapping of black cockatoo habitat was undertaken. Black cockatoo habitat is conventionally separated into foraging, potential breeding, and potential night roosting categories, as defined in Appendix C. Field methodology for each category is described below.

3.2.5.1. Foraging habitat

Foraging habitat is defined for each species of black cockatoo in Appendix C. The foraging value (i.e. quality) of vegetation to black cockatoos depends upon a number of factors including the foraging plant species present, the extent and density (including projected foliage cover) of those foraging species and the overall structure and condition of foraging species present. In addition, connectivity, proximity to known breeding and roosting sites and presence of weeds and/or tree deaths (i.e., disease or drought) was also considered.

Fauna habitat defined and mapped within the survey area was assigned a foraging quality (i.e. negligible to low, low to moderate, moderate, moderate to high or high) based on the criteria outlined in Appendix D. The DAWE (2022) foraging quality scoring tool was considered and has been appended, but was not applied, as the applicable potential habitat within the survey area is less than the minimum size requirement of 1 ha (Appendix C).

Evidence of black cockatoo foraging (i.e., branch clippings and/or chewed marri/jarrah fruit and/or chewed *Banksia* cones) was also searched for to identify if the vegetation within the survey area has previously been or is currently being used by black cockatoos for feeding.

3.2.5.2. Potential breeding habitat

Potential breeding habitat is defined in Appendix C. Potential nesting trees 'diameter at breast height' (DBH) were recorded (trees ≥500 mm DBH, noting ≥300 mm for Wandoo).

All potential nesting trees encountered within the survey area were recorded with a GPS (+/- 5-10 m accuracy). Each potential nesting tree was also visually assessed from the ground (i.e., with binoculars) for the presence of suitable nest hollows (defined in Appendix C) and allocated a nesting and/or hollow rank (Table 4).

Table 4: Potential breeding trees nest and/or hollow ranking

Rank	Description of tree nest and/or hollows
1	Active nest observed (adult bird seen entering or emerging from hollow, their eggs, fledglings or other evidence of recent nesting activity present); known active nest (as described by Birdlife 2022).
2	Hollow of suitable size1 and angle (i.e. near-vertical) observed with chew marks around entrance.
3	Potentially suitable hollow observed but no chew marks present.
4	Tree lacking suitable hollows or broken branches that might have large hollows, a tree with mainly intact branches and a spreading crown.

[1]ELA takes a precautionary approach and identifies potentially suitable hollows as those with an entrance diameter over 10 cm that could potentially accommodate Forest Red-tailed Black Cockatoo, which requires a diameter opening range of 12-41 cm.

3.2.5.3. Potential roosting habitat

Potential night roosting habitat is defined in Appendix C**.** Potential night roosting habitat was defined by mapping tall trees within close proximity to water (i.e., within 12 km). A 5 m buffer was applied around each of these trees to depict projected foliage cover to estimate potential roosting habitat as hectares.

3.3. Limitations

The EPA Technical Guidance documents (EPA 2016, 2020) recommend including a discussion of the constraints and limitations of the survey methods used. An assessment of potential constraints and limitations of this survey are summarised in Table 5 below. No limitations were identified.

Table 5: Survey limitations

Potential survey limitation	Impact on survey
Sources of information and availability of contextual information (i.e. pre-existing background versus new material).	**Not a limitation**. Land system mapping (DPIRD 2022) and broad-scale vegetation mapping (DPIRD 2019) were available at a scale of 1:250,000. Soil and landform mapping was also available. Available information was sufficient to provide context at varying scales and therefore was not considered a limitation.
Scope (i.e. what life forms, etc., were sampled).	**Not a limitation**. The survey requirement of a Reconnaissance flora and vegetation survey, Basic fauna survey and Targeted black cockatoo habitat assessment in accordance with relevant State and Commonwealth legislation and EPA guidance was adequately met.
Proportion of flora collected and identified (based on sampling, timing and intensity).	**Not a limitation**. A Reconnaissance level survey records the dominant and abundant species, with little requirement for a comprehensive account of species richness. Data recorded were sufficient for this level of survey.
Completeness and further work which might be needed (i.e. was the relevant survey area fully surveyed).	**Not a limitation**. The survey area was fully covered to meet requirements outlined in the scope of works. Site selection was considered adequate to accurately analyse and discriminate sites based on species composition and subsequently delineate vegetation type boundaries. It is noted that over 97% of the survey area was cleared.
Mapping reliability.	**Not a limitation**. Coverage of the survey area was considered to be good. High quality aerial maps were used for both the survey and subsequent vegetation mapping.

Potential survey limitation	Impact on survey
Timing, weather, season, cycle.	**Not a limitation.** The survey was undertaken in the appropriate season, i.e. Spring, as specified by the EPA Technical Guidance (EPA 2016, 2020).
Disturbances (fire, flood, accidental human intervention, etc.).	**Not a limitation.** Disturbances within the survey area include historical clearing. This did not negatively impact the ability to meet objectives outlined in the scope of works.
Intensity (in retrospect, was the intensity adequate).	**Not a limitation**. The number of relevés established was sufficient to determine the vegetation types present (including their structurally and compositionally dominant species) and to identify any vegetation of conservation significance. It is noted that over 97% of the survey area was cleared.
Resources (i.e. were there adequate resources to complete the survey to the required standard).	**Not a limitation**. The number of personnel conducting this field survey in the given time was adequate to undertake the required level of survey. Additional resources, including equipment available, additional support and personnel were adequate.
Access problems (i.e. ability to access survey area).	**Not a limitation**. The survey area was adequately able to be accessed.
Experience levels (e.g. degree of expertise in plant identification to taxon level).	**Not a limitation**. The personnel conducting this field survey were all suitably qualified to identify specimens, having previously undertaken flora and fauna surveys in the Avon Wheatbelt bioregion of Western Australia.

4. Results

4.1. Desktop assessment

The PMST search (DCCEEW 2024) was undertaken to identify conservation significant flora species and ecological communities recorded within, or nearby to, the survey area (current and historic; Appendix E). Additionally, an Atlas of Living Australia database search (ALA 2024) was also undertaken. It is noted that >95% of the survey area is cleared, with the remainder either plantation or remnant trees over weeds, as such additional database searches were not considered necessary. The Birdlife Australia database of black cockatoo roosting and nesting sites (Birdlife 2023) was interrogated for sites within or near the survey area.

4.1.1. Conservation significant flora species

The pre-survey flora likelihood of occurrence assessment is provided in Appendix F. Prior to the field survey 25 species were identified during the desktop assessment, including: 13 Threatened, three Priority 2, four Priority 3 and five Priority 4 flora species. All conservation significant flora species were considered as being unlikely to occur within the survey area (DCCEEW 2024, ALA 2024).

4.1.2. Conservation significant ecological communities

The pre-survey ecological communities likelihood of occurrence assessment is provided in Appendix G. One conservation significant community was identified during the database search and was considered as being Unlikely to occur in the survey area (DCCEEW 2024).

4.1.3. Conservation significant fauna species

The pre-survey fauna likelihood of occurrence assessment is provided in Appendix H. Prior to the field survey 19 species were identified during the desktop search, including: 12 Threatened, four Migratory, two Priority 2 and one Other specially (OS) protected fauna species. Two fauna species, namely Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo, were considered as having the potential to occur within the survey area, with the remaining species all considered unlikely occur.

4.1.4. Black cockatoo records

Three known white-tailed cockatoo roosts occur within 10 km of the survey area, located within the Narrogin townsite: NARNARR002, NARNARR004 and NARNARR005 (Birdlife 2023).

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4.2. Flora and vegetation survey

4.2.1. Flora overview

A total of 23 taxa from 9 families and 18 genera were recorded across three relevés established across the survey area. Families with the highest number of species included Poaceae (five species), Myrtaceae (six species) and Asteraceae (five species). A species by relevé matrix is provided in Appendix I and relevé site data is provided in Appendix J.

4.2.2. Conservation significant flora

No Threatened species listed under the EPBC Act or the BC Act were recorded within the survey area. Post survey, all conservation significant flora species identified during the desktop search were considered unlikely to occur within the survey area.

It is noted that *Eucalyptus sargentii* subsp. *onesis*, listed as a Priority 3 species by DBCA, was recorded within the survey area. However, recorded individuals were planted (not naturally occurring), along with other tree species including *Eucalyptus camaldulensis* subsp. *camaldulensis*, *Eucalyptus occidentalis*, *Eucalyptus spathulata* subsp. *spathulata* and *Casuarina obesa*. This species is a salt tolerant plant that is regularly used in Wheatbelt revegetation activities, particularly those associated with managing and mitigating dryland salinity. No additional DBCA listed Priority flora species were recorded within the survey area.

4.2.3. Introduced flora

Sixteen introduced (weed) species were recorded within the survey area, representing 69% of the total flora recorded. None of the introduced species recorded within the survey area are listed as WoNS or Declared Pests under the BAM Act (DPIRD 2024).

4.2.4. Vegetation types

No intact native vegetation types were mapped within the survey area, with vegetated portions comprising either remnant native trees over weeds or plantation. Cleared areas covered 29.31 ha (97.37%) of the survey area (Table 6, Figure 7).

Vegetation types are defined on the basis of relevé data and as such are broadly described using dominant flora species for the upper, mid and lower strata, along with informal field observations and photographs, and aerial imagery.

Following the field survey, no ecological communities listed as Threatened under the EPBC Act or the BC Act, or Priority by DBCA, occurred or were inferred to occur within the survey area.

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Table 6: Broad vegetation types mapped within the survey area

Representative Photo	Vegetation type	Relevés	Extent in the survey area (ha)	Proportion of survey area (%)
	*Corymbia calophylla* low isolated clumps of trees over mixed weeds	REL01	0.12	0.39
	Plantation (*Eucalyptus camaldulensis*)	REL02	0.39	1.30
	Plantation (Mixed *Eucalyptus* spp. and *Casuarina obesa*)	REL03	0.24	0.81
	Remnant *Eucalyptus wandoo* trees		0.005	0.02
	Remnant *Eucalyptus camaldulensis* trees		0.04	0.13
	Cleared		29.31	97.37
	Total		30.10	100.00

4.2.5. Vegetation condition

Vegetation condition ranged from Degraded to Completely Degraded (Table 7, Figure 8), based on the vegetation condition scale of Keighery (1994) provided in EPA (2016) for the South West Botanical Province. Disturbances within the survey area include historical clearing, plantations and weeds. Cleared areas accounted for 97.37% of the survey area.

Table 7: Vegetation condition recorded in the survey area

Condition	Extent in the survey area (ha)	Proportion of survey area (%)
Degraded	0.12	0.39
Completely Degraded	0.68	2.25
Cleared	29.31	97.37
Total	**30.10**	**100.00**

4.3. Fauna survey

4.3.1. Fauna overview

A total of 14 vertebrate fauna species (two introduced) were recorded within the survey area, comprising 10 birds, three mammals and one reptile. A complete fauna list is presented in Appendix K

4.3.2. Conservation significant fauna

No Threatened species listed under the EPBC Act or the BC Act, or Priority listed species by DBCA were recorded within the survey area. Post survey, two conservation significant fauna species identified during the desktop search were considered to have potential to occur within the survey area, namely Carnaby's Cockatoo (*Calyptorhynchus latirostris*) and Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso)* (discussed further in Section 4.4). The remaining species were considered unlikely to occur or does not occur.

4.3.3. Introduced fauna

Two introduced (feral) fauna species were recorded within the survey area, namely European rabbit (**Oryctolagus cuniculus*; recorded via scats) and Red Fox (**Vulpes vulpes*; recorded via tracks). Both species are listed as a Declared Pest s22(2) under the BAM Act and have a C3 management control category (DPIRD 2024).

4.3.4. Fauna habitat types

Two fauna habitat types were mapped within the survey area, with comprising either Plantation (Fauna habitat 1; 0.64 ha) or remnant trees (Fauna habitat 2; 0.16 ha). Fauna habitat 1 aligns with the vegetation types 'Plantation (*Eucalyptus camaldulensis*)' and 'Plantation (Mixed *Eucalyptus* spp. and *Casuarina obesa*)'. Fauna habitat 2 aligns with vegetation types' *Corymbia calophylla* low isolated clumps of trees over mixed weeds', 'Remnant *Eucalyptus wandoo* trees' and 'Remnant *Eucalyptus camaldulensis* trees'. Cleared areas covered 29.31 ha (97.37%) of the survey area (Table 6, Figure 9).

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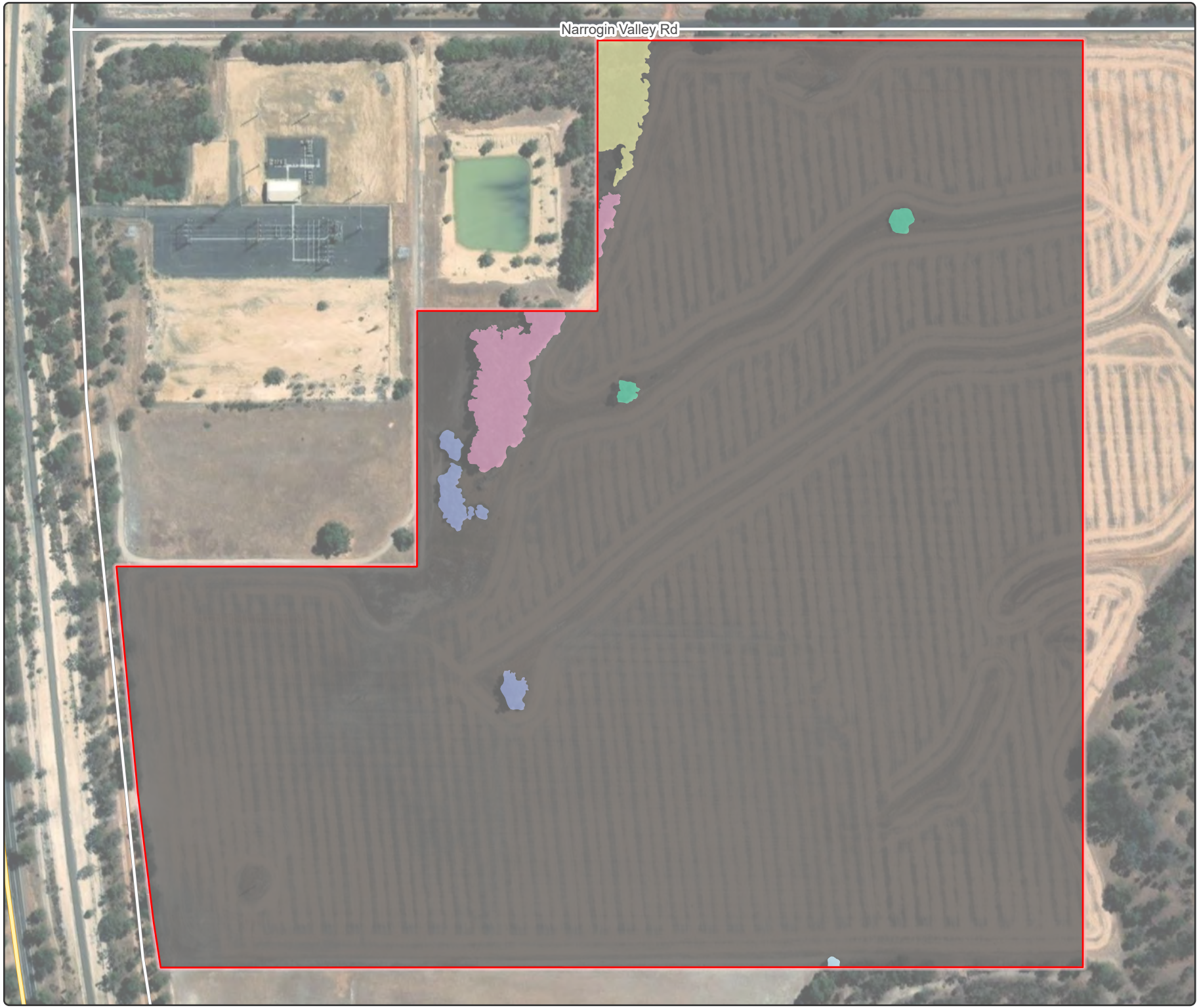

Legend

- Survey area
- Cleared

Vegetation types

- *Corymbia calophylla* low isolated clumps of trees over mixed weeds
- Plantation (*Eucalyptus camaldulensis*)
- Plantation (Mixed *Eucalyptus* spp. and *Casuarina obesa*)
- Remnant *Eucalyptus camaldulensis* trees
- Remnant *Eucalyptus wandoo* trees

Figure 7: Vegetation types

0 25 50 100

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

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Legend

- Survey area
- Cleared

Vegetation condition

- Degraded
- Completely Degraded

Figure 8: Vegetation condition

0 25 50 100

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

23PER6905-JP Date: 21/02/2024

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Legend

- Survey area
- Cleared

Fauna habitat

- Fauna habitat 1: Plantation
- Fauna habitat 2: Remnant trees

Figure 9: Fauna habitat

0 25 50 100

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

23PER6905-JP Date: 6/08/2024

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4.4. Black cockatoo habitat assessment

The survey area occurs outside the modelled distribution of Baudin's Cockatoo and, as such, this species was not considered in the current report. The survey area occurs within the known breeding range of Carnaby's Cockatoo, and the easternmost modelled distribution of 'may occur' for Forest Red-tailed Black Cockatoo; as such both species were considered as having the potential to occur. No primary or secondary signs of either Carnaby's Cockatoo or Forest Red-tailed Black Cockatoo were recorded during the field survey. Sections below discuss the habitat assessment undertaken for these species.

4.4.1. Foraging habitat

A total of five flora species (three native and two weeds) were recorded within the survey area that provide suitable foraging resources for at least one of the black cockatoo species. **Raphanus raphanistrum* and **Erodium botrys* provide a secondary food source for Carnaby's Cockatoo. Marri (*Corymbia calophylla*) and Wandoo (*Eucalyptus wandoo*) provide a primary food source for both Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. River red gum (*Eucalyptus camaldulensis* subsp. *camaldulensis*) provides a potential food source for Red-tailed Black Cockatoo (DAWE 2022, Groom 2011, Johnstone *et al*. 2010).

The '*Corymbia calophylla* low isolated clumps of trees over mixed weeds' vegetation type was mapped as providing Moderate foraging value for both Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. Remnant *Eucalyptus wandoo* trees were mapped as providing Low foraging value for both Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. Remnant *Eucalyptus camaldulensis* trees were mapped as providing Nil foraging value for Carnaby's Cockatoo and Low foraging value for Forest Red-tailed Black Cockatoo. The 'Plantation (*Eucalyptus camaldulensis*)' and 'Plantation (Mixed *Eucalyptus* spp. and *Casuarina obesa*)' vegetation types were mapped as providing Nil foraging value for Carnaby's Cockatoo and Moderate foraging value for Forest Red-tailed Black Cockatoo. For Carnaby's Cockatoo the survey area comprises 0.12 ha of Moderate, 0.005 ha of Low and 0.67 ha of Nil foraging value (Figure 10). For Forest Red-tailed Black Cockatoo, the survey area comprises 0.75 ha of Moderate and 0.04 ha of Low foraging value (Figure 11). Cleared areas account for 29.31 ha of the survey area (97.37%) and provide no foraging value for either species.

The DAWE (2022) black cockatoo habitat scoring tool was not applied, as the applicable potential habitat within the survey area is less than the minimum size requirement of 1 ha.

4.4.2. Potential breeding habitat

A total of 5 potentially suitable breeding trees were recorded within the survey area (Figure 12, Appendix L). Recorded tree species included Marri (*Corymbia calophylla*), Wandoo (*Eucalyptus wandoo* subsp. wandoo) and River red gum (*Eucalyptus camaldulensis*). All five trees had a nest and/or hollow rank of four (i.e., tree lacking suitable hollows or broken branches that might have large hollows, a tree with mainly intact branches and a spreading crown).

It is noted that River Red Gum (*Eucalyptus camaldulensis*) and Swamp Yate (*Eucalyptus occidentalis*) are known to provide potential breeding and roosting habitat for Carnaby's Cockatoo. Except for two larger mapped remnant *E. camaldulensis* trees, these tree species occurred within the 'Plantation (*Eucalyptus camaldulensis*)' and 'Plantation (Mixed *Eucalyptus* spp. and *Casuarina obesa*)' mapped vegetation types and were planted at high densities. This has resulted in thin trees (<30 cm DBH) with narrow, poorly developed crowns. It is therefore unlikely that these trees would be utilised in any roosting or breeding capacity by Carnaby's Cockatoo.

4.4.3. Potential roosting habitat

All potential breeding trees were considered tall trees providing potentially suitable roosting habitat for at least one of the two black cockatoo species in the survey area. It is also noted that several dams occur within 5 km of the survey area, one of which is located adjacent to the north-western boundary. Based on this, there is a total of 0.01 ha of potential roosting habitat within the survey area (Figure 12).



Legend

- Survey area
- Cleared
- Nil

Potential foraging habitat

- Moderate
- Low

Figure 10: Carnaby's Cockatoo foraging habitat

0 25 50 100

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

23PER6905-JP Date: 6/08/2024

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Legend

- Survey area
- Cleared

Potential foraging habitat

- Moderate
- Low

Figure 11: Forest Red-tailed Black Cockatoo foraging habitat

0 25 50 100

Metres

Datum/Projection:
GDA 1994 MGA Zone 50

23PER6905-JP Date: 22/02/2024

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Legend

- Survey area
- Potential roosting habitat
- *Corymbia calophylla* without hollows
- *Eucalyptus wandoo* without hollows
- *Eucalyptus camaldulensis* without hollows

Figure 12: Black cockatoo breeding and roosting habitat

0 25 50 100
Metres

Datum/Projection:
GDA 1994 MGA Zone 50

23PER6905-JP Date: 6/08/2024

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5. Discussion

5.1. Flora and vegetation

5.1.1. Flora

Flora species recorded in the survey area were typical of the Avon Wheatbelt IBRA bioregion (WAH 1998-), and salt tolerant plant (tree) species used in the management and mitigation of dryland salinity. A total of 23 taxa from 9 families and18 genera were recorded across the survey area, with weed species representing 69% of the total number of flora recorded. The low species richness and high proportion of weeds was expected given that over 95% of the survey area was cleared for cropping.

No Threatened species listed under the EPBC Act or the BC Act, or naturally occurring Priority listed species by DBCA were recorded within the survey area. Post survey, all conservation significant flora species identified during the desktop search were considered unlikely to occur within the survey area. No introduced (weed) species recorded within the survey area are listed as WoNS or Declared Pests under the BAM Act.

One DBCA listed Priority 3 species was recorded in the survey area, namely *Eucalyptus sargentii* subsp. *onesis*. However, recorded individuals were planted (not naturally occurring), along with other tree species including *Eucalyptus camaldulensis* subsp. *camaldulensis*, *Eucalyptus occidentalis*, *Eucalyptus spathulata* subsp. *spathulata* and *Casuarina obesa*. This species is a salt tolerant plant that is regularly used in Wheatbelt revegetation activities, particularly those associated with managing and mitigating dryland salinity.

5.1.2. Vegetation

No intact native vegetation types were mapped within the survey area, with vegetated portions comprising either remnant native trees over weeds or plantation. Remnant native trees within the survey area comprised *Corymbia calophylla* low isolated clumps of trees over mixed weeds (0.12 ha; Degraded condition), and individual *Eucalyptus wandoo* trees scattered across cleared areas (0.04 ha; Completely Degraded condition). Two plantation types were identified and mapped, one being dominated by *Eucalyptus camaldulensis* (0.39 ha) and the other with salt tolerant mixed *Eucalyptus* spp. species and *Casuarina obesa* (0.24 ha); both mapped as Completely Degraded. Cleared areas accounted for approximately 97% of the survey area (29.31 ha), and were a mixture of active cropping, fence lines and access tracks.

No ecological communities listed as Threatened under the EPBC Act or the BC Act, or Priority by DBCA, occurred or were inferred to occur within the survey area.

5.2. Fauna

5.2.1. Fauna

Two fauna habitat types were mapped within the survey area, namely ‘Plantation’ (0.64 ha) and ‘Remnant trees’ (0.16 ha). Both are considered to provide suitable, albeit limited, habitat for a number of terrestrial and avian fauna. Connectivity to vegetated portions of the survey area is restricted by transport and power infrastructure, clearing, and boundary fence lines. The survey area is therefore unlikely to support conservation significant mammal dispersal, however it has the ability to support a

variety of bird species. Majority of bird species recorded during the field survey are widespread and common species, including nectivores, insectivores and granivores.

No Threatened fauna species listed under the EPBC Act or the BC Act, or Priority listed species by DBCA were recorded within the survey area. Post survey, two conservation significant fauna species identified during the desktop search were considered as having potential to occur within the survey area, namely Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. The remaining species were considered unlikely to occur or does not occur.

Two introduced (feral) fauna species were recorded within the survey area, namely European Rabbit and Red Fox, with both species listed as a Declared Pest s22(2) under the BAM Act and have a C3 management control category; organisms that should have some form of management applied that will alleviate the harmful impact of the organism, reduce the numbers or distribution of the organism or prevent or contain the spread of the organism (DPIRD 2024).

5.2.2. Black cockatoos

The survey area occurs outside the modelled distribution of Baudin's Cockatoo and as such this species was not considered in the current report. The survey area occurs within the known breeding range of Carnaby's Cockatoo, and the easternmost modelled distribution of 'may occur' for Forest Red-tailed Black Cockatoo; as such both these species were considered as having the potential to occur. Three known white-tailed cockatoo roosts occur within 10 km of the survey area, located within the Narrogin townsite: NARNARR002, NARNARR004 and NARNARR005 (Birdlife 2023).

No primary or secondary signs of Carnaby's Cockatoo or Forest Red-tailed Black Cockatoo were recorded during the field survey.

Habitat critical to the survival of Carnaby's Cockatoo includes *Eucalyptus* woodlands that provide nest hollows used for breeding, together with nearby vegetation that provides feeding, roosting and watering habitat that supports successful breeding (DPaW 2013). Habitat critical for the survival of Forest Red-tailed Black Cockatoo includes all Marri (*Corymbia calophylla*), Karri (*Eucalyptus diversicolor*) and Jarrah (*Eucalyptus marginata*) forests, woodlands and remnants in the south-west of Western Australia receiving more than 600 mm of annual average rainfall (Chapman 2008). Aspects of the aforementioned habitats critical to the survival of these black cockatoo species are minimal within the survey area (i.e., small, isolated clumps of Marri trees (0.12 ha), remnant individual Wandoo (0.005 ha) and River red gum (0.04 ha) trees, and *Eucalyptus* spp. plantation (0.64 ha).

A total of five flora species were recorded within the survey area that provide suitable foraging resources for at least one of the black cockatoo species. **Raphanus raphanistrum* and **Erodium botrys* provide a secondary food source for Carnaby's Cockatoo. Marri (*Corymbia calophylla*) and Wandoo (*Eucalyptus wandoo*) provide a primary food source for both Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo. River red gum (*Eucalyptus camaldulensis* subsp. *camaldulensis*) provides a potential food source for Red-tailed Black Cockatoo (DAWE 2022, Groom 2011, Johnstone *et al*. 2010). For Carnaby's Cockatoo the survey area comprises 0.12 ha of Moderate, 0.005 ha of Low and 0.67 ha of Nil foraging value. For Forest Red-tailed Black Cockatoo the survey area comprises 0.75 ha of Moderate and 0.04 ha of Low foraging value.

A total of 5 potentially suitable breeding trees were recorded within the survey area, with all five lacking suitable hollows or broken branches that might have large hollows. It is noted that River Red Gum and

Swamp Yate were recorded in Plantation areas, with both species being known to provide potential breeding and roosting habitat for Carnaby's Cockatoo. These trees were planted at high densities, resulting in thin trunks (<30 cm DBH) with narrow, poorly developed crowns. It is therefore unlikely that such trees would be utilised in any roosting or breeding capacity by Carnaby's Cockatoo. Despite no confirmed nests, hollows or roost sites recorded within the survey area, the potential for breeding and roosting habitat for species of black cockatoo to occur cannot be discounted.

