Regional Development Assessment Panel Agenda

Meeting Date and Time: Tuesday, 1 December 2026; 1:00pm
Meeting Number: RDAP/88
Meeting Venue: 140 William Street, Perth

A live stream will be available at the time of the meeting, via the following link:
RDAP/88 - 1 December 2026 - Shire of Chittering

PART A – INTRODUCTION

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

PART B – SHIRE OF CHITTERING

1. Declarations of Due Consideration
2. Disclosure of Interests
3. Form 1 DAP Applications
   - 3.1 Lot 1261 (RN. 722) Old Gingin Road, Muchea – Battery Energy Storage System (BESS) and associated works – DAP/26/03199
4. Form 2 DAP Applications
5. Section 31 SAT Reconsiderations

PART C – OTHER BUSINESS

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

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

DAP Members
Clayton Higham (Presiding Member)
Karen Hyde (Deputy Presiding Member)
Neema Premji
Cr Kylie Hughes (Part B – Shire of Chittering)

DAP Secretariat
Tenielle Brownfield
Kristen Gray

PART A – INTRODUCTION

1. **Opening of Meeting, Welcome and Acknowledgement**

2. **Apologies**

3. **Noting of Minutes**

PART B – SHIRE OF CHITTERING

1. Declarations of Due Consideration

2. Disclosure of Interests

3. Form 1 DAP Applications

3.1 Lot 1261 (RN. 722) Old Gingin Road, Muchea – Battery Energy Storage System (BESS) and associated works – DAP/26/03199

4. Form 2 DAP Applications

Nil

5. Section 31 SAT Reconsiderations

Nil

Form 1: Responsible Authority Report

(Regulation 12)

PART B – Item 3.1 – LOT 1261 (RN 722) Old Gingin Road, Muchea

RESPONSIBLE AUTHORITY REPORT – FORM 1	
DAP Name:	Regional Development Assessment Panel
DAP File No:	DAP/26/03199
LG Reference:	P137/26
Proposed Development:	Battery Energy Storage System (BESS) and associated works
Value of Development:	$66 million
Owner:	Tronox Management Pty Ltd
Applicant:	SLR Consulting
Local Government Area:	Shire of Chittering
Responsible Authority:	Shire of Chittering
Authorising Officer:	Jake Whistler – Executive Manager Development Services
Application Acceptance Date:	4 September 2026

LOCATION PLAN

RESPONSIBLE AUTHORITY RECOMMENDATION

Accept that the DAP Application reference DAP/26/03199 is appropriate for consideration as a 'Use Not Listed' land use and consistent with the objectives of the zoning table in accordance with Clause 3.2.5 of the Shire of Chittering Local Planning Scheme No. 6;

That the Regional DAP resolves to **APPROVE** DAP Application reference DAP/26/03199 for a Battery Energy Storage System (BESS) and associated works at lot 1261 (RN 722) Old Gingin Road, Muchea in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the Planning and Development (Local Planning Schemes) Regulations 2015, and the provisions of the Shire of Chittering Local Planning Scheme No. 6, subject to the following conditions:

1. The development is to be undertaken in accordance with the approved plans and documents attached to this approval, as listed below, except where amended by subsequent conditions:

Plan/ Document Name
Attachment 1 – Endorsed Development Plan

2. This decision constitutes planning approval only and is valid for a period of four years from 1 December 2026. If the subject development is not substantially commenced within the specified period, the approval shall lapse and be of no further effect.

3. Prior to the commencement of any works on-site, the Bushfire Management Plan (Renewables) report dated 03/08/2026 is to be updated to the satisfaction of the Shire. Once the BMP is approved to the satisfaction of the Shire, all management measures contained within the updated Bushfire Management Plan shall be implemented prior to the operation and/or use of the proposed development to the satisfaction of the Shire and maintained for the life of the development.

4. Prior to the commencement of any works on-site, a Construction Environmental Management Plan shall be prepared and approved by the Shire. The approved Construction Environmental Management Plan shall be implemented at all times during the civil works/construction of the proposed development, to the satisfaction of the Shire.

5. Prior to the commencement of the approved use, an Emergency Management Plan shall be submitted to and approved by the Shire. The approved Emergency Management Plan is to be implemented and maintained for the life of the development to the satisfaction of the Shire.

6. Prior to the commencement of the approved use, a Risk Management Plan shall be submitted to and approved by the Shire. The approved Risk Management Plan is to be implemented and maintained for the life of the development to the satisfaction of the Shire.

7. Prior to the commencement of any works on-site, a Stormwater Management Plan shall be prepared and approved by the Shire. The approved Stormwater Management Plan shall be implemented to the satisfaction of the Shire prior to the operation and/or use of the proposed development and maintained in perpetuity.

Advice Notes

1. If an applicant or owner is aggrieved by this determination there is a right of review by the State Administrative Tribunal in accordance with the *Planning and Development Act 2005* Part 14. An application must be made within 28 days of the determination.

2. This approval does not constitute a building permit. You are to submit to the Shire either an Application for Building Permit Certified (BA1), or Application for Building Permit Uncertified (BA2). Building work cannot be commenced until a building permit has been issued. Should that occur, the penalty for a first offence is $50,000.

3. In regards to Condition No. 3, the Bushfire Management Plan shall be updated accordingly to address the comments raised by the Department of Fire and Emergency Services (DFES) in their submission dated 12/11/2026.

4. In regard to Condition No. 5, the Emergency Management Plan shall give consideration to the Bushfire Emergency Plan (BEP) Manual (As published by the Western Australian Planning Commission), Section 7 of the Model Requirements – Renewable Energy Facilities in addition to the comments raised by Department of Fire and Emergency Services in their submission dated 12/11/2026.

5. In regard to Condition No. 5, the Emergency Management Plan shall:
    I. Have regard to guidance provided under Section 5.11 and Appendix H of the BMP.
    II. Include a detailed Emergency Vehicle Access Plan that demonstrates:
        a. Additional access to the alternative road egress to the south;
        b. Demonstrated manoeuvrability (suitable turning radii, clearances, road load capacity and manoeuvring space for Department of Fire and Emergency Services heavy fire appliances); and
        c. Management measures that provide emergency access through the existing Tronox facility is to consider security gates, site operating procedures, vehicle movements and access arrangements outside normal working hours to be featured in the Bushfire Management Plan.
        d. Construction of any required gates to the standards stated in the Bushfire Management Plan, and arrangements to ensure keys to any locked gates are provided, to all relevant staff and onsite personnel, as well as being made available to Department of Fire and Emergency Services and local fire brigade.

6. In regards to Condition No. 4, the construction environmental management plan shall address the following (at a minimum):
    a. Stormwater, erosion and sedimentation management;
    b. Groundwater contamination measures;
    c. Contamination management measures;

d. Impacts on existing flora and fauna vegetation;
e. Construction waste and litter management;
f. Noise management;
g. Dust management; and
h. Traffic Management.

7. In regard to Condition No. 6, the Risk Management Plan shall address:
    a. Detailed site plans showing the location of site vehicle access points, internal roads, battery containers, substations, buildings and fire water supplies and recommended buffers to internal roads and accessways.
    b. The exact specifications of the elements within the renewable energy facility, such as the battery chemistry, relevant specifications and technical data sheets on the BESS facility.
    c. Details of the fire, smoke, heat, and toxic off-gassing detection system for the BESS facility. The system should specify what triggers an internal operator response and what triggers a 000 call.
    d. Details of the explosion prevention and venting system for the BESS facility.
    e. Details of the battery management and monitoring system. The system should enable the operator to intervene for the prevention of thermal runaway.
    f. Details of the system to prevent water ingress to battery containers and appropriate ingress protection rating for containers.
    g. Details of the warning and alarm system within battery containers and/or the facility. The system should specify what each alarm signal means.
    h. Details of the spill containment provisions for the management of fire water runoff.
    i. The interaction between the proposed BESS and the existing Tronox processing plant, including potential escalation, hazardous materials, exposure protection, emergency access and the consequences of multiple simultaneous incidents
    j. The expected roles and limitations of responding emergency services.
    k. Enabling of career and volunteer brigades site and BESS-specific awareness and familiarisation prior to the commissioning of the development.
    l. Completion of site familiarisation, emergency response planning, commissioning information and verification of firefighting infrastructure prior to the commencement of the BESS facility operations.

8. The applicant is advised of their requirement to contact the Department of Water and Environmental Regulation (DWER) to determine if any further approvals are required for the clearing of vegetation on Lot 1261 in regard to the approved development.

9. Lot 1261 is licensed under *Part V of the EP Act* (licence number L5939/1988/11) as a Category 8: Mineral sands mining or processing prescribed premises. The Licence Holder is Tronox Management Pty Ltd. It is noted that any changes to the licensed premises may require an amendment application to be submitted by the instrument holder under section 53 of the *EP Act* and can be authorised through a works approval or licence amendment. Further guidance on changes to

prescribed premises can be found in the Department's Industry Regulation Guide to Licensing which can be accessed at:
https://www.wa.gov.au/service/building-utilities-and-essential-services/integrated-essential-services/guideline-industry-regulation-guide-licensing

10. The land at Lot 1261 on Diagram 5326 (the site) was classified under the *Contaminated Sites Act 2003* as 'contaminated – remediation required' on 24 August 2009 based on soil and groundwater contamination resulting from historical activities of the site. The site was however considered suitable for ongoing commercial/industrial land use. An appropriate health and safety plan should be prepared to manage potential exposure risks associated with soil and groundwater contamination if intrusive works, including excavation or dewatering, are undertaken as part of the development.

PROPOSAL:

The proposal is for a battery energy storage system (BESS) at Lot 1261 (RN 722) Old Gingin Road, Muchea. The proposal covers approximately 0.56 ha and is located in a 0.93 ha footprint within the existing Tronox Chandala Processing Plant site.

The proposal is comprised of:

- A 38MW BESS facility;
  - 4x BESS Modules, each containing 8 DC 'Battery' Containers (9.2m long, 2.4m wide, 3.3m high, similar in size to a 30 foot shipping container) and 1x AC 'Power' Skid (12.2m long, 2.4m wide, 2.9m high, similar in size to a 40 foot shipping container).
- Two (2) transformers (with a maximum height of 5.2m);
- A water run-off storage area;
- Associated electrical infrastructure; and
- Internal access arrangements.

The proposal will operate as a privately owned entity within the Tronox Chandala Processing Plant (TCPP).

The development is proposed to provide electricity storage infrastructure to support the ongoing transition of Western Australia's energy network by storing electricity during periods of excess generation and discharging electricity during periods of increased demand. It is proposed by the applicant that the BESS will improve the reliability, resilience and flexibility of the South West Interconnected System (SWIS).

SUBJECT SITE AND SURROUNDS:

The proposal is sited on part of the land legally described as Lot 1261 (RN 722) Old Gingin Road, Muchea, within Tronox's Chandala Processing Plant (the subject site), approximately 400m from the nearest lot boundary. The subject site

is listed as being situated on Old Gingin Road, however the site also has existing road frontage/access along the western boundary to Brand Highway. Brand Highway provides the primary access/egress for the subject site.

Lot 1261 is owned by Tronox Management Pty Ltd and is approximately 341ha in size. The subject site is located approximately 5km north of the Muchea town centre and the nearest sensitive receptor being approximately 1 km to the north west of the site.

The subject site is predominantly vegetated surrounding the Tronox Chandala Processing Plant. As the proposal will be located within the existing footprint of the processing plant, approximately 0.9ha of vegetation (reported as 'degraded to completely degraded') will be required to be removed from the site for this proposal.

The surrounding landscape is predominantly agricultural/pastoral land which is either cleared of vegetation, or sparce vegetation is spread across the surrounding properties.

BACKGROUND:

Lot 1261 is zoned 'Agricultural Resource' under the Shire of Chittering Local Planning Scheme No. 6 (LPS6) and is within the Special Control Area (SCA) for 'Water Prone Area – Ellen Brook Palusplain'. A portion of the northern area of Lot 1261 is also within the SCA for 'Military Considerations' however the proposed development is not located within this Military Considerations SCA. The land surrounding Lot 1261 is similarly zoned.

Lot 1261 benefits from an 'Additional Use Right' under the designation 'A9' within Schedule 3 of LPS6 for the purposes of a 'Mineral Sands Processing Plant' land use. The site is currently approved and operating as the Tronox Chandala Processing Plant (TCPP) which is a mineral sands processing facility that produces ilmenite, zircon, rutile, leucoxene and synthetic rutile.

The proposed development will be situated within an approximate 0.9ha footprint in the south-west corner of the TCPP site. An additional 1.91ha bushfire protection zone is proposed for bushfire mitigation purposes due to the close proximity to the vegetation on the site. The BESS has a maximum height of 3.3m.

PLANNING ASSESSMENT:

PLANNING FRAMEWORK	
Region Scheme	N/A
Region Scheme - Zone/Reserve	N/A
Local Planning Scheme	Shire of Chittering Local Planning Scheme No. 6
Local Planning Scheme - Zone	Agricultural Resource
Structure Plan/Precinct Plan	N/A
Structure Plan/Precinct Plan - Land Use Designation	N/A
Lot Size	3,411,963sqm

Existing Land Use	Mineral Sands Processing Plant (Additional Use Rights – A9)
Heritage Status	☐ N/A ☐ State Register of Heritage Places ☒ Local Heritage List ☐ Local Heritage Area
Bushfire Prone Area	Yes

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

Bushfire Risk

During the consultation period, DFES highlighted some concerns with the proposed BAL Vegetation Classification, the vehicle access/egress to the site and the water supply provisioned within the BMP.

DFES subsequently provided comment to the Shire, which included recommended modifications and advice but ultimately could not provide a clear recommendation on the grounds of 'insufficient information provided – further information and review required'. While a complete copy of DFES' comments is contained in Appendix 2 of this report (Schedule of Submissions), the following provides a summary of these concerns and the officers recommendation to address these concerns.

- Vegetation Classification

DFES held concerns over the classification of certain vegetation ratings within the BMP. The applicant has reaffirmed that the correct vegetation classification has been identified and that no change is required to the Bushfire Management Plan. As this is a minor aspect of the BMP and ultimately won't impact the decision-making process, officers recommend that a condition of any approval requires the current BMP to be updated to further address the vegetation classification and submitted to the Shire for approval, and then implemented for the life of the development.

- Access/Egress to the Site

DFES also expressed concerns that the proposed development site does not have sufficient two-way access/egress. The applicant has confirmed that the site does have two-way access, with the primary access gained from Brand Highway via the constructed sealed roads within the Tronox site, and that secondary access is provided to Old Gingin Road via an existing limestone track which is 2WD accessible. Shire officers have attended the subject site and can confirm that this two-way access exists and is of an acceptable standard and consistent with the requirements for a Fire Service Access Route as per State Planning Policy 3.7 – Bushfire..

- Water Supply

DFES requested further clarity regarding the proposed water supply for the BESS. The applicant has stated that the existing water supply within the Tronox site will be sufficient in terms of their minimum requirements for fire-fighting water supply. The

existing water supply consists of a single 1735Kl tank (with a minimum fire reserve of 415Kl). Officers recommend that a condition of any approval requires the current BMP to be updated to demonstrate that the minimum fire reserve of 415Kl is sufficient to service the minimum fire reserves for the existing Tronox site and also for the new addition of the BESS. If during this process it is discovered that an increased fire reserve water supply is required, the BMP is to be updated to reflect this.

As all aspects of the BMP that require further attention are minor in nature and ultimately won't impact on the outcome of the development, officers are satisfied that a condition of any approval requiring the current BMP to be updated and submitted to the Shire for approval and then implemented for the life of the development, will address all of the above concerns.

Seasonal Inundation

Lot 1261 is located within the LPS6 Water Prone Area - Ellen Brook Palusplain (Special Control Area). The land within this SCA is subject to seasonal inundation and flooding.

Flood mapping provided with the application indicates that the potential flooding of the Ellen Brook will not reach or impact the development site.

As the land is subject to seasonal inundation, the groundwater is subject to direct potential contamination from land use activities. The BESS and associated TCPP infrastructure have the potential to contribute contaminant/pollutants to the receiving environment through stormwater runoff. This potential is present for both the operation and construction of the proposed development. In order to address these potential risks, a condition of approval is recommended to be applied to any approval that requires the development and implementation of a Construction Environmental Management Plan (CEMP) that will address the risk of groundwater contamination during the construction of the BESS.

The application has also proposed to reduce the risk of potential impacts on the groundwater by ensuring that the detailed designs that will be submitted to the Shire at the building permit stage will include the following:

- Appropriate drainage design to maintain the existing drainage regime where practicable and minimise disruption to natural overland flow paths.
- Stormwater drainage infrastructure, including table drains, diversion drains and culverts, designed to manage and convey runoff in a controlled manner.
- Energy dissipation and flow distribution measures at drainage discharge locations to minimise erosion and maintain stable flow conditions.
- Surface water controls to minimise erosion, sediment transport, localised flooding and waterlogging;
- Site and infrastructure design that avoids the concentration of runoff and maintains existing drainage patterns where practicable; and
- Ongoing inspection and maintenance programs for drainage infrastructure and associated erosion control measures throughout the operational phase.

Whilst these stormwater/drainage measures will be noted in the detailed design stage, it does not guarantee that the ongoing responsibilities of stormwater management will be implemented for the life of the development to prevent any contaminants from running off the development site and into the surrounding environment. As such, officers recommend that a condition of approval is to be applied to any approval

requiring a Stormwater Management Plan be prepared and submitted to the Shire for approval to ensure that the applicant adheres to their responsibilities for appropriate stormwater management for the life of the development.

This will help ensure that potential impacts to topography, drainage and overland flow are avoided or minimised during both construction and operation of the Project, while maintaining the overall drainage function of the site and minimising erosion and sedimentation risks.

Vegetation Removal

The proposal is located within the TCPP which is a highly modified industrial environment. The Project Area intersects with DBCA mapped native vegetation, however the context of Lot 1261 is important when assessing the vegetation proposed to be removed for the BESS.

The broader TCPP site has been historically extensively cleared for agricultural purposes (primarily livestock grazing prior to the TCPP commencing operations in the late 1980s), however there are patches of remnant native vegetation which remain on the site with portions of the site also having undergone rehabilitation in previous years.

Much of the current vegetation consists of remnant native communities, planted woodland, wetlands and cleared pasture. However, the vegetation proposed to be removed for the BESS is in a 'degraded to completely degraded' condition due to historical disturbances, including clearing, replanting, grazing and potential *Phytophthora* dieback.

The applicant has provided an Environmental Assessment Report (dated 30 July 2026) which details that relevant flora and fauna surveys were undertaken to identify the quality of the surrounding vegetation, and the vegetation that is proposed to be removed. This vegetation has been graded as being 'degraded to completely degraded'.

The total area of vegetation removal required for the BESS site totals approximately 0.9ha, including 0.69Ha of 'degraded to completely degraded' Banksia Woodland. The environmental studies undertaken also confirmed that there are no significant flora or fauna sites, threatened ecological communities or any black cockatoo foraging, breeding or roosting habitat within the BESS site.

To provide the reader with an understanding of the quality of the vegetation proposed for removal within Lot 1261, photographs of this vegetation have been provided, taken in the location of the development site (Attachment 3).

It is important to note that the applicant is required to consult with the Department of Water and Environmental Regulation (DWER) and obtain a clearing permit for the removal of any native vegetation. The applicant has already begun this process of obtaining the relevant clearing permit approvals from DWER, as confirmed by both DWER and the applicant (this confirmation is located within the attached Schedule of Submissions).

To address any potential issues of vegetation disturbance during the construction phase of the development, a condition of approval is recommended to be applied to any approval that requires the development and implementation of a Construction

Environmental Management Plan (CEMP) that will address the limiting of clearing and ground disturbances to the minimum area required for the construction and operation of the BESS, avoid the removal of mature native trees where practicable or when any native vegetation is not proposed to be removed during the construction phase, restrict vehicle movements to designated access tracks and ensure that correct management procedures are followed to ensure there is no further damage to the surrounding environment of the BESS site.

Land Use classification

Clause 3.4 of LPS6 identifies the permissibility of a particular use class in each of the zones of the Scheme. Clause 3.4 of LPS6 states the following:

3.4.1 'Where a specific use is mentioned in the Zoning Table, it is deemed to be excluded from the general terms used to describe any other use.'

3.4.2 If a person proposes to carry out on land any use that is not specifically mentioned in the Zoning Table and cannot reasonably be determined as falling within the type, class or genus of activity of any other use category the local government may –

a) determine that the use is consistent with the objectives of the particular zone and is therefore permitted; or
b) determine that the use may be consistent with the objectives of the zone and thereafter follow the advertising procedures of clause 64 of the deemed provisions in considering an application for Development approval; or
c) determine that the use is not consistent with the objectives of the particular zone and is therefore not permitted.

The above clauses describe a process of 'best fit' for categorising a development proposal into a particular land use category. Initially, Shire officers believed that the scope of the application may fall within the use class category of 'Public Utility' which is defined by LPS6 as:

'*means any work or undertaking constructed or maintained by a public authority, licensed service provider or the local government as may be required to provide water, sewerage, electricity, gas, drainage, communications or other similar services*.'

The applicant has confirmed via email correspondence with Shire officers throughout the duration of the application that the BESS is designed to mostly support the Tronox Chandala Processing Plant (TCPP) site, with any potential surplus power stored to be distributed back to the Western Power network. The applicant has also confirmed that there is flexibility with how the power to be stored can be distributed depending on any potential future needs, however that the predominant aspect is to service the Tronox site. Shire officers do not believe that the proposed development can be categorised as being 'best fit' within the 'Public Utility' land use and rather should be processed as a 'Use Not Listed' application as there are no other suitable land uses within LPS6 which could be considered.

The assessment of the application should be undertaken against the objectives of the zone (as is required for a 'use not listed' as per Clause 3.4.2 of LPS6. This assessment is contained within the following section of this report, allowing a determination to be made on the application.