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Appendix A Framework for conservation significant flora and fauna ranking

CATEGORIES OF THREATENED SPECIES UNDER THE ENVIRONMENT PROTECTION AND BIODIVERSITY CONSERVATION ACT 1999 (EPBC ACT)

Threatened fauna and flora may be listed in any one of the following categories as defined in Section 179 of the EPBC Act. Species listed as 'conservation dependent' and 'extinct' are not Matters of National Environmental Significance and therefore do not trigger the EPBC Act.

Category	Definition
Extinct (EX)	There is no reasonable doubt that the last member of the species has died.
Extinct in the Wild (EW)	Taxa known to survive only in captivity or as a naturalised population well outside its past range; or taxa has not been recorded in its known and/or expected habitat at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form.
Critically Endangered (CE)	Taxa considered to be facing an extremely high risk of extinction in the wild.
Endangered (EN)	Taxa considered to be facing a very high risk of extinction in the wild.
Vulnerable (VU)	Taxa considered to be facing a high risk of extinction in the wild.
Near Threatened (NT)	Taxa has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.
Least Concern (LC)	Taxa has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.
Data Deficient (DD)	There is inadequate information to make a direct, or indirect, assessment of taxa's risk extinction based on its distribution and/or population status.
Not Evaluated (NE)	Taxa has not yet been evaluated against the criteria.
Migratory (MI)	Not an IUCN category. Species are defined as migratory if they are listed in an international agreement approved by the Commonwealth Environment Minister, including: • the Bonn Convention (Convention on the Conservation of Migratory Species of Wild Animal) for which Australia is a range state; • the agreement between the Government of Australian and the Government of the People's Republic of China for the Protection of Migratory Birds and their environment (CAMBA); • the agreement between the Government of Japan and the Government of Australia for the Protection of Migratory Birds and Birds in Danger of Extinction and their Environment (JAMBA); or • the agreement between Australia and the Republic of Korea to develop a bilateral migratory bird agreement similar to the JAMBA and CAMBA in respect to migratory bird conservation and provides a basis for collaboration on the protection of migratory shorebirds and their habitat (ROKAMBA).

CONSERVATION CODES FOR WESTERN AUSTRALIA FLORA AND FAUNA

The Wildlife Conservation (Specially Protected Fauna) Notice 2018 and the Wildlife Conservation (Rare Flora) Notice 2018 have been transitioned under regulations 170, 171 and 172 of the Biodiversity Conservation Regulations 2018 to be the lists of Threatened, Extinct and Specially Protected species under Part 2 of the *Biodiversity Conservation Act 2016*.

Specially protected fauna or flora are species which have been adequately searched for and are deemed to be, in the wild, threatened, extinct or in need of special protection, and have been gazetted as such.

Threatened species (T)

Listed by order of the Minister as Threatened in the category of critically endangered, endangered or vulnerable under section 19(1), or is a rediscovered species to be regarded as threatened species under section 26(2) of the *Biodiversity Conservation Act 2016* (BC Act).

Threatened fauna is that subset of 'Specially Protected Fauna' listed under schedules 1 to 3 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for Threatened Fauna.

Threatened flora is that subset of 'Rare Flora' listed under schedules 1 to 3 of the Wildlife Conservation (Rare Flora) Notice 2018 for Threatened Flora.

The assessment of the conservation status of these species is based on their national extent and ranked according to their level of threat using IUCN Red List categories and criteria as detailed below.

Category	Code	Description
Critically Endangered species	CR	Threatened species considered to be "facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as critically endangered under section 19(1)(a) of the BC Act in accordance with the criteria set out in section 20 and the ministerial guidelines. Published under schedule 1 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for critically endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for critically endangered flora.
Endangered species	EN	Threatened species considered to be "facing a very high risk of extinction in the wild in the near future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as endangered under section 19(1)(b) of the BC Act in accordance with the criteria set out in section 21 and the ministerial guidelines. Published under schedule 2 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018 for endangered fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for endangered flora.
Vulnerable species	VU	Threatened species considered to be "facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with criteria set out in the ministerial guidelines". Listed as vulnerable under section 19(1)(c) of the BC Act in accordance with the criteria set out in section 22 and the ministerial guidelines. Published under schedule 3 of the Wildlife Conservation (Specially Protected Fauna)

Category	Code	Description
		Notice 2018 for vulnerable fauna or the Wildlife Conservation (Rare Flora) Notice 2018 for vulnerable flora.

Extinct species

Listed by order of the Minister as extinct under section 23(1) of the BC Act as extinct or extinct in the wild, as follows:

Category	Code	Description
Extinct species	EX	Species which have been adequately searched for and there is no reasonable doubt that the last individual has died. Published as Specially Protected under the Wildlife Conservation Act 1950, in Schedule 4 of the Wildlife Conservation (Specially Protected Fauna) Notice for Presumed Extinct Fauna and Wildlife Conservation (Rare Flora) Notice for Presumed Extinct Flora.
Extinct in the wild species	EW	Species that "is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; and it has not been recorded in its known habitat or expected habitat, at appropriate seasons, anywhere in its past range, despite surveys over a time frame appropriate to its life cycle and form", and listing is otherwise in accordance with the ministerial guidelines (section 25 of the BC Act). Currently there are no threatened fauna or threatened flora species listed as extinct in the wild. If listing of a species as extinct in the wild occurs, then a schedule will be added to the applicable notice.

Specially protected species

Listed by order of the Minister as specially protected under section 13(1) of the BC Act. Meeting one or more of the following categories: species of special conservation interest; migratory species; cetaceans; species subject to international agreement; or species otherwise in need of special protection.

Species that are listed as threatened species (critically endangered, endangered or vulnerable) or extinct species under the BC Act cannot also be listed as Specially Protected species.

Categories are detailed below.

Category	Code	Description
Migratory species	MI	Fauna that periodically or occasionally visit Australia or an external Territory or the exclusive economic zone; or the species is subject of an international agreement that relates to the protection of migratory species and that binds the Commonwealth; and listing is otherwise in accordance with the ministerial guidelines (section 15 of the BC Act). Includes birds that are subject to an agreement between the government of Australia and the governments of Japan (JAMBA), China (CAMBA) and The Republic of Korea (ROKAMBA), and fauna subject to the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention), an environmental treaty under the United Nations Environment Program. Migratory species listed under the BC Act are a subset of the migratory animals that are known to visit Western Australia, protected under the international agreements or treaties, excluding species that are listed as Threatened species. Published as migratory birds protected under an international agreement under schedule 5 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Species of special conservation interest (conservation dependent fauna)	CD	Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened, and listing is otherwise in accordance with the ministerial guidelines (section 14 of the BC Act). Published as conservation dependent fauna under schedule 6 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.
Other specially protected species	OS	Fauna otherwise in need of special protection to ensure their conservation, and listing is otherwise in accordance with the ministerial guidelines (section 18 of the BC Act). Published as other specially protected fauna under schedule 7 of the Wildlife Conservation (Specially Protected Fauna) Notice 2018.

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Priority species (P)

Possibly threatened species that do not meet survey criteria, or are otherwise data deficient, are added to the Priority Fauna or Priority Flora Lists under Priorities 1, 2 or 3. These three categories are ranked in order of priority for survey and evaluation of conservation status so that consideration can be given to their declaration as threatened fauna or flora.

Species that are adequately known, are rare but not threatened, or meet criteria for near threatened, or that have been recently removed from the threatened species or other specially protected fauna lists for other than taxonomic reasons, are placed in Priority 4. These species require regular monitoring.

Assessment of Priority codes is based on the Western Australian distribution of the species, unless the distribution in WA is part of a contiguous population extending into adjacent States, as defined by the known spread of locations.

Category	Code	Definition
Priority 1	P1	Poorly-known species Species that are known from one or a few locations (generally five or less) which are potentially at risk. All occurrences are either: very small; or on lands not managed for conservation, e.g. agricultural or pastoral lands, urban areas, road and rail reserves, gravel reserves and active mineral leases; or otherwise under threat of habitat destruction or degradation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under immediate threat from known threatening processes. Such species are in urgent need of further survey.
Priority 2	P2	Poorly-known species Species that are known from one or a few locations (generally five or less), some of which are on lands managed primarily for nature conservation, e.g. national parks, conservation parks, nature reserves and other lands with secure tenure being managed for conservation. Species may be included if they are comparatively well known from one or more locations but do not meet adequacy of survey requirements and appear to be under threat from known threatening processes. Such species are in urgent need of further survey.
Priority 3	P3	Poorly-known species Species that are known from several locations, and the species does not appear to be under imminent threat, or from few but widespread locations with either large population size or significant remaining areas of apparently suitable habitat, much of it not under imminent threat. Species may be included if they are comparatively well known from several locations but do not meet adequacy of survey requirements and known threatening processes exist that could affect them. Such species are in need of further survey.
Priority 4	P4	Rare, Near Threatened and other species in need of monitoring (a) Rare. Species that are considered to have been adequately surveyed, or for which sufficient knowledge is available, and that are considered not currently threatened or in need of special protection but could be if present circumstances change. These species are usually represented on conservation lands. (b) Near Threatened. Species that are considered to have been adequately surveyed and that are close to qualifying for vulnerable but are not listed as Conservation Dependent. (c) Species that have been removed from the list of threatened species during the past five years for reasons other than taxonomy.

Appendix B Likelihood of occurrence assessment criteria

Likelihood rating	Criteria
Recorded	The species has previously been recorded within the survey area from DBCA database search results and/or from previous surveys of the survey area, and/or the species has been confirmed through a current vouchered specimen at WA Herbarium.
Likely	The species has not previously been recorded from within the survey area. However, (to qualify requires one or more criteria to be met): the species has been recorded in close proximity to the survey area, and occurs in similar habitat to that which occurs within the survey area; core habitat and suitable landforms for the species occurs within the survey area either year-round or seasonally. In relation to fauna species, this could be that a host plant is seasonally present on site, or habitat features such as caves are present that may be used during particular times during its life cycle e.g. for breeding. In relation to both flora and fauna species, it may be there are seasonal wetlands present; and there is a medium to high probability that a species uses the survey area.
Potential	The species has not previously been recorded from within the survey area. However, (one or more criteria requires to be met): targeted surveys may locate the species based on records occurring in proximity to the survey area and suitable habitat occurring in the survey area; the survey area has been assessed as having potentially suitable habitat through habitat modelling; the species is known to be cryptic and may not have been detected despite extensive surveys; the species is highly mobile and has an extensive foraging range so may not have been detected during previous surveys; The species has been recorded in the survey area by a previous consultant survey or there is historic evidence of species occurrence within the survey area. However, (one or more criteria requires to be met): doubt remains over taxonomic identification, or the majority of habitat does not appear suitable (although presence cannot be ruled out due to factors such as species ecology or distribution); and coordinates are doubtful.
Unlikely	The species has been recorded locally through DBCA database searches. However, it has not been recorded within the survey area and it is unlikely to occur due to the site lacking critical habitat, having at best marginally suitable habitat, and/or being severely degraded it is unlikely to occur due to few historic record/s and no other current collections in the local area. The species has been recorded within the bioregion based on literature review but has not been recorded locally or within the survey area through DBCA database searches. The species has not been recorded in the survey area despite adequate survey efforts, such as a standardised methodology or targeted searching within potentially suitable habitat.
Does not occur (one or more criteria requires to be met).	The species is not known to occur within the IBRA bioregion based on current literature and distribution. The conspicuous species has not been recorded in the survey area despite adequate survey efforts at an appropriate time of year to detect the species within potentially suitable habitat. The survey area lacks important habitat for a species that has highly selective habitat requirements. The species has been historically recorded within survey area or locally; however, it is considered locally extinct due to significant habitat changes such as land clearing and/or introduced predators.

Appendix C Black cockatoo habitat definitions

Habitat	Definition
Foraging habitat	Foraging habitat is defined as plant species known to support foraging within the range of each species. The specific foraging requirements differ slightly between the three species as described in DAWE 2022: • **Carnaby's Cockatoo** - mainly feeds in native shrubland, kwongan heathland and woodland. Food items include seeds, flowers and nectar of native proteaceous plant species (i.e. *Banksia* spp., *Hakea* spp., and *Grevillea* spp.), as well as *Callistemon* spp. and marri (*Corymbia calophylla*). Also feeds on the seeds of introduced species including *Pinus* spp., *Erodium* spp., wild radish, canola, almonds, macadamia and pecan nuts; insects and insect larvae; occasionally flesh and juice of apples and persimmons; and liquid amber. • **Baudin's Cockatoo –** mainly feeds in eucalypt woodlands and forest, and proteaceous woodlands and heath. Food items primarily include seeds of marri, rarely jarrah (*Eucalyptus marginata*) and seeds of native proteaceous plant species (e.g. *Banksia* spp. and *Hakea* spp.). Also feeds on insects and insect larvae, pith of kangaroo paw (*Anigozanthos flavidus*); tips of *Pinus* spp.; *Macadamia* spp., almonds and pecans; seeds of apples, pears and persimmons. • **Forest Red-tailed Black Cockatoo** – mainly feeds in jarrah and marri woodlands and forest, and edges of karri forests including wandoo and blackbutt. Food items primarily include seeds of marri and jarrah. Also feeds on *Allocasuarina* cones, fruits of Snottygobble (*Persoonia longifolia*) and Mountain Marri (*Corymbia haematoxylon*). Other less important foods include: Blackbutt, Bullich, *Allocasuarina fraseriana*, *Hakea* spp., Tuart, Redheart Moit (*Eucalyptus decipiens*) and Bushy Yate (*E. lehmanni*). Also, some introduced eucalypts such as river red gum (*E. camaldulensis*) and flooded or rose gum (*E. grandis*).
Night roosting habitat	Habitat that contains one, or a group of, known or potential roosting trees: • **Known roosting tree** - a tree (generally the tallest), native or introduced know to be used for night roosting or which demonstrates evidence of roosting. Usually close to an important water source and within an area of high-quality foraging habitat. During the breeding season, male black cockatoos roost in the vicinity of the nesting trees, therefore a breeding area may also be considered to be night roosting habitat. • **Potential roosting tree** - a tall tree of any species within close proximity to water.
Breeding habitat	Breeding habitat: Habitat that contains known, suitable or potential nesting trees: • **Known nesting trees**: Trees (live or dead but still standing) which contains a hollow where black cockatoo breeding has been recorded or which demonstrates evidence of breeding (i.e. showing evidence of use through scratches, chew marks or feathers). • **Suitable nesting trees**: Trees with suitable nesting hollows present, although no evidence of use. Note that any species of tree may develop suitable hollows for breeding. • **Suitable nest hollow**: Any hollow with dimensions suitable for use for nesting by black cockatoos (Carnaby's Cockatoo 23-30cm [EPA 2019], Baudin's Cockatoo 30-40 cm [Chapman 2008], Forest Red-tailed Black Cockatoo 12–41 cm [Chapman 2008]). Suitable nest hollows are only found in live trees with a DBH of at least 500 mm. Usually this will be a natural hollow, but artificial hollows may also be suitable in some circumstances (for example, where the artificial hollow has been specifically designed for use by black cockatoos). Note that artificial hollows have only been shown to have value for Carnaby's Cockatoos to date. • **Potential nesting trees**: Trees that have a suitable DBH to develop a nest hollow, but do not currently have hollows. For most species of trees, suitable nest hollows are only found in live trees with a DBH of at least 500 mm. Trees suitable to develop a nest hollow in the future are 300-500 mm DBH. Note that many species of eucalypt may develop suitable hollows for breeding.

References

Chapman, T. 2008. *Forest Black Cockatoo (Baudin's cockatoo Calyptorynchus baudinii and Forest Red-tailed Black Cockatoo Calyptorynchus banksii naso) Recovery Plan*. Department of Conservation and Land Management, Western Australia.

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Appendix D Black cockatoo foraging habitat quality criteria

Foraging habitat quality	Carnaby's Cockatoo	Forest Black Cockatoo (Baudin's Cockatoo and Forest Red-tailed Black Cockatoo)
High	• Presence of suitable foraging plant species[1] at a high density (i.e. primary food sources[2] present at >60% PFC[3], secondary food sources[2] present at >70% PFC) and presence of preferred food sources at several strata; • Low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term); and/or • Lower quality foraging habitat based on vegetation characteristics, but with evidence of use (i.e. chewed nuts, cones, seeds or flowers). • Example: Banksia forest >60% PFC and Good or higher vegetation condition with low weed invasion and/or low tree deaths.	• Presence of suitable foraging plant species[1] at a high density (i.e. food sources present at >60% PFC[3]) and presence of preferred food sources at several strata; • Low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term); and/or • Lower quality foraging habitat based on vegetation characteristics, but with evidence of use (i.e. chewed nuts, cones, seeds or flowers). • Example: Marri-Jarrah Forest >60% PFC and Good or higher vegetation condition with low weed invasion and/or low tree deaths.
Moderate to high	• Presence of suitable foraging plant species at a high density (i.e. primary food sources present at 40-60% PFC, secondary food sources at >60% PFC) and presence of preferred food sources at several strata; • Foraging species with >60% PFC but foraging habitat viability reduced due to high weed invasion and/or tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).	• Presence of suitable foraging plant species at a high density (i.e. food sources present at 40-60% PFC) and presence of preferred food sources at several strata; • Foraging species with >60% PFC but foraging habitat viability reduced due to high weed invasion and/or tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).
Moderate	• Presence of suitable foraging plant species at a low to moderate density (i.e. primary food sources present at 20-40% PFC, secondary food sources at 40-60% PFC); • Foraging species with 40-60% PFC but foraging habitat viability reduced due to high weed invasion and/or tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).	• Presence of suitable foraging plant species at a low to moderate density (i.e. food sources present at 20-40% PFC); • Foraging species with 40-60% PFC but foraging habitat viability reduced due to high weed invasion and/or tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).
Low to moderate	• Suitable foraging species present but at a lower density (i.e. primary food sources present at 10-20% PFC, secondary food sources present at 20-40% PFC); • Foraging species with 20-40% projected foliage cover but foraging habitat viability	• Suitable foraging species present but at a lower density (i.e. food sources present at 5-20% PFC); • Foraging species with 20-40% projected foliage cover but foraging habitat viability reduced due to high weed invasion and/or

Foraging habitat quality	Carnaby's Cockatoo	Forest Black Cockatoo (Baudin's Cockatoo and Forest Red-tailed Black Cockatoo)
	reduced due to high weed invasion and/or tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).	tree deaths indicating that the vegetation could potentially decline in the medium term due to suppressed regrowth or disease; and/or • Lower quality foraging habitat but with evidence of use (i.e. chewed nuts, cones, seeds or flowers).
Low	• Suitable foraging species present at a low density (i.e. primary food sources present at <10% PFC, secondary food sources present at 10-20% PFC); and/or • Scattered foraging species or paddocks with known food sources such as melons or weeds that represent a short-term food source.	• Suitable foraging species present at a low density (i.e. food sources present at 1-5% PFC); and/or • Scattered foraging species or paddocks with known food sources such as melons or weeds that represent a short-term food source.
Negligible to low	• Presence of some scattered foraging species but <2% PFC.	• Presence of some scattered foraging species but <1% PFC.
No foraging value	• No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: water bodies, bare ground, developed sites, mown grass.	• No foraging value. No eucalypts or other potential sources of food. Examples: water bodies, bare ground, developed sites.

[1] Based on the list of suitable foraging plants collated from the following sources: DAWE (2022), Groom (2011), Johnstone *et al*. (2010), Heydenrych (2012) and Lee *et al*. (2013).

[2] Primary food sources for Carnaby's Cockatoo are defined as those species which are known to provide a regular foraging resource and have been designated as being 'high' priority for planting by the Department of Environment and Conservation (now known as DBCA), where as secondary food items are defined as those species that are only occasionally foraged upon, and which have been assigned as being moderate to low priority for planting by DBCA (Groom 2011).
[3] PFC = projected foliage cover

Note: the general context of the site (i.e., surrounding landscape, connectivity, proximity of species records, proximity of known breeding or roosting sites and any evidence of use) is also taken into consideration when assigning a quality rating.

References

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Heydenrych, B. 2012. *A preliminary investigation into restoring landscapes for Carnaby's Black Cockatoos in the Fitz-Stirling area of Gondwana Link on the south coast of Western Australia*. Greening Australia, Western Australia.

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Appendix E PMST database search results

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 22-Feb-2024

Summary
Details
- Matters of NES
- Other Matters Protected by the EPBC Act
- Extra Information

Caveat
Acknowledgements

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance (Ramsar	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	1
Listed Threatened Species:	23
Listed Migratory Species:	6

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	7
Commonwealth Heritage Places:	None
Listed Marine Species:	10
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	4
Regional Forest Agreements:	None
Nationally Important Wetlands:	None
EPBC Act Referrals:	5
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Peel-yalgorup system	100 - 150km upstream from Ramsar site	In buffer area only

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status
Eucalypt Woodlands of the Western Australian Wheatbelt	Critically Endangered	Community likely to occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Aphelocephala leucopsis Southern Whiteface [529]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Leipoa ocellata](#) Malleefowl [934]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Zanda baudinii listed as Calyptorhynchus baudinii](#) Baudin's Cockatoo, Baudin's Black-Cockatoo, Long-billed Black-cockatoo [87736]	Endangered	Species or species habitat likely to occur within area	In buffer area only
[Zanda latirostris listed as Calyptorhynchus latirostris](#) Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Species or species habitat known to occur within area	In feature area
MAMMAL			
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Macrotis lagotis](#) Greater Bilby [282]	Vulnerable	Translocated population known to occur within area	In buffer area only
[Myrmecobius fasciatus](#) Numbat [294]	Endangered	Species or species habitat known to occur within area	In feature area
[Phascogale calura](#) Red-tailed Phascogale, Red-tailed Wambenger, Kenngoor [316]	Vulnerable	Species or species habitat known to occur within area	In feature area
PLANT			
[Acacia insolita subsp. recurva](#) Yornaning Wattle [64495]	Endangered	Species or species habitat may occur within area	In buffer area only
[Andersonia gracilis](#) Slender Andersonia [14470]	Endangered	Species or species habitat may occur within area	In feature area
[Banksia oligantha](#) Wagin Banksia [20697]	Endangered	Species or species habitat may occur within area	In buffer area only
[Boronia capitata subsp. capitata](#) a shrub [29156]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Caladenia dorrienii Cossack Spider-orchid [6596]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Darwinia carnea Mogumber Bell, Narrogin Bell [9736]	Endangered	Species or species habitat known to occur within area	In feature area
Daviesia euphorbioides Wongan Cactus [3477]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Pultenaea pauciflora Narrogin Pea [14013]	Vulnerable	Species or species habitat known to occur within area	In feature area
Roycea pycnophylloides Saltmat [21161]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Verticordia fimbrilepis subsp. fimbrilepis Shy Featherflower [24631]	Endangered	Species or species habitat known to occur within area	In feature area

Listed Migratory Species		[Resource Information]	
Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris acuminata			
Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Commonwealth Lands [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Commonwealth Land Name	State	Buffer Status
Unknown		
Commonwealth Land - [51611]	WA	In buffer area only
Commonwealth Land - [51610]	WA	In buffer area only
Commonwealth Land - [50995]	WA	In buffer area only
Commonwealth Land - [50993]	WA	In buffer area only
Commonwealth Land - [51609]	WA	In buffer area only
Commonwealth Land - [52050]	WA	In buffer area only
Commonwealth Land - [50996]	WA	In buffer area only

Listed Marine Species [Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Bubulcus ibis as Ardea ibis Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata Sharp-tailed Sandpiper [874]	Vulnerable	Species or species habitat may occur within area	In feature area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Chalcites osculans as Chrysococcyx osculans Black-eared Cuckoo [83425]		Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla cinerea Grey Wagtail [642]		Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Highbury	Nature Reserve	WA	In buffer area only
Manning Road	Nature Reserve	WA	In buffer area only
Sandalwood Block Timber Reserve	5(1)(g) Reserve	WA	In buffer area only

Protected Area Name	Reserve Type	State	Buffer Status
Unnamed WA20985	Nature Reserve	WA	In buffer area only

EPBC Act Referrals [Resource Information]

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Controlled action				
Widening maintenance zones for 3 roads, Wheatbelt region, WA	2016/7698	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Narrogin Link Road Stage 3 - North Extension, WA	2016/7664	Not Controlled Action	Completed	In buffer area only
Not controlled action (particular manner)				
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

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Appendix F Flora likelihood of occurrence assessment

Species	Conservation status		Source	Description	Habitat	Likelihood Rating	
	EPBC Act	BC Act / DBCA				Pre-Survey	Post survey
Acacia insolita subsp. *recurva*	EN	CR	PMST; ALA	Spindly shrub, 0.6 – 1.2 m high. Fl. Yellow-cream.	Lateritic ridges	**Unlikely** Suitable habitat unlikely to occur.	**Unlikely** No suitable habitat present.
Darwinia carnea	EN	CR	PMST	Spreading shrub, 0.2-0.45 m high. Fl. green & red, Oct to Dec.	Lateritic loam & gravel.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Daviesia euphorbioides	EN	CR	PMST	Shrub, 0.4-0.8 m high. Fl. yellow & red, Jul to Sep.	Clayey sand, sandy gravel. Flats, sandplains.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Banksia cuneata	EN	EN	ALA	Non-lignotuberous, small tree or shrub, 2-4 m high. Fl. pink/pink & cream & yellow, Sep to Dec.	Grey, yellow or yellow-brown sand.	**Unlikely** Suitable habitat unlikely to occur.	**Unlikely** No suitable habitat present.
Banksia oligantha	EN	EN	PMST	Non-lignotuberous shrub, to 3 m high. Fl. red & cream/orange-brown, Oct to Nov	Yellow or yellow-brown sand	**Unlikely** Suitable habitat unlikely to occur.	**Unlikely** No suitable habitat present.
Caladenia dorrienii	EN	EN	PMST	Tuberous, perennial, herb, 0.1-0.2 m high. Fl. white-cream-yellow, Sep to Nov.	Clayey loam. Moist sites adjacent to rivers and seasonal creeks.	**Unlikely** Suitable habitat unlikely to occur.	**Unlikely** No suitable habitat present.
Lasiopetalum rotundifolium	EN	EN	ALA	Erect shrub, to 0.4 m high. Fl. pink.	Gravelly clayey sand. Hill.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

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Species	Conservation status		Source	Description	Habitat	Likelihood Rating	
	EPBC Act	BC Act / DBCA				Pre-Survey	Post survey
Andersonia gracilis	EN	VU	PMST	Slender erect or open straggly shrub, 0.1-0.5(-1) m high. Fl. white-pink-purple, Sep to Nov	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps	**Unlikely** Suitable habitat unlikely to occur.	**Unlikely** No suitable habitat present.
Boronia capitata subsp. *capitata*	EN	VU	PMST	Slender shrub, 0.3-1.3 m high. Fl. pink, Aug to Dec or Feb	Sand, often over laterite. Sandplains.	**Unlikely** Suitable habitat unlikely to occur.	**Unlikely** No suitable habitat present.
Roycea pycnophylloides	EN	VU	PMST	Perennial, herb, forming densely branched, silvery mats to 1 m wide. Fl. Sep.	Sandy soils, clay. Saline flats.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Verticordia fimbrilepis subsp. *fimbrilepis*	EN	VU	PMST	Shrub, 0.3-0.7 m high. Fl. pink-white, Oct to Dec or Jan.	Gravelly sandy or clayey soils. Flats, road verges.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Diuris micrantha	VU	VU	PMST	Tuberous, perennial, herb, 0.3-0.6 m high. Fl. yellow & brown, Sep to Oct.	Brown loamy clay. Winter-wet swamps, in shallow water.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Pultenaea pauciflora	VU	VU	PMST; ALA	Dense, much-branched shrub, to 0.8 m high. Fl. yellow, Oct to Nov.	Sandy & clay lateritic soils. Undulating country.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Andersonia bifida	-	P2	ALA	Compact shrub, ca 0.3 m high. Fl. white-cream-yellow, Sep to Dec or Jan.	Sandy clay loam, sandy loam. Granite outcrops	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Andersonia carinata	-	P2	ALA	Erect slender shrub, 0.1-0.45(-0.8) m high. Fl. pink/pink-white/pink-purple, Aug to Oct	White sand, gravelly lateritic soils. Plains.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

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Species	Conservation status		Source	Description	Habitat	Likelihood Rating	
	EPBC Act	BC Act / DBCA				Pre-Survey	Post survey
Stylidium tylosum	-	P2	ALA	Caespitose perennial, herb, 0.06-0.13 m high, Fl. yellow, Oct to Nov	Sandy clay. Hillslopes, or adjacent to granite outcrops. Open woodland, shrubland	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Acacia brachyphylla var. *recurvata*	-	P3	ALA	Spreading to upright rounded shrub, 0.2-0.6(-0.9) m high. Fl. yellow, Jun to Oct.	Sand, loam, gravelly soils.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Acacia lanei	-	P3	ALA	Spreading shrub, 1.5-2.3 m high. Fl. yellow, Jul to Sep. Clay, clay loam, gravelly loam	Along drainage lines & creeks.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Anthotium odontophyllum	-	P3	ALA	Perennial, tufted clonal herb, 0.05-0.08 m high. Fl. white-cream, Nov to Dec.	Sandy, clay or loamy soils over laterite. Eucalypt woodland over low heath.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Synaphea platyphylla	-	P3	ALA	Caespitose shrub. Fl. yellow, Sep to Oct.	Sandy loam.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Caladenia x triangularis	-	P4	ALA	Tuberous, perennial, herb.	Lowish undulating heavy loam country	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Gastrolobium ovalifolium	-	P4	ALA	Prostrate, spreading shrub, to 0.1 m high. Fl. orange & purple & yellow & red, Aug to Sep.	Sandy clay. Gravelly hills.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Gastrolobium stipulare	-	P4	ALA	Erect, leafy shrub, to 0.5 m high. Fl. yellow&red&brown, Sep.	Yellow-grey sand, gravelly clay loam, laterite. Slopes, ridges.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

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Species	Conservation status		Source	Description	Habitat	Likelihood Rating	
	EPBC Act	BC Act / DBCA				Pre-Survey	Post survey
Gastrolobium tomentosum	-	P4	ALA	Weak, decumbent, often clumped shrub, to 1 m high. Fl. orange & purple & red, Aug to Nov	Gravelly loam or clay, sometimes over sandier substrates. Hills, roadverges.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Xanthorrhoea brevistyla	-	P4	ALA	Perennial tree-like monocot, to 3.5 m high,. Fl. white, Oct to Dec	Sand, clay, laterite.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

Appendix G Ecological communities likelihood of occurrence assessment

Community ID	Community name	Conservation status		Source	Description	Likelihood rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
Wheatbelt woodlands	Eucalypt Woodlands of the Western Australian Wheatbelt	CR	P3	PMST	The community occurs in the IBRA Avon Wheatbelt 1 and 2 and Western Mallee subregions. It also includes outlying patches in the eastern parts of JAF01 Northern Jarrah Forest and JAF02 Southern Jarrah Forest adjacent to the Avon Wheatbelt, that are off the Darling Range, and receive less than 600 mm mean annual rainfall. The structure of the ecological community is a woodland in which the minimum crown cover of the tree canopy in a mature woodland is 10%. The key dominant or co-dominant species of the tree canopy are species of Eucalyptus trees that typically have a single trunk. Native understorey is present but is of variable composition, being a combination of grasses, other herbs and shrubs.	**Unlikely** Survey area occurs within within feature area. However >95% of the survey area is cleared with the remander comprising plantation and/or remnant trees.	**Does Not Occur**

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Appendix H Fauna likelihood of occurrence assessment

Species	Common name	Conservation status		Source	Habitat	Likelihood Rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
Calidris ferruginea	Curlew Sandpiper	CR; MI	CR	PMST	Mainly occurs around intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes, and lagoons near the coast. Roosting has been recorded on occasion near ponds in saltworks and sewage farms	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Zanda baudinii	Baudin's cockatoo	EN	EN	PMST	Predominantly occurs in eucalypt forests, especially Jarrah, Marri and Karri forests. Foraging occurs at all levels of the forest (from canopy to the ground), often feeding in the understorey on proteaceous trees and shrubs, especially Banksias and in orchards.	**Unlikely** Suitable habitat unlikely to occur. Survey area is outside the modelled distribution of this species	**Unlikely** No suitable habitat present.
Zanda latirostris	Carnaby's cockatoo	EN	EN	PMST	Carnaby's Cockatoo is endemic to, and widespread in, the south-west of Western Australia. It occurs from the wheatbelt, in areas that receive between 300 and 750 mm of rainfall annually, across to wetter regions in the extreme south-west, including the Swan Coastal Plain and the southern coast. Its range extends from Cape Arid in the south-east to Kalbarri in the north, and inland to Hatter Hill, Gibb Rock, Narembeen, Noongar, Wongan Hills, Nugadong, near Perenjori, Wilroy and Nabawa. Carnaby's Cockatoo occurs in uncleared or remnant native eucalypt woodlands, especially those that contain salmon	**Potential** The survey area occurs within the known breeding range of Carnaby's Cockatoo.	**Potential** Foraging and roosting species occur at low densities

Species	Common name	Conservation status		Source	Habitat	Likelihood Rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
					gum and wandoo, and in shrubland or kwongan heathland dominated by hakea, dryandra, banksia and grevillea species. It also occurs in remnant patches of native vegetation on land otherwise cleared for agriculture. The species forages seasonally in pine plantations in areas that receive high rainfall, e.g. the Swan Coastal Plain and around the Perth metropolitan area on both native and non-native plants, such as liquid amber. It also forages in forests containing marri, jarrah or karri.		
Myrmecobius fasciatus	Numbat	EN	EN	PMST	Previously widespread in arid and semi-arid Australia, the species is now restricted to two isolated wild populations in south-west Western Australia (Dryandra Woodland [150 km south-east of Perth] and the Upper Warren area [including Tone-Perup Nature Reserve, Greater Kingston National Park and adjoining State Forest] and a number of translocations to predator proof locations.	**Unlikely** Species only occurs in two isolated wild populations.	**Unlikely** No suitable habitat present.
Aphelocephala leucopsis	Southern Whiteface	VU	-	PMST	Wide range of open woodlands and shrublands where there is an understorey of grasses or shrubs, or both. These areas are usually in habitats dominated by acacias or eucalypts on ranges, foothills and lowlands, and plains.	**Unlikely** Survey area occurs within within 'may occur' distribution. Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

Species	Common name	Conservation status		Source	Habitat	Likelihood Rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
Calidris acuminata	Sharp-tailed Sandpiper	VU; MI	MI	PMST	Utilises fresh and hypersaline environments, feeding along the edge of water on mudflats, coastal and inland wetlands, and sewage ponds	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Calyptorhynchus banksii naso	Forest Red-tailed Black-Cockatoo, Karrak	VU	VU	PMST	The Forest Red-tailed Black Cockatoo inhabits the dense jarrah, karri (Eucalyptus diversicolor) and marri forests receiving more than 600 mm average rainfall annually. Although most records are in jarrah-marri forests, the subspecies has been observed in a range of other forest and woodland types, including blackbutt (E. patens), wandoo (E. wandoo), tuart (E. gomphocephala), Albany blackbutt (E. staeri), yate (E. cornuta) and flooded gum	**Potetnial** Survey area occurs within the 'may occur' modelled distribution map	**Potential** Foraging species occur at low densities
Falco hypoleucos	Grey Falcon	VU	VU	PMST	It prefers timbered lowland plains (especially those that are acacia-dominated) which are interspersed with tree-lined watercourses. The majority of its habitat has an average rainfall of less than 500 mm but frequents other habitats including grassland and sand dune habitats.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

Species	Common name	Conservation status		Source	Habitat	Likelihood Rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
Leipoa ocellata	Malleefowl	VU	VU	PMST	Occurs in scrubland and woodland dominated by mallee and wattle species. In Western Australia they are also found in some shrublands dominated by acacia, and occasionally in woodlands dominated by eucalypts such as Wandoo E. wandoo, Marri Corymbia calophylla and Mallet E. astringens.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Dasyurus geoffroii	Chuditch	VU	VU	PMST	Inhabits a variety of different habitat types including rocky outcrops, eucalypt forests and woodlands, sandy lowlands, beaches, shrubland, grasslands and deserts. Predominantly though, rocky areas provide denning habitat and foraging is predominantly done within nearby grasslands and creek lines.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Macrotis lagotis	Greater Bilby	VU	VU	PMST	Remaining populations of the greater bilby occupy three main habitats: open tussock grassland on uplands and hills, Acacia aneura (mulga) woodland/shrubland growing on ridges and rises, and hummock grassland in plains and alluvial areas	**Unlikely** Suitable habitat unlikely to occur	**Does not occur**

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Species	Common name	Conservation status		Source	Habitat	Likelihood Rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
Phascogale calura	Red-tailed Phascogale	VU	CD	PMST	Largely confined to woodlands with old-growth hollow-producing eucalypts, particularly Wandoo (Eucalyptus wandoo) and York gum (E. loxophleba), often with associated rock sheoak (Allocasuarina huegeliana), but has also been recorded in shrublands and various mosaics of woodland, shrubland and scrub-heath	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Apus pacificus	Fork-tailed swift	MI	MI	PMST	In Australia, they mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea. They also occur over settled areas, including towns, urban areas and cities. They mostly occur over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland or saltmarsh. They are also found at treeless grassland and sandplains covered with spinifex, open farmland and inland and coastal sand-dunes.	**Unlikely** This species can occupy a wide range of habitat types, however is almost exclusively aerial, including foraging. This species is therefore unlikely to utilise the survey area.	**Unlikely** No suitable habitat present.
Motacilla cinerea	Grey Wagtail	MI	MI	PMST	This species inhabits fast-flowing mountain streams and rivers with riffles and exposed rocks or shoals, often in forested areas. It is also found in more lowland watercourses, even canals, where there are artificial waterfalls, weirs, millraces or lock gates. Outside of the breeding season it occupies a wider variety of habitats, including farmyards, sewage farms, forest tracks, tea estates and even town centres.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

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Species	Common name	Conservation status		Source	Habitat	Likelihood Rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
Actitis hypoleucos	Common sandpiper	MI	MI	PMST	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats. Generally the species forages in shallow water and on bare soft mud at the edges of wetlands; often where obstacles project from substrate, e.g. rocks or mangrove roots.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Calidris melanotos	Pectoral sandpiper	MI	MI	PMST	In Australasia, the Pectoral Sandpiper prefers shallow fresh to saline wetlands. The species is found at coastal lagoons, estuaries, bays, swamps, lakes, inundated grasslands, saltmarshes, river pools, creeks, floodplains and artificial wetlands.	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.
Notamacropus irma	western brush wallaby	-	P4	PMST	Inhabits open forest or woodland, particularly favouring open, seasonally wet flats with low grasses and open scrubby thickets. It is also found in some areas of mallee and heathland, and is uncommon in karri forest..	**Unlikely** Suitable habitat unlikely to occur	**Unlikely** No suitable habitat present.

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Species	Common name	Conservation status		Source	Habitat	Likelihood Rating	
		EPBC Act	BC Act / DBCA			Pre-Survey	Post survey
Isoodon fusciventer	Quenda, southwestern brown bandicoot	-	P4	PMST	Inhabits scrubby, often swampy, vegetation with dense cover up to 1 m high, often feeds in adjacent forest and woodland that is burnt on a regular basis and in areas of pasture and cropland lying close to dense cover. Populations inhabiting Jarrah and Wandoo forests are usually associated with watercourses.	**Potential** Suitable habitat may occur	**Unlikely** No suitable habitat present.
Falco peregrinus	Peregrine falcon	-	OS	PMST	The Peregrine Falcon is found in most habitats, from rainforests to the arid zone, and at most altitudes, from the coast to alpine areas. It requires abundant prey and secure nest sites, and prefers coastal and inland cliffs or open woodlands near water in trees with old rave or Wedge-tailed Eagle nests, and may even be found nesting on high city buildings	**Potential** This species can occupy a wide range of habitat types	**Unlikely** Potential foraging habitat present within the survey area however no potential nest sites.

Appendix I Species by relevé matrix

Family	Species	Conservation Status		Relevés		
		EPBC Act	BC Act / DBCA	REL01	REL02	REL03
Asteraceae	**Arctotheca calendula*			X	X	
	**Hypochaeris glabra*			X	X	X
	**Sonchus oleraceus*					X
	**Ursinia anthemoides*			X		
Brassicaceae	**Raphanus raphanistrum*			X		
Casuarinaceae	*Casuarina obesa*					X
Fabaceae	**Chamaecytisus palmensis*			X		
	**Trifolium arvense*			X		X
	**Trifolium glomeratum*					X
Geraniaceae	**Erodium botrys*					X
Myrtaceae	*Corymbia calophylla*			X		
	Eucalyptus camaldulensis subsp. *camaldulensis*				X	X
	Eucalyptus occidentalis					X
	#*Eucalyptus sargentii* subsp. *onesis*		P3			X
	Eucalyptus spathulata subsp. *spathulata*					X
	Eucalyptus wandoo					
Orchidaceae	**Disa bracteata*					X
Poaceae	**Avena barbata*			X	X	X
	**Bromus diandrus*			X	X	X
	**Ehrharta calycina*			X	X	X
	**Lolium perenne*			X	X	X
	**Vulpia bromoides*			X	X	X
Polygonaceae	**Rumex acetosella*			X		

Planted trees for dryland salinity management

Appendix J Relevé data

Site name	Date	Site type	Observer
REL01	16/11/2023	Relevé	JC
Vegetation condition	**Disturbance notes**	**Age since fire (years)**	**Vegetation type**
Degraded	Weeds, grazing, tracks	Old (>20)	*Corymbia calophylla* low isolated clumps of trees over mixed weeds
Habitat description	**Landform unit**	**Aspect**	**Slope %**
Remnant Marri trees	Flat	N/A	0
Soil colour	**Soil type**	**Rock type**	**Outcropping (%)**
Grey/ Brown	Sandy Loam with light clay	Laterite	0%
Easting		**Northing**	
518219		6352824	



Site name	Date	Site type	Observer
REL02	16/11/2023	Relevé	JC
Vegetation condition	**Disturbance notes**	**Age since fire (years)**	**Vegetation type**
Completely Degraded	Plantation	Old (>20)	Plantation (*Eucalyptus camaldulensis*)
Habitat description	**Landform unit**	**Aspect**	**Slope %**
Red gum plantation	Flat	N/A	0
Soil colour	**Soil type**	**Rock type**	**Outcropping (%)**
Grey	Sandy Loam with light clay	N/A	0
Easting		**Northing**	
518244		6352875	



Site name	Date	Site type	Observer
REL03	16/11/2023	Relevé	JC
Vegetation condition	**Disturbance notes**	**Age since fire (years)**	**Vegetation type**
Completely Degraded	Plantation	Old (>20)	Plantation (Mixed *Eucalyptus* spp. and *Casuarina obesa*)
Habitat description	**Landform unit**	**Aspect**	**Slope %**
Plantation, mixed species	Flat	N/A	0
Soil colour	**Soil type**	**Rock type**	**Outcropping (%)**
Grey	Sandy Loam with light clay	N/A	0
Easting		**Northing**	
518326		6353059	



Appendix K Fauna list

	Common name	Species name	Sign
Aves	Kookaburra	*Dacelo novaeguineae*	Direct
	Australian raven	*Corvus coronoides*	Direct
	Australian magpie	*Gymnorhina tibicen*	Direct
	Magpie-Lark	*Grallina cyanoleuca*	Direct
	Brown honeyeater	*Lichmera indistincta*	Direct
	Grey fantail	*Rhipidura albiscapa*	Heard
	Weebill	*Smicrornis brevirostris*	Heard
	Striated Pardalote	*Pardalotus striatus*	Direct
	Western Spinebill	*Acanthorhynchus superciliosus*	Heard
	Silvereye	*Zosterops lateralis*	Heard
Mammal	Western Grey Kangaroo	*Macropus fuliginosus*	Scats
	European rabbit	**Oryctolagus cuniculus*	Scats
	Red fox	**Vulpes vulpes*	Tracks
Reptile	Western shingleback (bobtail)	*Tiliqua rugosa* subsp. *rugosa*	Direct

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Appendix L Black cockatoo potential breeding trees recorded within the survey area

Tree ID	Common name	Species name	DBH (cm)	Nest and/or hollow rank	Foraging evidence	Easting	Northing	Tree Photo
T1	Wandoo	*Eucalyptus wandoo*	Stem 1: 49 Stem 2: 37 Stem 3: 32	4	None	518468	6352520	
T2	River red gum	*Eucalyptus camaldulensis*	Stem 1: 37.5 Stem 2: 36 Stem 3: 61.5	4	None	518512	6353018	

Tree ID	Common name	Species name	DBH (cm)	Nest and/or hollow rank	Foraging evidence	Easting	Northing	Tree Photo
T3	River red gum	*Eucalyptus camaldulensis*	Stem 1: 81 Stem 2: 63	4	None	518329	6352824	
T4	Marri	*Corymbia calophylla*	Stem 1: 52	4	None	518234	6352824	

Tree ID	Common name	Species name	DBH (cm)	Nest and/or hollow rank	Foraging evidence	Easting	Northing	Tree Photo
T5	Marri	*Corymbia calophylla*	Stem 1: 120	4	None	518255	6352704	



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Appendix K

Correspondence – EPWA

GOVERNMENT OF WESTERN AUSTRALIA

Department of **Energy, Mines, Industry Regulation and Safety**
Energy Policy WA

Our Ref: A85260193

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To whom it may concern

PROPOSED BATTERY ENERGY STORAGE SYSTEM (BESS) AT NARROGIN

Thank you for the providing Energy Policy WA (EPWA) with the opportunity to comment on the proposed 200 megawatt/800 megawatt-hour (MW/MWh) Battery Energy Storage System (BESS) under development by South Energy in the Shire of Narrogin.

EPWA supports private investment in energy generation and storage, with projects to be developed on a commercial basis under the legislative and market frameworks for electricity supply in the South West Interconnected System (SWIS), while meeting all other relevant State and Federal legislative requirements.

The Australian Energy Market Operator's (AEMO) 2024 *Wholesale Electricity Market (WEM) Electricity Statement of Opportunities* highlights a need for new capacity in the SWIS from 2027 onwards. This is due to the planned retirement of coal fired power stations and expected growth in peak demand and electricity consumption due to electrification and new industries.

EPWA understands that the intent is for the BESS facility to operate in the WEM. Significant changes have been made to the WEM Rules to accommodate Electric Storage Resources in recent years, acknowledging the valuable contribution these facilities can provide as the SWIS transitions to a decarbonised electricity supply. This includes the ongoing work of the Market Advisory Committee and work such as the Reserve Capacity Mechanism Review and the WEM Investment Certainty Review; to ensure the WEM keeps pace with the energy transition.

In addition, the WEM allows for all proponents, including BESS facilities, to apply to become accredited and participate in the frequency co-optimised essential system services (FCESS) markets. These markets allow facilities that can provide services such as Regulation and Contingency Reserve to apply to become accredited and be dispatched (and compensated) for these services through the WEM.

In addition, the WEM Rules allow Western Power to procure Network Control Services through a separate Non-Cooptimised Essential System Services (NCESS) Framework. Both frameworks have been designed to be technology agnostic - they require a service to be defined by its technical parameters without preference for the type of facility that provides it. This ensure services are provided at least cost while meeting system needs.

South Energy should continue to engage with Western Power about the availability of network capacity at their proposed connection point. The level of network congestion at their proposed connection point will have implications for eligibility for Capacity Credits (a key source of revenue for WEM participants) and may have implications for other revenues in the WEM.

EPWA also notes that, while South Energy has provided some information relating to community engagement and proposed community benefits, the Shire of Narrogin is separately advocating for greater coordination between project proponents to deliver "legacy" assets such as housing, roads, or other long-lived infrastructure[1] through the delivery of projects.

EPWA does not have a regulatory approval role. However, EPWA encourages South Energy to engage the relevant regulatory agencies, particularly Western Power and AEMO, and with the Shire of Narrogin and local community stakeholders as the development of this project is progressed.

Yours sincerely



Jai Thomas
COORDINATOR OF ENERGY

5 December 2024

[1] Wheatbelt local governments are frustrated by lack of guidance from State Government about renewable projects | The West Australian



ghd.com

→ The Power of Commitment

State Government Agency	Submission Summary	Applicants Response	Officers Comments
Department of Water and Environmental Regulation	**Wastewater:** On-site domestic wastewater must consider the Government Sewerage Policy (WAPC 2019), including buffers from watercourses and riparian vegetation.	Sewage and Used Water Management during construction and operation will be addressed as part of the detailed design, construction, and Environmental Management Plans. These plans, along with any other plans related to the construction phase, will be developed by the EPC as part of the pre-mobilization plan and during the engineering design process.	Noted, the concerns raised can be addressed through a condition of approval, refer to condition 5.
	Water Supply: The proposed water source for construction, workforce accommodation, and operational needs (e.g. firefighting) should be proven to the satisfaction of the local government.	Water supply for various uses will be addressed as part of the Construction and Environmental Management Plans. These plans, along with any other plans related to the construction and operational phase, will be developed by the EPC as part of the pre-mobilization plan and during the engineering design process.	Noted.
	Watercourse Crossings: A permit may be required for works on the bed or banks of a watercourse under the Rights in Water and Irrigation Act 1914.	SE (South Energy Applicant) conducted both feature and easement surveys (find the attached survey file) and BYDA check that confirmed no presence of any watercourse, except for the water dam owned by Western Power, located on the northeast side of the WP substation. No construction works are expected to cross this dam or fall within the dam easement.	Noted.
	Native Vegetation: Clearing is not proposed. If clearing is later required, a clearing permit under the Environmental Protection Act 1986 may be necessary.	Although SE is not proposing clearing, SE engaged GHD to conduct an EPBC Self-Assessment to explore removing existing vegetation on the site, including remnant Eucalyptus camaldulensis trees and plantation areas, mixed Eucalyptus spp. and Casuarina obesa plantation areas, and a remnant Corymbia calophylla tree. It is noted that as per the EPBC / NVCP memo advice the three isolated trees located centrally within the site (being the two E. camaldulensis and one Corymbia Calophylla), it will meet Regulation 5, Item 19 (clearing of isolated trees) of the CNV Regulations, and an NVPC will not be required. SE is sharing the EPBC / NVCP memo advice for info.	Noted. This can be addressed by condition of approval.
	Sediment Management: Should be addressed in both the Stormwater Management Plan and the Construction and Environmental Management Plan.	This will be addressed as part of the Construction and Environmental Management Plans. These plans, along with any other plans related to the construction phase, will be developed by the EPC as part of the pre-mobilization plan.	Yes, a condition of approval to include a CEMP refer to condition 5.
	Acoustic Report: The Environmental Noise Assessment (Lloyd George Acoustics, 24/10/24) has not been assessed by DWER, as no request for assessment was confirmed.	GHD assisted SE in conducting a noise assessment for the site. With the technological development of noise controls offered by battery suppliers, SE would consider these for the Narrogin BESS site.	The Shire of Narrogin EHO's team has reviewed and assessed and is satisfied with the report.

State Government Agency	Summary of Submission	Applicants Response	Officer Comment
Department of Water and Environmental Regulation	**Domestic Wastewater:** On-site domestic wastewater must consider the Government Sewerage Policy (WAPC 2019), including buffers from watercourses and riparian vegetation.	Sewage and Used Water Management during construction and operation will be addressed as part of the detailed design, construction, and Environmental Management Plans. These plans, along with any other plans related to the construction phase, will be developed by the EPC as part of the pre-mobilization plan and during the engineering design process.	Noted. This matter can be addressed through the Construction and Environmental Management Plan. Refer to condition 5.
	Water Supply: The proposed water source for construction, workforce accommodation, and operational needs (e.g. firefighting) should be proven to the satisfaction of the local government Note: If it is intended to take groundwater and further advice is required, please contact our Water Licensing.	Water supply for various uses will be addressed as part of the Construction and Environmental Management Plans. These plans, along with any other plans related to the construction and operational phase, will be developed by the EPC as part of the pre-mobilization plan and during the engineering design process.	Noted. Responsibility for verifying supply suitability rests with the local government. No objections raised.
	Watercourse Crossings: A permit may be required for works on the bed or banks of a watercourse under the Rights in Water and Irrigation Act 1914. The subject property is located within a 'non-proclaimed' area for surface water under the Rights in Water and Irrigation Act 1914, however interference of the watercourse (such as the construction of a dam or crossing, or excavation of the watercourse) may require a permit to interfere with the bed or banks from the department. To determine if a permit is required the following guide may be used do-I-need-a-permit-to-interfere-with-bed-and-banks-of-a-watercourse.pdf.	SE conducted both feature and easement surveys (find the attached survey file) and BYDA check that confirmed no presence of any watercourse, except for the water dam owned by Western Power, located on the northeast side of the WP substation. No construction works are expected to cross this dam or fall within the dam easement.	Noted. No crossing works are proposed within the dam easement. Any future work will be subject to standard permits. No further action required at this stage.
	Native Vegetation: Clearing is not proposed. If clearing is later required, a clearing permit under the Environmental Protection Act 1986 may be necessary.	Although SE is not proposing clearing, SE engaged GHD to conduct an EPBC Self-Assessment to explore removing existing vegetation on the site, including remnant Eucalyptus camaldulensis trees and plantation areas, mixed Eucalyptus spp. and Casuarina obesa plantation areas, and a remnant Corymbia calophylla tree. It is noted that as per the EPBC / NVCP memo advice the three isolated trees located centrally within the site (being the two E. camaldulensis and one Corymbia Calophylla), it will meet Regulation 5, Item 19 (clearing of isolated trees) of the CNV Regulations, and an NVPC will not be required. SE is sharing the EPBC / NVCP memo advice for info.	Noted. The applicant has advised that clearing is not proposed. If required, the clearing permit process will apply as per advice note 5.
	Sediment Management: Should be addressed in both the Stormwater Management Plan and the Construction and Environmental Management Plan.	This will be addressed as part of the Construction and Environmental Management Plans. These plans, along with any other plans related to the construction phase, will be developed by the EPC as part of the pre-mobilization plan.	Noted, refer to condition 5.
	Acoustic Report: The Environmental Noise Assessment (Lloyd George Acoustics, 24/10/24) has not been assessed by DWER, as no request for assessment was confirmed.	GHD assisted SE in conducting a noise assessment for the site. With the technology development of noise controls offered by battery suppliers, SE would consider these for the Narrogin BESS site.	Noted. DWER did not assess the report. The Shire's Environmental Health Officers have reviewed the Acoustic Assessment and advised that it is satisfactory.