Zone Objectives

Clause 3.2.5 of LPS6 provides the following four objectives for the Agricultural Resource zone:

a) *preserve productive land suitable for grazing, cropping and intensive horticulture and other compatible productive rural uses in a sustainable manner;*

b) *protect the landform and landscape values of the district against despoliation and land degradation;*

c) *encourage intensive agriculture and associated tourist facilities, where appropriate;*

d) *allow for the extraction of basic raw materials where it is environmentally and socially acceptable.*

The proposal occupies a total footprint of 0.93ha within Lot 1261. Lot 1261 has a total area of approx. 341ha. The land is currently used for the purposes of the TCPP and while the 0.93ha footprint of the development reduces the available land to be used for this purpose, it does not inhibit the balance of the lot to continue this use.

It is considered that the proposal is consistent with the objectives of the Agricultural Resource zone, as it does not inhibit Lot 1261 and surrounding land to be used in a manner consistent with the Clause 3.2.5 objectives.

In the instance that the Regional Development Assessment Panel (RDAP) do not agree that the proposal should be categorised as a 'Use Not Listed' definition, officers consider that the proposal should be treated as a 'Public Utility'. Should the RDAP consider this the appropriate process for this application, it can still make a determination on the application as the advertising requirements for a 'Public Utility' have been adhered to, as the application has already been advertised under the requirements of a complex application under the Regulations (which allows for a more in-depth advertising process compared to a standard application required for a 'Public Utility' land use).

Pursuant to the Zoning Table of LPS6, a 'Public Utility' is a 'D' permissibility within the 'Agricultural Resource' zone.

The 'Public Utility' definition consists of two main limbs, summarised as:

i. works constructed/maintained by a public authority, licensed service provider or local government; and
ii. provision of a service.

While the proposal does not entirely satisfy the first limb described above as it is not a public authority or licensed service provider, it will have a relationship with Western Power, who is a public authority. The second limb of the definition relates specifically to the provision of a service. The examples provided in the definition relate to the necessary services that a community relies upon, and are regarded as essential

services. The definition identifies 'electricity' specifically, as a service that is regarded to fit within the 'Public Utility' definition.

As there is no confirmation from the applicant regarding exactly how much power from the BESS will be provided back to Western Power, this land use definition cannot be solely relied upon to classify the proposal under the 'Public Utility' land use. The key items for consideration which are discussed further within this report will remain relevant regardless of how the application is considered for approval and therefore allowing a determination to be made on the application. The option of classifying the proposal as a 'Public Utility' is provided in the 'alternative' section of this report.

Amenity

Clause 4.20 of LPS6 makes provision for the amenity of non-residential development to be contextually appropriate in terms of its form and scale, off-site impacts and visual impacts.

The proposed BESS on Lot 1261 is contained within the existing operations of the TCPP and the introduction of the BESS is not considered to have any adverse impacts on the amenity of the area when taking into consideration the existing developments.

The following Table describes the proposals compliance with all 11 elements of Clause 4.20 of LPS6:

Provision	**Requirement**	**Proposal**	**Assessment**
Amenity of Non-Residential Development	a) the form and scale of the development is to be compatible with surrounding land uses;	Surrounding land uses include the Tronox Chandala Processing Plant.	Development is compatible.
	b) the impacts of the development are to be contained on site and/or suitably managed off-site;	Noise reporting indicates compliance with *Environmental Protection (Noise) Regulations 1997* will be achieved.	Impacts will be suitably contained/managed via conditions of approval/compliance with State/Federal legislation.
	c) the impact of the development on the road network and traffic management is to be consistent with the road function and hierarchy	Any vehicle movements associated with the proposal will gain access directly off Brand Highway and into Lot 1261.	Development is compatible.

	d) adequate provision is to be made for parking for staff and visitors, with separation between staff / visitor parking and service / haulage vehicles	Existing TCPP car bays to be utilised.	Existing on-site parking within the TCPP will be sufficient for this proposed development due to the expected low number of employees associated with the site.
	e) buildings are to have co-ordinated or complementary materials, colours and styles, including: i. doors, windows and building materials that develop a coherent pattern, and are proportional to the building; and ii. screening of services and areas for waste management and essential services (eg air conditioning units).	Steel battery cabinets for electricity storage, associated power infrastructure with building materials not nominated.	The nature of the development does not render this provision applicable, particularly given the visual impact of the surrounding land uses. Notwithstanding, the proposal is significantly screened from Brand Highway due to the existing vegetation on Lot 1261.
	f) visual impacts to be minimised by the use of vegetation screening, tree retention and building orientation	Property already has extensive screening to Brand Highway.	The proposal is approximately 400m from Brand Highway, with existing vegetation offering suitable screening.
	g) landscaping to be provided, to a minimum of 10 per cent of the site area, using plant species approved by the local government, including provision of shade trees at 1 per 4 car bays	Property already has extensive landscaping and carparking trees are already in existence.	Compliant.

	h) minimise the use of front fencing, and where required, fencing to be set back to the building line and behind the landscaped area where feasible, and coloured matt black or other dark tones	Lot 1261 already has suitable fencing surrounding the TCPP site.	Compliant.
	i) external lighting designed to minimise light spill and glare on adjoining properties	External lighting will be limited to operational and maintenance purposes, directed downward and designed to minimise light spill beyond the subject site.	Compliant.
	j) storage of plant and equipment to be screened or remote from public areas, particularly from the street, and provision made on site for a loading bay where the land use requires it	The proposal is 400m from the nearest road with significant vegetation offering screening.	Compliant.
	k) use of 'on building' signage where the building addresses the street, and where 'freestanding' signage is necessary it should either be affixed to a front fence, or located adjacent to it at a height that is compatible with the setting.	No signage proposed.	Not applicable.

Local Planning Policy 18 – 'Setbacks' has influence over amenity by influencing the citing of development through boundary setback provisions. The following table indicates the proposal's compliance against this Policy:

Provision	**Requirement**	**Proposal**	**Assessment**
LPP18	100m setback from a Highway	400m from Brand Highway	Compliant

	30m setback to other roads, side and rear lot boundaries	440m from Brand Highway.	Compliant
	30m from an existing water body or highest know flood level	110m to the nearest water body (Chandala Brook) and there are no mapped flood risk areas within 30m of the Proposal.	Compliant

CONSULTATION:

PUBLIC CONSULTATION

As the application is being assessed as a 'Use Not Listed', the application is required to be advertised as per Clause 64 (3) of the *Planning and Development (Local Planning Schemes) Regulations 2015*. The Shire has undertaken the required advertising by making the application available for comment to the public via the Shire's website for a period of 28 days, beginning on the 2 October 2026 and closing on the 30 October 2026. No submissions were received.

As the proposed development is setback within Lot 1261 at a greater distance than 200m, no advertising to adjoining neighbours was required. The landowners of Lot 1261 also own the adjoining northern and southern properties, and as the proposed development is setback 413m from the adjoining western neighbour, it is not expected to directly impact any neighbouring properties.

As no submissions have been received during the public consultation period, there are no matters raised for further consideration.

REFERRALS/CONSULTATION WITH GOVERNMENT/SERVICE AGENCIES

This application was referred to the following government/service agencies for advice:

- Department of Fire and Emergency Services
- Department of Water & Environmental Regulation
- Public Transport Authority
- Western Power

Consultation was undertaken with the government agencies with correspondence sent 2 October 2026 and agencies given until 13 November 2026 (42 days) to provide a response. A full copy of each response received has been provided within the schedule of submissions, including commentary from the applicant and the reporting officer against each submission provided as an attachment to this report (Attachment 2).

DESIGN REVIEW PANEL ADVICE

Not applicable.

OTHER ADVICE

Not applicable.

ALTERNATIVE TO RESPONSIBLE AUTHORITY RECOMMENDATION

Alternatives

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

1. Accept that the DAP application reference DAP/26/03199 is appropriate for consideration as a 'Public Utility' land use and compatible with the assessment of a 'Public Utility' definition in accordance with the Shire of Chittering Local Planning Scheme No. 6.

2. That the Regional DAP resolves to **APPROVE** DAP Application reference DAP/26/03199 for Battery Energy Storage System (BESS) and associated works at lot 1261 (RN 722) Old Gingin Road, Muchea in accordance with Clause 68 of Schedule 2 (Deemed Provisions) of the Planning and Development (Local Planning Schemes) Regulations 2015, and the provisions of the Shire of Chittering Local Planning Scheme No. 6, subject to the following conditions:

The conditions and advice notes as recommended as part of the responsible authority recommendation remain the same and should be included in this 'alternative', should this option be exercised.

CONCLUSION:

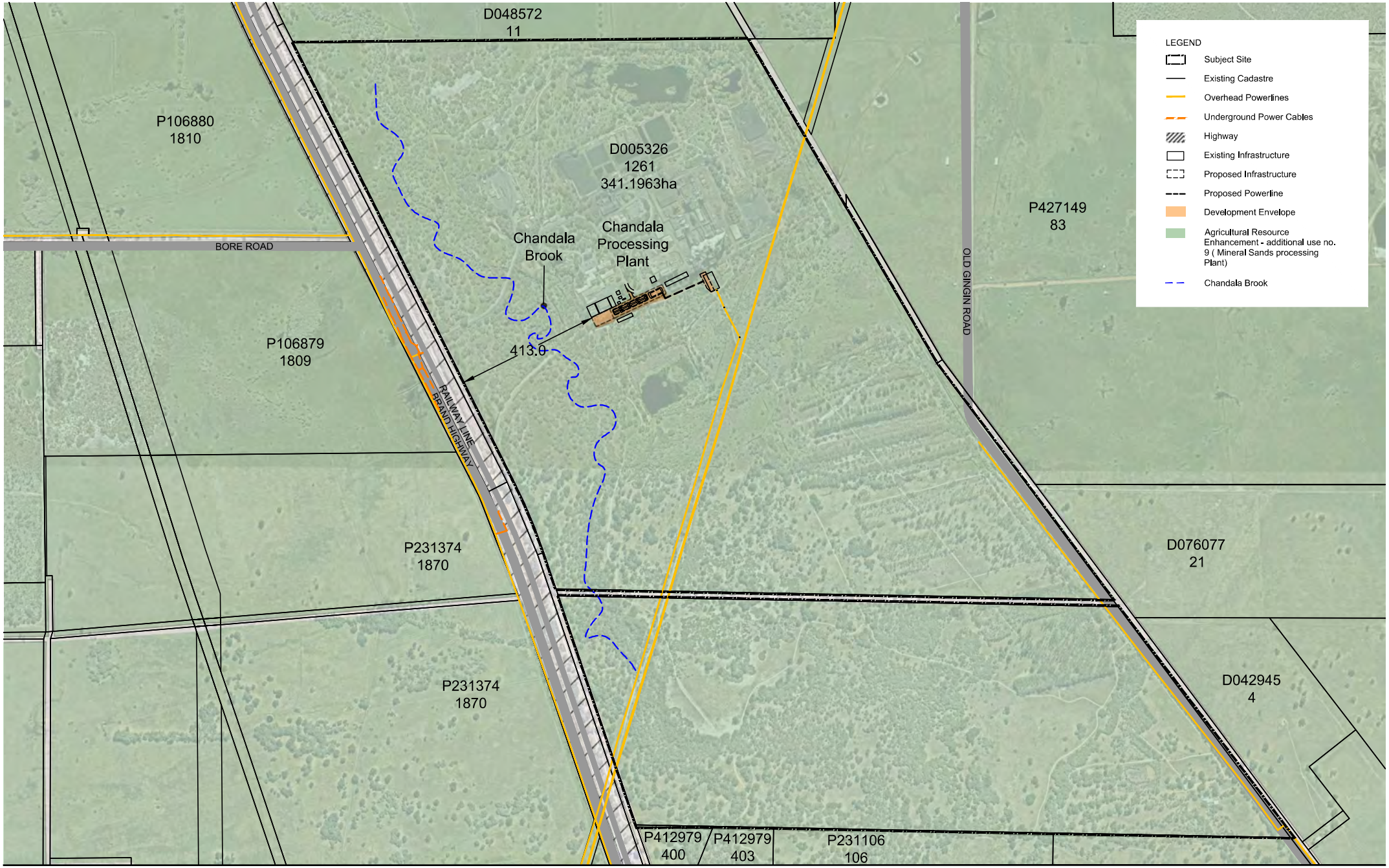
A detailed assessment has been undertaken with the proposal considered to be consistent with the relevant local planning framework. A critical aspect of this development is its ability to be considered as a 'Use Not Listed' application. Officers consider that the proposal is consistent with the objectives of the Agricultural Resource zone within the Shire of Chittering Local Planning Scheme No. 6 and is capable of being considered for approval.

Officers recommend that the application for Development Approval is approved subject to appropriate conditions.

ATTACHMENTS

1. Endorsed Development Plans
2. Battery Energy Storage System Development Application
    a. Appendix A – Certificate of Title
    b. Appendix B – Development Plans
    c. Appendix C – Environmental Assessment Report
    d. Appendix D – Noise Impact Assessment
    e. Appendix E – Transport Impact Statement
    f. Appendix F – Bushfire Management Plan
    g. Appendix G – DPLH Aboriginal Cultural Heritage Advice Letter
3. Schedule of Submissions

4. Copies of external referral responses
5. Site Visit Photos



Site 4 - Local Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

Date: 29 Jul 2026 Scale: 1:10000 @ A3 1:5000 @ A1 File: **675.07369 CP01A** Staff: JK GW Checked: CW

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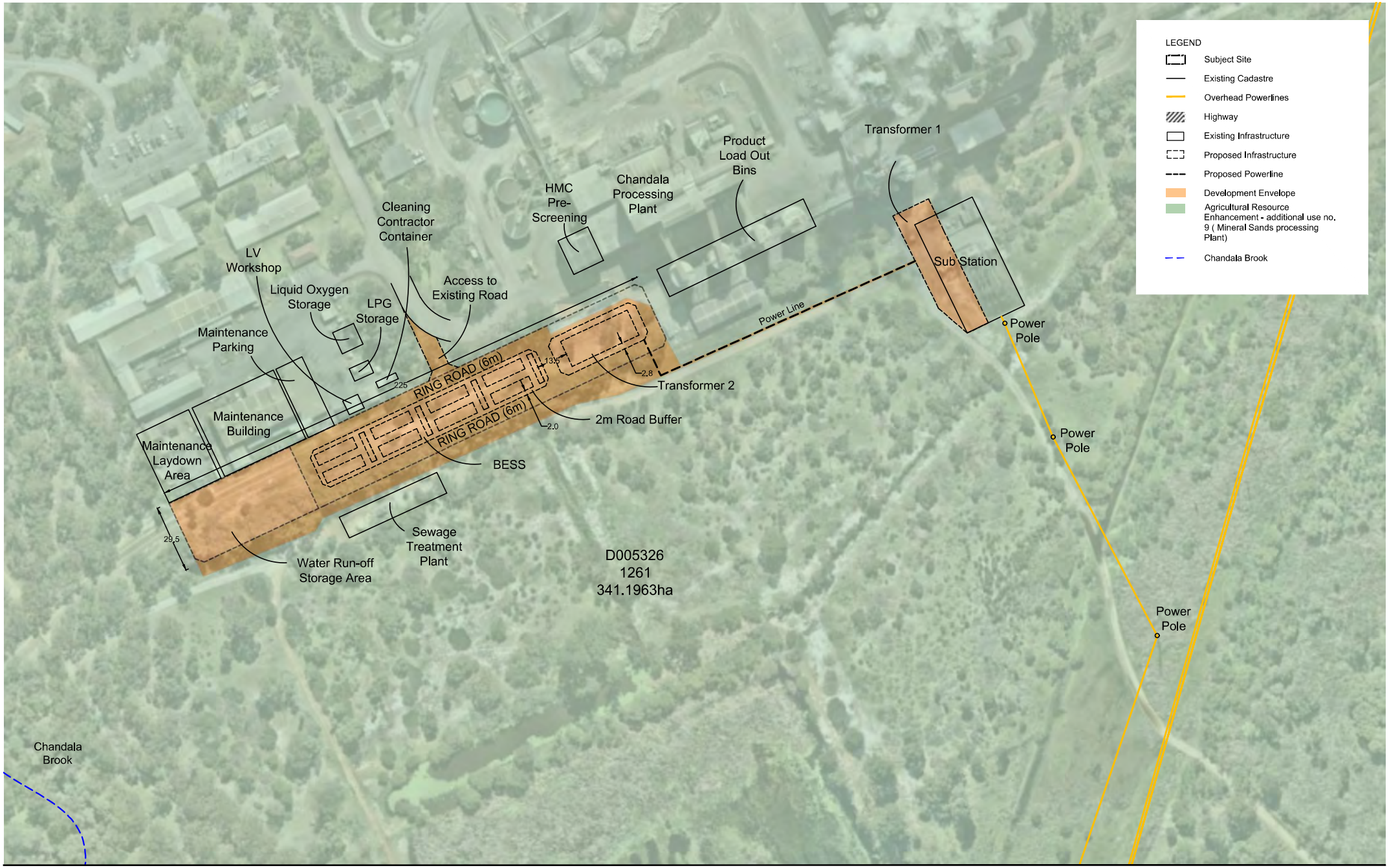

Site 4 - Site Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

Date: 29 Jul 2026 Scale: 1:1500 @ A3 1:750 @ A1 File: 675.07369 CP01A Staff: JK GW Checked: CW

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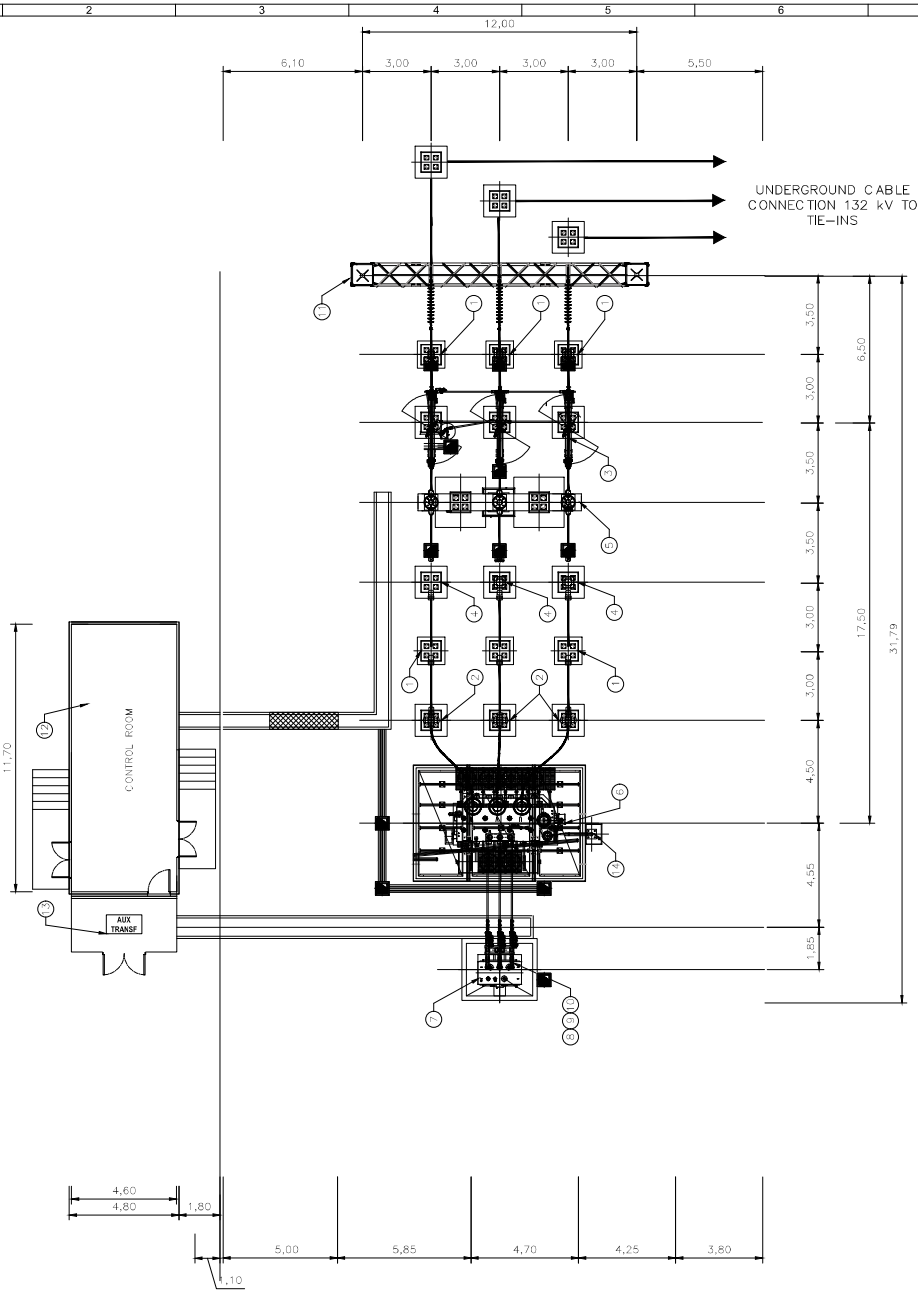


SWITCHGEAR LIST		
POS.	UNIT	NAME
1	6	132 kV SURGE ARRESTERS
2	3	132 kV VOLTAGE TRANSFORMERS
3	1	132 kV THREE-POLE DISCONNECTOR WITH EARTHING SWITCH
4	3	132 kV CURRENT TRANSFORMER
5	1	132 kV CIRCUIT BREAKER
6	1	132/22 kV POWER TRANSFORMER
7	1	22 kV GROUNDING REACTOR
8	1	22 kV CABLE CONNECTION
9	3	22 kV SURGE ARRESTERS
10	1	22 kV DISCONNECTOR
11	1	132 kV GANTRY
12	1	CONTROL BUILDING
13	1	AUXILIARY SERVICES TRANSFORMER 300 kVA (DRY-TYPE)
14	1	NEUTRAL GROUNDING STRUCTURE (HV)

REV	DESCRIPTION	DRAWN	CHECK	REVIEW
A	CONCEPT DESIGN	N.F.	A.V.	A.V.