State Government Agency	Summary of Submission	Applicants Response	Officers Comment
Water Corporation	**Water Supply:** The property is serviced by a 20mm Non-Standard Service located on Mellons Road.	Site Water Supply during construction and operation should be addressed as part of the detailed design, construction, and Environmental Management Plans. These plans, along with any other plans related to the construction phase, will be developed by the EPC as part of the pre-mobilization plan and during the engineering design process.	Noted. No objection raised. Responsibility for verifying water availability rests with the applicant.
	Wastewater: No reticulated sewerage is available to the lot.	Sewage and Used Water Management during construction and operation will be addressed as part of the detailed design, construction, and Environmental Management Plans. These plans, along with any other plans related to the construction phase, will be developed by the EPC as part of the pre-mobilization plan and during the engineering design process.	Noted. No connection to Water Corporation infrastructure proposed. Management of wastewater can be addressed via condition 5.
	Approval Near Assets: Any works near Water Corporation assets must receive prior approval via an Asset Protection Risk Assessment (APRA). Guidance is available on their website. To assess whether the proposed development will require an APRA, details of the Prescribed Proximities are available on our website: www.watercorporation.com .au/Developing-and-building/Working-near-assets/ Approval-for-works.	SE conducted both feature and easement surveys (find the attached survey file) and BYDA check that confirmed no presence of any water pipes on the site.	Noted. No Water Corporation assets identified on the site. No further action required.
State Government Agency	**Submission Summary**	**Applicant Response**	**Officer Comment**
Main Roads WA	No objection. Developer to liaise with Main Roads Heavy Vehicle Services for Over Size Over Mass (OSOM) movements.	Due to an internal administrative oversight, the referral submission from Main Roads WA was not initially allocated to the assessing officer's records. A document search on 22 April 2025 identified the correspondence, which was then provided to the officer and noted. As the submission raised no objections and only procedural advice regarding OSOM vehicle movements, no applicant response was required.	No objection. Standard OSOM coordination required, as per condition 18.
State Government Agency	**Submission Summary**	**Applicant Response**	**Officer Comment**
Department of Fire & Emergency Services (DFES)	**Vegetation Classification** Vegetation within Plot 3 (particularly the area adjacent to Plot 1) cannot be substantiated as Class B Woodland in its entirety with the limited information and photographic evidence provided. It appears to be contiguous with Plot 1 and the foliage cover exceeds 30%. The BMP should detail specifically how the Class B Woodland classification was derived as opposed to Class A Forest. If unsubstantiated, the vegetation classification should be revised to consider the vegetation at maturity as per AS3959, or the resultant BAL ratings may be inaccurate. Action: Modification to the BMP is required.	The applicant has provided an updated BMP Report. Applicant maintains Class B is appropriate, citing distance (>100m) from assets and canopy structure.	The response provides technical justification, though DFES endorsement is recommended prior to commencement, condition 8 requests that prior to operation the report is referred to the Shire of Narrogin.

	Vegetation Management: There are areas classified as Class G Grassland which are excluded in the post development scenario. The BAL contours and determined BAL ratings rely on the active management of these areas to low threat until Stages 2 and 3 are developed. The decision maker should be satisfied that there is an enforceable mechanism to ensure the current vegetation classifications, and/or exclusions, are maintained as such to achieve the radiant heat levels relied upon for the areas calculated as either an APZ or 10kw/m2. Action: The decision maker to be satisfied with the vegetation management proposed.	APZ maintenance will be enforced by operator. APZ and exclusions detailed in updated BMP (Appendix A, Table 6).	Applicant has provided an amended BMP report.
	Method 2: The BAL Contour Map denotes areas of 10Kw/m2, at both 1090k and 1200k temperatures. No Method 2 calculation to support these contours has been provided in the BMP. The BMP states that a Method 2 is not required to demonstrate compliance with the Bushfire Protection Criteria, however SPP 3.7 does not adequately consider renewable energy facilities. Reducing the radiant heat level to the level able to be withstood by the weakest component of the critical infrastructure should be demonstrated in the BMP. **Action:** Modification to the BMP is required.	Method 2 calculations included in updated BMP. Prepared in line with CFA REF Guidelines.	No change.
	Consultation: If an approval is granted, the DFES District Officer responsible for this region and the local fire and emergency services should be consulted during the development, construction, and leading up to the commissioning of the facility. It is considered critical for the local fire and emergency services to understand the hazards present in the facility and the measures required to ensure the safety of firefighting personnel when working in or around different parts of the facility. This may impact on how crews respond to a fire within the facility, which may in turn have ramification regarding the optimal number and location of water supplies.	Applicant agrees and supports early engagement.	Noted. Application should be referred to the Shire of Narrogin Local Volunteer Bushfire Brigade.
	Risk Management Plan: A Risk Management Plan (RMP) that describes the infrastructure and risk and hazards on site has not been provided. A RMP is considered to be a critical requirement of planning to inform fire risk management in the design and operation of facilities. As per the REF Guidelines: a Risk Management Plan describes the risk management process and its outcomes, including the specific site hazards/risks and their analysis, control measures, and the monitoring and review process. The RMP should inform the design	The applicant states a site-specific RMP will be prepared prior to commissioning, by a specialist.	Noted, a condition of approval will require that a RMP to be provided to the satisfaction to the Shire of Narrogin and DFES.

	of the facility.		
	Siting and Design: A2.1b and A2.2 – not demonstrated: The BAL ratings cannot be validated for the reason(s) outlined in the above table. Furthermore, evidence is required that the proposal meets the separation distance requirements (whichever is greater) to ensure: a) that radiant heat from a nearby bushfire will not trigger a failure in the infrastructure (whatever the most susceptible component is); and b) that radiant heat emitted from a failure in infrastructure should be used to inform the minimum separation distance required (i.e. radiant heat level that the weakest component can withstand) and provided to demonstrate compliance. Sufficient evidence in the form of technical specifications and/or standards should be provided. If the determined radiant heat level includes the Method 2 calculation to support the 10 Kw/m2 lines as shown on the BAL Contour Map, Method 2 should be provided in the BMP. A BAL Contour depicting the radiant heat level of 10KW/m2 at a flame temperature of 1200k has been provided to show the radiant heat impact of the O&M building. The BMP states that this flame temperature is used for determining the location of an onsite shelter. It is noted in the BMP that a radiant heat level of 10KW/m2 at a flame temperature of 1200k is only one compliant factor of an onsite shelter and the building is should only be used as a last resort when it is unsafe to evacuate, however the contour line is unable to be validated as the Method 2 calculation has not been provided in the BMP. Modification to the BMP required.	Method 2 data now included. Separation and radiant heat thresholds addressed in revised BMP	No change.
	Water Supply: A4.1 – not demonstrated: The location of the proposed water tanks is unknown, they are not shown on the BAL Contour Map. DFES notes that water tanks and adjacent hard standings should be provided in areas of BAL-29.It is recommended that the water tanks and adjacent hard standing areas are clearly detailed on plans to ensure that all standards can be met. Modification to the BMP is required.	Figure 6 updated with tank locations; 4 of 6 tanks are within BAL-29 or BAL-19.	No change.
	DFES Internal Consultation: The proposal was referred internally to the Special Operations branch of DFES, however due to the impact of the high-threat period on resources, no response could be provided within the referral timeframe. If any responses are received, they will be forwarded to the decision maker. Recommendation – compliance with acceptable solutions not demonstrated – modifications required It is considered critical the bushfire management measures within the BMP are modified to ensure they are accurate and can be implemented to reduce the vulnerability of the	Applicant has acknowledged DFES internal consultation.	Noted. No change.

	development to bushfire. The proposed development has not demonstrated compliance with the following: 1. Element 2: Siting and Design, and 2. Element 4: Water Supply. Further information is also required to demonstrate compliance with the Victorian Country Fire Authority REF Guidelines, taken to be best practice. As this planning decision is to be made by the Development Assessment Panel please forward notification of the decision to DFES for our records.		

Public Submission	Submission Summary	Applicant Response	Officer Comment
Submission 1	1. The property is the closest residence to the proposed development, located ~20m from the eastern boundary. Maps in the DAP application fail to identify or show the house, which raises concerns about the accuracy of impact assessments. 2. The proposed 20m setback is considered inadequate given proximity to a dwelling. A 50m setback is requested in this location to increase total separation distance. 3. Objection raised to use of the internal easement track for construction access adjacent to the property. The track is unsealed, currently acts as a visual/sound buffer, and its use would impact amenity, noise, dust, privacy, and create access conflicts with the submitter's driveway. 4. Concerns raised that recent clearing along Parks Road (for fence installation) has reduced screening vegetation assumed in the Glint & Glare Assessment, requiring updated assessment and possible mitigation. 5. Concern that road maintenance responsibilities for Parks and Contine Roads are not addressed, despite expected heavy traffic during construction.	The submission refers to the solar farm component of the broader development. The BESS is located in a different area and does not adjoin the submitter's property. Concerns such as construction access and glare do not apply to the BESS.	The submission refers to a separate DAP application (solar farm) located near the submitter's residence and does not relate to the subject BESS proposal. The concerns raised are not applicable to the Narrogin BESS site and therefore are not considered valid planning matters for this assessment.
Submission 2	No objections to the proposal in support.	Noted.	Noted.
Submission 3			

	1. Objects to renewable energy projects using productive agricultural land, stating it undermines local harmony and integrity of renewable energy companies. 2. Concern about water runoff from solar panel compaction on higher ground flowing onto neighbouring farm lots, making them difficult to farm. 3. Fire management and chemical use must be tightly controlled to prevent runoff or impacts to neighbouring land. 4. Liability concern if a fire starts on their property and spreads to the solar farm, especially given differing insurance coverage levels. 5. Electromagnetic Fields (EMF) may impact animal health and GPS systems; effects are uncertain. 6. Requests more than a 20m setback from internal boundaries, noting unfairness in applying 50m only to highway boundaries. 7. Concern about land devaluation and resale impacts. 8. Glint and glare from panels may affect a newly purchased house near Parks Road; mitigation required. 9. Objection to the proposal proceeding in its current form due to lack of consultation and perceived negative community impacts.	The submission refers to the solar farm component of the broader development. The BESS is located in a different area and does not adjoin the submitter's property. Concerns such as construction access and glare do not apply to the BESS.	The submitter was notified as part of the advertising process for the BESS proposal due to the property's proximity to the site. However, the submission appears to conflate this application with another DAP application within the Shire of Narrogin which was advertised at the same time, the other application was a solar farm proposal. The matters raised—including EMF, GPS disruption, land devaluation, and setbacks—do not relate to the subject BESS application and are not supported by valid planning grounds. The Narrogin BESS is a standalone battery storage development, not a solar energy generation facility.

Tuesday, 15 April 2025

Our Ref: A23.166-LRP-BMPRES_1_FINAL

Tarek Osman
South Energy, on behalf of
Narrogin BESS Development Pty Ltd

WESTERN ENVIRONMENTAL

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SUBJECT: RESPONSE TO DFES COMMENTS ON BUSHFIRE MANAGEMENT PLAN DEVELOPMENT APPLICATION: NARROGIN BATTERY ENERGY STORAGE SYSTEM

Western Environmental Approvals Pty Ltd (WEPL) has prepared this response to comments provided by the Department of Fire and Emergency Services (DFES) regarding the Bushfire Management Plan (BMP) prepared to accompany the Development Application for Narrogin Battery Energy Storage System, proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley (the subject site).

WEPL has provided the following responses to the comments provided by DFES in Table 1.

Table 1: DFES comments and responses provided by WEPL.

DFES comment	WEPL response
Vegetation Classification Vegetation within Plot 3 (particularly the area adjacent to Plot 1) cannot be substantiated as Class B Woodland in its entirety with the limited information and photographic evidence provided. It appears to be contiguous with Plot 1 and the foliage cover exceeds 30%. The BMP should detail specifically how the Class B Woodland classification was derived as opposed to Class A Forest. If unsubstantiated, the vegetation classification should be revised to consider the vegetation at maturity as per AS3959, or the resultant BAL ratings may be inaccurate.	WEPL acknowledges the DFES comment, however disagrees. WEPL notes that the species of trees within Plot 3 are a different species to those that are present in Plot 1. The trees within Plot 3 are spindly with sparse canopy cover. The understorey structure was open with clear vertical separation of fuels between the grassy understorey and the tree canopies (refer to Photo 6 in the BMP). Regardless of the classification, this plot is more than 100 m from any proposed assets and as such, has no bearing on the determined BAL for any of the proposed assets. WEPL deems Class B Woodland classification appropriate for the vegetation in question.
Vegetation Management There are areas classified as Class G Grassland which are excluded in the post-development scenario. The BAL contours and determined BAL ratings rely on the active management of these areas to low threat until Stages 2 and 3 are developed. The decision maker should be satisfied that there is an enforceable mechanism to ensure the current vegetation classifications, and/or exclusions, are maintained as such to achieve the radiant heat levels relied upon for the areas calculated as either an APZ or 10kW/m2.	WEPL acknowledges the DFES comment. There is an APZ over the site which is under the ownership of the project owner. The APZ is an enforceable mechanism, and the facility operator will need to maintain the vegetation in accordance with this. Vegetation management is discussed as a compliance comment in Appendix A of the BMP as part of the assessment against the CFA Guidelines. The management of vegetation to APZ standards is also included as a management measure in Table 6 of the BMP.

DFES comment	WEPL response
Method 2 The BAL Contour Map denotes areas of 10kW/m2, at both 1090K and 1200K temperatures. No Method 2 calculation to support these contours has been provided in the BMP. The BMP states that a Method 2 is not required to demonstrate compliance with the Bushfire Protection Criteria, however SPP 3.7 does not adequately consider renewable energy facilities. Reducing the radiant heat level to the level able to be withstood by the weakest component of the critical infrastructure should be demonstrated in the BMP.	WEPL acknowledges the DFES comment. It should be noted however, that whilst DFES considers that SPP 3.7 does not adequately consider renewable energy facilities, this is an agency position only, not policy. Regardless, WEPL has adopted what we consider industry best practice and assessed the proposed development against the CFA Design Guidelines and Model Requirements: Renewable Energy Facilities Version 4. The Method 2 calculations have been appended to the updated BMP.
Risk Management Plan A Risk Management Plan (RMP) that describes the infrastructure and risk and hazards on site has not been provided. A RMP is considered to be a critical requirement of planning to inform fire risk management in the design and operation of facilities.	WEPL acknowledges the DFES comment. If deemed necessary, a risk consultant will be engaged to undertake these works prior to commissioning of the facility.
Consultation In the event that an approval is granted, the DFES District Officer responsible for this region and the local fire and emergency services should be consulted during the development, construction and leading up to the commissioning of the facility. It is considered critical for the local fire and emergency services to understand the hazards present in the facility and the measures required to ensure the safety of firefighting personnel when working in or around different parts of the facility. This may impact on how crews respond to a fire within the facility, which may in turn have ramification regarding the optimal number and location of water supplies.	WEPL acknowledges the DFES comment.

DFES comment	WEPL response
Siting and Design <u>A2.1b and A2.2 – not demonstrated</u> The BAL ratings cannot be validated for the reason(s) outlined in the above table. Furthermore, evident is required that the proposal meets the separation distance requirements (whichever is greater) to ensure: a) that radiant heat from a nearby bushfire will not trigger a failure in the infrastructure (whatever the most susceptible component is); and b) that radiant heat emitted from a failure in infrastructure should be used to inform the minimum separation distance required (i.e.) radiant heat level that the weakest component can withstand) and provided to demonstrate compliance. Sufficient evidence in the form of technical specifications and/or standards should be provided. If the determined radiant heat level includes the Method 2 calculation to support the 10 Kw/m2 lines as shown on the BAL Contour Map, the Method 2 should be provided in the BMP. A BAL Contour depicting the radiant heat level of 10KW/m2 at a flame temperature of 1200k has been provided to show the radiant heat impact of the O&M building. The BMP states that this flame temperature is used for determining the location of an onsite shelter. It is noted in the BMP that a radiant heat level of 10KW/m^2 at a flame temperature of 1200k is only one compliant factor of an onsite shelter and the building is should only be used as a last report when it is unsafe to evacuate, however the contour line is unable to be validated as the Method 2 calculation has not been provided in the BMP.	WEPL acknowledges the DFES comment, however disagrees. The Class B Woodland classification is deemed appropriate for the vegetation in question as per the above justification. The Method 2 BAL calculations have been appended to the updated BMP. For these reasons, the BAL ratings can now be validated.
Water Supply <u>A4.1 – not demonstrated</u> The location of the proposed water tanks is unknown, they are not shown on the BAL Contour Map. DFES notes that water tanks and adjacent hard standings should be provided in areas of BAL-29. It is recommended that the water tanks and adjacent hard standing areas are clearly detailed on plans to ensure that all standards can be met.	WEPL acknowledges the DFES comment, however disagrees. Water tanks have been depicted over a BAL contour shown in Figure 6 of the BMP. A water tank is shown at the entry points to the site, as well as next to each BESS. The Guidelines do not state that water tanks need to be situated in areas subject to BAL-29 or lower. Despite this, four of the six 50 kL water tanks have been situated in areas subject to BAL-29 and BAL-19. The locations of the water tanks are considered appropriate within the subject site.

The BMP adequately considers how compliance with the bushfire protection criteria of the Guidelines can be achieved. The proposed development is therefore deemed compliant with SPP 3.7 and the Guidelines and is recommended for approval.

If you wish to discuss any of the matters above, please contact me at daniel.p@westenv.com.au

Regards,



DANIEL PANICKAR
Senior Principal and Partner
Level 3 BPAD Practitioner

Bushfire Management Plan

Development Application: Narrogin Battery Energy Storage System

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Bushfire Management Plan

Development Application: Narrogin
Battery Energy Storage System

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Internal Review

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15-Apr-2025	**22-Nov-2024**	**22-Nov-2024**

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Statement of Limitations

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In particular, it should be noted that this report is based on a scope of services defined by the Client, and is limited by budgetary and time constraints, the information supplied by the Client (and its agents) and, in some circumstances, access and/or site disturbance constraints.

The scope of services did not include any assessment of the title to or ownership of the properties, buildings and structures referred to in this report, or the application or interpretation of laws in the jurisdiction in which those properties, buildings and structures are located.

Reliance on Data

In preparing this report, WEPL has relied on data, surveys, analyses, designs, plans and other information provided by the Client (or its agents), other individuals and organisations ("the data").

Except as otherwise stated in this report, WEPL has not verified the accuracy or completeness of the data. WEPL does not represent or warrant that the data is true or accurate, and disclaims any and all responsibility or liability with respect to the use of the data.

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WEPL does not accept any responsibility or liability for any incorrect or inaccurate conclusions should any data be incorrect, inaccurate or incomplete or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WEPL.

The conclusions must also be considered in light of the agreed scope of services (including any constraints or limitation therein) and the methods used to carry out those services, both of which are as stated or referred to in this report.

Bushfire Protection

The bushfire management measures and risk treatments proposed in this document do not guarantee that buildings or infrastructure will not be damaged in a bushfire, nor that there will be no injuries or fatalities either on the site or offsite while evacuating. Primarily, this is due to the unpredictable nature and behaviour of fire and fire weather conditions. In addition, implementation of the required bushfire management measures (including construction standards, maintenance etc.) and any other required or recommended measures, will depend upon, among other things, the ongoing actions of landowners and/or operators over which WEPL has no control.

Report for Benefit of Client

This report is confidential. Neither the whole nor any part of this report, or any copy or extract thereof, may be disclosed or otherwise made available to any third party without the prior written approval of WEPL.

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Other parties should not rely on this report or the accuracy or completeness of any conclusions contained in this report, and should make their own enquiries and obtain independent advice in relation to such matters.

Other Limitations

This report is intended to be read in its entirety, and sections or parts of this report should therefore not be read and relied on out of context.

WEPL will not be liable to update or revise this report to take into account any events or circumstances or facts becoming apparent after the date of this report.

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Appendix D: Standards for Asset Protection Zones

Appendix E: Vehicular access technical requirements (WAPC, 2024)

1. Introduction

1.1 Proposal Details

South Energy, on behalf of Narrogin BESS Development Pty Ltd is seeking to progress a Development Application (DA) for Proposed Lot A, 76 Narrogin Valley Road, Narrogin (hereafter referred to as the subject site, Figure 1). A subdivision application has been lodged for 76 Narrogin Valley Road (Lodgement ID: 2024-228946), for which Western Environmental Approvals Pty Ltd (WEPL) previously prepared a Bushfire Management Plan (BMP; WEPL, 2024). This BMP included bushfire mitigation measures to support a two-lot subdivision, resulting in the creation of Proposed Lot A, in the west of the property, and proposed Lot B in the east of the property. The proposed development will result in an intensification of land use on Proposed Lot A, the subject site, and involves the development of a Battery Energy Storage System (200 MW and 800 MW) facility, a substation control building, an operations and maintenance shed, as well as a laydown and facilities area (Figure 2). The BESS is proposed to connect to an existing Western power substation on the northwestern adjacent land parcel at Lot 8 (No. 153) Booth Street, Narrogin.

The subject site is within a designated bushfire prone area as per the *Western Australia State Map of Bush Fire Prone Areas* (DFES, 2024; Figure 3), which triggers bushfire planning requirements under *State Planning Policy 3.7 Bushfire* (SPP 3.7; WAPC, 2024a) and reporting to accompany submission of the DA in accordance with the associated *Planning for Bushfire Guidelines* (the Guidelines; WAPC, 2024b).

WEPL was commissioned to prepare a BMP to support the DA. This BMP has been prepared by Bushfire Consultant Bridie Farrar and Senior Principal Bushfire Consultant Daniel Panickar (FPAA BPAD Level 3 Certified Practitioner No. BPAD37802). Development at the subject site will be completed in three stages. This BMP pertains to assets which are proposed to be constructed during Stage 1 of the development given the detail of future stages (Stages 2 and 3) had not yet been determined at the time of preparing the BMP.

The building footprints for Stages 2 and 3 have been included in the site plan (Figure 2) and the potential for these assets to be appropriately sited within the subject site has been broadly considered in this BMP. WEPL understands that the DA is to be lodged to cover all three stages of the proposed development and may seek conditional development approval of Stages 2 and 3 on the basis that bushfire planning be undertaken for these Stages in future. Each of these two potential subsequent expansion stages will comprise 200 MW and 800 MW BESS structures. Stages 2 and 3 will require a new BMP or a BMP addendum in order to appropriately assess the proposed assets against the bushfire protection criteria set out in the Guidelines.

1.1.1 Site context

The subject site is located within Shire of Narrogin and is zoned Rural under the Shire of Narrogin Local Planning Scheme No. 3. The subject site contains a mixture of unmanaged, classifiable vegetation as well as cleared areas. The subject site is bound by:

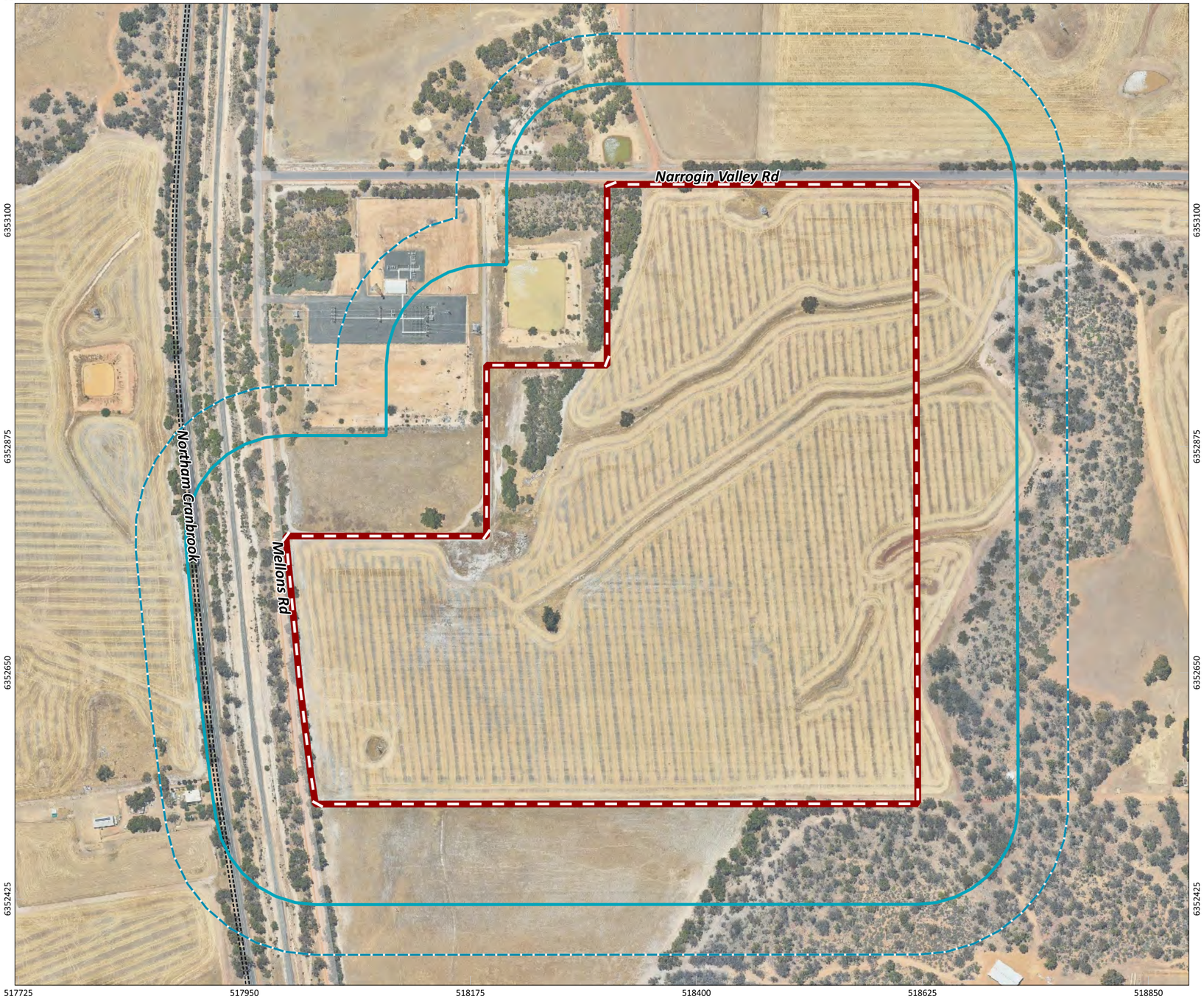
- Narrogin Valley Road and rural lots to the north

- Rural lots to the east and south
- Mellons Road, a train line and Great Southern Highway to the west.

1.2 Purpose and Application of the BMP

This BMP has been prepared in accordance with SPP 3.7 and the Guidelines to support the assessment of the DA for the subject site submitted to the Shire of Narrogin.

In addition, this BMP provides strategies and guidance to reduce the level of bushfire risk exposure for the subject site through implementation of a range of bushfire management measures in accordance with the Guidelines.





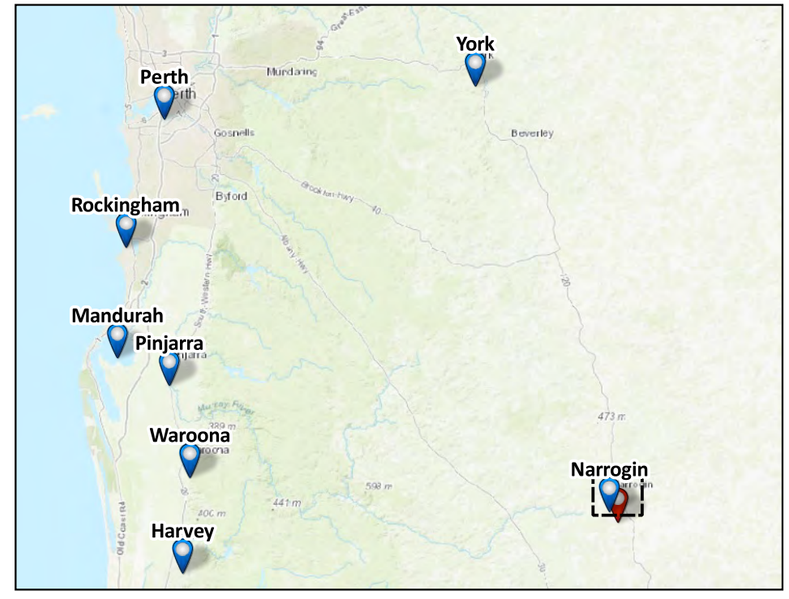


Figure 1: Site Overview

N

0 60 120 180 240 m

SCALE	1:4,495
SHEET SIZE	A3 COLOUR
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
DATA SOURCE	LANDGATE AERIAL IMAGERY NOW

PROJECT/REPORT NAME

Bushfire Management Plan: Development Application
Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley

CLIENT: South Energy

PROJECT NUMBER	VERSION
A23.166	0

DRAWN BY / REVIEWED BY	DATE
JP/BF	28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

NOTES:

Cadastral boundary (LGATE-002). Base map ESRI Topo. Townsites (LGATE-248).

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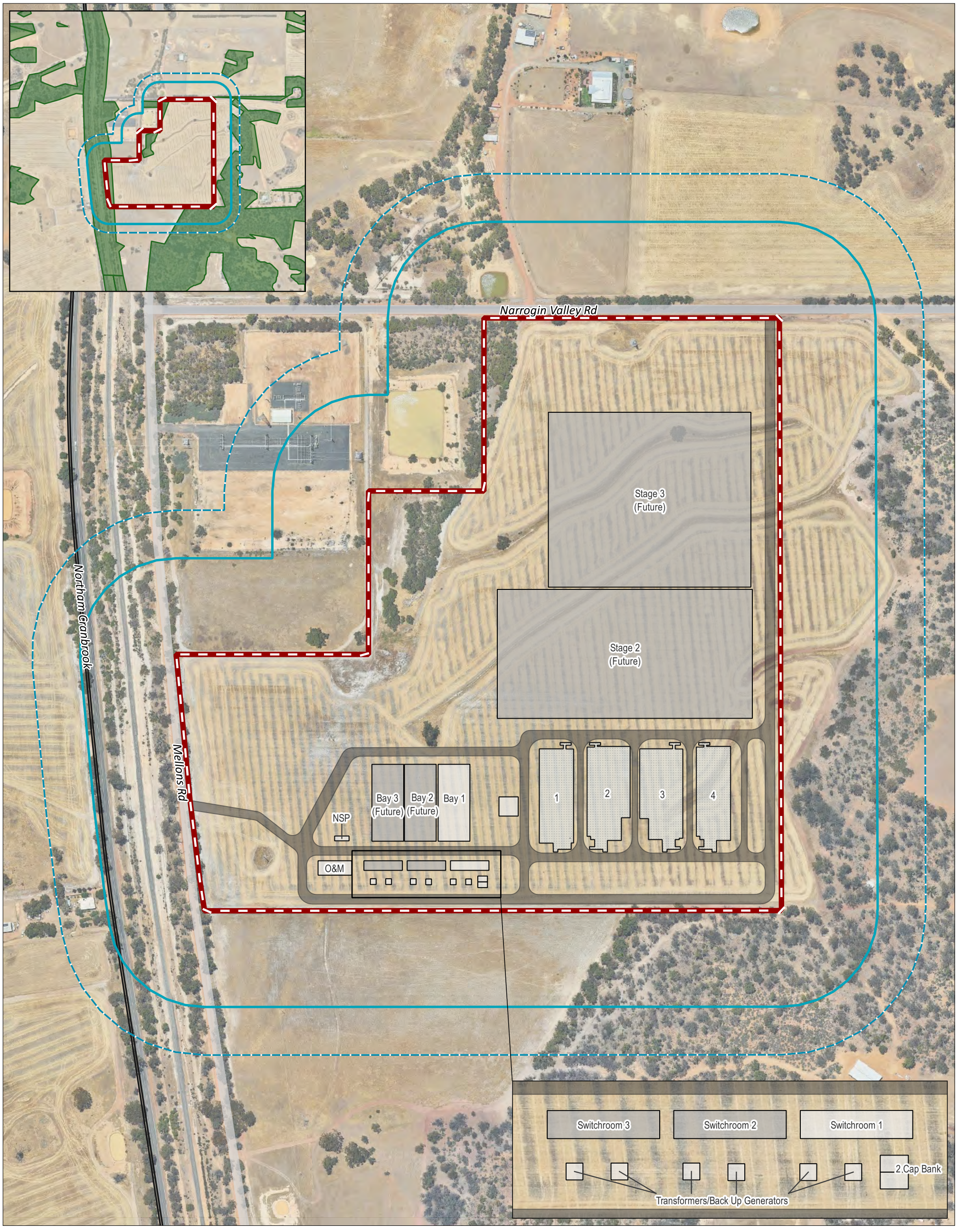

Figure 2: Site Plan

0 30 60 90 120 m

N

SCALE: 1:3,733	SHEET SIZE: A3 COLOUR	CLIENT: South Energy	
COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 50		PROJECT NUMBER: A23.166	VERSION: 0
DATA SOURCE: LANDGATE AERIAL IMAGERY NOW		DRAWN BY / REVIEWED BY: JP/BF	DATE: 28/11/2024

PROJECT/REPORT NAME: Bushfire Management Plan: Development Application
Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Future Development
- Road
- Subject building
- BESS
- Native Vegetation Extent (DPIRD-005)

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

NOTES:

Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.

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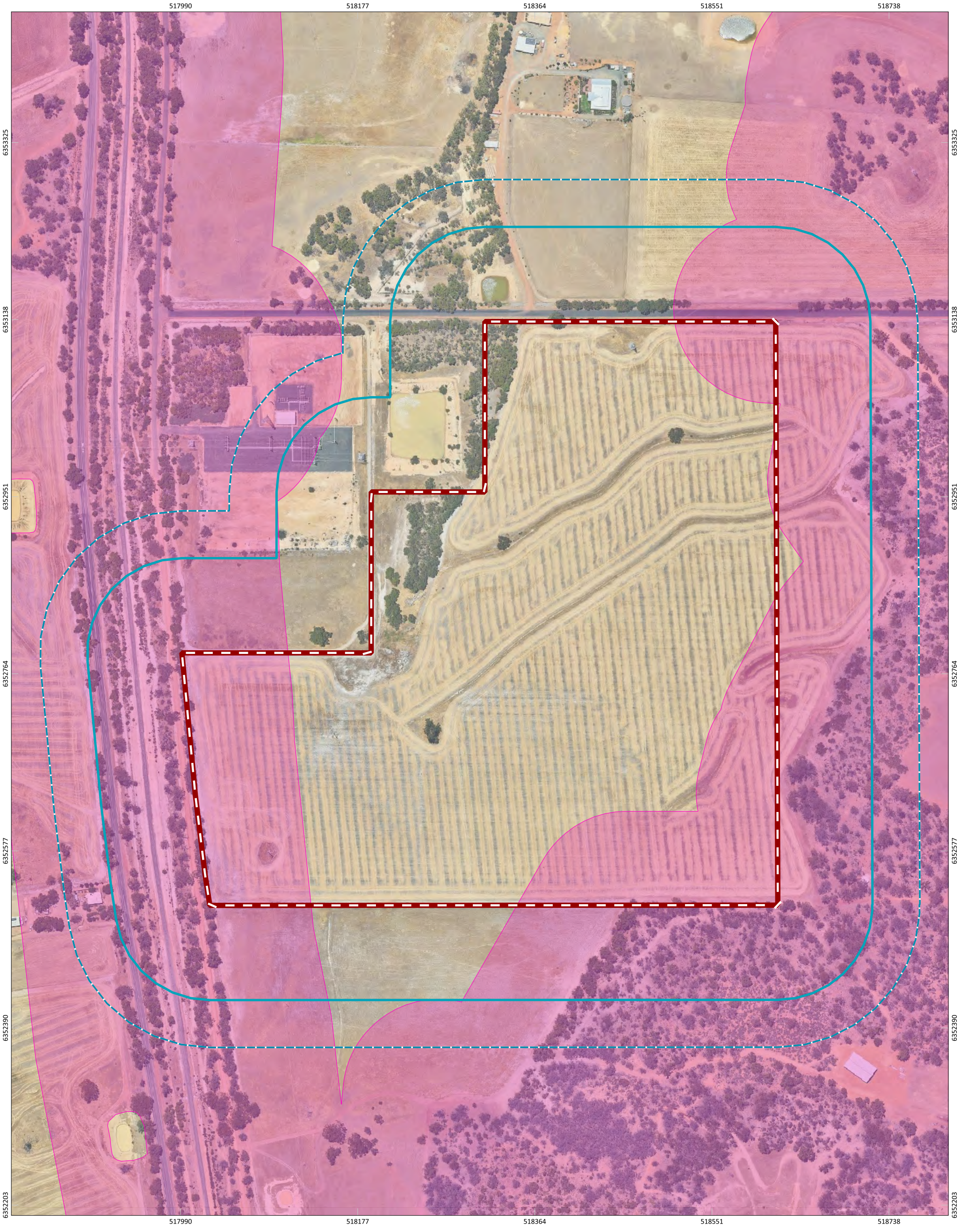

Figure 3: Bushfire Prone Areas

0 30 60 90 120 m N	PROJECT/REPORT NAME Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley	
SCALE 1:3,733	SHEET SIZE A3 COLOUR	CLIENT South Energy
COORDINATE REFERENCE SYSTEM GDA2020 / MGA zone 50	PROJECT NUMBER A23.166	VERSION 0
DATA SOURCE LANDGATE AERIAL IMAGERY NOW	DRAWN BY / REVIEWED BY JP/BF	DATE 28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m

Bush Fire Prone Area Planning (OBRM-023)

- Bushfire Prone Area 2

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

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2. Environmental Considerations

2.1 Native Vegetation - Modification and Clearing

SPP 3.7 policy objective 5.4 recognises the need to consider bushfire risk management measures alongside environmental, biodiversity and conservation values.

There is some mapped native vegetation within the subject site (DPIRD-005; Figure 2), which is proposed to be retained, post-development. The remainder of the site has been historically cleared and used for agricultural purposes. Clearing of native vegetation is not required for development to proceed.

WEPL is not aware of any outstanding environmental approvals required for development to proceed.

2.2 Revegetation/Landscape Plans

No revegetation is proposed within the subject site.

Mapped native vegetation which occurs in the northern portion of the subject site will be retained in its current form.

3. Bushfire Assessment Results

3.1 Bushfire Assessment Inputs

The proposed BESS enclosures and substations, if ignited by a bushfire or other means are likely to present a challenge for firefighters to contain. As such, a bushfire assessment has been undertaken for the proposed BESS in accordance with the Guidelines as well as the Country Fire Authority (CFA) *Design Guidelines and Model Requirements for Renewable Energy Facilities Version 4* (CFA Guidelines; State of Victoria, 2023). Inputs to the assessment against the Guidelines are detailed below. The assessments against the CFA Guidelines is presented in Appendix A.

3.1.1 Fire Danger Index

A blanket Fire Danger Index (FDI) 80 is adopted for Western Australia, as outlined in *Australian Standard AS 3959: 2018 Construction of Buildings in Bushfire Prone Areas* (SA, 2018).

3.1.2 Vegetation Classification and Slope under Vegetation

Vegetation and effective slope (i.e. slope under vegetation) within the subject site and surrounding 150 m (the assessment area) were assessed on 17/01/2024 in accordance with the Guidelines and AS 3959: 2018.

The pre-development classified vegetation and effective slope for the site from each of the identified vegetation plots are identified below in Table 1 and Figure 4.

Table 1: Classified Vegetation as per AS 3959: 2018

Plot	Vegetation classification	Effective slope
1	Class A Forest	Downslope >0 to 5 degrees
2	Class A Forest	All upslopes and flat land (0 degrees)
3	Class B Woodland	Downslope >0 to 5 degrees
4	Class B Woodland	All upslopes and flat land (0 degrees)
5	Class C Shrubland	All upslopes and flat land (0 degrees)
6	Class G Grassland	Downslope >0 to 5 degrees
7	Class G Grassland	All upslopes and flat land (0 degrees)
8	Excluded - clause 2.2.3.2 (e)	-
9	Excluded - clause 2.2.3.2 (f)	-

Photographs relating to each area and vegetation type are included in Appendix B.

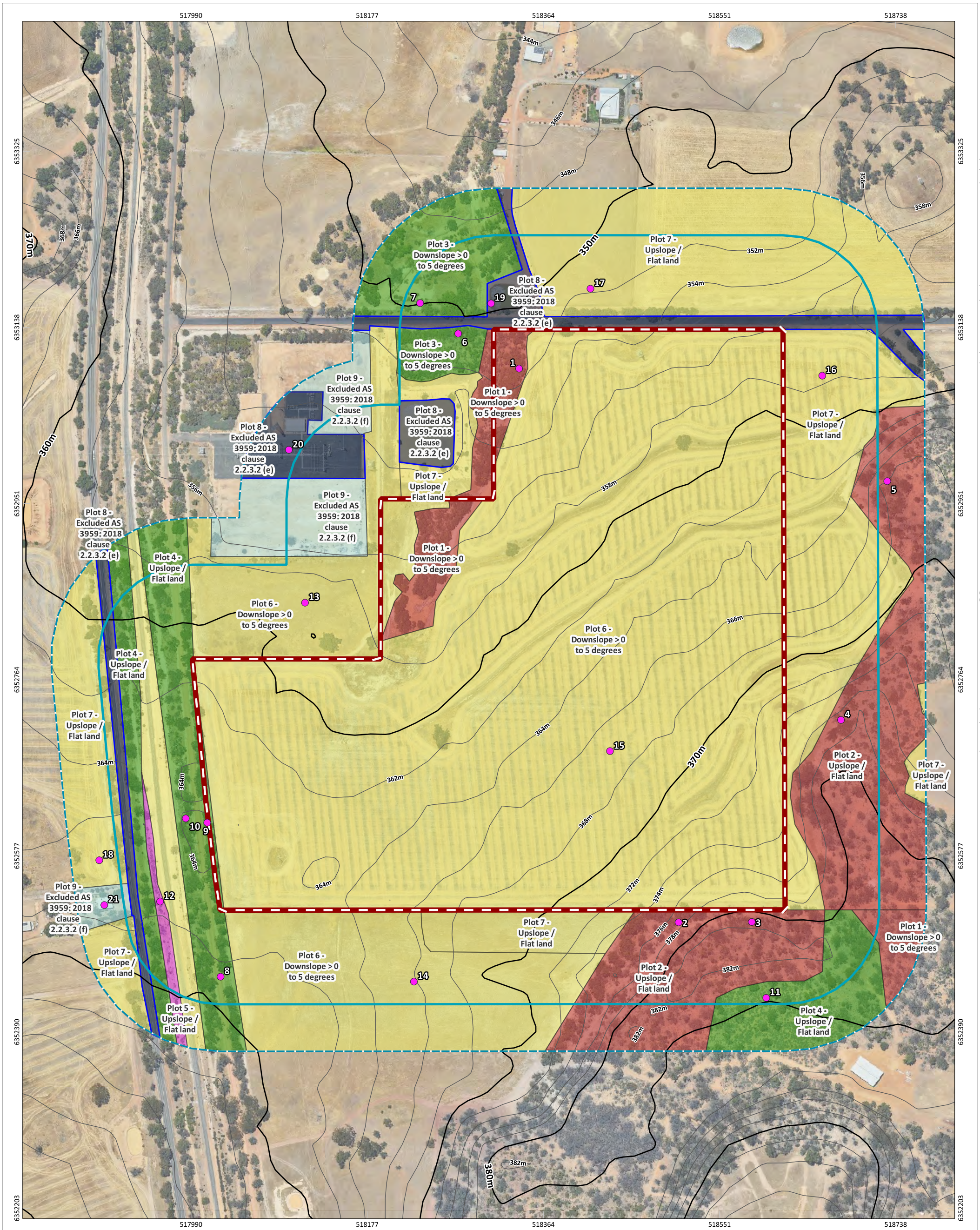

Figure 4: Pre-Development Vegetation Classification

N 0 30 60 90 120 m	PROJECT/REPORT NAME: Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley		
SCALE: 1:3,733	SHEET SIZE: A3 COLOUR	CLIENT: South Energy	
COORDINATE REFERENCE SYSTEM: GDA2020 / MGA zone 50		PROJECT NUMBER: A23.166	VERSION: 0
DATA SOURCE: LANDGATE AERIAL IMAGERY NOW		DRAWN BY / REVIEWED BY: JP/BF	DATE: 28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Photos

2m Contours (DPIRD-072)

- 2m Contour
- 10m Contour

Vegetation Classification

- Class A - Forest
- Class B - Woodland
- Class C - Shrubland
- Class G - Grassland
- Excluded AS 3959: 2018 2.2.3.2 (e)
- Excluded AS 3959: 2018 2.2.3.2 (f)

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

NOTES:

Cadastral boundary (LGATE-002). Label corresponds to the vegetation association number.

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3.2 Bushfire Assessment Outputs

A Bushfire Attack Level (BAL) assessment has been undertaken in accordance with SPP 3.7, the Guidelines, AS 3959: 2018 and the bushfire assessment inputs in Section 3.1.

3.2.1 BAL Assessment

All land located within 100 m of the classified vegetation depicted in Figure 4 is considered bushfire prone and is subject to a BAL assessment in accordance with AS 3959: 2018.

A Method 1 BAL assessment (as outlined in AS 3959: 2018) has been completed for the proposed development and incorporates the following factors:

- Fire Danger Index (FDI) rating.
- Vegetation class.
- Slope under classified vegetation.
- Distance between proposed subdivision area and the classified vegetation.

A Method 2 BAL assessment was also undertaken (as outlined in AS 3959: 2018) to determine the 10 kW/m^2 threshold line for proposed assets using both a 1200 K and 1090 K flame temperature. These contours have been used to inform appropriate siting of habitable, non-habitable and renewable energy infrastructure assets within the subject site. The 10 kW/m^2 radiant heat flux threshold is widely adopted as being sufficient to significantly reduce the risk of radiant heat from the surrounding vegetation igniting the proposed assets within the site, in line with general advice in the CFA Guidelines. Ultimately, this also implies that the APZ will create adequate separation to prevent the ignition of a bushfire resulting from the functioning of the BESS. The APZ prescribed around these assets is, at its thinnest point, 25 m in width - well exceeding the 10 m recommended by the Western Australian Planning Commission (WAPC) for Renewable Energy Facilities in Bushfire Prone Areas (WAPC, 2020).

This Method 2 calculation has not been undertaken to demonstrate compliance with the bushfire protection criteria. Given this, WEPL understands referral of the DA to DFES is not required as per section 9.4 of the Guidelines.

Based on the identified BAL, construction requirements for relevant buildings/structures can then be assigned. The BAL rating gives an indication of the expected level of bushfire attack (i.e. radiant heat flux, flame contact and ember penetration) that may be received by proposed buildings and subsequently informs the standard of construction required to increase building survivability.

3.2.2 Method 1 BAL Assessment

Table 3 and Figure 5 display the Method 1 BAL assessment (in the form of BAL contours) that has been completed for the proposed BESS in accordance with AS 3959: 2018 methodology.

3.2.3 Post Development Assumptions

The inset in Figure 5 illustrates the post-development vegetation plots following the subject site being cleared and landscaping being planted to a low threat state. The assessment outputs in this BMP have been based on the post development scenario.

Post-development, all proposed assets within Stage 1 will be subject to BAL ratings of ≤BAL-12.5.

Table 2: Method 1 BAL Calculation (BAL Contours)

Plot	Vegetation classification	Effective slope	Separation distances required (m)				
			BAL-FZ	BAL-40	BAL-29	BAL-19	BAL-12.5
1	Class A Forest	Downslope >0 to 5 degrees	<20	20 - <27	27 - <37	37 - <50	50 - <100
2	Class A Forest	All upslopes and flat land (0 degrees)	<16	16 - <21	21 - <31	31 - <42	42 - <100
3	Class B Woodland	Downslope >0 to 5 degrees	<13	13 - <17	17 - <25	25 - <35	35 - <100
4	Class B Woodland	All upslopes and flat land (0 degrees)	<10	10 - <14	14 - <20	20 - <29	29 - <100
5	Class C Shrubland	All upslopes and flat land (0 degrees)	<7	7 - <9	9 - <13	13 - <19	19 - <100
6	Class G Grassland	Downslope >0 to 5 degrees	<7	7 - <9	9 - <14	14 - <20	20 - <50
7	Class G Grassland	All upslopes and flat land (0 degrees)	<6	6 - <8	8 - <12	12 - <17	17 - <50
8	Excluded - clause 2.2.3.2 (e)	-	No separation distances required - BAL-LOW				
9	Excluded - clause 2.2.3.2 (f)	-	No separation distances required - BAL-LOW				

Based on the site assessment inputs and BAL assessment, all proposed buildings are exposed to BAL ratings ≤BAL-12.5. A summary of the BAL ratings for these assets within the subject site is provided in Table 4.

3.2.4 Method 2 Radiant Heat Flux Calculations

Table 3 and Figure 5 display the Method 2 BAL assessment and associated setback distances that have been calculated for the proposed BESS in accordance with AS 3959: 2018 methodology (Appendix C). This Method 2 calculation has not been undertaken to demonstrate compliance with the bushfire protection criteria.

Table 3: Method 2 BAL Calculation

Plot	Vegetation classification	Effective slope	Separation distances required (m)	
			10kW/m^2 **@ 1090 K**	10kW/m^2 **@ 1200 K**
1	Class A Forest	Downslope 5 degrees	<60	<75
2	Class A Forest	Flat land 0 degrees	<49	<64
3	Class B Woodland	Downslope 5 degrees	<43	<56
4	Class B Woodland	Flat land 0 degrees	<35	<47
5	Class C Shrubland	Flat land 0 degrees	<24	<33
6	Class G Grassland	Downslope 5 degrees	<25	<34
7	Class G Grassland	Flat land 0 degrees	<22	<30
8	Excluded - clause 2.2.3.2 (e)	-	No separation distances required - BAL-LOW	
9	Excluded - clause 2.2.3.2 (f)	-	No separation distances required - BAL-LOW	

Table 4: BAL Ratings for Assets Within the Subject Site

Proposed Building/Asset	Type	Plot Most Affecting BAL Rating	Separation Distance	Flame Temperature	BAL Rating
BESS 1	Renewable energy infrastructure	Plot 6	25 m	1090 K	BAL-12.5
BESS 2	Renewable energy infrastructure	Plot 2	65 m	1090 K	BAL-12.5
BESS 3	Renewable energy infrastructure	Plot 2	61 m	1090 K	BAL-12.5
BESS 4	Renewable energy infrastructure	Plot 2	58 m	1090 K	BAL-12.5

Proposed Building/Asset	Type	Plot Most Affecting BAL Rating	Separation Distance	Flame Temperature	BAL Rating
NSP	Renewable energy infrastructure	Plot 6	34 m	1090 K	BAL-12.5
Transformers/backup generators	Renewable energy infrastructure	Plot 6	27 m	1090 K	BAL-12.5
2 Cap Bank	Renewable energy infrastructure	Plot 2	25 m	1090 K	BAL-12.5
0&M Shed	Habitable	Plot 6	34 m	1200 K	BAL-12.5
Switch room 1	Non-habitable	Plot 7	42 m	1090 K	BAL-12.5
Spares stores	Non-habitable	Plot 6	52 m	N/A - BAL-LOW due to separation distances	
Bay 1	Non-habitable	Plot 6	25 m	1090 K	BAL-12.5
Ability of future assets to comply with siting requirements					
Switch room 2 (Future)	Non-habitable	Plot 7	42 m	1090 K	BAL-12.5
Switch room 3 (Future)	Non-habitable	Plot 6	42 m	1090 K	BAL-12.5
Bay 2 (Future)	Non-habitable	Plot 6	25 m	1090 K	BAL-12.5
Bay 3 (Future)	Non-habitable	Plot 6	25 m	1090 K	BAL-12.5
Stage 2 (Future)	TBC*	Plot 6	25 m	1090 K	BAL-12.5
Stage 3 (Future)	TBC*	Plot 6	25 m	1090 K	BAL-12.5

*The detail of the asset type and siting is to be confirmed. Figure 6 demonstrates that appropriate siting of both renewable energy infrastructure and habitable buildings is achievable within these areas.

It should be noted that the separation distances provided in Table 4 are subject to change following micro-siting of facilities which may occur post-development approval.

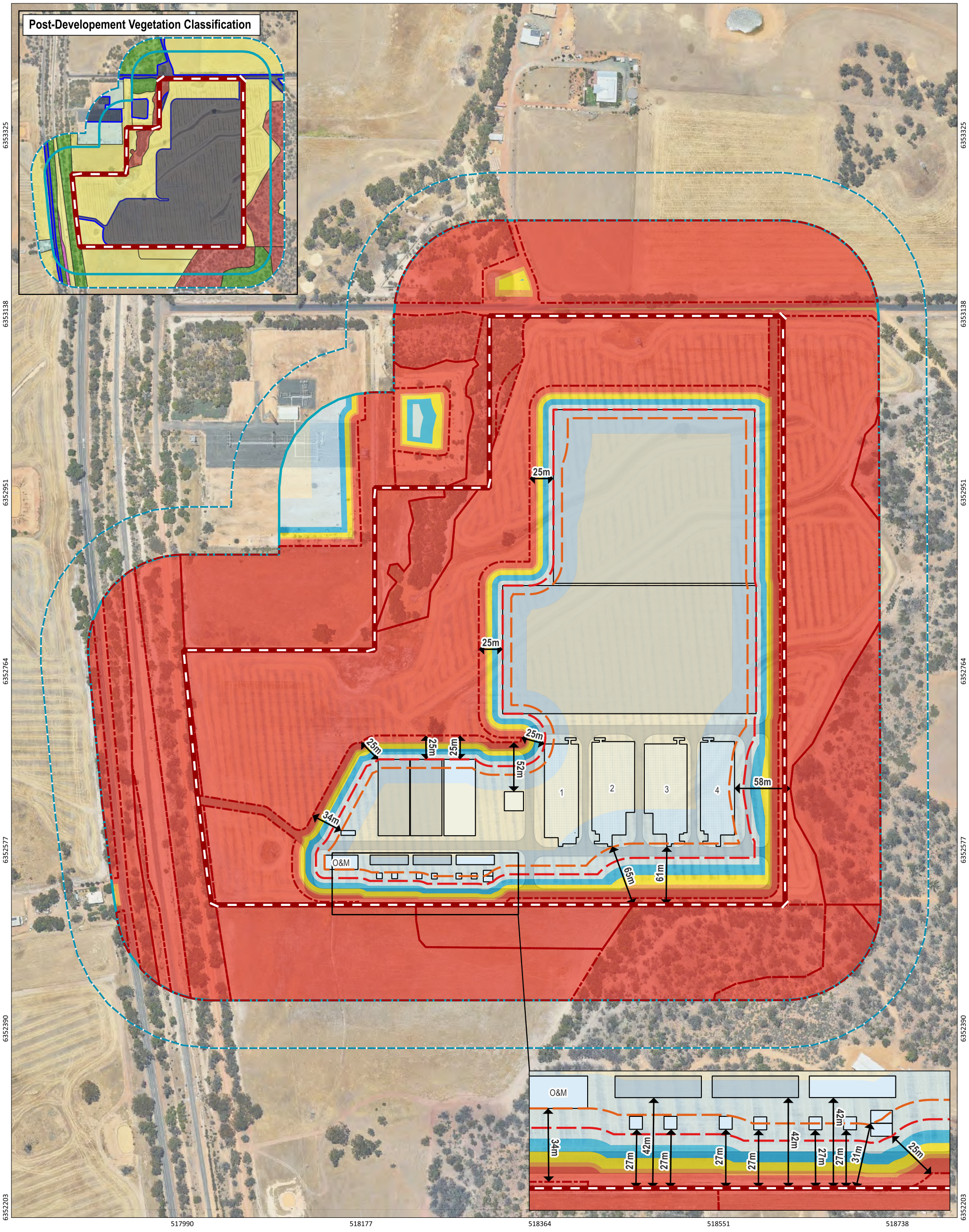

Figure 5: Bushfire Attack Level (BAL) Contours

0 30 60 90 120 m

N

PROJECT/REPORT NAME	Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley
SCALE	1:3,733
SHEET SIZE	A3 COLOUR
CLIENT	South Energy
COORDINATE REFERENCE SYSTEM	GDA2020 / MGA zone 50
PROJECT NUMBER	A23.166
VERSION	0
DATA SOURCE	LANDGATE AERIAL IMAGERY NOW
DRAWN BY / REVIEWED BY	JP/BF
DATE	28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Bushfire hazard Interface
- Future Development
- Road
- Subject building
- BESS
- 10kW/m² (1090K)
- 10kW/m² (1200K)

Vegetation Classification
- Class A - Forest
- Class B - Woodland
- Class C - Shrubland
- Class G - Grassland
- Excluded AS 3959: 2018 2.2.3.2 (e)
- Excluded AS 3959: 2018 2.2.3.2 (f)

Bushfire Attack Level (BAL)
- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

NOTES:

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4. Identification of Bushfire Hazard Issues

Post-development, all proposed assets will be subject to BAL ratings of ≤BAL-12.5. All proposed assets within Stage 1 are also sited in areas with a radiant heat flux not exceeding 10 kW/m^2.