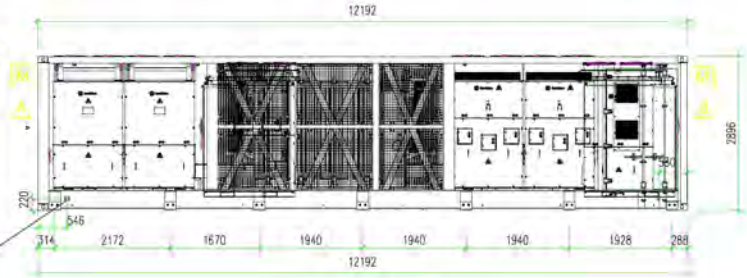
acciona

TRONOX

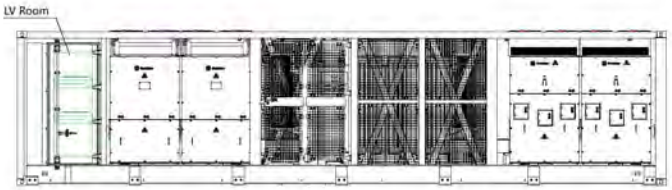
CLIENT: TRONOX
PROJECT: CHANDALA BESS
TITLE: SUBSTATION GENERAL ARRANGEMENT
DRAWING NO.: xxxx-xxxx-xxxx-xxxx-xxxx
REV: A

密级 Level	秘密 Confidential

[redacted]



Front View



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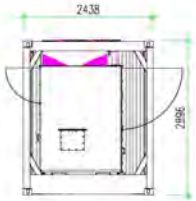
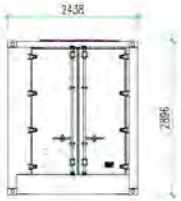


Side View A
Left View



Side View B
Right View

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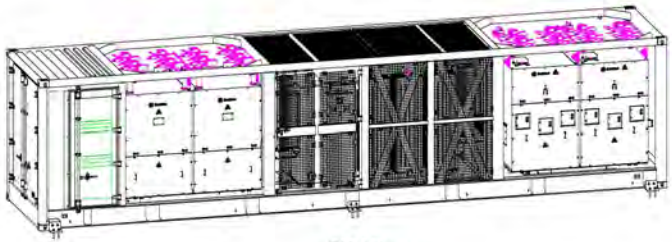

3D View

[redacted]

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远景能源有限公司
Envision Energy LTD.

[redacted]

Appearance Design of PCS&Transformer

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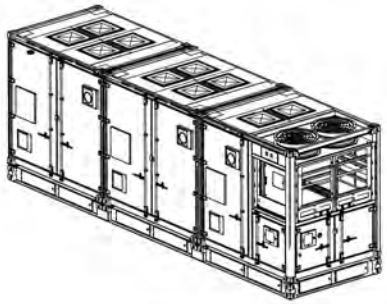
密级 Level	内部公开 Internal



Overall Appearance

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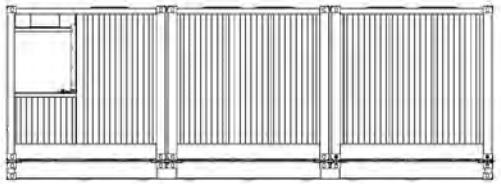

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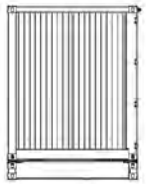
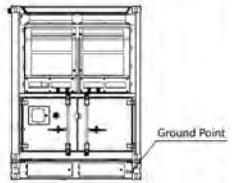
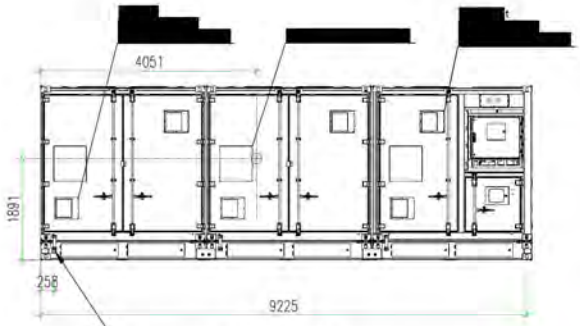


Left View

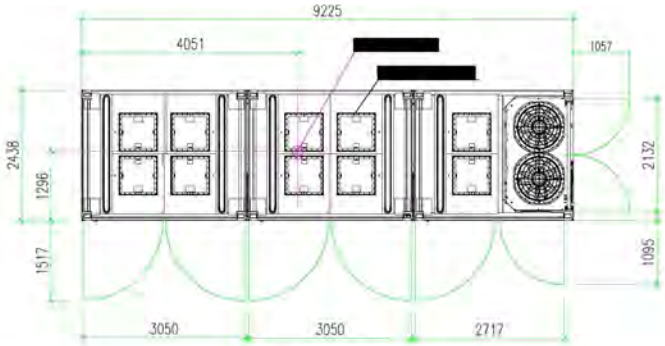


Right View



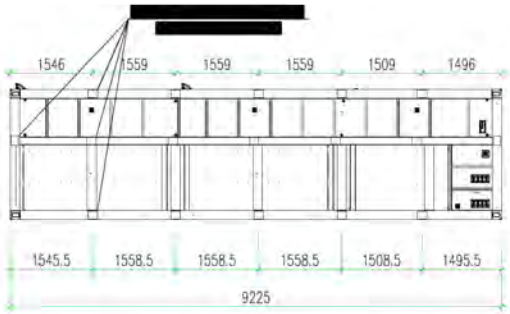
Battery Container

Front View



Top View

Note: All doors can be opened to 180°.



Bottom View

[redacted]

Notes:

1. All the dimensions not specified in this drawing are in millimeters (mm).

[redacted]

Dimensions of battery container：9225mm×2438mm×3258mm.

[redacted]

[redacted]

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[redacted]

Appearance Design of Battery Container

[redacted]

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Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

Prepared by:

SLR Consulting Australia Pty Ltd

SLR Project No.: 675.073695.00005

11 August 2026

Revision: 3.0

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	23 July 2026	Alyssa Shanks	Christian Parker	Claire Willey
2.0	6 August 2026	Christian Parker	Claire Willey	Claire Willey
3.0	11 August 2026	Christian Parker	Claire Willey	Claire Willey

Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1 (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid. SLR may have used artificial intelligence (AI) in the preparation of this document. Should SLR use AI, any information and analysis resulting therefrom will be reviewed for accuracy.

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Appendix B Development Plans
Appendix C Environmental Assessment Report
Appendix D Noise Impact Assessment
Appendix E Transport Impact Statement
Appendix F Bushfire Management Plan
Appendix G DPLH Aboriginal Cultural Heritage Advice Letter

Acronyms and Abbreviations

AC	Alternating Current
BESS	Battery Energy Storage System
BMP	Bushfire Management Plan
CEMP	Construction Environmental Management Plan
CPP	Chandala Processing Plant
DC	Direct Current
EAR	Environmental Assessment Report
EMS	Environmental Management System
LPS 6	Local Planning Scheme No. 6
SWIS	South West Interconnected System
TIS	Transport Impact Statement
WAPC	Western Australian Planning Commission

Executive Summary

This report has been prepared in support of a Development Application for a Battery Energy Storage System (BESS) and associated infrastructure at Lot 1261 (No.722) Old Gingin Road, Muchea. The Proposal covers approximately 0.56 ha and is located in a 0.93 ha footprint within the existing Tronox Chandala Processing Plant site. It comprises a 38MW BESS facility, two transformers, a water run-off storage area, associated electrical infrastructure and internal access arrangements. The Proposal will operate as a privately owned entity within the Tronox Chandala Processing Plant.

The Proposal will provide critical electricity storage infrastructure to support the ongoing transition of Western Australia's energy network. By storing electricity during periods of excess generation and discharging electricity during periods of increased demand, the BESS will improve the reliability, resilience and flexibility of the South West Interconnected System.

The subject site is located within an established mineral sands processing facility with access to existing internal infrastructure and connection opportunities to the Western Power network. The surrounding locality is characterised by a mix of rural, agricultural and industrial land uses. The Proposal's siting within the existing mineral sands processing facility operational footprint minimises the potential for land use conflict with nearby sensitive receptors.

Supporting technical assessments demonstrate that the Proposal can be accommodated within the existing industrial setting with environmental, acoustic, bushfire and traffic impacts either negligible or capable of being appropriately managed. The development envelope is located within an existing modified industrial environment and is not expected to adversely affect the amenity, operation or future development potential of surrounding land uses.

An assessment against the relevant State and local planning framework confirms that the Proposal is consistent with the objectives of the Shire of Chittering Local Planning Scheme No. 6, the applicable State planning policy framework and broader strategic planning objectives relating to renewable energy infrastructure.

Accordingly, the Proposal satisfies the relevant planning requirements and it is respectfully requested that the Development Assessment Panel approve the Proposal, subject to reasonable and standard conditions.

1.0 Introduction

This planning report has been prepared by SLR in support of an application for development approval for a Battery Energy Storage System (BESS) facility and associated infrastructure on Lot 1261 (No.722) Old Gingin Road, Muchea (the subject site).

The proposed development comprises a 38 MW BESS facility, two transformers, a water run-off storage area, associated electrical infrastructure and an internal access required for the operation of the facility (the Proposal).

The Proposal forms part of Western Australia's ongoing transition towards a lower-emissions energy network and will provide critical BESS capacity to support the reliability and stability of the South West Interconnected System (SWIS). The Proposal will store electricity during periods of surplus generation and discharge electricity during peak demand periods, supporting renewable energy generation and network resilience.

The development is proposed within the existing Tronox Chandala Processing Plant (CPP), which provides an appropriate established industrial setting with access to existing infrastructure and physical separation from sensitive land uses.

This report provides an overview of the proposed development and a planning assessment demonstrating the Proposal is in compliance with the relevant State and local planning framework.

The application is submitted to the Shire of Chittering for determination by the Development Assessment Panel (DAP) and is supported by:

- Certificate of Title (Appendix A)
- Development Plans (Appendix B)
- Environmental Assessment Report (Appendix C)
- Noise Impact Assessment (Appendix D)
- Transport Impact Statement (Appendix E)
- Bushfire Management Plan (Appendix F)
- DPLH Aboriginal Cultural Heritage Advice Letter (Appendix G)

2.0 Context

2.1 Regional Context

The subject site is situated approximately 50 kilometres north of the Perth Metropolitan Area. The nearby townships of Muchea, Bullsbrook and Bindoon form the nearest population centres. The locality is characterised by a mix of rural, agricultural and industrial land uses. The Proposal's location within an established large-scale industrial operation, surrounded by larger rural and agricultural landholdings, provides an appropriate setting for utility-scale BESS infrastructure and minimises the potential for land use conflict with sensitive receptors.

2.2 Local Context

The Proposal is sited within Tronox's Chandala Processing Plant, approximately 400m from the nearest lot boundary. The subject site is located approximately 5km north of Muchea town centre and is surrounded by general farming land, with the nearest sensitive receptor being approximately 1 km to the north west.

The Proposal is identified on the local context plan provided below in Figure 1 and Appendix B.

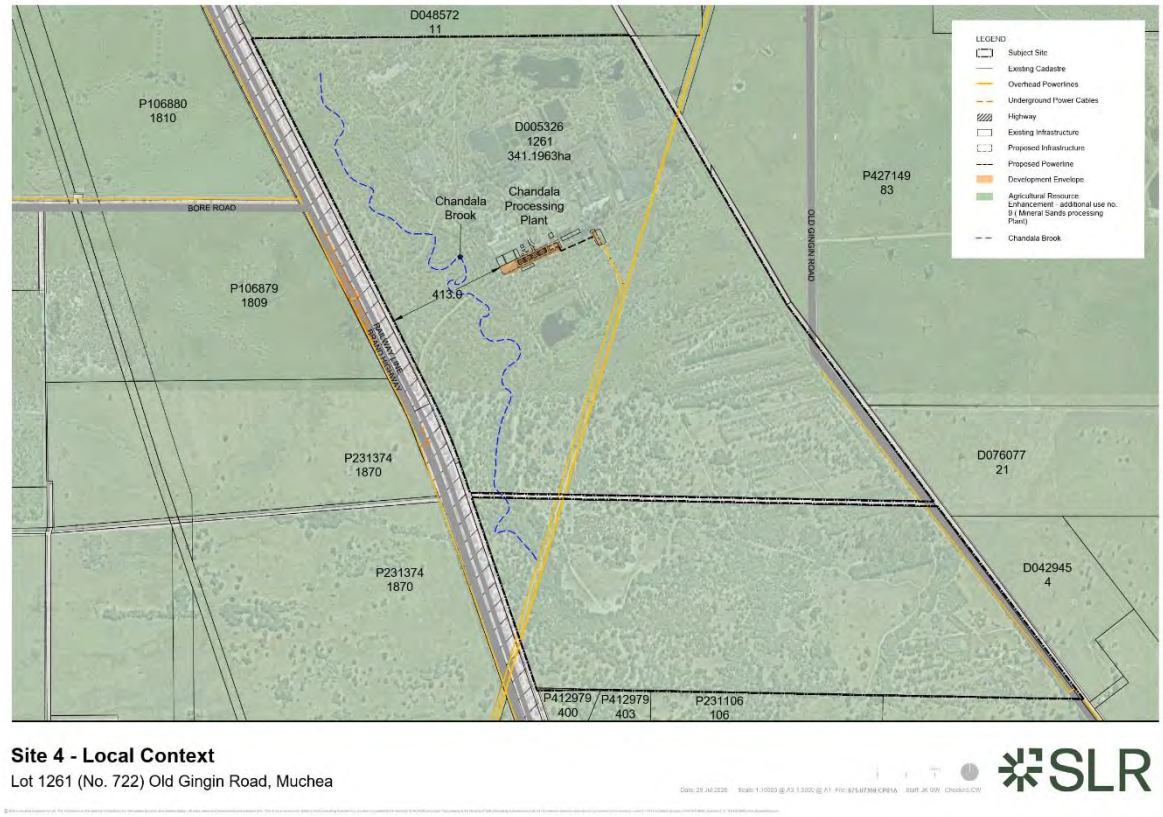


Figure 1: Local Context Plan

3.0 Subject Site

3.1 Property Details

The site, the subject of this application, forms part of the land legally described as Lot 1261 on Deposited Plan 5326. The land is owned by Tronox Management Pty Ltd and comprises the CPP.

The Proposal occupies approximately 0.56 ha of a broader 0.93 ha area located south of the existing CPP. The Proposal will be developed within the 0.93 ha footprint and will operate as privately owned entity within the CPP. The subject site is also located within the Agricultural Resource zone under the Shire of Chittering Local Planning Scheme No. 6 (LPS 6).

The respective land ownership and property details are confirmed in Table 1.

Table 1: Subject site property details

Lot	Plan	Volume/Folio	Street Address	Registered Owner	Area
1261	D005326	1845/479	722 Old Gingin Road, Muchea	TRONOX MANAGEMENT PTY LTD	341ha

3.1.1 Certificate of Title Encumbrances and Notifications

The subject site has five encumbrances and notifications listed on the certificate of title. Two of these are relevant to the Proposal:

- Easement to the Western Australian Government Railways Commission. Further details are provided in Instrument F290681 registered on 27/8/1993. The easement is located adjacent to the proposed BESS location identified in Figure 2 below.

Figure 2: Easement F290681

Reviewing the easement boundary against available aerial imagery, it is apparent that the current easement does not align with the constructed railway infrastructure as described within the easement documents. Notwithstanding this misalignment, the easement is no longer required as the railway has not been used for many years and has substantially deteriorated to the point it is no longer useable without substantial repair. The process of extinguishing the easement has begun with all relevant parties.

- Contaminated Sites Act 2003 (contaminated site – remediation required) Memorial L090474, registered 1/10/2009.

3.2 Subject Site Features

The Proposal occupies approximately 0.56ha within a 0.93 ha broader footprint located to the south of existing CPP infrastructure. The Proposal will be developed within the existing industrial footprint of the CPP but will operate as privately owned entity within the CPP. The CPP is a mineral sands processing facility that produces ilmenite, zircon, rutile, leucoxene and synthetic rutile. The development envelope has largely been disturbed and modified. It is accessible via the existing internal road network from Brand Highway and Old Gingin Road. Surrounding land uses are predominantly agricultural, with the nearest residential sensitive receptor located approximately 1 km northwest of the subject site.

Environmental features associated with the site have been considered under the Environmental Assessment Report (Appendix C) which confirms the site is highly modified and suitable, subject to the implementation of the recommended environmental management measures.

The Environmental Features detailed within the EAR include:

- Land Use
  - Existing Tronox CPP and surrounding rural land uses.
- Reserves and Conservation Areas
  - No reserves or conservation areas intersect with the Proposal.
- Climate
  - Similar climate to Perth.
- Topography
  - Relatively flat between 58m to 62m relative to Australian Height Datum (AHD).
- Regional Geology and Soils
  - The Yanga System intersects with the Proposal and consists of poorly drained plains and ‘wet soils,’ where the water table is frequently at or near the surface, particularly in winter. This causes significant waterlogging and flood risks.
  - The Proposal intersects a mapped area of moderate to low risk of Acid Sulfate Soils.
  - Subject site is listed as a contaminated site and requires remediation
- Hydrology and Hydrogeology
  - Groundwater quality impacts beneath portions of the CPP associated with legacy site operations
  - No surface water features or wetlands intersect with the Proposal
- Flora and Vegetation
  - The Proposal intersects with 1.39ha of degraded to completely degraded vegetation
  - No conservation significant flora or threatened and priority ecological communities intersect with the Proposal.
  - It is inconclusive whether dieback is present on the subject site.
- Terrestrial Fauna
  - The Proposal intersects with low to moderate quality black cockatoo foraging habitat.
  - The Proposal does not intersect with black cockatoo breeding or roosting habitat.
- Bushfire
  - The Proposal intersects with bush fire prone areas.
- Air Quality
  - The existing CPP has air quality monitoring requirements.

4.0 Proposed Development

4.1 Background and Operational Needs

Western Australia's electricity network is undergoing significant transformation as increasing levels of renewable generation are integrated into the SWIS.

The Proposal provides critical infrastructure that improves network system reliability by storing electricity during periods of excess generation and discharging energy during periods of increased demand. These facilities support network stability, energy affordability, reduced greenhouse gas emissions and broader decarbonisation objectives.

The CPP is suited to this form of infrastructure due to its established industrial character, existing internal infrastructure, separation from sensitive receptors and connection opportunities to the Western Power network.

The proposed BESS will contribute to the reliability, resilience and security of Western Australia's electricity network while avoiding the need to locate equivalent infrastructure within more environmentally sensitive or residentially constrained locations.

4.2 Development Summary

Development approval is sought for the construction and operation of a BESS and associated infrastructure within Lot 1261 (No.722) Old Gingin Road, Muchea.

The Proposal includes:

- 4x BESS Modules, each containing 8 DC ‘Battery’ Containers (9.2m long, 2.4m wide, 3.3m high, similar in size to a 30 foot shipping container) and 1x AC ‘Power’ Skid (12.2m long, 2.4m wide, 2.9m high, similar in size to a 40 foot shipping container).
- 2x Transformers with a maximum height of 5.2m.
- 1x Water Run-off Storage Area.
- Internal access arrangements.
- Associated electrical infrastructure.
- Stormwater to be managed on site by expanding on the existing stormwater infrastructure as required to accommodate the Proposal.

The 0.56 ha BESS development envelope is indicated in Figure 3 below and Appendix B.

Figure 3: Site Plan

Approval is sought over the nominated development envelope to provide flexibility during the detailed design phase, with the precise location of equipment and connection infrastructure to be finalised following detailed engineering design and network approval processes. It is proposed that a condition of approval be imposed to require the submission of a final site plan prior to the commencement of development.

Table 2: Development Details

Specifications	Indicative Development Details
Location	Lot 1261 (No.722) Old Gingin Road, Muchea, within the Tronox CPP, Shire of Chittering
Development Envelope	The Proposal covers approximately 0.56 ha, located in an approximate 0.93 ha development envelope to the south of the existing Tronox CPP footprint. An additional 1.91 ha bushfire protection zone is proposed for bushfire mitigation purposes. The BESS has a maximum height of 3.3 m.
Existing Land Use	Existing disturbed land within the Tronox CPP, including an unused portion of railway infrastructure.
Proposal Scope	Construction and operation of a BESS and associated electrical infrastructure connected to Western Power's network.
Power Output	Approximately 38MW with greater than 8 hours of nameplate storage capacity.

Specifications	Indicative Development Details
Power Supply – Electrical Cabling and Upgrades	Connection to Western Power's SWIS via a new on site transformer(s) within/adjacent to the existing on site switchyard and adjacent to the BESS modules. Includes service trenching, underground powerlines and associated electrical infrastructure.
Existing Approved Development	Located within the existing Tronox CPP. The CPP is operating under an existing Part IV approval and Part V licence.
Infrastructure Facilities	Battery containers, inverters, electrical equipment, powerline connection, access roads and ancillary infrastructure.
Internal Site Access	Existing internal road network within the Tronox CPP will provide access to the Proposal.
Site Access and Egress	Existing access via Brand Highway and the Tronox CPP access road.
Extent of Clearing & Disturbance Area	Limited clearing of native vegetation that may be required to establish asset protection zones and implement bushfire management measures. Any clearing will be minimised and managed in accordance with the recommendations of the EAR and relevant approval requirements.
Fire water tanks and reticulation system	Fire water tanks, firewalls and associated reticulation infrastructure are proposed to support emergency response requirements for the Proposal. Detailed design, sizing and operational specifications will be confirmed as part of the final engineering design and will incorporate appropriate fire detection, suppression and containment measures in accordance with relevant industry standards and emergency response requirements.
Lighting	External lighting associated with the facility will be limited and designed for operational and maintenance purposes only. Any lighting will be directed downward and contained within the facility to minimise spill beyond the site boundary. The facility will be remotely monitored and is not anticipated to require significant operational lighting.

4.3 Environmental Assessment Considerations

An Environmental Assessment Report (EAR) prepared by SLR concludes that the Proposal can be developed and operated within the existing industrial setting with negligible residual environmental impacts. The development area is located entirely within a highly modified industrial environment and avoids environmentally sensitive areas, conservation reserves, mapped wetlands and watercourses. Potential impacts are limited primarily to temporary construction activities, limited clearing of degraded vegetation associated with bushfire protection requirements, and low-likelihood emergency scenarios such as a battery fire or thermal runaway event, with identified risks capable of being appropriately managed through a Construction Environmental Management Plan (CEMP) and operational Environmental Management System (EMS). The assessment also found that the Proposal does not trigger referral under Part IV of the *Environmental Protection Act 1986* (EP Act), is not a prescribed premises activity requiring a works approval or licence under Part V of the EP Act and does not require referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). An application for a native vegetation clearing permit to establish bushfire protection zones was lodged with the Department of Water and Environmental Regulation on Monday 27 July 2026.

4.4 Acoustic Considerations

Herring Storer Acoustics undertook a Preliminary Environmental Noise Impact Assessment (NIA) for the Proposal. The assessment modelled all battery and inverter equipment operating simultaneously (at maximum propagation conditions) under worst-case (night-time) meteorological conditions. It considered impacts on a number of noise sensitive receptors surrounding the CPP, the closest of which (R1) is located approximately 1 km to the north-west. Refer to Figure 4 below.

Figure 4: NIA Noise Sensitive Receiver Locations

The NIA concluded that predicted noise emissions will comply with the applicable *Environmental Protection (Noise) Regulations 1997* requirements.

At night, the Assigned Noise Level at R1 is 65 dB(A) and 35 dB(A) at the balance of the locations identified. The highest predicted, assessable noise emissions for the nearest noise sensitive premise is 37 dB(A) at “R1”. This includes all proposed plant associated with the project operating at 100%, and with the adjustment for tonal characteristics.

Having regard to cumulative noise impacts, at the calculated noise level of 32 dB(A), the noise emissions associated with the proposed BESS facility would not contribute to any other noise emission in the area sufficiently to significantly increase noise at R1 above the most stringent Assigned Noise Level.

Similarly, for other identified noise sensitive receivers, the BESS noise levels would contribute a negligible amount to current noise emissions – on the assumption that the current noise emissions may be as high as the applicable Assigned Noise Level at these locations.

Hence, it is considered that the proposed BESS facility addition to the CPP could be undertaken with negligible risk to impacting premises in the vicinity

It is recommended that a detailed assessment be undertaken during the design development phase of the project to confirm expected development approval conditions based on finalised specifications and noise data. Refer to Appendix D.

4.5 Traffic and Access Considerations

A Transport Impact Statement (TIS) prepared by PTG Consulting determined that the operational traffic generation associated with the BESS facility will be negligible. During operation, the facility is expected to generate approximately two light vehicle movements and one truck movement during monthly maintenance visits, with the site being monitored remotely under normal operating conditions. Existing access arrangements via Brand Highway and the internal Tronox CPP road network are considered adequate to accommodate the Proposal without adverse impacts on traffic operations, road safety or parking provision. Refer to Appendix E.

4.6 Bushfire Considerations

A Bushfire Management Plan (BMP) prepared by Covey Associates has been provided in support of the Proposal. The BMP confirms that, while the subject site is designated as bushfire prone, the Proposal does not include habitable buildings and therefore does not trigger a statutory requirement for assessment under State Planning Policy 3.7 Bushfire or the associated Planning for Bushfire Guidelines. Notwithstanding this, a bushfire risk assessment has been voluntarily undertaken and a risk-based bushfire management strategy adopted for the BESS and associated infrastructure.

The BMP identifies the key bushfire risks as potential bushfire impact on the renewable energy infrastructure, and the potential for an infrastructure fire to ignite surrounding vegetation. These risks are addressed through the establishment and ongoing maintenance of Non-Vegetated Zones (NVZ) and Asset Protection Zones (APZ), including a 52.8m perimeter NVZ/APZ around the BESS compound and NVZ/APZs around the proposed transformers, supported by internal emergency vehicle access, firewater supply, vegetation management, emergency information, emergency services familiarisation and a site-specific Emergency Management Plan. Subject to implementation of the recommended measures, the BMP concludes that bushfire risk can be appropriately managed for the life of the facility. Refer to Figure 5 below and Appendix F.

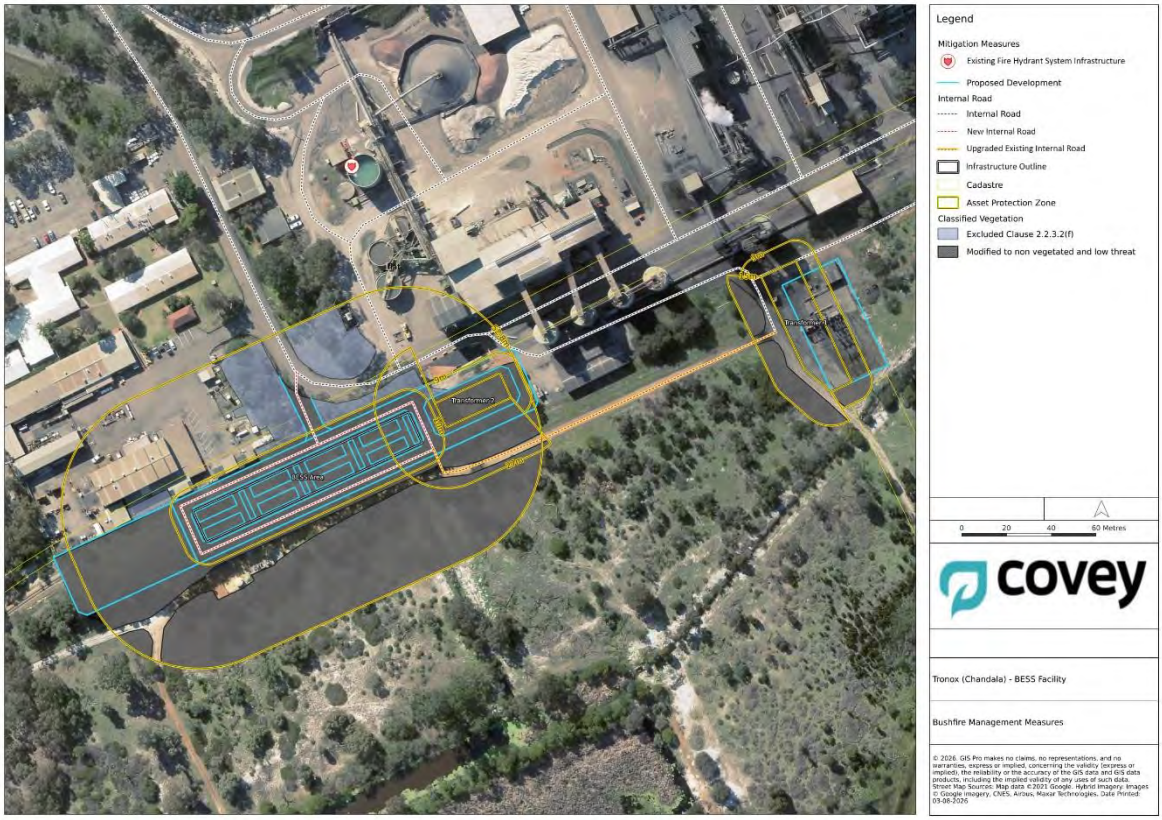


Figure 5: Chandala BESS Site – Bushfire Management Plan

4.7 Heritage Considerations

A review of information currently mapped on the Aboriginal Cultural Heritage Inquiry System (ACHIS), indicates that the Proposal is within the public boundary of Gin Gin Brook Waggyl (ID 20008). When an ACH site or place contains sensitive cultural heritage information, its actual location is hidden from the public. The Department of Planning, Lands and Heritage (DPLH) administer the boundaries of ACH sites and places and have confirmed that the Proposal only intersects with the public boundary of Gin Gin Brook Waggyl (ID 20008). Refer to Appendix G.

Please see Table 3 for a list of ACH sites and places within a 2km radius of the subject site, but do not intersect with the subject site.

Table 3: ACH sites and places within 2km of the subject site.

Site Name/ID	Status	Heritage Values	Proximity to Site (approximate)
Moore River Waugal (ID 20749)	Registered Site	Creation/Dreaming	Within 60m west of subject site
Ellen Brook: Muchea 2 (ID 3566)	Registered Site	Artefacts/Scatter	350m west of subject site

Ellen Brook: Muchea 1 (ID 3565)	Registered Site	Sub surface cultural material; Artefacts/ Scatter	840m northwest of subject site
Chandala Brook Duplicate of ID 3535 (ID 3525)	Registered site	Creation/ Dreaming Narrative	Within 60m west of subject site
Boonanarring Brook (ID 21616)	Lodged ACH place	Creation/ Dreaming Narrative	Within 60m west of subject site
Wallering Brook (ID 21617)	Lodged ACH place	Creation/Dreaming Narrative	Within 60m west of subject site
Nulilla Brook (ID 21618)	Lodged ACH place	Creation/ Dreaming Narrative	Within 60m west of subject site
Breera Brook (ID 21619)	Lodged ACH place	Creation/ Dreaming Narrative	Within 60m west of subject site
Lennard Brook (ID 20650)	Lodged ACH place	Creation/ Dreaming Narrative; Landscape/ Seascape Feature; Other; Water Source	Within 60m west of subject site
Muchea Pipeline Deviation 1 (ID 19182)	Lodged ACH place	Creation/ Dreaming Narrative; Other	1.6km west of subject site
Red Gully Creek (ID 19183)	Historic ACH place	Creation/ Dreaming Narrative; Plant Resource	Within 60m west of subject site

The proximity of the above ACH sites and places indicates that the subject site is in a place containing cultural heritage significance. As this study has not included a review of the site files, the exact nature of the ACH present throughout the wider area is currently unknown. However, Lodged ACH places Boonanarring Brook (ID 21616), Wallering Brook (ID 21617), Nulilla Brook (ID 21618), Breera Brook (ID 21619), and historic ACH place Red Gully Creek (ID 19183) do appear to be duplicates of the same place record.

5.0 Planning Assessment

The planning framework comprises the *Planning and Development Act 2005* and its subsidiary legislation Schedule 2 Deemed Provisions of the *Planning and Development (Local Planning Schemes) Regulations 2015* (Deemed Provisions), State Planning Policies, Position Statements and Guidelines, as well as the Shire of Chittering Local Planning Scheme No. 6 (LPS 6), and Local Planning Policies. The proposed development has also taken into consideration the WAPC's Draft Renewable Energy Planning Code which was released in December 2025 for public comment and closing in April 2026.

5.1 State Planning Framework

5.1.1 Schedule 2 Deemed Provisions: *Planning and Development (Local Planning Schemes) Regulations 2015*

Pursuant to clause 60 of the Deemed Provisions, approval is required to commence and construct the proposed development. Clause 67(2) of the Deemed Provisions sets out the matters to which the local government is to give due regard in considering a development application, to the extent they are relevant to the proposed development. An assessment against the provisions of Clause 67(2) of the Deemed Provisions is provided in Table 4.

Table 4: Clause 67(2) Assessment: Matters for Consideration

Clause 67(2) provisions	Applicant's Response	
a. The aims and provisions of this Scheme and any other local planning scheme operating within the Scheme area;	The aims and provisions of the Shire's LPS 6 and the relevant objectives of the Agricultural Resource zone have been considered in section 5.2.2 of this report.	✓
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;	The proposed development is consistent with orderly and proper planning. The development, although a use not listed under LPS 6, is consistent with the objectives and purpose of the land use zone (Agricultural Resource under LPS 6) and will support the State's broader transition towards decarbonisation and a green energy driven SWIS. The Proposal is consistent with the relevant development requirements specified under LPS 6, as varied under LPP 13 and 14. The Proposal is supported by environmental, bushfire, noise and traffic technical reports which demonstrate the development will not result in adverse amenity impacts and or can be appropriately managed. Refer to sections 5.1 and 5.2.	✓
c. any approved State planning policy;	Assessment has been made against • State Planning Policy 2.0 – Environment and Natural Resources Policy. • State Planning Policy 2.5 – Rural Planning • State Planning Policy 2.9 – Water • State Planning Policy 3.7 – Bushfire Refer to section 5.1.7 of this report.	✓
d. any environmental protection policy approved under the *Environmental Protection Act 1986* section 31(d);	N/A.	N/A

Clause 67(2) provisions	Applicant's Response	
e. any policy of the Commission;	An assessment against the following documents has been prepared at Section 5.1.2, 5.1.3 and 5.1.6: • State Planning Strategy 2050. • WAPC Position Statement: Renewable Energy Facilities (2020). • WAPC Draft Renewable Energy Planning Code.	✓
f. any policy of the State;	An assessment of the State Energy Transformation Strategy Stage 2 2021-2025 and State Infrastructure Strategy 2022 are assessed in sections 5.1.4 and 5.1.5.	✓
fa. any local planning strategy for this Scheme endorsed by the Commission;	The Shire of Chittering Local Planning Strategy is assessed in section 5.2.1.	✓
g. any local planning policy for the Scheme area;	Assessment has been made against: • Local Planning Policy No.13 – Car Parking • Local Planning Policy No.14 – Setbacks Refer to section 5.2.3 of this report.	✓
h. any structure plan or local development plan that relates to the development;	N/A	N/A
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	N/A
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	N/A
k. the built heritage conservation of any place that is of cultural significance;	N/A	N/A
l. the effect of the proposal on the cultural heritage significance of the area in which the development is located;	A review of information currently mapped on the ACHIS, indicates that the Proposal is within the public boundary of Gin Gin Brook Waggyl (ID 20008). When an ACH site or place contains sensitive cultural heritage information, its actual location is hidden from the public. The Department of Planning, Lands and Heritage (DPLH) administer the boundaries of ACH sites and places and have confirmed that the Proposal only intersects with the public boundary of Gin Gin Brook Waggyl (ID 20008) (refer to Appendix G).	✓

Clause 67(2) provisions	Applicant's Response	
m. the compatibility of the development with its setting, including — i. the compatibility of the development with the desired future character of its setting; 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 proposed BESS is located wholly within the existing Tronox CPP. The scale, form and appearance of the BESS are compatible with surrounding development and will not adversely affect the future industrial function of adjoining land. The nearest residential dwelling is located approximately 1km north west from the Proposal.	✓
n. the amenity of the locality including the following — i. environmental impacts of the development; and ii. the character of the locality; and iii. social impacts of the development.	The EAR (refer to Appendix C) confirms that environmental impacts are limited and capable of being appropriately managed through standard mitigation measures and environmental management plans. The NIA (refer to Appendix D) confirms compliance with the *Environmental Protection (Noise) Regulations 1997* and concludes the Proposal presents negligible risk of adverse noise impacts. The Proposal is located wholly within the existing Tronox CPP lot and approximately 400m from the nearest lot boundary and is not expected to result in any unacceptable impact on the character or amenity of the locality.	✓

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;	The EAR (refer to Appendix C) concludes that potential impacts on groundwater, contamination, surface water and ecological values can be appropriately managed through implementation of a CEMP and operational environmental controls. Management measures proposed following detailed design include: • Stormwater, erosion and sediment controls. • Spill prevention and contamination management measures. • Management of excavations and any groundwater encountered during construction and ongoing operation of the Proposal. • Protection of existing groundwater monitoring infrastructure. • Rehabilitating disturbed areas where practicable following construction. • Routine inspection and maintenance of drainage infrastructure and water management controls throughout the operational life of the Proposal. • Procedures for managing and responding to incidents that may affect surface water or groundwater quality during operation. • Bunding and containment systems for transformers and other equipment containing oils, fuels or hazardous substances, sized in accordance with relevant standards and regulatory requirements. • Appropriate drainage design to maintain existing drainage patterns where practicable and minimise concentration of runoff. • Separation of clean and potentially contaminated stormwater, where required. • Spill response facilities and equipment located at suitable operational areas. • Design and placement of infrastructure to avoid direct interference with watercourses, drainage lines and sensitive water-dependent environments where practicable. • Provision of appropriate surface water controls to minimise erosion, sediment transport and localised flooding. • Ongoing inspection and maintenance programs for containment systems, drainage infrastructure and hazardous	✓

Clause 67(2) provisions	Applicant's Response	
	materials storage areas throughout the operational phase.	
p. whether adequate provision has been made for the landscaping of the land to which the application relates and whether any trees or other vegetation on the land should be preserved;	The development is located within an existing disturbed industrial site and requires only limited clearing associated with construction activities and bushfire (APZ). No mapped native vegetation occurs within the development envelope and no significant flora or vegetation values will be affected by the Proposal. Existing landscaping on the Tronox CPP site will be retained where outside the proposed development envelope.	✓
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 subject site is well suited to the proposed development, being located within an established heavy industrial land use and adjacent to existing electricity infrastructure. The EAR (refer to Appendix C) confirms the site contains no significant environmental constraints that would preclude development. Management measures are proposed for the following relevant risks: • Flood risk • Acid sulfate soils • Contaminated site • Groundwater contamination • Flora and fauna • Dieback • Air quality The BMP confirms with several measures the Proposal can appropriately mitigate bushfire risk. Refer to Appendix F.	✓
r. the suitability of the land for the development taking into account the possible risk to human health or safety;	The Proposal has been informed by environmental, acoustic, bushfire and transport assessments which demonstrate that where required, impacts can be managed via battery management systems, fire detection, fire suppression, fire walls and setbacks, and emergency response measures. The extent and scope of necessary measures will be confirmed as part of the detailed design process. Refer to Appendices C, D, E and F.	✓
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;	The TIS (Appendix E) confirms that the proposed site ingress and egress is appropriate.	✓

Clause 67(2) provisions	Applicant's Response	
t. the amount of traffic likely to be generated by the development, particularly in relation to the capacity of the road system in the locality and the probable effect on traffic flow and safety;	The TIS (Appendix E) predicts the amount of traffic likely to be generated by the development and confirms that this can be adequately absorbed such that the Proposal has a negligible effect on the safety and efficiency of the transport network.	✓
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;	Given the BESS will be largely unattended once operational, the long-term generation of solid wastes will be limited. Existing on site amenities have adequate capacity to support any service technicians or other personal required to attend to the facility. A CEMP will be prepared for the construction period and include these temporary facilities where existing on site facilities are inappropriate.	✓
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;	No community service or benefit will be lost as a result of the proposed development	✓
w. the history of the site where the development is to be located;	N/A	N/A
x. the impact of the development on the community as a whole notwithstanding the impact of the development on particular individuals;	The Proposal is informed by technical investigations that consider the likely impacts on the environment, noise and bushfire and transport. Refer to Appendix C, D, E and F.	✓
y. any submissions received on the application;	To be confirmed as part of the development application process.	
1. za. the comments or submissions received from any authority consulted under clause 66;	To be confirmed as part of the development application process.	
2. zb. any other planning consideration the local government considers appropriate.	To be confirmed as part of the development application process.	

5.1.2 State Planning Strategy 2050

The Proposal aligns with the State Planning Strategy 2050 by supporting Western Australia's transition to a more resilient, efficient and sustainable energy system. The BESS will contribute to energy security and reliability while utilising previously disturbed industrial land and existing utility infrastructure. The Proposal supports economic diversification, decarbonisation objectives and the consolidation of strategic infrastructure within an established heavy industrial site.

5.1.3 WAPC Position Statement: Renewable Energy Facilities

The Proposal is consistent with the WAPC Position Statement: Renewable Energy Facilities. The BESS is located within an existing industrial site, adjacent to established electricity

infrastructure and separated from residential areas. The site has been selected to avoid significant environmental constraints and minimise land-use conflict. The Proposal will assist in facilitating the integration of renewable energy generation into the electricity network while maintaining compatibility with the existing CPP and surrounding rural land uses.

5.1.4 Energy Transformation Strategy

The proposed BESS supports the objectives of the Western Australian Energy Transformation Strategy by providing infrastructure necessary to facilitate increasing levels of renewable energy generation within the SWIS. The Proposal improves network flexibility, reliability and resilience and assists in managing fluctuations associated with renewable generation sources.

5.1.5 State Infrastructure Strategy 2022

The Proposal supports the State Infrastructure Strategy 2022 by contributing to the delivery of strategic energy infrastructure required to support Western Australia's future economic growth and decarbonisation objectives. The provision of BESS infrastructure improves network resilience and supports the ongoing transformation of the State's energy system.

5.1.6 Draft Renewable Energy Planning Code 2025

The WAPC released the Draft Renewable Energy Planning Code (the Code) for public comment on 12 December 2025. The purpose of the Code is to provide a clear and consistent framework for assessing energy infrastructure that supports the generation, storage and transmission of renewable energy across Western Australia. Currently, the Draft Code focuses only on Wind Farms (Part 2) and has a placeholder for BESS (Part 5).

WAPC have advised that the Code will formally apply once it is approved and incorporated into the Deemed Provisions and local planning schemes, indicatively from August 2026.

As a draft, seriously entertained planning proposal, the Proposal has given due regard to the following objectives detailed in Table 5.

Table 5: Draft Renewable Energy Planning Code Assessment

Objective	Response
Guide the establishment of energy infrastructure to support a sustainable energy supply for Western Australia;	The Proposal will support sustainable energy supply through the BESS.
Avoid or minimise land use conflicts and adverse impacts on the surrounding environment, amenity, public health and safety	By co-locating the proposed development with existing industrial development, the Proposal minimises any land use, environmental, amenity, public health and safety concerns.
Promote development that responds to the characteristics of the site and its local context.	The proposed BESS is within the Tronox CPP, 400m from the closest lot boundary, allowing the development to occur without any impact on the site characteristics or local context.

5.1.7 State Planning Policy

5.1.7.1 State Planning Policy 2.0 – Environment and Natural Resources Policy

The Proposal is consistent with the objectives of State Planning Policy 2.0 as it has been located within an existing disturbed industrial area to avoid impacts on environmental assets and natural resources. The EAR confirms that the Proposal avoids significant vegetation, wetlands, watercourses, conservation reserves, environmentally sensitive areas, threatened ecological communities and significant fauna habitat. Any potential environmental impacts are localised, manageable and capable of being mitigated through standard environmental management measures.