A reassessment of BAL ratings, through either a BMP addendum or revised BMP will be undertaken when Stages 2 and 3 are to be developed, or if changes to classified vegetation within the assessment area or development design within Stage 1 which require a modified bushfire management response occur.

5. Assessment Against the Bushfire Protection Criteria

5.1 Compliance

The proposed development is required to comply with policy measure 7.1 of SPP 3.7 and the Guidelines.

Table 5 outlines the Acceptable Solutions (AS) that are relevant to the proposal and summarises how the intent of each Bushfire Protection Criteria has been achieved through the application of bushfire risk management measures. No Outcomes-based Solutions (OS) have been proposed for this development. These management measures are depicted in Figure 6 where relevant.

Implementation of this BMP is expected to meet objectives 5.1-5.4 of SPP 3.7.

Table 5: Assessment Against the Bushfire Protection Criteria

Bushfire Protection Criteria	AS	OS	N/A
Element 1: Location **A1.1 Development location**	☐	☐	✓
Not Applicable - This Acceptable Solution does not apply to commercial/industrial development applications.			
Element 2: Siting and design **A2.1a Siting and design**	✓	☐	☐
All proposed habitable, non-habitable and renewable energy infrastructure assets will be sited in areas subject to BAL-12.5 or lower. The proposed development is considered to be compliant with A2.1a.			
A2.1b Siting in an area with a radiant heat impact exceeding 29 kW/m^2 (BAL-40 or BAL-FZ)	☐	☐	✓
Not Applicable - No proposed habitable buildings or BESSs will be sited in areas subject to BAL-40 or BAL-FZ.			
A2.2 Asset Protection Zone (APZ)	✓	☐	☐
The proposed development has an APZ sufficient for the potential radiant heat flux to not exceed 10 kW/m^2 and will be managed in accordance with the requirements of 'Standards for Asset Protection Zones' (WAPC, 2024b; **Appendix D**). The APZ can be contained within the boundaries of the lot. The proposed development is considered to be compliant with A2.1.			
A2.3 Clearing of native vegetation	✓	☐	☐
No native vegetation is proposed to be cleared to facilitate the application of any bushfire mitigation measures at the subject site.			
A2.4 Storage of hazardous, flammable and/or combustible materials	✓	☐	☐
The proposed development includes the establishment of a number of BESS enclosures at the subject. These combustible assets will be situated in cleared areas that are subject to a radiant heat flux not exceeding 10 kW/m^2 (with a flame temperature of 1090 K; **Figure 5**, **Figure 6**). These systems have also been sited and will be designed to comply with the CFA Guidelines (**Appendix A**). The proposed development is considered to be compliant with A2.4.			

Bushfire Protection Criteria	AS	OS	N/A
Element 3: Vehicular access **A3.1 Private driveway**	☐	☐	☐
The proposed development incorporates internal roads throughout the subject site, which each have a minimum width of 6 m. Each of the internal roads are loop roads which link back to the main access point at the northern boundary of the subject site (**Figure 2**). The internal roads will be designed to comply with the vehicular access technical requirements as per the Guidelines (**Appendix E**) as well as the CFA Guidelines (**Appendix A**). The proposed development is considered to be compliant with A3.1.			
Element 4: Water supply **A4.1 Water supply**	✓	☐	☐
No existing reticulated water is present at the subject site. Water tanks will be provided for firefighting purposes and will include six 50 kL firefighting water tanks, offering a total of 300 kL of water for bushfire protection of the habitable buildings and renewable energy infrastructure. The proposed development is considered to be compliant with A4.2.			

Note: AS - Acceptable solution, PS - Performance solution, N/A - Not applicable.

5.2 Additional Bushfire Mitigation Measures

5.2.1 Water tank requirements

Each tank and associated stand will be above-ground, constructed of non-combustible material and comply with AS/NZS 3500.1:2018 Plumbing and drainage Water Services.

All exposed water supply pipes and fittings will be metal. Fittings should be located away from the source of bushfire attack.

Each tank will be fitted with a 50mm male camlock coupling with full flow valve.

5.2.2 Renewable Energy Assessment Framework

SPP 3.7 and the Guidelines do not currently provide a comprehensive assessment framework for the assessment of renewable energy facilities, with many of the bushfire requirements only applicable to habitable buildings. Consequently, assessment of the BESS facility against the bushfire protection criteria of the Guidelines may be considered insufficient given the additional risk associated with the proposed development. In the absence of a bushfire assessment framework catered towards renewable energy facilities in Western Australia, the CFA Guidelines are considered the most appropriate framework currently available in Australia. The proposed development has therefore been assessed against the requirements of the CFA Guidelines, tailored to Western Australia. The assessment against the CFA Guidelines (Appendix A) is considered to meet the general objectives and policy requirements of SPP 3.7.

5.2.3 Emergency Response

Early evacuation of the subject site will be the primary emergency response to following during a bushfire emergency. However, if it becomes unsafe to evacuate, shelter-in-place will need to be considered as a last resort response. The habitable O&M building has been strategically located in areas that will be subject to a radiant heat exposure of 10 kW/m^2 at a flame temperature of 1200 K. This is considered an acceptable exposure threshold for buildings which will serve as on-site shelters. These buildings can therefore be used as a last resort temporary shelter in the event evacuation is unsafe during a bushfire emergency. The O&M building is not intended to be used as a community refuge building as it has not been designed to the Australian Building Codes Board Community Refuge Standards but may be used as a place of last resort.

In accordance with the CFA Guidelines, an emergency evacuation plan will need to be prepared prior to commencement of operations. The emergency evacuation plan shall be prepared in accordance with Australian Standard AS 3745-2010 Planning for Emergencies in Facilities, taking guidance from the *Bushfire Emergency Plan (BEP) Manual* (WAPC, 2024c).

5.2.4 Access and Egress

The subject site has two access points which provide vehicular access to the site from Narrogin Valley Road to the north and Mellons Road to the west. Both are public through roads and will provide sufficient access to safer destinations, in the event of a bushfire.

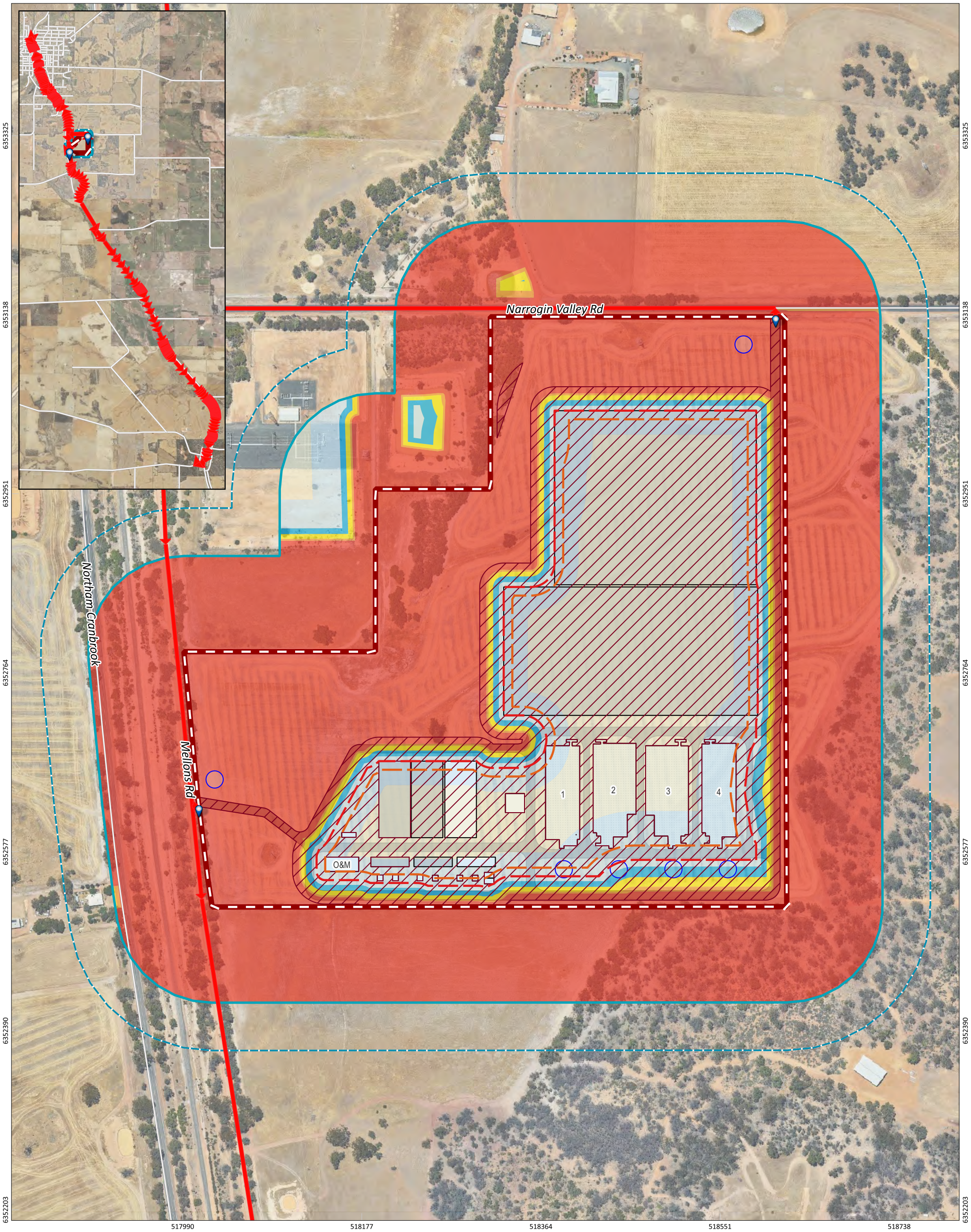

Figure 6: Spatial representation of the bushfire mitigation measures

0 30 60 90 120 m N		PROJECT/REPORT NAME Bushfire Management Plan: Development Application Proposed Lot A, 76 Narrogin Valley Road, Narrogin Valley	
SCALE 1:3,733	SHEET SIZE A3 COLOUR	CLIENT South Energy	
COORDINATE REFERENCE SYSTEM GDA2020 / MGA zone 50		PROJECT NUMBER A23.166	VERSION 0
DATA SOURCE LANDGATE AERIAL IMAGERY NOW		DRAWN BY / REVIEWED BY JP/BF	DATE 28/11/2024

Legend

- Subject Site
- Buffer 100m
- Buffer 150m
- Asset Protection Zone (APZ)
- Firefighting Water Tanks (50kL)
- Future Development
- Road
- Subject building
- BESS
- Access / egress route
- 10kW/m² (1090K)
- 10kW/m² (1200K)
- Access point

Bushfire Attack Level (BAL)

- BAL-FZ
- BAL-40
- BAL-29
- BAL-19
- BAL-12.5
- BAL-LOW

No	Description	Drawn	Approved	Date
A	Original issue	JP	BF	28/11/2024

Name: Daniel Panickar
Western Environmental Approvals Pty Ltd

Signature:

Accreditation No: BPAD 37802
Expiry: December 2024

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6. Responsibilities for Implementation and Management of Bushfire Management Measures

Responsibility for implementation of the bushfire risk management measures outlined in Section 5 of this BMP applies to the developer, future owners/builders within the subject site and the local government. Table 6 provides a works program detailing these measures, timing of implementation and responsibility.

Table 6: Proposed Works Program

No.	Bushfire management measure
Developer responsibilities - Prior to occupancy	
1	Ensure that Asset Protection Zones (APZs) are established and maintained as per the design in Figure 6.
2	Ensure that vehicular access is constructed as per the site plan (Figure 2).
3	Install firefighting water tanks as depicted in Figure 6.
4	Consider the design requirements contained within the CFA Guidelines when establishing the detailed design of the BESS facility.
Landowner responsibilities - Ongoing	
5	Maintain clear access to the firefighting water tanks and associated hardstands to ensure firefighting appliances can access the tanks in the event of a bushfire.
6	Maintain APZs to the standard in the Guidelines.
7	Maintain all firebreaks in accordance with the Shire of Narrogin Annual Firebreak Notice.

7. Conclusion

In the professional opinion of the author, the proposed development satisfies the intent, aim and objectives of SPP 3.7 and the Guidelines and is recommended for approval.

8. References

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Department of Fire and Emergency Services (DFES). (2024). *Map of Bush Fire Prone Areas*. Retrieved on 14/08/2024 from: http://www.dfes.wa.gov.au/regulationandcompliance/bushfireproneareas/Pages/default.aspx.

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Appendix A:
CFA Guidelines Assessment

Background

New and emerging renewable energy technology has outpaced the development of fire and emergency management standards and guidance, especially in Western Australia. The State Government has identified the need for a comprehensive bushfire assessment framework specific to renewable energy facilities however this is yet to be developed. In the absence of a Western Australian assessment framework, the Country Fire Authority (CFA) *Design Guidelines and Model Requirements for Renewable Energy Facilities Version 4* (CFA Guidelines; State of Victoria, 2023) is considered to provide the most appropriate framework for the assessment of renewable energy facilities in designated bushfire prone areas.

The proposed BESS and associated infrastructure have been assessed against the requirements of the CFA Guidelines tailored to the Western Australian planning system as documented below.

Facility Location

The subject site is considered a high-risk environment under the CFA Guidelines given it is designated as bushfire prone. Renewable energy facilities proposed in high-risk environments must address the following:

- An assessment against SPP 3.7 and the associated Guidelines;
- The impact of any ignitions arising from the BESS infrastructure on nearby communities, infrastructure and assets;
- The impact of bushfire on the BESS infrastructure (e.g. ember attack, radiant heat impact and flame contact); and
- Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks on site to an acceptable level.
- The above requirements have been appropriately addressed through the preparation of the BMP (WEPL, 2024) and information provided by the Client.
- WEPL is not aware of peat soils within 10 m of the proposed infrastructure.

Facility Design

Emergency Vehicle Access

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Construction of a four (4) metre perimeter road within the perimeter fire break.	✓	A 4 m wide perimeter road will be constructed along the edge of the subject site.
Roads must be of all-weather construction and capable of accommodating a vehicle of 15 tonnes.	✓	Internal access roads will be constructed of an all-weather surface material and designed to accommodate a 15-tonne vehicle.
Constructed roads should be a minimum of four (4) metres in trafficable width with a four (4) metre vertical clearance for the width of the formed road surface.	✓	All internal access roads will be a minimum 4 m in width constructed of an all-weather surface material. A 4 m vertical clearance will be maintained at all times.
The average grade should be no more than 1 in 7 (14.4% or 8.1°) with a maximum of no more than 1 in 5 (20% or 11.3°) for no more than 50 metres.	✓	Finished ground levels will be determined during detailed design stage. Road grades will be designed to adhere to the relevant requirements of the Guidelines.
Dips in the road should have no more than a 1 in 8 (12.5% or 7.1°) entry and exit angle.	✓	Finished ground levels will be determined during detailed design stage. Road grades will be designed to adhere to the relevant requirements of the Guidelines.
Roads must incorporate passing bays at least every 600m, which must be at least 20 metres long and have a minimum trafficable width of six (6) metres. At least one passing bay must be incorporated where roads are less than 600 metres long.	✓	The internal access roads will allow vehicles to pass, given the roads intersect at regular intervals and the BESS will be located on a hardstand with 6 m clearance between obstructions. The intent of this requirement has therefore been met given there is adequate opportunity for vehicles to pass.
Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, BESS and related infrastructure, substations and grid connection areas.	✓	The existing public road networks provide adequate access for emergency vehicles. The subject site is accessed from Narrogin Valley Road which connects to Mellons Road. Narrogin Valley Road is a sealed road and Mellons Road is partially sealed. Both roads have a minimum width of 7 m for two-way access. The internal private road network includes a series of roads surrounding and throughout the BESS facility.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Provision of at least two (2) but preferably more access points to each part of the facility. The number of access points must be informed through a risk management process.	✓	The main access point to the subject site is in the northern portion, providing access from Narrogin Valley Road. A secondary access point is available in the western portion of the subject site, providing vehicular access from Mellons Road.

Firefighting Water Supply

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Water access points must be clearly identifiable and unobstructed to ensure efficient access.	✓	Water tanks will be provided on site for the storage static water for firefighting purposes. Water access points will be clearly identifiable through signage. All water tanks are located for ease of access and will remain unobstructed.
Static water storage tank installations must comply with AS 2419.1-2021: Fire hydrant installations – System design, installation and commissioning.	✓	The water supply system will be designed in accordance with AS 2419.1-2021. This will be documented at detailed design stage.
The static water storage tank(s) must be an above-ground water tank constructed of concrete or steel.	✓	The static water storage tanks will be above ground and constructed from concrete or steel.
The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours.	✓	The static water storage tanks will be refilled within 24 hours either automatically via a groundwater bore or manually through a local water supply contractor. This will be documented at detailed design stage.
The static water storage tanks must be located at vehicle access points to the facility and must be positioned at least ten (10) metres from any infrastructure (solar panels, wind turbines, battery energy storage systems, etc.).	✓	The static water storage tanks will be located at the main entrance and setback a minimum 10 m from the high-risk BESS infrastructure.
The hard-suction point must be provided, with a 150mm full bore isolation valve equipped with a Storz connection, sized to comply with the required suction hydraulic performance.	✓	The static water storage system is subject to detailed design however it is expected that each tank will be fitted with the required connection valves and adapters, including a Storz connection.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The hard-suction point must be positioned within four (4) metres to a hardstand area and provide a clear access for emergency services personnel.	✓	The static water storage tanks and connection points will be located within 4 m of the internal access roads for ease of access. This will be documented at detailed design stage.
An all-weather road access and hardstand must be provided to the hard-suction point. The hardstand must be maintained to a minimum of 15 tonne GVM, 15m long and 6m wide, in accordance with GL-11: DFES Site Planning and Fire Appliance Specifications.	✓	A hardstand will be provided to the water connection points for fire service access. The hardstands will be designed to DFES specifications, including minimum 15 tonne GVM, 15m in length and 6m wide. This will be documented at detailed design stage.
The road access and hardstand must be kept clear at all times.	✓	The internal roads and hardstands will be kept clear at all times.
The hard-suction point must be protected from mechanical damage (e.g. bollards) where necessary.	✓	The static water supply system is subject to detailed design. It is likely that bollards will be installed to protect the water connection points from damage.
Where the access road has one entrance, an eight (8) metre radius turning circle must be provided at the tank.	N/A	No dead-end roads are proposed within the subject site.
An external water level indicator must be provided to the tank and be visible from the hardstand area.	✓	All static water storage tanks will be fitted with a level indicator, visible from the hardstand area. This will be documented at detailed design stage.
Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank.	✓	Signage will be installed on each static water storage tank.
Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s).	✓	Signage will be installed at the main entrance to the BESS facility.
For standalone BESS facilities where there is no reticulated water available, the fire hydrant system that complies with AS 2419.1-2021 must provide: **i. the fire water supply must be of a quantity no less than 288,000L or as per the provisions of AS2419.1-2021: Fire hydrant installations, Table 2.2.5 (D) for open yards flowing for a period no less than four hours at 20L/s, whichever is the greater.** **ii. The quantity of static fire water storage is to be calculated from the number of hydrants required to flow from AS 2419.1-2021: Fire hydrant installations, Table 2.2.5 (D).** **iii. Fire hydrants must be provided and located so that every part of the BESS is**	✓	The proposed development design includes provisions for six (6) 50,000 L firefighting water tanks to be situation within the subject site, equating to a total of 300,000 L. One firefighting water tank will be situated at each of the two access points to the subject site, whilst the remaining four will be more of less adjacent to the BESS infrastructure, but no closer than 10 m.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
within reach of a 10m hose stream issuing from a nozzle at the end of a 60m length of hose connected to a fire hydrant outlet (70m coverage). iv. The fire water supply must be located at vehicle entrances to the facility, at least 10m from any infrastructure (electrical substations, inverters, BESS, buildings, etc). v. The fire water supply must be reasonably adjacent to the BESS and shall be accessible without undue danger in an emergency (E.g. fire water tanks are to be located closer to the site entrance than the BESS). vi. The fire water supply must comply with AS 2419.1-2021: Fire hydrant installations, Section 5: Water storage tanks.		

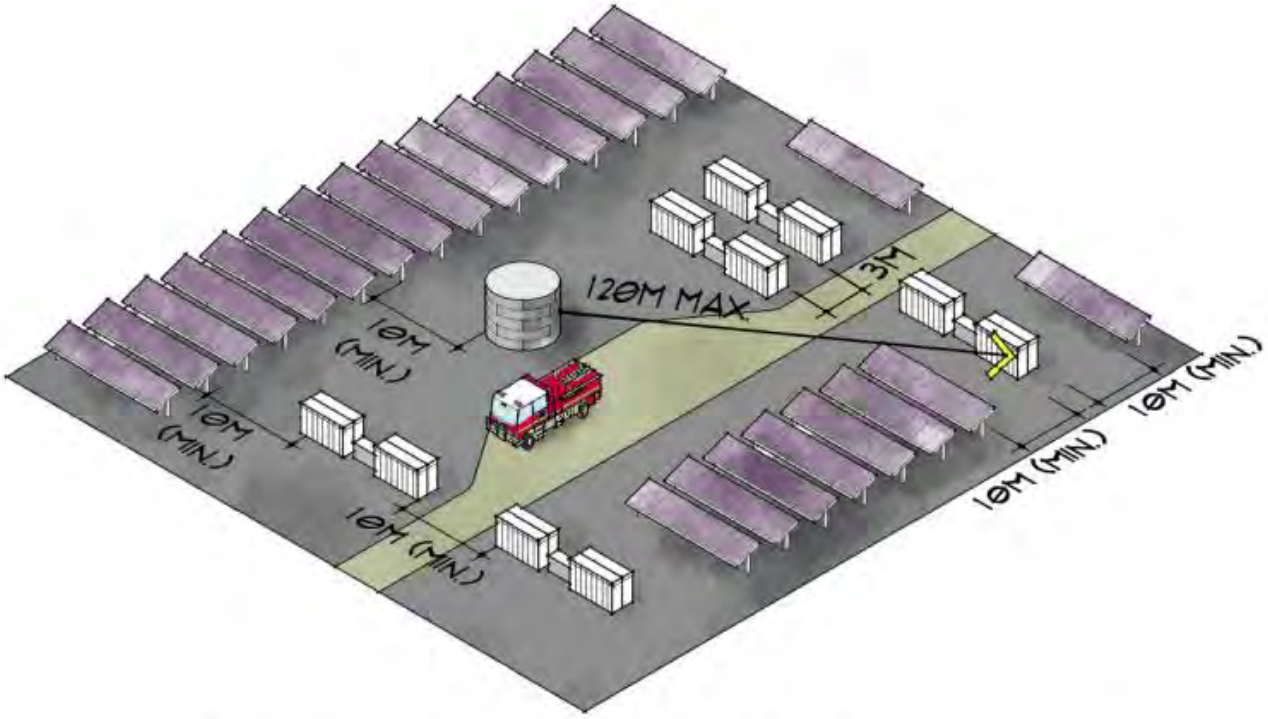

Figure 8: *Potential arrangement for fire water supply tank(s) for facilities with decentralised battery energy storage systems with no reticulated water supply to the site.*



Figure 9: *Best-practice arrangement of fire service infrastructure at facilities with centralised battery energy storage systems without reticulated water supply, or a reticulated water supply that does not meet the performance requirements of AS 2419.1-2021: Fire hydrant installations.*

Fire Detection and Suppression Equipment

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Suitable fire detection and suppression equipment must be provided: **a. For on-site buildings and structures, according to the requirements of the National Construction Code (NCC).** **b. For storage of dangerous goods, according to the requirements of any Australian Standards for storing and handling dangerous goods.** **c. For electrical installations, a minimum of two (2) suitable fire extinguishers must be provided within 3m - 20m of each Power Conversion Unit.** **d. In all vehicles and heavy equipment, each vehicle must carry at least a nine (9) litre water stored pressure fire extinguisher with a minimum rating of 3A, or other firefighting equipment as a minimum when on-site during the Fire Danger Period.**	✓	Fire detection and suppression equipment will be provided in accordance with the relevant legislation. Each power conversion unit will be fitted with aerosol fire extinguishing device along with smoke detectors, heat detectors, combustible gas detectors, water fire suppression system and audible alarm. All authorised vehicles will be required to carry a fire extinguisher which will be confirmed during site inductions as part of the operational management plan.

Landscape Screening and On-Site Vegetation

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Any proposed or existing vegetation must be considered in the BMP for its potential to intensify and propagate fire within and away from the site.	✓	The BMP considers all existing and proposed vegetation within 150m of the subject site.
Where landscape screening is required, for example, to screen visual impacts, the design must consider any potential increase in fire risk due to the type (species), density, height, location and overall width of the screening.	✓	No screening vegetation is proposed as part of the proposed development.
Facilities must be designed so that the radiant heat flux (output) from vegetation does not create the potential for ignition of on-site infrastructure or other vegetation.	✓	The proposed BESS facility will be surrounded by an APZ to ensure the radiant heat flux from vegetation is maintained at 10kW/m^2 which exceeds SPP 3.7 policy requirements.
Radiant heat impact leading to ignition may be mitigated through: • **Vegetation removal (where permitted).** • **Separation from nearby infrastructure (e.g., fire breaks; refer below).** • **The provision of thermal barriers at nearby infrastructure.**	✓	The radiant heat impact has been reduced through the establishment of an APZ to maintain separation between infrastructure and retained vegetation.
Substations should be surfaced to eliminate all vegetation, including grasses.	✓	The substation will be constructed on a non-combustible surface to provide hard standing and reduce bushfire risk.
The Electricity Regulations 1947 and Code of Practice for Personnel Electrical Safety for Vegetation Control Work Near Live Powerlines prescribe vegetation clearance requirements for electric lines based on voltage.	✓	Vegetation within proximity to power lines will be managed in accordance with the relevant regulations and codes of practice.

Firebreaks

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
A firebreak must be established and maintained around the perimeter of the facility, commencing from the boundary or from the vegetation screening inside the property boundary.	✓	A perimeter firebreak with minimum width of 4m and minimum vertical clearance of 4.5m will be maintained along the boundary of the subject site, in accordance with the Shire of Narrogin 2024/2025 Firebreak and Fuel Hazard Reduction Notice.
A firebreak must be established and maintained around the perimeter of the BESS, controls rooms, electricity compounds, substations and all other buildings onsite.	✓	Internal access roads provide perimeter access around the BESS, substations and all other associated infrastructure and buildings.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The width of fire breaks must be a minimum of 10m, and at least the distance where radiant heat flux (output) from the vegetation does not create the potential for ignition of on-site infrastructure.	✓	A minimum 10m wide cleared buffer will be provided inside the subject site boundary. The firebreak buffer will contain non-combustible retaining walls, internal access roads and/or cleared land (non-vegetated) managed as part of the APZ. The APZs have been calculated in relation to the 10 kW/m^2 radiant heat threshold which well exceeds the 10 m minimum requirement.

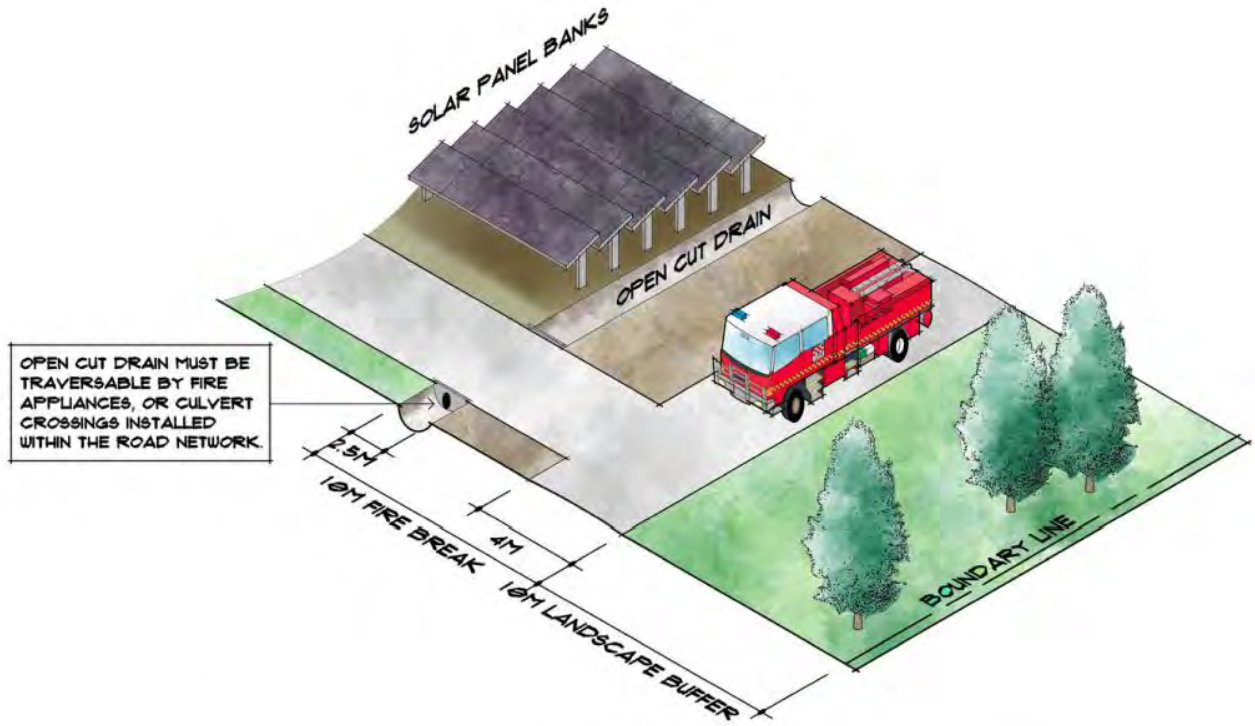

Figure 10: *Typical cross-section indicating fire break requirements at a solar energy facility.*

BESS Specific Requirements

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The design of the BESS facility must incorporate a separation distance that prevents fire spread between battery containers / enclosures and: • **Other battery containers / enclosures.** • **On-site buildings.** • **Substations.** • **The site boundary.** • **Any other site buildings.** • **Vegetation.**	✓	All components of the BESS facility have been designed to prevent fire spread. Detailed design will ensure separation distances within the subject site are in line with globally accepted standard NFPA 855 - Standard for Installation of Statutory Energy Storage Systems and manufacturers specifications.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
The design must incorporate a firebreak around the BESS and related infrastructure, of a width of no less than 10m.	✓	A 10m firebreak will be provided (refer above).
The design must incorporate a layout of site infrastructure that: • **Considers the safety of emergency responders.** • **Minimises the potential for grassfire and/or bushfire to impact the BESS.** • **Minimises the potential for fires to battery containers / enclosures to impact on-site and off-site infrastructure.**	✓	The centralised layout enables first responders to safely access the site and fire suppression infrastructure in an emergency. The APZ also provide permanent separation between the proposed BESS facility and areas of vegetation. The BESS facility will utilise infrastructure that integrates fire prevention systems and controls to prevent potential fires. This will be finalised in detailed design.
The BESS must be located reasonably adjacent to a site vehicle entrance suitable for emergency vehicles.	✓	Stage 1 is located adjacent the western vehicular access point from Mellons Road.
The BESS must be located so that the site entrance and any fire water tanks are not aligned to the prevailing wind direction (therefore least likely to be impacted by smoke in the event of a fire at the BESS). **The BESS must be provided with in-built fire and gas detection systems. Where these systems are not provided, measure to effectively detect fires within containers must be detailed within the Risk Management Plan.**	✓	The BESS is setback approximately 250m from the fire water tank at the western entrance. Water tanks are located to the west, north and south of the BESS and as such, firefighting water will be accessible under differing wind conditions. The BESS will be provided with in-built smoke detectors, heat detectors and combustible gas detectors.
The BESS must be provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels.	✓	The BESS will be provided with in-built smoke detectors and hydrogen gas detectors to prevent explosions.
The BESS must be provided with suitable ember protection to prevent embers from penetrating battery containers / enclosures.	✓	Any external gaps or ventilation systems can be fitted with ember protection. This will be documented at detailed design stage.
The BESS must be provided with suitable access roads for emergency services vehicles, to and within the site, including to BESS and fire service infrastructure.	✓	The access arrangements enable emergency service vehicles to effectively manoeuvre the site and access the fire service infrastructure, as demonstrated in the Emergency Vehicle Access section.
The BESS must be installed on a non-combustible surface such as concrete.	✓	The BESS will be installed on a non-combustible surface.
The BESS must be provided with suitable ventilation.	✓	The BESS will be fitted with automatic ventilation system.
The BESS must be provided with impact protection to at least the equivalent of a W guardrail-type barrier, to	✓	Suitable impact protection measures may be developed, subject to final

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
prevent mechanical damage to battery containers / enclosures.		hazard risk assessment to be completed during detailed design stage.
The BESS must be provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection.	✓	All wiring will be enclosed and all cabling connecting the individual components will be underground.
The BESS must be provided with spill containment that includes provision for management of fire water runoff.	✓	BESS containers will be equipped with spill containment. Fire water runoff will be managed through detail hydrology design.

Facility Construction and Commissioning

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Install and commission fire detection and suppression for the facility at the earliest possible stage of construction.	TBC	A construction programme is yet to be prepared for the project.
Provide first-aid firefighting equipment, such as fire extinguishers (and where possible, portable fire hose reels), appropriate to the identified emergency scenarios, at all construction portables / buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.	✓	Transportable buildings used during the construction phase of the project will include first-aid firefighting equipment.
Provide the required fire protection equipment for any storage of dangerous goods as per the relevant Australian Standards.	✓	Fire protection equipment will be provided in accordance with the relevant standards for the storage of dangerous goods.
Obtain appropriate permits for work during the restricted and prohibited burning periods and ensure that any conditions on the permits are adhered to.	✓	The proponent will be responsible for obtaining any necessary permits during restricted burn periods.
Adhere to restrictions on Total Fire Ban or days of elevated fire danger according to Emergency WA website.	✓	The proponent will adhere to the restrictions of Total Fire Ban days.
During the restricted and prohibited burning periods, ensure vehicle operators are instructed to remain on tracks and are not permitted to drive through paddocks.	✓	Vehicles will only be permitted on designated access roads.
Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities.	✓	Smoking will be restricted to a prescribed area, away from all fire hazards.
Provide remotely accessible site/system security monitoring at the facility.	TBC	This will be determined during the detailed design phase.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Provide training for personnel in the use of on-site first aid firefighting equipment, and responsibilities during emergencies.	✓	Personnel nominated as part of the emergency response team will be required to undertake first aid and firefighting equipment training.
Develop an Emergency Plan for the construction and commissioning phase of the project.	✓	A construction management plan will be developed for the project which will include emergency procedures during the construction and commissioning phase of the project.
Provide an emergency communication system that is reliable and will operate in the event of power failure.	✓	All vehicles will be fitted with two-way radios to enable communication during an emergency. Mobile phone reception is also available at the site.
Notify DFES at least seven days prior to the commissioning of any renewable energy infrastructure at the facility (e.g. BESS).	✓	DFES will be notified prior to commissioning the BESS.
Develop safe work procedures for the facility, including but not limited to: • **Electricity and chemical management.** • **Vegetation management.** • **Site security.** • **Ignition source control, including hot works.** • **Infrastructure, equipment and vehicle maintenance.** • **Emergency management.**	✓	The proponent will develop an operational management plan which will include safe work procedures for the facility.

Facility Operation

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
A BMP must be developed for the facility, in consultation with DFES, before development starts.	✓	A BMP has been prepared in accordance with SPP 3.7 and the Guidelines. The BMP may be referred to DFES in accordance with SPP 3.7 for advice as part of the assessment process. This is at the discretion of the Local Government.
Undertake bushfire prevention and preparedness activities.	✓	An emergency plan will be prepared which will outline bushfire prevention and preparedness activities. In addition, bushfire prevention and preparedness activities will be undertaken in accordance with the Shire of Narrogin 2024/2025 Firebreak and Hazard Reduction Notice.

CFA Guideline Requirements (Adapted to WA)	Compliance can be achieved	Compliance comments
Facility operators must undertake the following measures: • **Grass must be maintained at or below 100mm in height.** • **Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation.** • **Restrictions and guidance must be adhered to during days of high (and above) fire danger or Total Fire Ban days.**	✓	The proposed BESS facility will be surrounded by an APZ to ensure the radiant heat flux from vegetation is maintained at 10kW/m^2. All grass within the APZ will be maintained at or below 100mm and leaf litter will be removed on a regular basis.
Appropriate monitoring for facility infrastructure must be provided to ensure that any shorts, faults or equipment failures with the potential to ignite or propagate fire are rapidly identified and controlled.	✓	The BESS facility will be subject to routine monitoring to identify any shorts, faults or equipment failures. The monitoring regime will be detailed in the operational management plan.
Inspection, maintenance and any required repair activities must be conducted for all infrastructure, equipment and vehicles at the facility. Maintenance must be in line with any relevant Australian Standards and manufacturers requirements.	✓	Inspection, maintenance and repairs will be undertaken in accordance with the relevant Australian Standards and manufacturers requirements.

Appendix B:
Classified vegetation photos

Plot 1	Class A Forest
Photo 1 Trees to 30 m in height with canopy cover estimated between 30% and 70%. Overstorey dominated by Eucalypts with a grassy understorey. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 2	**Class A Forest**
Photo 2 Trees to 30 m in height with canopy cover estimated between 30% and 70%. Overstorey dominated by Eucalypts with grasses and sparse shrubs in the understorey. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 2	**Class A Forest**
Photo 3 Planted Eucalypt trees up to 30 m in height with overall canopy cover exceeding 30%. Understorey mainly consisting of grasses. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 2	Class A Forest
Photo 4 Trees to 30 m in height with canopy cover estimated between 30% and 70%. Overstorey dominated by Eucalypts with a grasses and sparse shrubs in the understorey. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 2	**Class A Forest**
Photo 5 Trees to 30 m in height. Vegetation structure is multi-tiered with an overall canopy cover exceeding 30%. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 3	**Class B Woodland**
Photo 6 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	

Plot 3	Class B Woodland
Photo 7 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 4	**Class B Woodland**
Photo 8 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 4	**Class B Woodland**
Photo 9 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 4	Class B Woodland
Photo 10 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey and sparse shrubs. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 4	**Class B Woodland**
Photo 11 Trees to 30 m in height with estimated canopy cover to be <30%. The vegetation structure is open with a grassy understorey. The slope under this vegetation was assessed to be upslope/flat land. Drone photography was used to capture this photo due to site access constraints.	
Plot 5	**Class C Shrubland**
Photo 12 Shrubs to 2 m in height with grasses in the understorey. Shrubs make up more than 10% of the overall foliage cover. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 6	Class G Grassland
Photo 13 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 6	**Class G Grassland**
Photo 14 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	
Plot 6	**Class G Grassland**
Photo 15 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be downslope >0 - 5 degrees.	

Plot 7	Class G Grassland
Photo 16 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 7	**Class G Grassland**
Photo 17 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be upslope/flat land.	
Plot 7	**Class G Grassland**
Photo 18 Grasses dominant throughout this plot with sparse trees with isolated canopies. Overstorey foliage cover is less than 10%. The slope under this vegetation was assessed to be upslope/flat land.	

Plot 8	Excluded - clause 2.2.3.2 (e)
Photo 19 Permanent dam with areas surrounding the water which are devoid of vegetation. This plot is excluded under AS 3959:2018 Clause 2.2.3.2 (e).	
Plot 8	**Excluded - clause 2.2.3.2 (e)**
Photo 20 Existing Western Power facilities which includes asphalted areas as well as other cleared areas and a permanent dam containing water.	
Plot 9	**Excluded - clause 2.2.3.2 (f)**
Photo 21 Existing dwelling and associated gardens which are managed to a low-threat state. This plot also includes the driveway which is devoid of vegetation.	

Appendix C:
Method 2 BAL Calculations

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 14/04/2025 **Assessment Date:** 14/08/2024

Site Street Address: Narrogin BESS, Narrogin

Assessor: Daniel Panickar; Western Environmental

Local Government Area: WA **Alpine Area:** No

Equations Used

Transmissivity: Fuss and Hammins, 2002
Flame Length: RFS PBP, 2001/Vesta/Catchpole
Rate of Fire Spread: Noble et al., 1980
Radiant Heat: Drysdale, 1985; Sullivan et al., 2003; Tan et al., 2005
Peak Elevation of Receiver: Tan et al., 2005
Peak Flame Angle: Tan et al., 2005

Run Description: Plot 1 Forest

Vegetation Information

Vegetation Type: Forest
Vegetation Group: Forest and Woodland
Vegetation Slope: 5 Degrees **Vegetation Slope Type:** Downslope
Surface Fuel Load(t/ha): 25 **Overall Fuel Load(t/ha):** 35
Vegetation Height(m): 2 Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 0 Degrees **Site Slope Type:** Downslope
Elevation of Receiver(m): Default **APZ/Separation(m):** 60

Fire Inputs

Veg./Flame Width(m): 100 **Flame Temp(K):** 1090

Calculation Parameters

Flame Emissivity: 95 **Relative Humidity(%):** 25
Heat of Combustion(kJ/kg) 18600 **Ambient Temp(K):** 308
Moisture Factor: 5 **FDI:** 80

Program Outputs

Level of Construction: BAL 12.5 **Peak Elevation of Receiver(m):** 12.47
Radiant Heat(kW/m2): 9.78 **Flame Angle (degrees):** 72
Flame Length(m): 26.23 **Maximum View Factor:** 0.169
Rate Of Spread (km/h): 3.39 **Inner Protection Area(m):** 43
Transmissivity: 0.76 **Outer Protection Area(m):** 17
Fire Intensity(kW/m): 61280

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	21	27	38	51	75	6

Run Description: Plot 2 Forest

Vegetation Information

Vegetation Type: Forest

Vegetation Group: Forest and Woodland

Vegetation Slope: 0 Degrees

Vegetation Slope Type: Level

Surface Fuel Load(t/ha): 25

Overall Fuel Load(t/ha): 35

Vegetation Height(m): 2

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 0 Degrees

Site Slope Type: Downslope

Elevation of Receiver(m): Default

APZ/Separation(m): 49

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K): 1090

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 25

Heat of Combustion(kJ/kg) 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 80

Program Outputs

Level of Construction: BAL 12.5

Peak Elevation of Receiver(m): 9.52

Radiant Heat(kW/m2): 9.95

Flame Angle (degrees): 74

Flame Length(m): 19.8

Maximum View Factor: 0.169

Rate Of Spread (km/h): 2.4

Inner Protection Area(m): 35

Transmissivity: 0.774

Outer Protection Area(m): 14

Fire Intensity(kW/m): 43400

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	17	22	31	42	64	6

Run Description:	Plot 3 Woodland		
Vegetation Information			
Vegetation Type:	Woodland		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	5 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	15	**Overall Fuel Load(t/ha):**	25
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	43
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg)	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80
Program Outputs			
Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	7.87
Radiant Heat(kW/m2):	9.78	**Flame Angle (degrees):**	76
Flame Length(m):	16.22	**Maximum View Factor:**	0.164
Rate Of Spread (km/h):	2.03	**Inner Protection Area(m):**	34
Transmissivity:	0.782	**Outer Protection Area(m):**	9
Fire Intensity(kW/m):	26263		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	14	18	26	36	56	6

Run Description:	Plot 4 Woodland		
Vegetation Information			
Vegetation Type:	Woodland		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Level
Surface Fuel Load(t/ha):	15	**Overall Fuel Load(t/ha):**	25
Vegetation Height(m):	2	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	Default	**APZ/Separation(m):**	35
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg)	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80
Program Outputs			
Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	6.04
Radiant Heat(kW/m2):	9.8	**Flame Angle (degrees):**	78
Flame Length(m):	12.36	**Maximum View Factor:**	0.162
Rate Of Spread (km/h):	1.44	**Inner Protection Area(m):**	27
Transmissivity:	0.797	**Outer Protection Area(m):**	8
Fire Intensity(kW/m):	18600		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	11	14	21	29	47	6

Run Description: Plot 5 Grassland

Vegetation Information

Vegetation Type: Grassland

Vegetation Group: Grassland

Vegetation Slope: 5 Degrees

Vegetation Slope Type: Downslope

Surface Fuel Load(t/ha): 4.5

Overall Fuel Load(t/ha): 4.5

Vegetation Height(m): 0

Only Applicable to Shrub/Scrub and Vesta

Site Information

Site Slope: 0 Degrees

Site Slope Type: Downslope

Elevation of Receiver(m): 3

APZ/Separation(m): 25

Fire Inputs

Veg./Flame Width(m): 100

Flame Temp(K): 1090

Calculation Parameters

Flame Emissivity: 95

Relative Humidity(%): 25

Heat of Combustion(kJ/kg) 18600

Ambient Temp(K): 308

Moisture Factor: 5

FDI: 110

Program Outputs

Level of Construction: BAL 12.5

Peak Elevation of Receiver(m): 4.02

Radiant Heat(kW/m2): 9.76

Flame Angle (degrees): 79

Flame Length(m): 8.17

Maximum View Factor: 0.157

Rate Of Spread (km/h): 20.19

Inner Protection Area(m): 25

Transmissivity: 0.819

Outer Protection Area(m): 0

Fire Intensity(kW/m): 46945

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	7	10	14	21	34	3

Run Description:	Plot 6 Grassland		
Vegetation Information			
Vegetation Type:	Grassland		
Vegetation Group:	Grassland		
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Level
Surface Fuel Load(t/ha):	4.5	**Overall Fuel Load(t/ha):**	4.5
Vegetation Height(m):	0	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	3	**APZ/Separation(m):**	22
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg)	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	110
Program Outputs			
Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	3.38
Radiant Heat(kW/m2):	9.55	**Flame Angle (degrees):**	80
Flame Length(m):	6.87	**Maximum View Factor:**	0.152
Rate Of Spread (km/h):	14.3	**Inner Protection Area(m):**	22
Transmissivity:	0.827	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	33248		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	6	8	12	18	30	3

Run Description:	Shrubland Flat		
Vegetation Information			
Vegetation Type:	Shrubland/Short Heath		
Vegetation Group:	Shrub & Heath		
Vegetation Slope:	0 Degrees	**Vegetation Slope Type:**	Downslope
Surface Fuel Load(t/ha):	15	**Overall Fuel Load(t/ha):**	15
Vegetation Height(m):	1.5	Only Applicable to Shrub/Scrub and Vesta	
Site Information			
Site Slope:	0 Degrees	**Site Slope Type:**	Downslope
Elevation of Receiver(m):	3	**APZ/Separation(m):**	24
Fire Inputs			
Veg./Flame Width(m):	100	**Flame Temp(K):**	1090
Calculation Parameters			
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg)	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80
Program Outputs			
Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	3.81
Radiant Heat(kW/m2):	9.71	**Flame Angle (degrees):**	80
Flame Length(m):	7.74	**Maximum View Factor:**	0.155
Rate Of Spread (km/h):	2.87	**Inner Protection Area(m):**	24
Transmissivity:	0.822	**Outer Protection Area(m):**	0
Fire Intensity(kW/m):	22208		

BAL Thresholds

	BAL-40:	BAL-29:	BAL-19:	BAL-12.5:	10 kw/m2:	Elevation of Receiver:
Asset Protection Zone(m):	7	9	14	20	33	3

Appendix D:
Standards for Asset Protection Zones

The following standards have been extracted from the *Planning for Bushfire Guidelines* (WAPC, 2024).

Every habitable building is to be surrounded by, and every proposed lot can achieve, an APZ depicted on submitted plans, which meets the following requirements:

a. Width: Measured from any external wall or supporting post or column of the proposed building, and of sufficient size to ensure the potential radiant heat impact of a fire does not exceed 29kW/m² (BAL-29) in all circumstances.
b. Location: the APZ should be contained solely within the boundaries of the lot on which a building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity (see explanatory notes).
c. Management: the APZ is managed in accordance with the requirements of '*Standards for Asset Protection Zones*' (below):

• Fences within the APZ:

  - Should be constructed from non-combustible materials or bushfire-resisting timber referenced in Appendix F of AS 3959.

- Fine fuel load (Combustible, dead vegetation matter <6 millimetres in thickness):

  - Should be managed and removed on a regular basis to maintain a low threat state.

  - Should be maintained at <2 tonnes per hectare (on average).

  - Mulches should be non-combustible (e.g. stone, gravel or crushed mineral earth) or wood mulch >6 millimetres in thickness.

- Trees (>6 metres in height):

  - Trunks at maturity should be a minimum distance of six metres from all elevations of the building;

  - Branches at maturity should not touch or overhand a building or powerline.

  - Lower branches and loose bark should be removed to a height of two metres above the ground and/or surface vegetation.

  - Canopy cover within the APZ should be <15 per cent of the total APZ area.

  - Tree canopies at maturity should be at least five metres apart to avoid forming a continuous canopy. Stands of existing mature trees with interlocking canopies may be treated as an individual canopy provided that the total canopy cover within the APZ will not exceed 15 per cent and are not connected to the tree canopy outside the APZ.

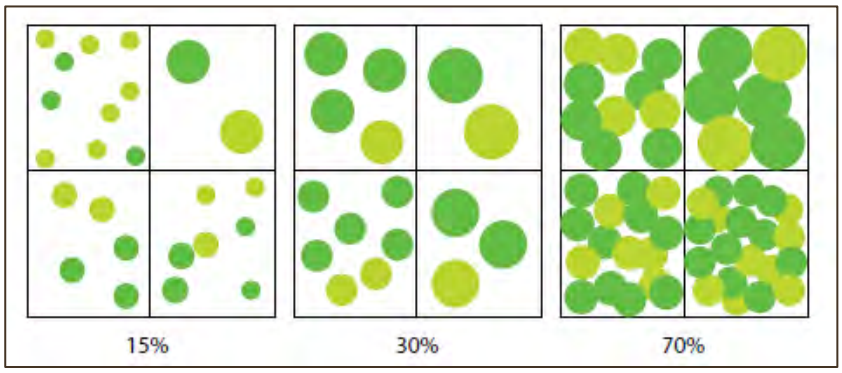

Figure 7: Illustrated tree canopy cover projection (WAPC, 2021)

- Shrub and scrub 0.5 metres to six metres in height (shrub or scrub >6 metres in height are to be treated as trees):
    - Should not be located under trees or within three metres of buildings.
    - Should not be planted in clumps >5 square metres in area.
    - Clumps should be separated from each other and any exposed window or door by at least 10 metres.
- Ground covers <0.5 metres in height (ground covers >0.5 metres in height are to be treated as shrubs):
    - Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load' above.
    - Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
- Grass:
    - Grass should be maintained at a height of 100 millimetres or less, at all times.
    - Wherever possible, perennial grasses should be used and well-hydrated with regular application of wetting agents and efficient irrigation.
- Defendable space:
    - Within three metres of each wall or supporting post of a habitable building, the area is kept free from vegetation, but can include ground covers, grass and non-combustible mulches as prescribed above.

- LP Gas Cylinders:
    - Should be located on the side of a building furthest from the likely direction of a bushfire or on the side of a building where surrounding classified vegetation is upslope, at least one metre from vulnerable parts of a building.
    - The pressure relief valve should point away from the house.
    - No flammable material within six metres from the front of the valve.
    - Must site on a firm, level and non-combustible base and be secured to a solid structure.

ADDITIONAL NOTES

The Asset Protection Zone (APZ) is an area surrounding a building that is managed to reduce the bushfire hazard to an acceptable level. Hazard separation in the form of using subdivision design elements or excluded and low threat vegetation adjacent to the lot may be used to reduce the dimensions of the APZ within the lot.

The APZ should be contained solely within the boundaries of the lot on which the building is situated, except in instances where the neighbouring lot or lots will be managed in a low-fuel state on an ongoing basis, in perpetuity. The APZ may include public roads, waterways, footpaths, buildings, rocky outcrops, golf courses, maintained parkland as well as cultivated gardens in an urban context, but does not include grassland or vegetation on a neighbouring rural lot, farmland, wetland reserves and unmanaged public reserves.

Plant flammability, landscaping design and maintenance should also be considered for trees, shrub, scrub and ground covers with the APZ. Please refer to explanatory notes '*E2 Managing an Asset Protection Zone (APZ) to a low threat state*,' '*E2 Landscaping and design of an asset protection zone*,' and '*E2 Plant flammability*' in the Guidelines for further information relating to APZ standards.

Appendix E:
Vehicular access technical requirements (WAPC, 2024)

Technical requirements	Public road	Emergency access way[1]	Fire service access route[1]	Battle-axe and private driveways[2]
Minimum trafficable surface (m)	In accordance with A3.1	6	6	4
Minimum horizontal clearance (m)	N/A	6	6	6
Minimum vertical clearance (m)	4.5			
Minimum weight capacity (t)	15			
Maximum grade unsealed road3	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Maximum grade sealed road3	As outlined in the IPWEA Subdivision Guidelines	1:7 (14.3%)		
Maximum average grade sealed road	As outlined in the IPWEA Subdivision Guidelines	1:10 (10%)		
Minimum inner radius of road curves (m)	As outlined in the IPWEA Subdivision Guidelines	8.5		

[1]To have crossfalls between 3 and 6%

[2]Where driveways and battle-axe legs are not required to comply with the widths in A3.5 or A3.6, they are to comply with Residential Design Codes and Development Control Policy 2.2 Residential Subdivision.

[3]Dips must have no more than a 1 in 8 (12.5% - 7.1 degree) entry and exit angle.

Technical Memorandum

April 3, 2025

To	Tarek Osman	**Contact No.**	+61 8 6222 8395
Copy to	-	**Email**	tristan.sleigh@ghd.com
From	Loreena Langner Tristan Sleigh	**Project No.**	12638490
Project Name	Narrogin BESS Development Pty Ltd		
Subject	Technical Memorandum – EPBC Self-Assessment		

1. Introduction

Narrogin BESS Development Pty Ltd (South Energy, on behalf of Narrogin BESS Development Pty Ltd) is proposing a Battery Energy Storage System (BESS) facility at Narrogin in Western Australia (WA) (the project). The project is to be constructed at Lot 9 (No. 76) Narrogin Valley Road, Narrogin Valley (the site).

In response to site constraints, South Energy is exploring removing existing vegetation on the site (Proposed Works). The vegetation on-site includes remnant *Eucalyptus camaldulensis* trees and plantation areas, mixed *Eucalyptus* spp. and *Casuarina obesa* plantation areas, and a remnant *Corymbia calophylla* tree (see Figure 1).

GHD has been engaged by South Energy to conduct due diligence tasks related to environmental approvals for the potential removal of all vegetation on the site.