5.1.7.2 State Planning Policy 2.5 – Rural Planning

State Planning Policy 2.5 – Rural Planning (SPP2.5) states that due to their size, scale and potential level of impact some rural land uses could be considered industrial, some rural land uses are located on industrial land, and some industrial land uses are located on rural land. Section 5.11 of SPP 2.5 sets out broad locational criteria for regional facilities. The proposed development has been assessed against the criteria in the following table.

Table 6: SPP2.5 Criteria

Criteria	Proposed
Facilities should be located on a main road or on a road that is of suitable standard and treatment to accommodate significant increase in traffic volumes and freight tasks which may be generated by the proposal.	The subject site is accessed via an existing road network that is constructed to an appropriate standard and has capacity to accommodate the anticipated traffic generation associated with the proposal. The development is not expected to result in a significant increase in traffic volumes or freight movements that would adversely impact the function or safety of the surrounding road network.
Facilities should contain or satisfactorily manage potential environmental (including water resources), noise, amenity and air quality impacts on the landholding without affecting nearby rural land uses.	Environmental, noise, amenity and air quality impacts associated with the proposal will be contained and managed within the subject site through operational controls and standard management practices. The scale and nature of the development are not expected to adversely affect nearby rural land uses, water resources, or the amenity of surrounding properties.
Facilities should not be visually dominant within key viewsheds, and should be visually compatible with surrounding land uses and development.	The proposed scale and form of development is consistent with the existing development on site, located 400m from the nearest lot boundary and naturally screened by vegetation.
Facilities should be provided with essential services commensurate with the intended land use.	The Proposal will utilise existing on-site infrastructure and will be connected to the Western Power network.

5.1.7.3 State Planning Policy 2.9 – Water

State Planning Policy 2.9 – Water (SPP2.9) outlines how water resource management should be integrated into the planning process. The subject site is located within the 'Swan Canning River System'. The objectives of the policy are outlined as follows:

- Protect and improve the environmental and the social, cultural and economic values of the state's water resources.
- Protect public health and the long-term supply of good quality and affordable drinking water.
- Manage the risk of flooding to people, property and infrastructure.
- Ensure the secure and sustainable supply, use, disposal and re-use of water resources.
- Ensure future development is resilient to the water-related impacts of climate change.
- Minimise future costs and protect public health by ensuring that appropriate wastewater infrastructure is provided.

The Proposal aligns with the objectives of SPP 2.9 as it is located within an existing disturbed industrial site and has been designed to avoid and minimise impacts on surrounding water resources. The EAR concluded that potential impacts on groundwater, surface water and ecological values can be appropriately managed through standard construction and operational controls.

The proposed development has also been assessed against the general measures and the specific measures of the Swan Canning River System as outlined in the tables below.

Table 7: SPP2.9 General Measures

General Measures	Proposed
a) All relevant water related matters should be considered at the earliest possible stage of the planning process and all subsequent stages in accordance with the Guidelines.	Water-related considerations have informed the siting and design of the proposed BESS from the outset of the planning process. The EAR considered nearby water resources, including Chandala Brook located approximately 150 m west of the Proposal, surrounding wetlands and the Ellen Brook Floodplain ESA. The assessment concluded that potential impacts on water resources can be appropriately managed through standard construction and operational environmental controls.
b) Proposals are to be accompanied by sufficient information in accordance with the Guidelines, which specify instances where a Water Management Report is required and what it must contain.	The development application is supported by an EAR which addresses surface water, groundwater and contamination considerations relevant to the proposal. The Proposal is located within an existing disturbed industrial environment and the assessment concluded that the proposal is not expected to generate routine wastewater discharges or adversely affect nearby water resources.
c) Proposals and supporting information should be referred to relevant agencies and licensed water service providers in accordance with the Guidelines.	The proposal may be referred to relevant government agencies and service providers as part of the development assessment process.

General Measures	Proposed
d) Proposals should consider water resource-related issues associated with climate change.	The proposed BESS will contribute to Western Australia's energy transition by supporting renewable energy generation and improving network resilience. The proposal is not expected to place a significant demand on local water resources and has been designed within an existing industrial setting to minimise environmental impacts and support long-term sustainable infrastructure outcomes.
e) Planning decisions (except development applications) should consider cumulative impacts on water resources. Where the cumulative impact is considered significantly detrimental, the proposal should not be supported.	The EAR concluded that impacts on groundwater, surface water and surrounding environmental values are expected to be low and capable of being appropriately managed. Given the limited footprint of the development within an existing industrial operation and the absence of routine wastewater discharges, the proposal is not expected to result in significant cumulative impacts on water resources.

Table 8: SPP2.9 Swan Canning River System Measures

Measures	Proposed
a) Maintain and enhance the ecological and hydrological functions of the river system, and demonstrate detrimental impacts have been prevented.	The Proposal is located within an existing disturbed industrial area and will not involve works within any river, waterway or foreshore area. The EAR concluded that impacts to surface water, groundwater and ecological values can be appropriately managed through standard construction and operational environmental controls.
b) Demonstrate a benefit to the community and a functional need to be located within the river and/ or foreshore reserves, where the proposal is located on public land.	N/A
c) Maintain and enhance public access to and along the rivers and its foreshores, including through the establishment of foreshore reserves.	N/A
d) Consider the importance of the river as a strategic water transport network for commercial and recreational use.	N/A
e) Maintain and enhance the natural landscape character and sense of place of the river system.	The development is contained within an existing industrial facility and is separated from nearby water features. The proposal will not alter the landscape character, environmental values or sense of place associated with the Swan Canning River System.

Measures	Proposed
f) Maintain and enhance views of the Swan Canning river system.	The proposed development is not located within a river corridor or identified viewshed of the Swan Canning River System. As such, the development will not impact views to or from the river system.
g) Identify Whadjuk Noongar Aboriginal Heritage and use best endeavours to protect, avoid or minimise harm consistent with the *Aboriginal Heritage Act 1972.*	A review of information currently mapped on the ACHIS, indicates that the Proposal is within the public boundary of Gin Gin Brook Waggyl (ID 20008). When an ACH site or place contains sensitive cultural heritage information, its actual location is hidden from the public. The Department of Planning, Lands and Heritage (DPLH) administer the boundaries of ACH sites and places and have confirmed that the Proposal only intersects with the public boundary of Gin Gin Brook Waggyl (ID 20008) (refer to Appendix G).
h) Protect, maintain or increase vegetation coverage (preferably with endemic species).	The proposal is primarily located within a disturbed industrial setting. Any vegetation clearing required will be minimised and limited to that necessary for construction and operational safety requirements. Existing vegetation outside the development envelope will be retained.
i) Maintain or establish ecological and public open space linkages to the Swan Canning River system for wildlife habitat and movement and natural flows.	The proposal is not located within a recognised ecological corridor or public open space linkage associated with the Swan Canning River System.

5.1.7.4 State Planning Policy 3.7 - Bushfire

The subject site is designated within a bushfire prone area which triggers the consideration of bushfire planning requirements under State Planning Policy 3.7 – Bushfire (SPP3.7). The response to SPP 3.7 is discussed in section 4.6 and Appendix F – Bushfire Management Plan.

5.2 Local Planning Framework

5.2.1 Shire of Chittering Local Planning Strategy

The Shire of Chittering Local Planning Strategy (the Strategy) was endorsed by the Western Australian Planning Commission (WAPC) in October 2019. The Strategy sets out the long-term strategic direction for land use and development within the Shire and has been prepared to reflect the community and Council vision for the future of the Shire. The subject site is identified as 'Industrial' under the Strategy highlighting its existing industrial land use, despite the Agricultural Resource LPS 6 zoning.

5.2.2 Shire of Chittering Local Planning Scheme No.6

The subject site is zoned 'Agricultural Resource' under LPS 6 and within Special Control Area – Water Prone Area Ellen Brook Palusplain (SCA).

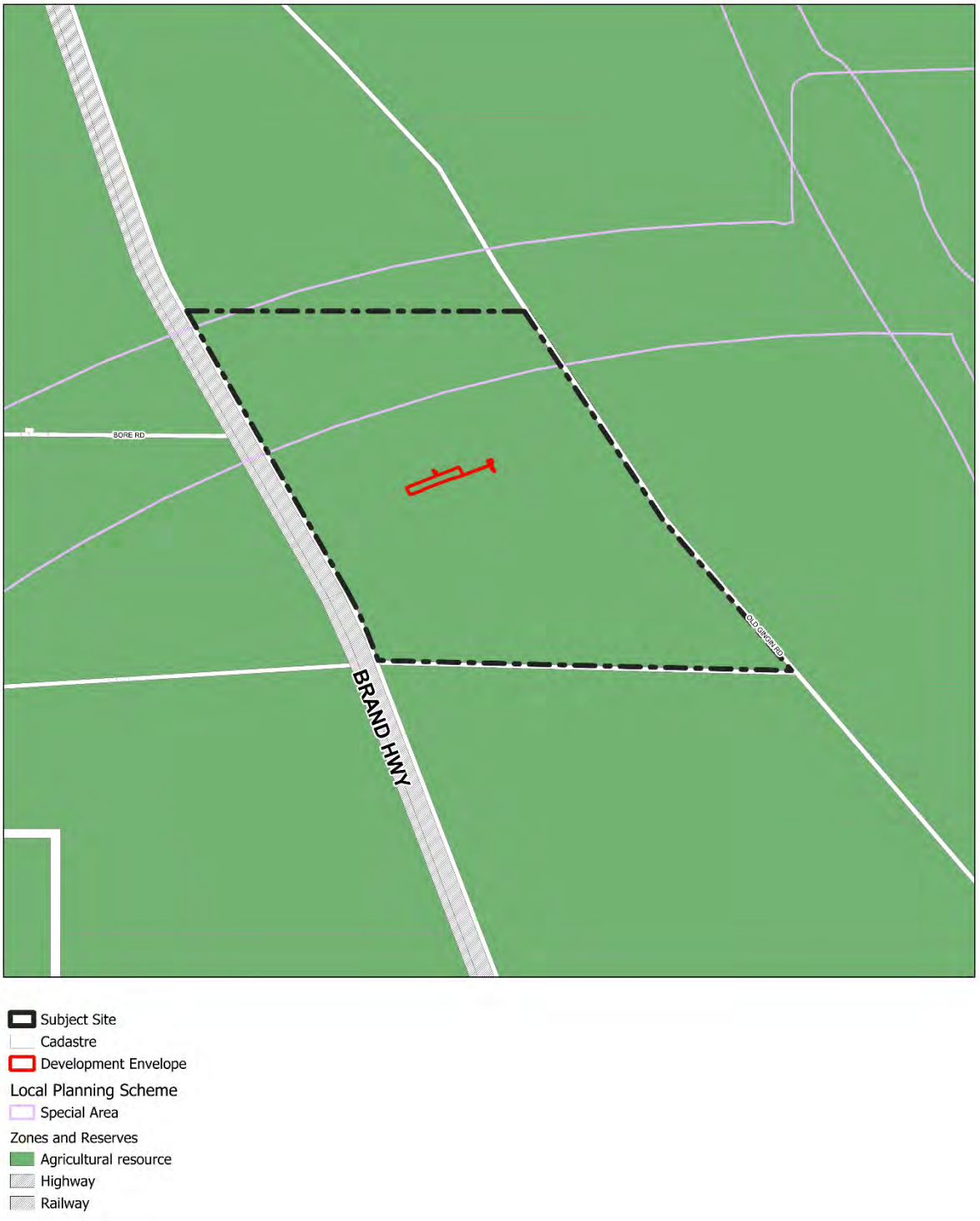


Figure 6: LPS 6 Plan

The Proposal is defined as a is Battery Energy Storage System, defined under the Draft Renewable Energy Planning Code 2025 to mean:

> *Battery Energy Storage System – means the use of premises for the operation of one or more battery storage devices that:*
>
> - *convert electricity into stored energy; and*

- *release stored energy as electricity; and*

includes any equipment necessary for the operation of the plant.

The BESS land use is not a defined land use under the Zoning Table of LPS 6. Pursuant to Clause 3.4.2(a) of LPS 6, where a use is not specifically listed, the local government may determine that the use is consistent with the objectives of the particular zone and is therefore permitted or (b) determine that the use may be consistent with the objectives of the zone and thereafter follow the advertising procedures of clause 64 of the Deemed Provisions in considering an application for Development Approval;

The objectives of the 'Agricultural Resource' are listed in Table 9 below. The Proposal is consistent with these objectives and appropriate in the Agricultural Resource zone.

Table 9: Agricultural Resource Objectives

Objectives	Response
Preserve productive land suitable for grazing, cropping and intensive horticulture and other compatible productive rural uses in a sustainable manner.	The Proposal is located within the existing CPP operational footprint and occupies a small portion of the broader landholding. It will not result in the loss of productive agricultural land or compromise the productive use of surrounding rural land.
Protect the landform and landscape values of the district against despoliation and land degradation.	The Proposal is located within an existing industrial site and will not materially alter the broader landform or landscape values of the area.
Encourage intensive agriculture and associated tourist facilities, where appropriate.	The Proposal does not involve intensive agriculture or tourism; however, it will not prejudice those activities on suitable land elsewhere in the locality.
Allow for the extraction of basic raw materials where it is environmentally and socially acceptable.	The Proposal does not involve basic raw material extraction.

Clause 5.3.1 of LPS 6 outlines the requirements for sites located within the SCA area. Clause 5.3.1 states:

> *Development approval is required for any development within the Special Control Area, excluding development of a class specified in Column 1 of and item in the following table and if all conditions sets out in Column 2 of the table opposite that item are satisfied in relation to the development.*

The proposed BESS is not a development of a class specified in Column 1 and is therefore not exempt from development. Clause 5.3.3 outlines the planning requirements for the SCA which are listed as follows:

Table 10: SCA Requirements

Requirement	Response
The construction and occupation of any dwelling or outbuilding;	Not Applicable

Requirement	Response
The type of effluent disposal system used in this area shall be high performance with bacterial and nutrient stripping capabilities to the specifications of local government and the Health Department and shall be located in a position determined by local government;	Not Applicable – existing on site effluent disposal system will be used.
Minimum floor levels for any building above the highest known water levels;	Minimum floor level of 0.3m above known on site flood levels.
Any land use that may contribute to the degradation of the surface or sub-surface water quality.	The Proposal is not considered a land use that may contribute to the degradation of the surface or sub-surface water quality. However, the Proposal is located within the existing Tronox CPP, a long-established industrial facility, and within a registered contaminated site. Historical industrial activities have resulted in localised groundwater contamination, including sulphate, ammonia-nitrogen and acidic groundwater plumes. The land was also historically cleared and used for agricultural purposes prior to industrial development. These historical land uses represent the primary sources of existing surface and sub-surface water quality degradation identified in the EAR.
No development other than for conservation purposes will be permitted within 30m of any natural water body;	110m to the nearest water body (Chandala Brook)
Damming, draining, or other developments which may alter the natural flow of surface water will not be permitted unless such works are part of an approved Catchment Management Plan.	Not Applicable – No damming or draining proposed.

Clause 4.20 provides additional requirements for the Amenity of Non-residential Development as follows:

Table 11: Amenity of Non-residential Development Assessment

Requirement	Response
the form and scale of the development is to be compatible with surrounding land uses;	The Proposal is located within the existing CPP, with significant vegetation screening to all lot boundaries. Technical studies have confirmed there is no impact on surrounding land uses.
the impacts of the development are to be contained on site and/or suitably managed off-site;	Environmental, Acoustic, Transport and Bushfire impacts have been assessed and confirmed to be able to be suitably managed without adversely impacting neighbouring properties
the impact of the development on the road network and traffic management is to be consistent with the road function and hierarchy;	The TIS confirms that operational traffic generation will be negligible and that existing access arrangements are suitable.

Requirement	Response
adequate provision is to be made for parking for staff and visitors, with separation between staff / visitor parking and service / haulage vehicles;	The BESS will be largely unattended during operation. Existing on-site parking and amenities within the CPP are sufficient to accommodate service technicians and maintenance vehicles.
buildings are to have co-ordinated or complementary materials, colours and styles, including: • doors, windows and building materials that develop a coherent pattern, and are proportional to the building; and • screening of services and areas for waste management and essential services (eg air conditioning units).	The Proposal is located within the existing CPP and will generally be coordinated with the existing character of industrial development
visual impacts to be minimised by the use of vegetation screening, tree retention and building orientation;	The Proposal is set back approximately 400m from the nearest lot boundary and is located within the existing CPP. Extensive existing landscaping of the site will further mitigate any visual impacts.
landscaping to be provided, to a minimum of 10 per cent of the site area, using plant species approved by the local government, including provision of shade trees at 1 per 4 car bays;	Aerial imagery shows majority of the subject site is landscaped and the Proposal will not have a significant impact on this landscaping. No additional car bays are required
minimise the use of front fencing, and where required, fencing to be set back to the building line and behind the landscaped area where feasible, and coloured matt black or other dark tones;	No new front fencing proposed.
external lighting designed to minimise light spill and glare on adjoining properties;	External lighting will be limited to operational and maintenance purposes, directed downward and designed to minimise light spill beyond the subject site.
storage of plant and equipment to be screened or remote from public areas, particularly from the street, and provision made on site for a loading bay where the land use requires it;	The Proposal is 400m from the nearest road with significant vegetation screening the Proposal.
use of ‘on building’ signage where the building addresses the street, and where ‘freestanding’ signage is necessary it should either be affixed to a front fence, or located adjacent to it at a height that is compatible with the setting.	No new signage proposed.

5.2.3 Local Planning Policy

5.2.3.1 Local Planning Policy 13 – Car Parking

Local Planning Policy 13 – Car Parking (LPP13) outlines the requirements for car parking throughout the Shire. As the proposed BESS falls under a Use Not Listed, Clause 5.1(b) of LPP 13 applies, which states:

> *Where an application is made for planning consent and the purpose for which the land or building is to be used is not specified in Table 1, the Local Government shall determine the number of car parking bays to be provided, based on the number of employees and likely visitors to the site.*

Once the Proposal is constructed, only incidental car parking will be required for maintenance vehicles which will be accommodated within the existing on-site parking areas.

5.2.3.2 Local Planning Policy 14 – Setbacks

Local Planning Policy 14 – Setbacks (LPP14) outlines the setback requirements for proposed development throughout the Shire. The following minimum setbacks apply to the Proposal.

Table 12: Setback Requirements

Requirement	Response
100m setback to Brand Highway	400m setback
30m setback to other roads, side and rear lot boundaries	440m setback
30m from an existing water body or highest know flood level.	110m to the nearest water body (Chandala Brook) and there are no mapped flood risk areas within 30m of the Proposal.

6.0 Conclusion

The Proposal represents appropriate and strategically located energy infrastructure on the existing Tronox CPP site. The Proposal is consistent with the objectives of the local and State planning framework, being located within an existing partially environmentally disturbed setting, already developed and intended for industrial development use. The Proposal will support the reliability, resilience and ongoing transition of Western Australia's SWIS electricity network. Technical assessments demonstrate that environmental, acoustic, bushfire and traffic impacts are either negligible or capable of being appropriately managed. Accordingly, the Proposal satisfies the relevant planning requirements and it is respectfully requested that the Development Assessment Panel, approve the Proposal, subject to reasonable and standard conditions.

Sincerely,

SLR Consulting Australia Pty Ltd

Christian Parker
Associate Consultant - Planning

Appendix A Certificate of Title

Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

SLR Project No.: 675.073695.00005

11 August 2026

Appendix B Development Plans

Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

SLR Project No.: 675.073695.00005

11 August 2026

Appendix C Environmental Assessment Report

Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

SLR Project No.: 675.073695.00005

11 August 2026

Appendix D Noise Impact Assessment

Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

SLR Project No.: 675.073695.00005

11 August 2026

Appendix E Transport Impact Statement

Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

SLR Project No.: 675.073695.00005

11 August 2026

Appendix F Bushfire Management Plan

Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

SLR Project No.: 675.073695.00005

11 August 2026

Appendix G DPLH Aboriginal Cultural Heritage Advice Letter

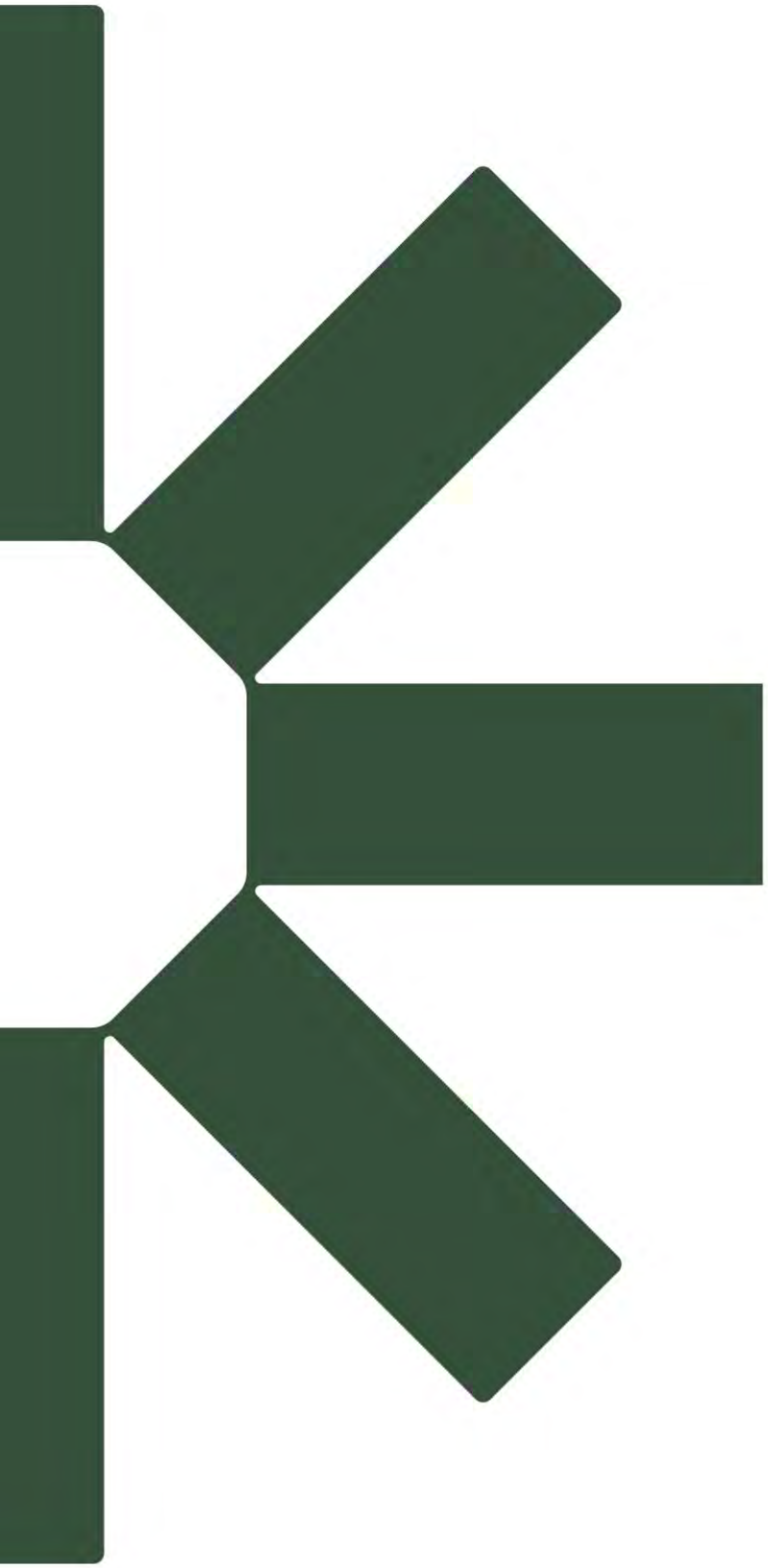
Battery Energy Storage System Development Application

Lot 1261 (No.722) Old Gingin Road, Muchea

DC Project SPV1 PTY Ltd as Trustee for DC Project Trust 1

SLR Project No.: 675.073695.00005

11 August 2026



Making Sustainability Happen

WESTERN AUSTRALIA

TITLE NUMBER	
Volume	Folio
1845	**479**

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 M 1261 ON DIAGRAM 5326

REGISTERED PROPRIETOR:
(FIRST SCHEDULE)

TRONOX MANAGEMENT PTY LTD OF LOT 22 MASON ROAD KWINANA BEACH WA
(T N490108) REGISTERED 22/11/2016

LIMITATIONS, INTERESTS, ENCUMBRANCES AND NOTIFICATIONS:
(SECOND SCHEDULE)

1. EXCEPT AND RESERVING METALS, MINERALS, GEMS AND MINERAL OIL SPECIFIED IN TRANSFER 15182/1947.
2. E182366 EASEMENT BENEFIT SEE SKETCH ON VOL 1845 FOL 479. REGISTERED 1/9/1989.
3. E557534 EASEMENT TO THE STATE ENERGY COMMISSION OF WESTERN AUSTRALIA. SEE SKETCH ON VOL 1845 FOL 479. REGISTERED 1/3/1991.
4. F290681 EASEMENT TO THE WESTERN AUSTRALIAN GOVERNMENT RAILWAYS COMMISSION. SEE INSTRUMENT F290681. REGISTERED 27/8/1993.
5. L090474 MEMORIAL. CONTAMINATED SITES ACT 2003 (CONTAMINATED SITE - REMEDIATION REQUIRED) REGISTERED 1/10/2009.

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:	1845-479 (M 1261/D5326)
PREVIOUS TITLE:	1104-953
PROPERTY STREET ADDRESS:	722 OLD GINGIN RD, MUCHEA.
LOCAL GOVERNMENT AUTHORITY:	SHIRE OF CHITTERING

LANDGATE COPY OF ORIGINAL NOT TO SCALE 06/07/2026 09:26 AM Request number: 70072274

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1845 479

Application E211638
Volume 1104 Folio 953

WESTERN AUSTRALIA

CERTIFICATE OF TITLE

UNDER THE "TRANSFER OF LAND ACT, 1893" AS AMENDED

VOL. 1845 FOL. 479

Page 1 (of 2 pages)

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.

Dated 13th October, 1989

REGISTRAR OF TITLES

ESTATE AND LAND REFERRED TO

Estate in fee simple in portion of Swan Location 1352 and being Lot M1261 the subject of Diagram 5326, delineated on the map in the Third Schedule hereto, except and reserving metals, minerals, gems and mineral oil specified in Transfer 15182/1947, together with a right of carriageway and certain water rights over the portion of Swan Location 2766 marked 'A' on the said map hereon all as set out in Transfer E182366.

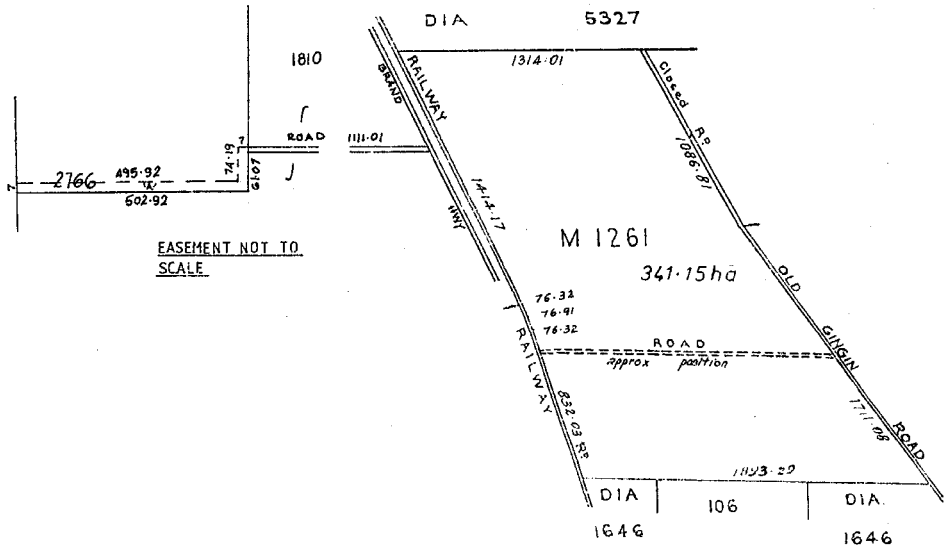
FIRST SCHEDULE (continued overleaf)

Yalgoo Minerals Pty. Ltd. of 1050 Hay Street, West Perth and KMCC Western Australia Pty. Ltd. of care of Robox Nominees Pty. Ltd. Level 23, AMP Tower, 140 Saint George's Terrace, Perth, as tenants in common in equal shares.

SECOND SCHEDULE (continued overleaf)

1. ~~CAVEAT E84754. Lodged 24.4.89 at 14.26 hrs.~~
Withdrawn E557533 1.3.91

THIRD SCHEDULE



SCALE 1. 30000

MT RK.

NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS.

E67590/3/89-20M-L/4664

PERSONS ARE CAUTIONED AGAINST ALTERING OR ADDING TO THIS CERTIFICATE OR ANY NOTIFICATION HEREON

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Superseded - Copy for Sketch Only

LT. 37

FIRST SCHEDULE (continued) NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS

REGISTERED PROPRIETOR	INSTRUMENT NATURE	INSTRUMENT NUMBER	REGISTERED	TIME	SEAL	CERT. OFFICER
The correct address of the first proprietor is 10 Stirling Highway, Nedlands.	Application	E739235	5.11.91	14.56		
The correct address of the second proprietor is Ground Floor, 1 Havelock Street, West Perth.	Application	E739236	5.11.91	14.56		
The address of the first registered proprietor is now Level 5, 441 St Kilda Road, Melbourne, Victoria and the address of the second registered proprietor is 1 Brodie Hall Drive, Bentley.	Notification	G266441	27.8.96	14.41	Office of Titles Western Australia	

SECOND SCHEDULE (continued) NOTE: ENTRIES MAY BE AFFECTED BY SUBSEQUENT ENDORSEMENTS

INSTRUMENT NATURE	INSTRUMENT NUMBER	PARTICULARS	REGISTERED	TIME	SEAL	CERT. OFFICER	CANCELLATION	NUMBER	REGISTERED OR LODGED	SEAL	CERT. OFFICER
Transfer	E557534	The right to enter in and upon the portion of the within land marked "A" on the map in the margin for the purpose of erecting and maintaining towers, poles, wires and other necessary apparatus, together also with certain other rights, conditions and restrictions as to buildings as set out in the said Transfer is granted to The State Energy Commission of Western Australia.	1.3.91	10.23							
Caveat	E557535	Lodged 1.3.91 at 10.24 hrs.					Withdrawn	G228839	15.7.96		
Withdrawal	F72559	As to the interest of KMCC Western Australia Pty Ltd only of Caveat E557535 Lodged 22.12.92 at 15.03 hrs.									
Transfer	F290681	A right of carriageway over the portion of the within land coloured pink on the map in Transfer F290681 together with certain rights of support over the said land all as set out in the said Transfer is granted to The Western Australian Government Railways Commission.	27.8.93	11.14							

CERTIFICATE OF TITLE VOL. 1845 FOL. ~~480~~ 479

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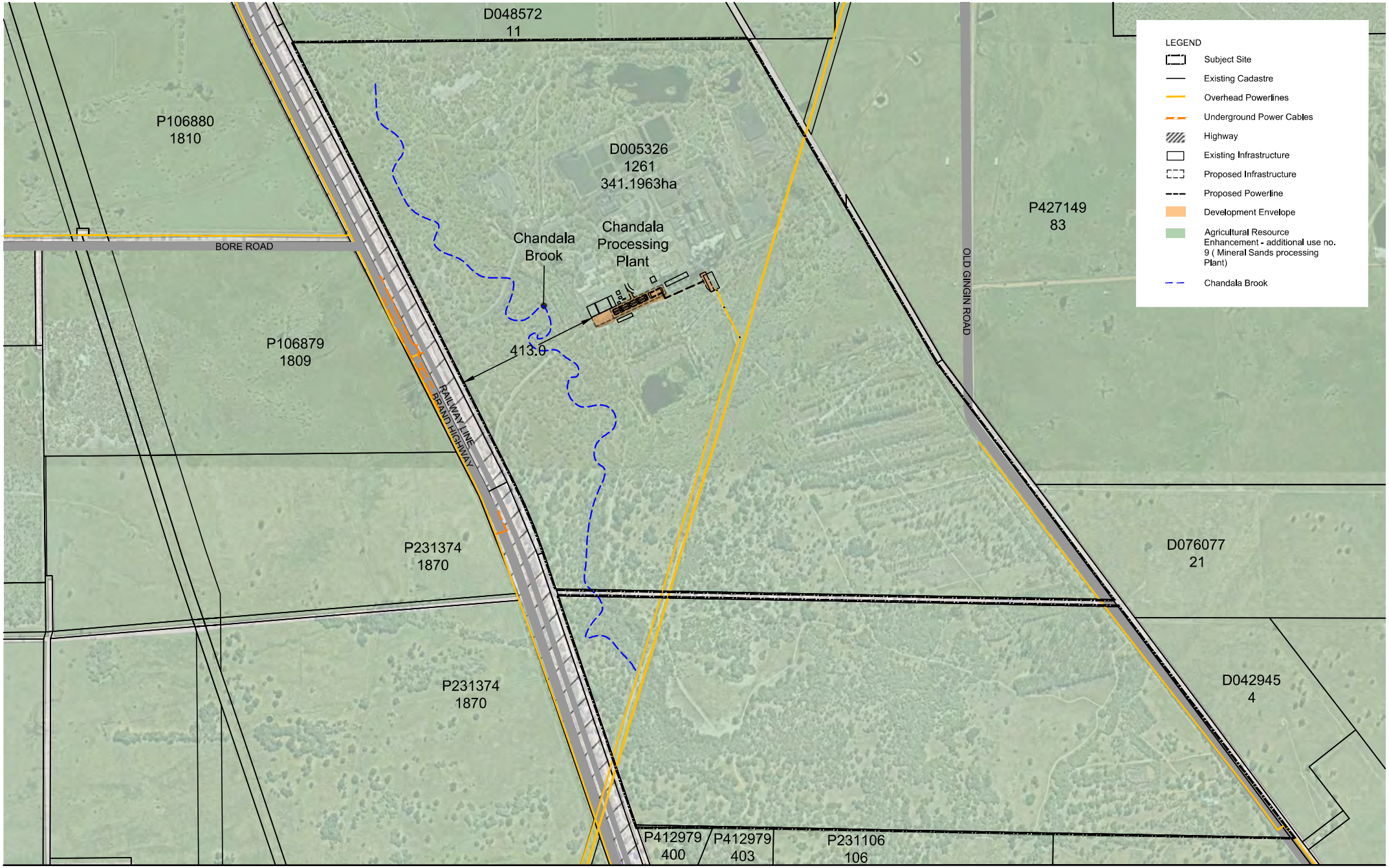

Site 4 - Local Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

Date: 29 Jul 2026 Scale: 1:10000 @ A3 1:5000 @ A1 File: **675.07369 CP01A** Staff: JK GW Checked: CW

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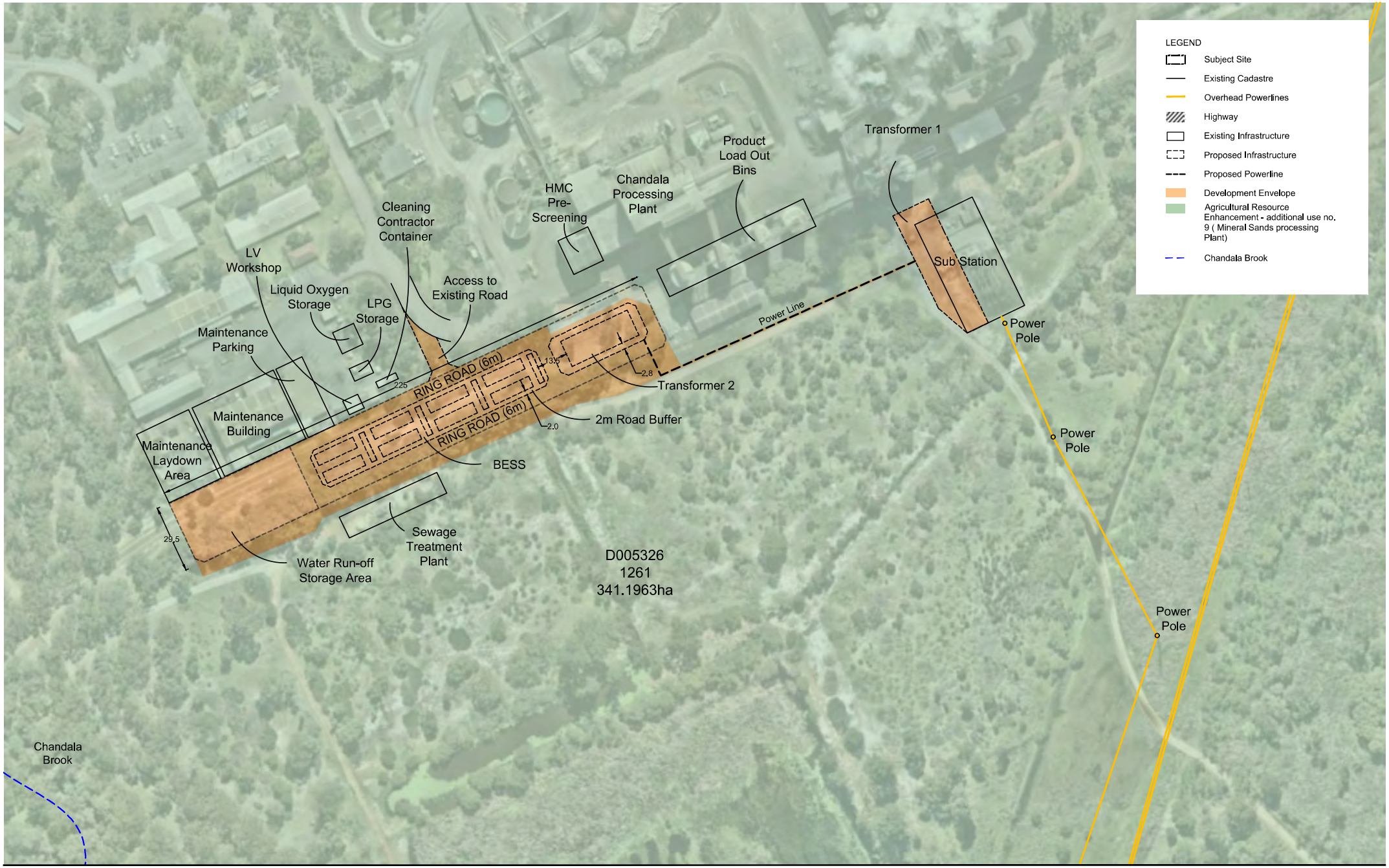

Site 4 - Site Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

Date: 29 Jul 2026 Scale: 1:1500 @ A3 1:750 @ A1 File: 675.07369 CP01A Staff: JK GW Checked: CW

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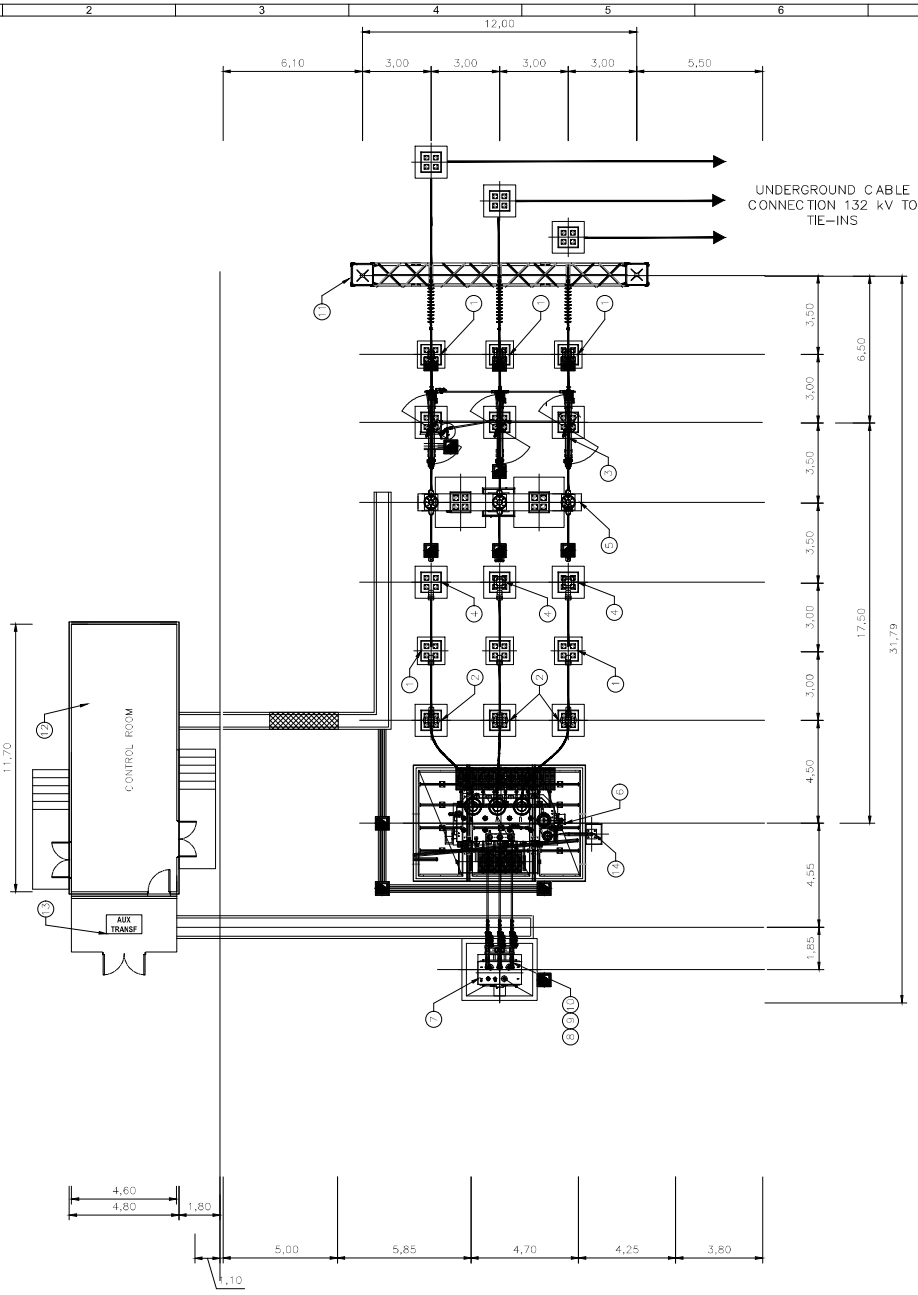


SWITCHGEAR LIST		
POS.	UNIT	NAME
1	6	132 kV SURGE ARRESTERS
2	3	132 kV VOLTAGE TRANSFORMERS
3	1	132 kV THREE-POLE DISCONNECTOR WITH EARTHING SWITCH
4	3	132 kV CURRENT TRANSFORMER
5	1	132 kV CIRCUIT BREAKER
6	1	132/22 kV POWER TRANSFORMER
7	1	22 kV GROUNDING REACTOR
8	1	22 kV CABLE CONNECTION
9	3	22 kV SURGE ARRESTERS
10	1	22 kV DISCONNECTOR
11	1	132 kV GANTRY
12	1	CONTROL BUILDING
13	1	AUXILIARY SERVICES TRANSFORMER 300 kVA (DRY-TYPE)
14	1	NEUTRAL GROUNDING STRUCTURE (HV)

REV	DESCRIPTION	DRAWN	CHECK	REVIEW
A	CONCEPT DESIGN	N.F.	A.V.	A.V.