1.1 Purpose of this Memorandum

The purpose of this Memorandum is to provide South Energy with an understanding of the potential impact significance associated with clearing of vegetation within the site.

Although no primary or secondary signs of either Carnaby's Cockatoo or Forest Red-tailed Black Cockatoo were recorded during previously undertaken field survey, the habitat assessment (Ecological Australia 2024) has identified vegetation (e.g., E. *camaldulensis* and *Corymbia Calophylla*) occurring on site that has been identified as 'foraging habitat' and 'potential breeding trees'. Both habitats are potentially considered to support Carnaby's Black Cockatoo and the Forest Red-tailed Black Cockatoo (Black cockatoos), listed Matters of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

As impacts to this habitat may impact these listed species, an EPBC Act self-assessment has been undertaken. This assessment provides guidance on whether a referral under the EPBC Act is necessary or can be avoided, based on outcomes of past EPBC Act referral decisions for similar projects and a significance assessment against the Significant Impact Guidelines 1.1 (DotE 2019).

Clearing of native vegetation in WA is regulated under the *Environmental Protection Act 1986* (EP Act). There are two processes involved:

1. the clearing referral; and
2. the Native Vegetation Clearing Permit (NVCP).

This Technical Memorandum is provided as an interim output under our agreement with South Energy. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

An assessment was conducted to determine whether the vegetation clearing on site would trigger either of these processes.

1.2 Scope and limitations

This technical memorandum has been prepared by GHD for South Energy. It is not prepared as, and is not represented to be, a deliverable suitable for reliance by any person for any purpose. It is not intended for circulation or incorporation into other documents. The matters discussed in this memorandum are limited to those specifically detailed in the memorandum and are subject to any limitations or assumptions specially set out.

This Technical Memorandum is provided as an interim output under our agreement with South Energy. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.



Figure 1 The site (Source: Ecological Australia, 2024)

This Technical Memorandum is provided as an interim output under our agreement with South Energy. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

2. EPBC Self-assessment

The EPBC Act safeguards nationally significant animals, plants, habitats, and places within Australian territories. In WA, a self-assessment under the EPBC Act helps project proponents understand their responsibilities and determine whether their project might impact any protected matters. This process involves identifying protected matters and assessing the likely impacts of the proposed action.

A controlled action decision indicates that the proposed action is likely to have a significant impact on protected matters. To reach this decision, the minister requires a referral that assesses the impacts of the proposed action on protected matters, following the Significant Impact Guidelines 1.1 (DoE 2013). The referral must also outline the avoidance and mitigation measures planned. If the minister determines the proposal is a controlled action, it will undergo further assessment, and the minister or their delegate will decide on its approval. The assessment and approval phases focus solely on the impacts identified during the controlled action decision.

A not controlled action decision means the proposed action is unlikely to significantly impact protected matters, regardless of how it is carried out. Consequently, no further assessment is needed, but the action must be undertaken as described in the referral. If the minister decides the proposal is not a controlled action, the proponent cannot be prosecuted under the EPBC Act for executing the work, even if it ultimately has a significant impact on a protected matter or Commonwealth land.

To determine if a referral under the EPBC Act is necessary for the Project, a desktop assessment of similar projects, their environmental impacts on Black Cockatoos, and referral outcomes was conducted (see Table 1).

The analysis concluded that projects that were referred were deemed a controlled action if they involved clearing of more than 1 ha of high-value foraging habitat for Black Cockatoos. Projects clearing 1 ha or greater of low to moderate foraging value were not deemed controlled actions, and did not require assessment under the EPBC Act.

Table 1 Desktop assessment against impacts on Black Cockatoos of similar projects and their referral decisions

Project	Start date	Impacts on Black Cockatoos	Referral decision
Baldivis Residential Development - Spires Estate	02/12/2024	Loss of: – 1.83 ha of low-quality foraging habitat – 9 potential nesting trees (suitable Diameter at Breast Height (DBH)), no suitable hollows – 39 potential roosting trees	Not a controlled action
Donningtons Gravel Quarry	01/10/2024	Loss of: – 3.73 ha of low to medium-quality foraging habitat – 2.48 ha of potential breeding habitat – 134 potential nesting trees, no suitable hollows – Evidence of foraging recorded – Known to breed within 2 km	Not a controlled action
Upgrade of Flynn Drive to dual carriageway between Tranquil Vista to Old Yanchep Road, CARRAMAR, BANKSIA GROVE and NEERABUP	01/12/2024	Loss of: – 5.7 ha of high to very high-quality foraging habitat – 2 potential nesting trees, no suitable hollows	Controlled action
806 South West Highway Commercial Development	14/01/2024	Loss of: – 2.99 ha of low to very high-quality foraging habitat	Not a controlled action

This Technical Memorandum is provided as an interim output under our agreement with South Energy. It is provided to foster discussion in relation to technical matters associated with the project and should not be relied upon in any way.

Project	Start date	Impacts on Black Cockatoos	Referral decision
		– 44 potential nesting trees, no suitable hollows – 1 tree with suitable nesting hollow, currently occupied by galahs – 107 potential roosting trees	
Dunsborough water supply pipeline upgrade	01/12/2024	Loss of: – 0.06 ha of low to negligible-quality foraging habitat – No potential nesting or roosting trees	Not a controlled action
Northern Terminal to Neerabup Terminal 330kV Transmission Line	01/05/2025	Loss of: – 152.52 ha of high-quality foraging habitat – 104 potential nesting trees, no suitable hollows – 8 suitable nesting trees containing 12 hollows	Controlled action
Raphael Road Residential Development	01/08/2024	Loss of: – Less than 1 ha of low-quality foraging habitat – 35 foraging habitat trees – 141 potential nesting trees, no suitable hollows – 191 potential roosting trees – Foraging evidence recorded	Not a controlled action
Kargotich Road Widening Project	01/10/2024	– No impacts to Carnaby's Black Cockatoos. For Forest Red-tailed Black Cockatoos, Loss of: – 2.88 ha foraging habitat – 15 potential nesting trees, no suitable hollows	Not a controlled action
Orton Road Upgrade Project	01/10/2024	Loss of: – 0.62 ha of degraded foraging habitat – 10 potential nesting trees, no suitable hollows	Not a controlled action
Keirnan Park Recreation Precinct	01/11/2023	Loss of: – 0.64 ha of high-quality foraging habitat – 47 potential nesting trees, no suitable hollows – Carnaby's recorded and foraging evidence recorded – Red-tailed Black Cockatoo roosting observed	Not a controlled action
Tree removal for road widening - Eighth Road, Armadale, WA	01/01/2024	Loss of: – 3 potential nesting trees, no suitable hollows	Not a controlled action

3. EPBC Significance assessment

A preliminary significance assessment against the Significant Impact Guidelines 1.1 involving information drawn from the previous site biological survey (Ecological Australia, 2024) was undertaken to determine whether significant impacts to Black Cockatoos would be incurred in the event that *all* vegetation on the site was removed (referred to as 'the proposed works'). The outcome of this assessment indicates that clearing of the vegetation within the site is unlikely to significantly impact on Carnaby's Cockatoo and/ or the Forest Red-tailed black cockatoo.

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Table 2 Assessment against the Significant Impact Guidelines 1.1 - Matters of National environmental Significance

Significant Impact Criteria	Assessment
Lead to a long-term decrease in the size of a population	**Unlikely to be significant.** – The Proposed Works will result in the loss of 0.04 ha of Low value foraging habitat, and the loss of 0.12 ha and 0.75 ha of Moderate value foraging habitat for Carnaby's Cockatoo and the Red-tailed Black Cockatoo, respectively. – No evidence of foraging was recorded. – The Proposed Works may result in the clearing of roosting due to the presence of River Red Gum (*Eucalyptus camaldulensis*) and Marri (*Corymbia calophylla*) although there are no confirmed nests, roost sites recorded within the site. The Proposed Works will result in the loss of 0.01 ha of potential roosting habitat for black cockatoos. – The site is located within the known breeding range of Carnaby's Cockatoos, and the easternmost modelled distribution of 'may occur' for Forrest Red-tailed Black Cockatoo. – Five potentially suitable DBH breeding trees (including *Corymbia calophylla, Eucalyptus occidentalis)* that will be cleared, do not contain suitable hollows for black cockatoo nesting and these species are not known to support breeding within the Wheatbelt region (DAWE 2022). – The foraging habitat present within the site is unlikely to support local populations of Black Cockatoo.
Reduce the area of occupancy of the species	**Unlikely to be significant.** – The Proposed Works will result in the loss of 0.04 ha of Low value foraging habitat, and the loss of 0.12 ha and 0.75 ha of Moderate value foraging habitat for Carnaby's Cockatoo and the Red-tailed Black Cockatoo, respectively. – Clearing for the Proposed Works will be an area of vegetation that is in Degraded and Completely Degraded vegetation condition. Cleared areas covered 29.31 ha (97 %) of the site. – The foraging habitat present within the site is unlikely to support local populations of Black Cockatoo.
Fragment an existing population into two or more populations	**Unlikely to be significant** – Black cockatoos are highly mobile species and can fly above the fragmentation caused by transport and power infrastructure, clearing, and boundary fence lines. – Fragmentation currently exists as a result of transport and power infrastructure, clearing, and boundary fence lines. The Proposed Works will cause further fragmentation within the site; however, this is unlikely to impact populations of Black Cockatoo given they are a highly mobile species.
Adversely affect habitat critical to the survival of a species	**Unlikely to be significant.** – The Proposed Works will result in the loss of 0.04 ha of Low value foraging habitat, and the loss of 0.12 ha and 0.75 ha of Moderate value foraging habitat for Carnaby's Cockatoo and the Red-tailed Black Cockatoo, respectively. – No evidence of feeding was recorded. – The Proposed Works may result in the clearing of roosting due to the presence of River Red Gum (*Eucalyptus camaldulensis*) and Marri (*Corymbia calophylla*) although there are no confirmed nests, roost sites recorded within the site. The Proposed Works will result in the loss of 0.01 ha of potential roosting habitat for black cockatoos. – The site is located within the known breeding range of Carnaby's Cockatoos, and the easternmost modelled distribution of 'may occur' for Forrest Red-tailed Black Cockatoo. – Five potentially suitable DBH breeding trees (including *Corymbia calophylla, Eucalyptus occidentalis)* that will be cleared, do not contain

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Significant Impact Criteria	Assessment
	suitable hollows for black cockatoo nesting and these species are not known to support breeding within the Wheatbelt region (DAWE 2022). – The Proposed Works will not restrict access to other areas of foraging, breeding, and roosting habitat.
Disrupt the breeding cycle of a population	**Unlikely to be significant.** – The site is located within the known breeding range of Carnaby's Cockatoos, and the easternmost modelled distribution of 'may occur' for Forrest Red-tailed Black Cockatoo. – No known breeding sites are located within 20 km of the site, and as such the foraging habitat present within the site is unlikely to support breeding. – Five potentially suitable DBH breeding trees (including *Corymbia calophylla, Eucalyptus occidentalis)* that will be cleared, do not contain suitable hollows for black cockatoo nesting and these species are not known to support breeding within the Wheatbelt region (DAWE 2022). The Proposed Works will result in the loss of 0.04 ha of Low value foraging habitat, and the loss of 0.12 ha and 0.75 ha of Moderate value foraging habitat for Carnaby's Cockatoo and the Red-tailed Black Cockatoo, respectively.
Modify, destroy, remove, isolate, or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Unlikely to be significant.** – The Proposed Works will result in the loss of 0.04 ha of Low value foraging habitat, and the loss of 0.12 ha and 0.75 ha of Moderate value foraging habitat for Carnaby's Cockatoo and the Red-tailed Black Cockatoo, respectively. – No evidence of feeding was recorded. – The Proposed Works may result in the clearing of roosting due to the presence of River Red Gum (*Eucalyptus camaldulensis*) and Marri (*Corymbia calophylla*) although there are no confirmed nests, roost sites recorded within the site. The Proposed Works will result in the loss of 0.01 ha of potential roosting habitat for black cockatoos. – The site is located within the known breeding range of Carnaby's Cockatoos, and the easternmost modelled distribution of 'may occur' for Forrest Red-tailed Black Cockatoo. – Five potentially suitable DBH breeding trees (including *Corymbia calophylla, Eucalyptus occidentalis)* that will be cleared, do not contain suitable hollows for black cockatoo nesting and these species are not known to support breeding within the Wheatbelt region (DAWE 2022). – The site has existing weed infestation associated with farming and existing land uses. – The Proposed Works will implement management measures to mitigate and reduce the spread of the weeds and bushfire risk within the site and the surrounding area.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	**Unlikely to be significant.** – The Proposed Works is not expected to introduce or spread invasive species into black cockatoo habitat. – The Proposed Works does not involve any actions which could potentially introduce the European honeybee into the site or surrounds. Bees are not currently present within the site. – The Proposed Works is not expected to result in the introduction or spread of weeds that will result in significant impacts to black cockatoo habitat. – The Proposed Works will implement management measures to mitigate and reduce the spread of weeds and bushfire risk within the site and the surrounding area. – The Proposed Works is not expected to introduce any predator species (e.g. foxes, feral cats, or rabbits) into the site.
Introduce disease that may cause the species to decline	**Unlikely to be significant.**

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Significant Impact Criteria	Assessment
	– The Proposed Works does not involve any actions which could potentially introduce infectious diseases within black cockatoo populations which could cause the species to decline.
Interfere with the recovery of the species	**Unlikely to be significant.** – The project is unlikely to significantly interfere with the recovery of Carnaby's Cockatoo and Red-tailed Black Cockatoo species as it does not involve clearing of known breeding and roosting habitat trees and will only clear Low to Moderate foraging value habitats. – No known breeding sites are located within 20 km of the site, and as such the foraging habitat present within the site is unlikely to support breeding.

4. Native Vegetation Clearing Permit (NVCP)

In WA, the clearing of native vegetation is regulated under EP Act through two separate processes, the 'clearing referral process' and the 'NVCP'. The two processes serve different purposes and have distinct procedures:

– The clearing referral process allows individuals or organizations to refer their proposed native vegetation clearing to the Department of Water and Environmental Regulation (DWER) or the Department of Mines, Industry Regulation and Safety (DMIRS) to determine if a clearing permit is required. It is suitable for clearing activities with very low environmental impact. If the referral meets specific criteria, a clearing permit may not be necessary.
– The NVCP process involves a more detailed assessment to ensure that the clearing does not significantly impact the environment. A NVCP is required for clearing activities that do not qualify for an exemption or do not meet the 'low-impact criteria' of the clearing referral process.

An assessment of the project against the two processes is provided below.

4.1 Clearing referral

4.1.1 Assessment against the DWER Criterion

A project that meets the four DWER clearing referral criteria, as outlined in the sections below, is exempt from requiring a permit (DWER 2021).

As the outlined in the sections below, the project meets all criteria except Criterion 1 – and as such it is not exempted under the clearing referral process.

Criterion 1: The area proposed to be cleared is small relative to the total remaining vegetation

Under consideration of Criterion 1, DWER assesses the size of the proposed clearing, relative to the overall remaining vegetation in the region and the remaining vegetation of the same ecological community in the region.

Table 3 DWER Criterion 1 Thresholds

Thresholds for a permit to be required	Proposed clearing
More than 1 ha is proposed to be cleared (Intensive Land Use Zone)	Disturbance to 0.12 ha of native vegetation
Less than 30% of that native vegetation association or complex is remaining within the relevant IBRA bioregion	The Narrogin 1023 vegetation association, representative of the site, has less than 30% of its pre-European extent remaining within the Katanning subregion (16% remaining) (DBCA 2019).

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Thresholds for a permit to be required	Proposed clearing
Less than 30% native vegetation is remaining within a 10 km buffer of the proposed clearing	Less than 30% native vegetation is remaining within a 10 km buffer of the proposed clearing

The project does not satisfy this criterion, on the basis that there is insufficient remaining vegetation in the region.

Criterion 2: There are no known or likely significant environmental values within the area

Under consideration of Criterion 2, DWER consider the potential impacts on various environmental values within the proposed clearing. There are no known or likely significant environmental values within the clearing area as described in Table 4.

Table 4 DWER Criterion 2 Considerations

Environmental Value	Impacts of proposed clearing
Vegetation condition	Vegetation condition ranges from Degraded to Completely Degraded with high levels of disturbance throughout the site.
Significant fauna	No Threatened or Priority fauna were identified in the site during field survey. Any Conservation Significant species that could possibly occur are highly mobile and could easily relocate during clearing.
Fauna habitat	Potential habitat for Carnaby's Cockatoo and Forest Red-tailed Black Cockatoo was recorded with the site, however no evidence of presence or use was recorded.
Significant ecological linkage	The proposed clearing is not part of a significant ecological linkage, nor will it disrupt the movement of fauna through the region.
Mapped ecological community	No TECs/PECs were identified within the Investigation Sites.
Significant flora	No significant flora was identified within the site during field surveys.
Mapped wetland	The site does not intersect any mapped wetlands.
Mapped watercourse	The does not intersect any mapped watercourses.
Water resources	It is considered unlikely that clearing will significantly disturb or interrupt natural drainage and surface run-off patterns. No Public Drinking Water Source Areas are present within the Investigation Sites.
Conservation reserve	The Investigation Sites do not intersect any conservation reserves.
Land and soil quality	Acid sulfate soils are not present within the site. The proposed clearing will not alter hydrogeological regimes due to the minimal extent of clearing within a larger area. The clearing is unlikely to cause deterioration in surface water or ground water quality.
Heritage and native title	No heritage sites have been identified within the site.

The project satisfies this criterion.

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Criterion 3: The state of scientific knowledge of native vegetation within the region is adequate

Under consideration of Criterion 3, DWER reviews the current state of scientific knowledge within the clearing area and the wider region. Details of native vegetation in the region are contained in DBCA databases. The state of scientific knowledge of native vegetation within the region is adequate for the minor nature of the proposed clearing.

The project satisfies this criterion.

Criterion 4: Conditions will not be required to manage environmental impacts

Under consideration of Criterion 4, DWER assesses if the applicant has implicated the mitigation hierarchy when planning the clearing activity.

The hierarchy of avoid, minimise, reduce, and rehabilitate has been used while selecting the Investigation Areas to mitigate the environmental impacts of the Proposed Works. The Proposed Works have been designed to minimise direct impacts of vegetation clearing. Use of existing disturbed areas been prioritised to minimise the need for clearing. The clearing will not require offsets or any other conditions to manage effects on the environment.

The project satisfies this criterion.

4.2 NVCP Exemption Assessment

Clearing native vegetation in WA is regulated under the EP Act. It is an offence to clear native vegetation without a permit or an applicable exemption.

Under the NVCP process there are two types of exemptions:

– Schedule 6 exemptions under the EP Act
– Exemptions under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (CNV Regulations)

An assessment was conducted to determine the need for a NVCP under Part V of the EP Act, considering the project's environmental and tenure aspects in line with exemptions, as well as other legislative requirements. The assessment concluded:

– The proposed work does not qualify for Schedule 6 exemptions.
– If South Energy proposes to clear only the three isolated trees, located centrally within the site (being the two E. *camaldulensis* and one *Corymbia Calophylla*) it will meet Regulation 5, Item 19 (clearing of isolated trees) of the CNV Regulations, and an NVPC will not be required.
– An NVCP under Part V of the EP Act will be required should the remaining 0.12 ha of native vegetation require clearing for the project

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5. Recommendations

5.1 EPBC Act

The DCCEEW referral guidelines for Black Cockatoos recommend referring any clearing of potential habitat exceeding 1 ha in size. South Energy's site, however, covers only 0.91 ha of vegetation, which is already 97% cleared. While the site includes foraging habitat (remnant *Eucalyptus camaldulensis* trees and plantation areas, mixed *Eucalyptus spp.* and *Casuarina obesa* plantation areas), it lacks high value foraging habitat, and no evidence of foraging was found.

The Proposed Works might involve clearing potential roosting and breeding habitat due to the presence of River Red Gum (*Eucalyptus camaldulensis*), and Marri (*Corymbia calophylla*). However, no confirmed nests, hollows, or roost sites have been recorded within the site, and the potential clearing of roosting habitat would be minimal (0.01 ha). These tree species are also not known to support breeding with the Wheatbelt Region (DAWE 2022).

Given these findings, it is unlikely that clearing 0.91 ha of vegetation on site will significantly impact Black Cockatoos, and if referred, it is unlikely the proposed action would be deemed a controlled action. However, ultimately, under the EPBC Act the decision to refer a Project sits with the proponent.

5.2 Clearing Referral/ NVCP

If South Energy proposes to clear only the three isolated trees located centrally within the site (being the two E. *camaldulensis* and one *Corymbia Calophylla*) it will meet Regulation 5, Item 19 (clearing of isolated trees) of the CNV Regulations, and an NVPC will not be required.

Should the remaining 0.12 ha of native vegetation require clearing, it is unlikely to be suitable for Native Vegetation Clearing Referral given:

– The proposed clearing occurs within a highly cleared landscape containing limited or restricted native vegetation types.
– Habitat for Carnaby’s Cockatoo and Forest Red-tailed Black Cockatoo was recorded with the site.
– The Proposed Works do not qualify for any exemption that would eliminate the need for a NVCP.

Given this, a NVCP under Part V of the EP Act should be obtained if the non-isolated areas of remnant vegetation are required to be cleared.

As illustrated in the project's layout plan in Figure 2, the project will not trigger NVCP as long as the layout remains current.

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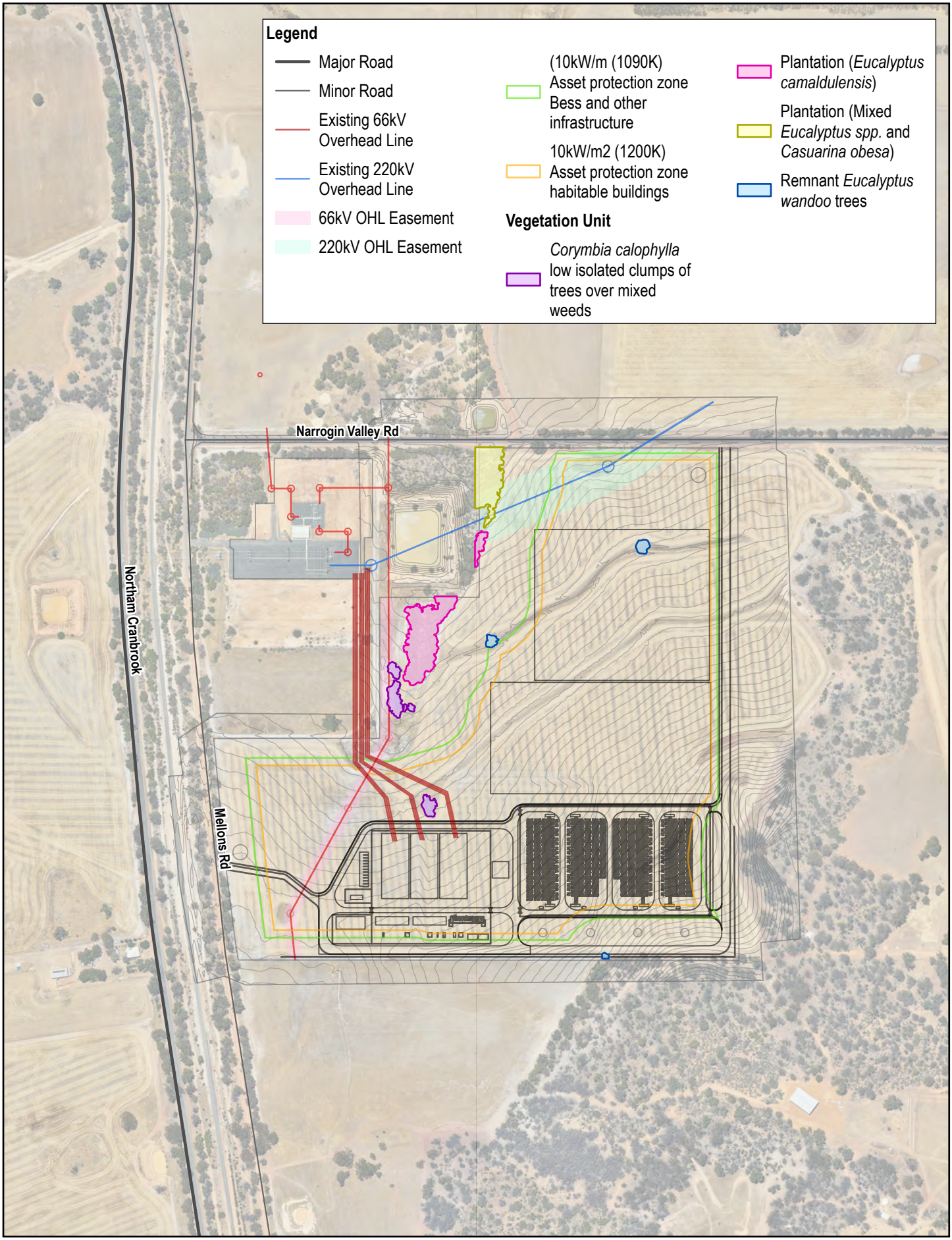

Paper Size ISO A4

0 50 100 150 200

Meters

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 50

N

GHD

Narrogin BESS Develoment Pty Ltd
South Energy Narrogin BESS

Project No. **12638490**
Revision No. **A**
Date **28/03/2025**

Layout Plan and Vegetation Impact

FIGURE 2

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Print date: 11 Feb 2025 - 11:31

Data source: WANow: . Created by: rbrown3

6. References

Department of the Environment (DotE) (2013). *Matters of National Environmental Significance: Significant impact guidelines 1.1,* Canberra: Commonwealth of Australia.

DAWE 2022, Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black cockatoo, Department of Agriculture, Water and the Environment, Canberra, February.

Government of Western Australia (GoWA) (2021). *Guideline: Native Vegetation Clearing Referrals*. Joondalup: Department of Water and Environmental Regulation.

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NOTE - See Certificate of Title 1702-85 for interests & encumbrances over Lot 9 not shown.

DISCLAIMER
This plan has been prepared for Narrogin BESS Development Pty Ltd from a combination of field survey and existing records for the purpose of showing the physical features of the land to assist in designing future development. It should not be used for any other purpose.

The title boundaries shown hereon were not verified or marked at the time of survey but are derived from a combination of Landgate SCDB and original lot dimensions with an estimated accuracy of +/-0.5m. The boundaries shown are subject to survey once a WAPC subdivision approval is obtained. This plan should not be used for building to boundary, or to prescribed set-backs, without further boundary survey.

AHD connection made to SSM COR36 by RTK GNSS observations.

Underground services shown on this drawing have been plotted from service authority records obtained from 'Before You Dig Australia' or a similar source. Unless indicated otherwise only surface features have been located by survey.

Before starting any demolition, excavation or construction on the site, the relevant person should make an independent and updated enquiry of 'Before You Dig Australia' and any relevant service providers to ascertain the existence of further services (if any) and the accurate location of those not surveyed at the time of preparing this plan (or data).

No responsibility can be accepted by Harley Dykstra for any damage caused to any underground service or any loss or injury so suffered if enquiry and verification have not been completed in accordance with this note.

Contractors to verify all survey control marks to be correct (by field checks) prior to utilisation for construction purposes.

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Harley Dykstra
PLANNING & SURVEY SOLUTIONS

rev	details	approved	date
A	Original drawing	PH	16/07/24

survey	PH 08/07/24 CD 10/07/24
cad file	24000-02A.dgn
drawn	NP 15/07/24
checked	PH 16/07/24
horiz datum	MGA 2020
level datum	AHD
scale at A1	1 : 1500
all distances are in metres	0 20 40 60

plan type
FEATURE & CONTOUR SURVEY

client
Narrogin BESS Development Pty. Ltd.

description
Lot 9 on D67821
76 Narrogin Valley Road,
NARROGIN VALLEY

drawing no
24000-02A

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