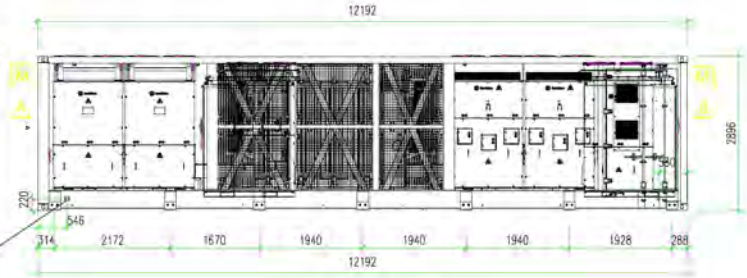
acciona

TRONOX

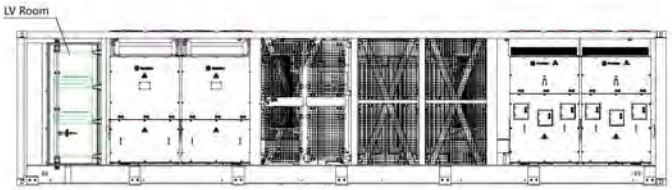
CLIENT: TRONOX
PROJECT: CHANDALA BESS
TITLE: SUBSTATION GENERAL ARRANGEMENT
DRAWING NO.: xxxx-xxxx-xxxx-xxxx-xxxx
REV: A

密级 Level	秘密 Confidential

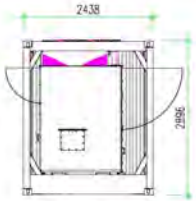
[redacted]



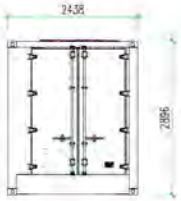
Front View



Back View



Side View A
Left View



Side View B
Right View

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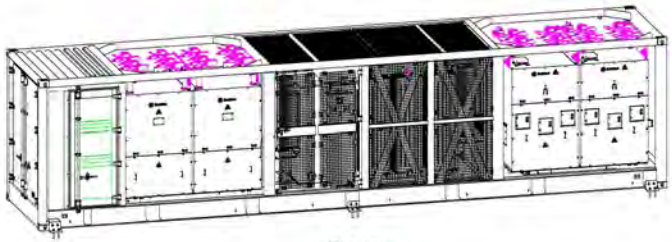

3D View

[redacted]

[redacted]

远景能源有限公司
Envision Energy LTD.

[redacted]

Appearance Design of PCS&Transformer

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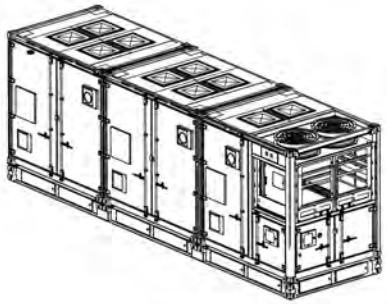
密级 Level	内部公开 Internal



Overall Appearance

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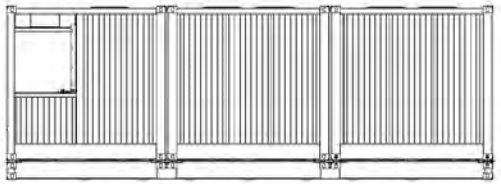
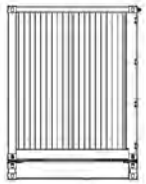
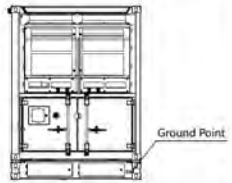


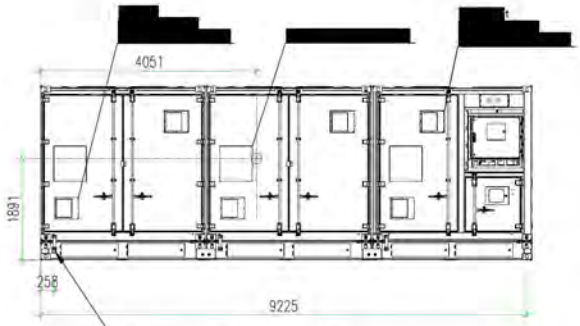
Back View



Left View

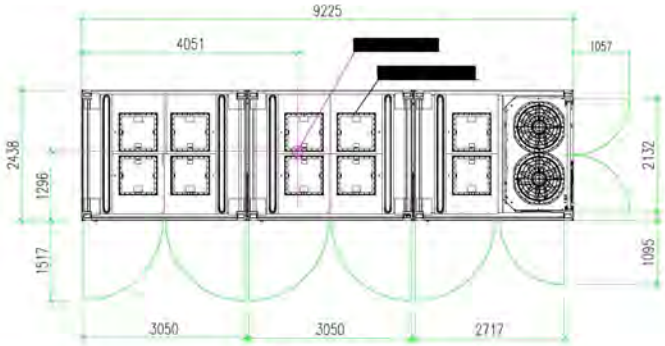


Right View



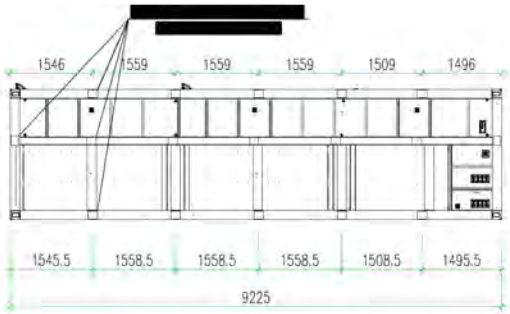
Battery Container

Front View



Top View

Note: All doors can be opened to 180°.



Bottom View

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Notes:

1. All the dimensions not specified in this drawing are in millimeters (mm).

[redacted]

Dimensions of battery container：9225mm×2438mm×3258mm.

[redacted]

[redacted]

远景能源有限公司
Envision Energy LTD.

[redacted]

Appearance Design of Battery Container

[redacted]

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Environmental Assessment Report

Chandala Battery Energy Storage System

Accenture Australia Pty Ltd

Exchange Tower, 2 The Esplanade Perth, WA

Prepared by:

SLR Consulting Australia Pty Ltd

SLR Project No.: 675.073695.00001

30 July 2026

Revision: 2.0

Making Sustainability Happen

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	24 July 2026	O. Harold/ N. Calder	K. Fox	W. Kok
2.0	30 July 2026	O. Harold	N. Calder	W Kok

Basis of Report

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Accenture Australia Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid. SLR may have used artificial intelligence (AI) in the preparation of this document. Should SLR use AI, any information and analysis resulting therefrom will be reviewed for accuracy.

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SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

Executive Summary

SLR Consulting Australia Pty Ltd (SLR) was commissioned by Accenture Australia Pty Ltd to prepare the Environmental Assessment Report (EAR) to support proposed development of a Battery Energy Storage System (BESS) and associated infrastructure at the Tronox Management Pty Ltd (Tronox) Chandala Processing Plant (CPP), located at Lot 1261 Old Gingin Road, Muchea, Western Australia (the Project). The Project is proposed within an approximately 2.84 hectare (ha) development area (the Project Area) located entirely within the CPP and will be developed by an independent legal entity separate from the owner and operator of the CPP.

This EAR has been prepared to support an application for development approval and provides an overview of the environmental features of the Project Area and outlines the proposed measures to avoid, mitigate or manage potential environmental impacts associated with the construction and operation of the BESS.

The Project Area has been selected within an existing disturbed industrial area of the CPP to avoid and minimise impacts to environmental values wherever practicable. The assessment identified that the Project does not present a significant risk to environmental features within or surrounding the Project Area.

Potential environmental impacts are limited primarily to temporary construction activities, limited clearing of native vegetation that may be required to establish bushfire management zones and unlikely emergency events associated with battery storage infrastructure. These risks can be managed through construction and operational environmental management measures, including the development and implementation of a Construction Environmental Management Plan (CEMP) and an Environmental Management System (EMS) during operation.

The environmental approvals review identified that the Project may require a native vegetation clearing permit (NVCP) under Part V of the *Environmental Protection Act 1986* (EP Act). However, the Project does not require:

- Referral under Part IV of the EP Act.
- A works approval or licence under Part V of the EP Act.
- Referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

No other significant State or Commonwealth environmental approval requirements were identified.

Based on the findings of this assessment, the Project is considered environmentally acceptable and can be developed and operated within the existing industrial setting of the CPP with minimal environmental risk.

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Appendix A Chandala – Protected Matters Report

Appendix B Chandala Processing Plant Black Cockatoo and other MNES Assessment 2024

Appendix C Chandala Expansion Areas Flora and Vegetation Assessment

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Appendix E Bushfire Management Plan (Renewables) Tronox (Chandala) BESS Facility

Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AI	Artificial Intelligence
APZ	Asset Protection Zone
ASS	Acid sulfate soils
BC Act	*Biodiversity Conservation Act 2016*
BESS	Battery Energy Storage System
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
CLM Act	*Conservation and Land Management Act 1984*
CPP	Chandala Processing Plant
DA	Development Application
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DFES	Department of Fire and Emergency Services
DoA	Department of Agriculture
DPIRD	Department of Primary Industries and Regional Development
DWER	Department of Water and Environmental Regulation
EAR	Environmental Assessment Report
EMS	Environmental Management System
EP Act	*Environmental Protection Act 1986*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
EPA	Environmental Protection Authority
ESA	Environmentally Sensitive Area
ha	hectare
IBRA	Interim Biogeographic Regionalisation of Australia
km	kilometre
MNES	Matters of National Environmental Significance
MS	Ministerial Statement
NVCP	Native Vegetation Clearing Permit
PEC	Priority Ecological Community
PDWSA	Public Drinking Water Source Area
PMST	Protected Matters Search Tool
RIWI Act	*Rights in Water and Irrigation Act 1914*
SPP	State Planning Policy
TEC	Threatened Ecological Community
WA	Western Australia
WAPC	Western Australian Planning Commission

1.0 Introduction

1.1 Background

SLR Consulting Australia Pty Ltd (SLR) was commissioned by Accenture Australia Pty Ltd to prepare an Environmental Assessment Report (EAR) to support the proposed development of a Battery Energy Storage System (BESS) and associated infrastructure (the Project). The Project is proposed at Tronox Management Pty Ltd's (Tronox) Chandala Processing Plant (CPP) within Lot 1261, Old Gingin Road, Muchea, WA.

The CPP is located approximately 5 km north of Muchea town centre and operates under Part V Prescribed Premises Licence L5939/1988/11. The Project will be developed entirely within the existing industrial footprint of the CPP but will operate as privately owned entity within the CPP.

Accenture is coordinating the initial design, project approvals, network approvals and associated studies for the Project which will connect to Western Power's South-West Interconnected System at Muchea substation.

Key Project components include:

- BESS modules comprised of BESS containers and an alternating current skid.
- Lithium-ion battery technology with liquid-cooled battery packs and gaseous fire suppression system.
- Up to two transformers.
- Service trenching, overhead powerlines, civil pads, internal roads and a surface water storage area (for fire water runoff in the event of emergency event).
- A total development area of approximately 2.84 hectares (ha) (the Project Area), comprising:
    - 0.93 ha for the proposed BESS, internal roads, service connections and transformers (the Proposed Infrastructure).
    - 1.91 ha of bushfire protection zones.

The Project is pending detailed design. A concept plan for the Project is provided in Figure 2.

The Project Area is located within an existing industrial facility comprising a mixture of previously disturbed industrial land, existing infrastructure corridors and partially vegetated areas (refer to Figure 1). The site contains an existing railway alignment and is situated within a highly modified industrial setting associated with the long-term operation of the CPP.

This EAR has been prepared to support an application for development approval under the Shire of Chittering Local Planning Scheme No. 6.

1.2 Environmental Assessment Objectives

This EAR provides an overview of the general environmental features of the Project Area, identifies the key environmental issues and potential impacts associated with the intended development of the site and proposes measures to avoid and / or mitigate these impacts, including confirmation of environmental approval requirements.

1.3 Scope of Works

The EAR scope includes a desktop review of existing environmental features for the Project Area including government databases, search tools and technical reports available for the CPP. The desktop environmental review also includes the following:

- NatureMap database search and review of purchased Department of Biodiversity Conservation and Attractions (DBCA) flora, fauna, and community datasets.
- Searches of the Federal Department of Climate Change, Energy, the Environment and Water (DCCEEW) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST) (Appendix A).
- Review of applicable environmental legislation, policies and guidelines and their relevance to the Project Area.
- Topography, soil, potential acid sulfate soils (ASS) and contaminated sites.
- Groundwater levels, groundwater protection areas, surface water, and geomorphic wetlands.
- Reserves and conservation areas and Environmentally Sensitive Areas (ESAs).
- Bushfire prone areas / risk mapping.
- Review of supporting technical reports, including reference to the following:
    - Chandala Processing Plant Black Cockatoo and other MNES Assessment 2024 (Appendix B).
    - Chandala Expansion Areas Flora and Vegetation Assessment (Appendix C).
    - Chandala Processing Plant 2024 – Phytophthora Dieback occurrence assessment (Appendix D).
    - Bushfire Management Plan (Renewables) Tronox (Chandala) BESS Facility (Appendix E).
    - Chandala Processing Plant – Annual Groundwater Quality Monitoring Report 2025 (HGEO, 2026)
    - DWER 20250429 Operating Licence L5939 (DWER, 2025)

The recommendations responding to the environmental features and associated management and mitigation measures, have been included within the EAR.

An assessment of noise and heritage has been undertaken as a part of the development application and therefore is excluded from the scope of the EAR.

2.0 Key Environmental Legislation

2.1 Commonwealth Legislation

2.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act is the federal governing environmental legislation, administered by DCCEEW. The EPBC Act protects Matters of National Environmental Significance (MNES) at a national level. Environmental assessments under the EPBC Act are undertaken to enable environment and heritage protection and biodiversity conservation. An action should not be undertaken that has, will have or is likely to have a significant impact on any MNES, or other

protected matters without a pre-action referral to the Australian Government's Minister for the Environment.

A search using the PMST was conducted in June 2026 (refer to Appendix A). The search identified:

- 14 threatened fauna species (including Black Cockatoo species) or their potential habitat, that may occur, are likely to occur, or are known to occur within a 10 kilometre (km) radius of the Project Area.
- 27 threatened flora species, or their potential habitat, that may occur, are likely to occur, or are known to occur within a 10 km radius of the Project Area.
- Eight migratory species, or their potential habitat, that may occur, are likely to occur, or are known to occur within a 10 km radius of the Project Area.

Based on a review of the findings of ecological field surveys undertaken for the Tronox CPP and provided the avoidance, mitigation and management measures identified in this EAR are implemented, potential impacts to MNES are unlikely to be significant.

A documented EPBC Act self-assessment is considered sufficient to demonstrate that the Project is unlikely to have a significant impact on MNES and does not require referral under the EPBC Act.

2.2 State Legislation

2.2.1 Environmental Protection Act 1986

The *Environmental Protection Act 1986* (EP Act) is the key legislative tool for environmental protection in Western Australia. The EP Act is administered by the Department of Water and Environmental Regulation (DWER), with the Environmental Protection Authority (EPA) operating as an independent statutory authority as established under the EP Act.

Part IV of the EP Act sets out the requirements for environmental impact assessment. The environmental impact assessment process provides an orderly and systematic evaluation of a proposal and its potential impact on the environment. A critical component of the assessment is the consideration of ways in which the proposal, if implemented, could avoid, or reduce any potential impact on the environment.

A proposal is referred to the EPA under Part IV of the EP Act if the proposal is likely, if implemented, to have a significant effect on the environment. The EPA will then decide whether to assess the proposal and, if so, set a level of assessment.

The EPA environmental factors and objectives that may be relevant to the Project are outlined in Table 2-1. Based on environmental features of the receiving environment and relevant technical studies reviewed as a part of this EAR, it is expected that the Project can be managed to meet the EPA objectives for each of the above Environmental Factors through implementation of the mitigation hierarchy, in particular avoidance of impacts through Project siting and design. The Project will not be referred under Part IV of the EP Act.

Table 2-1: EPA Environmental Factors and Objectives

Theme	Factor	Objectives
Land	Flora and Vegetation	To protect flora and vegetation so that biological diversity and ecological integrity are maintained.
	Terrestrial Fauna	To protect terrestrial fauna so that biological diversity and ecological integrity are maintained.
	Terrestrial Environmental Quality	To maintain the quality of land and soils so that environmental values are protected.
Water	Inland Waters	To maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
People	Social Surroundings	To protect social surroundings from significant harm.

Part V of the EP Act sets out the requirements for prevention, control and abatement of pollution or environmental harm as well as regulating clearing of native vegetation. Under Part V of the EP Act, a native vegetation clearing permit (NVCP) is required prior to clearing native vegetation unless an exemption applies. The Environmental Protection (Clearing of Native Vegetation) Regulations 2004 prescribe a range of clearing activities that are exempt from the requirement to obtain a permit, provided the clearing is undertaken outside an ESA declared under section 51B of the EP Act.

The Proposed Infrastructure has been sited to avoid disturbance to remnant native vegetation. Notwithstanding this, as the Proposed Infrastructure is located within a bushfire prone area, an application for a native vegetation clearing permit (NVCP) to establish bushfire protection zones was lodged with DWER on 27 July 2026.

2.2.2 Other Legislation

Table 2-2 provides a summary of the other State legislation and regulations relevant to the Project.

Table 2-2: State Legislation Relevant to the Project

Key Legislation	Responsible Government Agency	Aspect
Biodiversity Conservation Act 2016 (BC Act)	Department of Biodiversity Conservation and Attractions (DBCA)	The BC Act provides for listing of and protection of native species, threatened species, ecological communities, fauna, critical habitat, as well as listing of threatening processes. If Project activities will result in the taking or disturbance of threatened species or the modification of a Threatened Ecological Community, a Ministerial Authorisation via section 40 or section 45 of the BC Act, respectively, will be obtained prior to construction. No significant species or Threatened Ecological Communities, listed under the BC Act, were recorded within the Project Area.

Key Legislation	Responsible Government Agency	Aspect
Biosecurity and Agriculture Management Act 2007	Department of Primary Industries and Regional Development (DPIRD)	The *Biosecurity and Agriculture Management Act 2007* provides for the management of declared pests, weeds and diseases and seeks to minimise the risk of their introduction and spread. Construction activities have the potential to spread weeds, pests, or diseases to nearby areas of native vegetation. This will be managed through the Project's construction environmental management plan (CEMP) that will be developed prior to commencement of the construction phase.
Bush Fires Act 1954	Department of Fire and Emergency Services (DFES)	The *Bush Fires Act 1954* establishes requirements for bushfire prevention and management and supports planning frameworks relating to development in bushfire-prone areas. It includes provisions for diminishing the dangers resulting from bush fires. The Project Area is located within a designated bushfire prone area. Although the proposed Project does not trigger assessment under *State Planning Policy 3.7 Bushfire* or the associated *Planning for Bushfire Guidelines*, a precautionary approach has been adopted, and a Bushfire Management Plan (Appendix E) has been developed for the Project to identify strategies to reduce the level of bushfire risk exposure.
Conservation and Land Management Act 1984 (CLM Act)	DBCA Department of Agriculture (DoA)	The CLM Act provides for the management and protection of State forests, national parks, conservation parks, nature reserves and other conservation lands including the licensing and permitting of activities taking place in reserves and conservation areas. The closest conservation area is Chandala Nature Reserve which is located approximately 3 km north of the Project Area. Impacts on flora, fauna and fauna habitat in these surrounding conservation areas are unlikely due to the separation distance.
Contaminated Sites Act 2003	Department of Water and Environmental Regulation (DWER)	The *Contaminated Sites Act 2003* establishes a framework for identifying, reporting, investigating and managing contaminated sites to protect human health and the environment. The Act provides for the management of contaminated soils and water.

Key Legislation	Responsible Government Agency	Aspect
		The Project Area is located within a Registered Contaminated Site and classified as “Contaminated – remediation required”. The proposed activity is a commercial/industrial use and therefore is consistent with the current land use. Appropriate contamination management procedures will be considered and implemented to manage contamination risk during construction and the risk of contamination from operation of the Project.
Environmental Protection (Clearing of Native Vegetation) Regulations 2004	DWER	The Environmental Protection (Clearing of Native Vegetation) Regulations 2004 prescribe clearing activities that may be undertaken without a NVCP, provided the activities occur outside an ESA declared under section 51B of the EP Act. Clearing of native vegetation will be required to implement bushfire management measures. An application for a native vegetation clearing permit (NVCP) to establish bushfire protection zones was lodged with DWER on 27 July 2026.
Planning and Development Act 2005	Western Australian Planning Commission / Local Government	The *Planning and Development Act 2005* establishes the statutory framework for land-use planning and development assessment in Western Australia. The Act provides for the assessment and determination of development proposals through local and State planning processes. The Project requires planning approval. Planning requirements will be considered in conjunction with the Shire of Chittering, the Western Australian Planning Commission and other relevant decision-making authorities. Project design has considered the surrounding land uses and planning context to minimise potential impacts on environmental and community values.
Rights in Water and Irrigation Act 1914 (RIWI Act)	DWER	The RIWI Act regulates the abstraction, use, service and health of water and watercourses (including beds and banks). Water licensing is required in all proclaimed areas and for all artesian groundwater wells throughout the state. Construction water requirements may trigger RIWI Act approvals where groundwater abstraction, new bores or

Key Legislation	Responsible Government Agency	Aspect
		modifications to existing bores are required. Depending on the source of supply licences under Section 5C and/or 26D may be required to be obtained prior to commencement of the relevant water supply activity. No natural watercourses that may require licensing are known to occur within the Project Area. However, a site stormwater open drain is within the Project Area and flows to an open, unsealed pond. Impacts on this feature will be managed through detailed design and the Project's CEMP during construction and under the EMS during operation.

2.3 Relevant Standards, Guidelines, and Policies

Clearing and development is subject to compliance with applicable standards, guidelines and policies developed by the State's regulators to assist proponents in understanding the minimum requirements for environmental protection. Table 2-3 details the key standards, guidelines, and policies relevant to clearing and development of the Project Area.

Table 2-3: Relevant Standards, Guidelines, and Policies

Document	Description
EPA Policies and Guidance	
Statement of Environmental Principles, Factors and Objectives (EPA, 2023)	States the objective and principles of the EP Act and provides the environmental factors and objectives the EPA uses for systematic environmental impact assessment.
Environmental Factor Guideline – Flora and Vegetation (EPA, 2016)	Provides guidance with the objective to protect flora and vegetation so that biological diversity and ecological integrity are maintained.
Environmental Factor Guideline – Inland Waters (EPA, 2018)	Provides guidance with the objective to maintain the hydrological regimes of groundwater and surface water so that environmental values are protected.
Environmental Factor Guideline – Social Surroundings (EPA, 2023)	Provides guidance with the objective to protect social surroundings from significant harm.
Environmental Factor Guideline – Terrestrial Environmental Quality (EPA, 2016)	Provides guidance with the objective to maintain the quality of land and soils so that environmental values are protected.
Environmental Factor Guideline – Terrestrial Fauna (EPA, 2016)	Provides guidance with the objective to protect terrestrial fauna so that biological diversity and ecological integrity at maintained.
Technical Guidance – Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016)	Provides technical guidance to ensure adequate flora and vegetation data of an appropriate standard are obtained for use in environmental impact assessment.

Document	Description
Technical Guidance – Terrestrial Fauna Surveys (EPA, 2020)	Provides technical guidance to ensure adequate terrestrial fauna data of an appropriate standard are obtained for use in environmental impact assessment.
Guidance Statement No. 33: Environmental Guidance for Planning and Development (EPA, 2008)	Provides information and advice to assist land use planning and development processes to protect, conserve and enhance the environment.
DWER Guidelines and Operational Policies	
Assessment and Management of Contaminated Sites Guideline (DWER, 2021)	Provides guidance on the assessment and management of contaminated sites in Western Australia within legislative framework of the *Contaminated Sites Act 2003* and the *Contaminated Sites Regulations 2006*.
Green Energy Proponent Guideline (DWER, 2024)	This guideline has been prepared to assist proponents in undertaking assessments under Part IV of the EP Act and to identify key issues considered by the EPA when assessing green energy projects.
Western Australian Planning Commission (WAPC) Guidelines, Position Statements and State Planning Policies	
Position Statement: Renewable Energy Facilities (WAPC, 2020)	The policy identifies assessment measures to facilitate appropriate development of renewable energy facilities. It seeks to ensure these facilities are in areas that minimise potential impact upon the environment, natural landscape and urban areas while maximising energy production returns and operational efficiency.

3.0 Environmental Approvals Context

The CPP is located on freehold land owned by Tronox Management Pty Ltd and is also situated within General Purpose Lease G70/275. The proposed BESS will be located entirely within the existing industrial footprint of the CPP and does not involve mineral extraction or mineral processing activities. The Project does not increase the approved mining disturbance footprint and no environmental constraints associated with the existing land tenure have been identified that would prevent implementation of the Project. Any tenure, land access or operational requirements associated with occupation of the land will be addressed separately as required.

The existing CPP operation, for which the proposed Project overlaps, is authorised under Part IV of the EP Act (Ministerial Statement (MS) 50 (as amended by MS 67) and MS 958).

The conditions of MS 958 replaced the conditions of MS 412, which replaced the conditions of MS 59.

MS 50 (as amended) authorises the dry processing of mineral sands and MS 958 authorises the processing of ilmenite to synthetic rutile. The statements focus on:

- Environmental monitoring and management.
- Construction plans.
- Commitments made with regard to the dry process plant.

- Compliance reporting.
- Dieback management.
- Decommissioning and rehabilitation.

None of the MSs contemplate or approve electrical generation assets, BESS, or grid-scale energy infrastructure.

The proposed BESS will be owned and operated by a third party and therefore falls outside the scope of MS 50 and MS 958. Notwithstanding this, the relationship between the proposed BESS and the existing approved CPP operations has been considered. There is no inconsistency with, or constraint arising from, the conditions of MS 50 or MS 958 that would prevent or restrict the Project.

MS 958 conditions the implementation of a dieback management plan. A CEMP will be developed that incorporates any relevant requirements under the Tronox Dieback Management Plan (Tronox, 2025).

The CPP is operated by Tronox under licence L5939/1988/11 issued pursuant to Part V of the EP Act to conduct mineral sands mining or processing. The licence regulates emissions to air, discharges to land and water, waste management practices, and monitoring and reporting obligations.

The Project is not a prescribed activity for the purpose of Part V of the EP Act. Therefore, a Part V works approval, and licence is not required for the Project.

Tronox has an established EMS to implement conditions of their various approvals, which includes a range of management plans, monitoring and reporting requirements.

Although the proposed Project will be applying for its own approvals and develop independent management plans, the existing management plans and frameworks will be considered to ensure construction and operation of the proposed Project is cognisant of existing approval requirements.

4.0 Environmental Features and Management

4.1 Land Uses

4.1.1 Receiving Environment

The Project is located within the Shire of Chittering and is approximately 5 km north of the Muchea town centre. The Project is accessed via Old Gingin Road. Surrounding land uses are predominantly agricultural.

The Project Area is situated within the Tronox CPP. The CPP is a mineral sands processing facility that produces ilmenite, zircon, rutile, leucoxene and synthetic rutile. The closest residential sensitive receptor is located approximately 1.3 km northwest of the proposed BESS site.

4.1.2 Management

No specific land use management measures are required, as the Project is consistent with the existing industrial area and CPP uses.

4.2 Reserves and Conservation Areas

4.2.1 Receiving Environment

4.2.1.1 Conservation Areas

Conservation areas consist of areas protected for the purpose of conservation, including but not limited to national parks, nature reserves, conservation parks, and regional parks.

No conservation areas intersect with the Project Area (DBCA, 2017). The nearest Conservation Area is located approximately 3 km north of the Project and is identified as Chandala Nature Reserve (DBCA, 2017).

4.2.1.2 Environmentally Sensitive Areas

Environmentally sensitive areas (ESAs) are declared by the DWER to prevent the degradation of important environmental values such as threatened flora, threatened ecological communities (TECs), or significant wetlands.

No ESAs were identified within the Project Area (DWER, 2018). The nearest ESA is located approximately 0.65 km southwest of the Project Area and is classified under the wetland management category of ‘Conservation’ (Figure 3).

4.2.2 Management

A CEMP will be prepared and implemented to manage potential for offsite impacts, including to the ESA, associated with the Project. Measures will include:

- Stormwater, erosion and sediment controls.
- Spill prevention and contamination management measures.
- Management of excavations and any groundwater encountered during construction.
- Protection of existing groundwater monitoring infrastructure.
- Rehabilitating disturbed areas where practicable following construction.

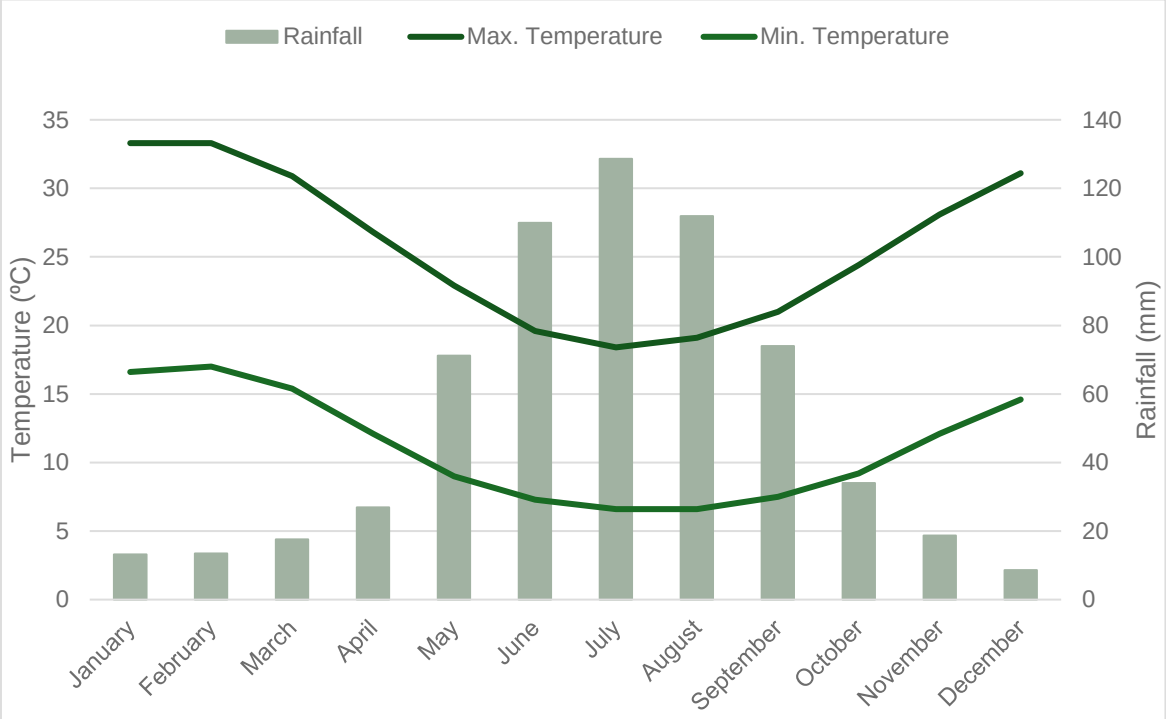
The detailed design of the Project will incorporate appropriate controls to mitigate the risk of offsite impacts associated with operation of the Project, including measures to prevent, detect and respond to battery fire events and to contain any potentially contaminated runoff or firefighting water.

4.3 Climate

4.3.1 Receiving Environment

The closest long-term Bureau of Meteorology (BoM) weather station with a complete dataset is Gingin Aero (Station 009178), located approximately 12 km northwest of the Project Area.

The long-term mean minimum temperature for Gingin Aero between 1996 and 2026 ranges from 6.6ºC (August) to 17.0ºC (February), and the mean maximum ranges from 18.4ºC (July) to 33.3ºC (February) (BoM, 2026) (Graph 4-1). Gingin Aero receives rainfall on 73.8 days annually with July being the wettest month and December the driest. The mean annual rainfall for the station is 631.8 mm (BoM, 2026).



Graph 4-1: Climate Statistics for Gingin Aero Weather Station (009178) 1996-2026 (BoM, 2026)

4.3.2 Management

There are no specific management considerations relating to climate.

4.4 Topography

4.4.1 Receiving Environment

The topography of the Project Area is relatively flat. The elevation across the Project Area is 58 m to 62 m, relative to Australian Height Datum. Areas surrounding the site are prone to waterlogging and localised flooding.

4.4.2 Management

In order to reduce the risk of potential impacts to topography, drainage and overland flow, the following will be included in the detailed design:

- Appropriate drainage design to maintain the existing drainage regime where practicable and minimise disruption to natural overland flow paths.
- Stormwater drainage infrastructure, including table drains, diversion drains and culverts, designed to manage and convey runoff in a controlled manner.
- Energy dissipation and flow distribution measures at drainage discharge locations to minimise erosion and maintain stable flow conditions.
- Surface water controls to minimise erosion, sediment transport, localised flooding and waterlogging.
- Site and infrastructure design that avoids the concentration of runoff and maintains existing drainage patterns where practicable.

- Ongoing inspection and maintenance programs for drainage infrastructure and associated erosion control measures throughout the operational phase.

This will help ensure that potential impacts to topography, drainage and overland flow are avoided or minimised during both construction and operation of the Project, while maintaining the overall drainage function of the site and minimising erosion and sedimentation risks.

4.5 Regional Geology and Soils

4.5.1 Receiving Environment

4.5.1.1 Soil Landscapes and Land Systems

Soil landscapes and land system mapping of Western Australia describes broad soil and landscape characteristics from regional to local scales, ranging from 1:20,000 to 1:250,000

The Project Area intersects one land system:

- Yanga System: Poorly drained plain with pale sands and deep sandy duplex, wet, semi-wet and saline wet soils. Banksia-pricklybark-marri-swamp sheoak-paperbark woodlands (DPIRD, 2018).

The Yanga System consists of poorly drained plains and ‘wet soils,’ where the water table is frequently at or near the surface, particularly in winter. This causes significant waterlogging and flood risks.

4.5.1.2 Acid Sulfate Soils

A review of the DWER ASS risk mapping indicates that the Project Area is located within an area classified as having a ‘moderate to low risk of ASS.’ This is shown in Figure 4.

4.5.1.3 Contaminated Sites

A review of the DWER contaminated sites database indicated that the Project Area is located on a registered contaminated site and is classified as “Contaminated – remediation required” (DWER, 2018). Details of the registered contaminated site are summarised in Table 4-1. This is further presented in Figure 4.

Table 4-1: DWER Registered Contaminated Site

ID Number	Lot Details	Contamination	Restrictions on Use
80788	Lot 1261 On Diagram 5326	Hydrocarbons, ammonium and sulphate salts are present in soil and groundwater at various locations beneath the Site.	Due to the nature and extent of groundwater contamination beneath the Site, the abstraction of groundwater for any purpose other than remediation or analytical testing is restricted until further notice.

4.5.2 Management

A CEMP will be prepared and implemented for the Project to manage potential for erosion and contamination, particularly on soil and groundwater. Measures will include:

- Confining construction activities to designated work areas to reduce the disturbance of previously contaminated soils.

- Storing, handling and using chemicals and dangerous goods in accordance with all relevant legislation, manufacturer's instructions and the relevant Material Safety Data Sheets.
- No groundwater extraction being permitted within the Project Area during construction.
- Implementing erosion and sediment controls to stabilise exposed soils and stockpiles to reduce erosion risk.
- Reinstating and rehabilitating temporary disturbance areas following construction where practicable.
- Preventing the unnecessary movement of soils to avoid potential risk of contamination during construction
- An Unexpected Finds Procedure to be implemented if potential contamination or ASS are encountered during earthworks.

The detailed design of the Project will incorporate appropriate controls to mitigate contamination risks associated with operation of the Project, including measures to prevent, detect and respond to battery fire events and to contain any potentially contaminated runoff or firefighting water.

4.6 Hydrology and Hydrogeology

4.6.1 Receiving Environment

4.6.1.1 Groundwater

The Project is located within the Gingin Groundwater Area and the Lake Mungala, and SA3 South Groundwater Subareas (DWER, 2019). The Project Area intersects with three groundwater licences. Two of the licences are for bores located outside the contaminated site zone and one licence is for groundwater recovery bores located within the contaminated site that are used to manage the contamination plumes. Licence details are provided in Table 4-2.

Table 4-2: DWER Groundwater Licences

Licence Number	Licence Type	Issue Date	Expiry Date	Parties
59054	Groundwater Licence	18/12/2025	23/05/2028	Tronox Management Pty Ltd
60344	Groundwater Licence	24/5/2018	23/5/2028	Tronox Management Pty Ltd
171790	Groundwater Licence	29/4/2020	28/4/2030	Tronox Management Pty Ltd

Groundwater quality monitoring at the CPP has been ongoing since the 1990s. Monitoring focuses on historical groundwater impacts beneath portions of the CPP associated with legacy site operations, including localised sulfate, ammonia-nitrogen and acidic groundwater plumes within the superficial aquifer system (HGEO, 2026). Portions of these contamination plumes within the shallow aquifer extend beneath the Project Area (HGEO, 2026).

No public drinking water source areas (PDWSAs) intersect the Project Area. The nearest PDWSA is the Reserve Road (Chittering) Water Reserve Priority 1 (P1) located approximately 3.5 km east of the Project.

4.6.1.2 Surface Water

There are no major surface water features that intersect with the Project Area. The closest major surface water feature is Chandala Brook, located approximately 0.1 km west of the Project Area (Figure 5). Additionally, Yal Yal Brook is located approximately 0.1 km south of the Project Area.

Chandala Brook is maintained by surface water runoff, discharge from shallow aquifers, springs and upward leakage from confined aquifers. Surface and near surface drainage is toward Chandala Brook (Tronox Management Pty Ltd, 2024).

4.6.1.3 Wetlands

There are no wetlands that intersect with the Project Area; however, the Project is surrounded by the Ellen Brook Floodplain (Figure 5). This wetland is assigned the 'Multiple Use' wetland management category (DBCA, 2017). In addition to this, a wetland assigned the 'Conservation' wetland management category occurs 0.7 km south of the Project Area and a wetland assigned 'Resource Enhancement' occurs approximately 0.8 km south of the Project Area (DBCA, 2017).

4.6.2 Management

Water required for construction and operation of the Project will be sourced from a suitable and legally available supply. The final water supply arrangement will be determined during the detailed design phase and may include access to an existing licensed supply or another approved source. Where regulatory approvals are required to access or abstract water, all necessary licences, permits and approvals will be obtained prior to commencement of the relevant activities.

A CEMP and EMS will be prepared and implemented to manage potential surface water and groundwater impacts associated with the Project. Measures will include:

- Stormwater, erosion and sediment control measures to prevent sediment-laden runoff from leaving the site.
- Spill prevention, containment and response measures for fuels, oils, lubricants, chemicals, concrete products and other hazardous substances used during construction and operation.
- Management of excavations and any groundwater encountered during construction and ongoing operation of the Project.
- Protection of existing groundwater monitoring infrastructure.
- Rehabilitating disturbed areas where practicable following construction.
- Routine inspection and maintenance of drainage infrastructure and water management controls throughout the operational life of the Project.
- Procedures for managing and responding to incidents that may affect surface water or groundwater quality during operation.

In order to reduce the risk of ongoing potential groundwater and surface water impacts associated with the Proposed Infrastructure the following will be included in detailed design:

- Bunding and containment systems for transformers and other equipment containing oils, fuels or hazardous substances, sized in accordance with relevant standards and regulatory requirements.
- Appropriate drainage design to maintain existing drainage patterns where practicable and minimise concentration of runoff.
- Separation of clean and potentially contaminated stormwater, where required.
- Spill response facilities and equipment located at suitable operational areas.
- Design and placement of infrastructure to avoid direct interference with watercourses, drainage lines and sensitive water-dependent environments where practicable.
- Provision of appropriate surface water controls to minimise erosion, sediment transport and localised flooding.
- Ongoing inspection and maintenance programs for containment systems, drainage infrastructure and hazardous materials storage areas throughout the operational phase.

This will help ensure that potential impacts to groundwater and surface water resources are avoided or minimised during both construction and operation of the Project.

4.7 Flora and Vegetation

4.7.1 Receiving Environment

The Interim Biogeographic Regionalisation of Australia (IBRA) divides Australia into 89 bioregions based on major biological, geographical and geological attributes. These bioregions are subdivided into 419 subregions as part of a refinement of the IBRA framework. The Project Area occurs within the Swan Coastal Plain bioregion and the Perth (SWA02) subregion.

The Perth subregion is described as:

"*Colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of seasonal wetlands and also includes Rottnest, Carnac and Garden Islands etc.*" (Mitchell, Williams, & Desmond, 2002).

The Project is located within the Tronox CPP which is a highly modified industrial environment. The Project Area intersects with DBCA mapped native vegetation. The extent of DBCA mapped native vegetation is shown in Figure 6.

The broader CPP site (approximately 341 ha) was extensively cleared for agricultural purposes, primarily livestock grazing, prior to development of the processing plant in the late 1980s (Bamford Consulting Ecologists, 2024) (Appendix B). Despite widespread historic clearing, remnants of native vegetation remain. Since development, portions of the site have been rehabilitated and revegetated. Much of the current vegetation reflects a mosaic of remnant native communities, planted woodland, wetlands and cleared pasture. However, the vegetation is in a degraded to completely degraded condition due to historical disturbances, including clearing, replanting, grazing and potential *Phytophthora* dieback (Umwelt, 2024) (Appendix C).

Some differences exist between the vegetation community mapping presented by Bamford Consulting Ecologists (2024) (Appendix B) and Umwelt (2024) (Appendix C). As the Umwelt

(2024) study was specifically undertaken to classify vegetation communities and assess condition, its mapping has therefore been adopted for this assessment of flora and vegetation.

Table 4-3 outlines the vegetation units and vegetation condition recorded across the Project Area. More than half of the Project Area comprises cleared land (i.e., roads and existing buildings etc). Planted eucalyptus woodland and Banksia woodland each make up approximately 25% of the Project Area. Vegetation condition is degraded to completely degraded. These vegetation units are mapped in Figure 5.4 of Umwelt (2024) (Appendix C).

Table 4-3 Vegetation Communities and Condition within the Project Area

Vegetation Unit	Vegetation Condition	Area (ha)
Banksia woodland: *B. attenuata, B. menziesii* and *Eucalyptus todtiana* woodland over *M. trichophylla, M. seriata* and *X. preissii* isolated shrubs over mixed herbs and pasture weeds on flats and plains.	Degraded to completely degraded	0.69
Planted Eucalyptus trees over weeds on flats	Completely degraded	0.69
Cleared land	Cleared land	1.46
Total		**2.84**

4.7.1.1 Conservation Significant Flora

A desktop review of the PMST database indicated 27 threatened flora taxa, or their potential habitat, may occur, are likely to occur, or are known to occur within a 10 km radius of the Project Area (Appendix A), comprising:

- Four species listed as Critically Endangered under the EPBC Act.
- Eighteen species listed as Endangered under the EPBC Act.
- Five species listed as Vulnerable under the EPBC Act.

Paid DBCA database searches did not identify any conservation significant flora previously recorded within the Project Area. The nearest recorded occurrence of conservation significant flora is *Grevillea curviloba*, located approximately 0.9 km south of the Project Area (Figure 7).

Umwelt (2024) recorded 70 vascular flora taxa during the July 2024 survey, including 20 introduced taxa. No significant flora taxa were identified within the Project Area or the broader survey area (Appendix C). Due to the predominance of pasture weeds and disturbance-affected native vegetation Umwelt (2024) concluded that the survey area, including the Project Area, does not provide suitable habitat for significant flora. Furthermore, the Umwelt (2024) survey area lies outside the known distribution of some flora taxa.

4.7.1.2 Threatened and Priority Ecological Communities

A desktop review of the PMST database identified seven threatened ecological communities (TECs) that may occur, are likely to occur, or are known to occur within a 10 km radius of the Project Area (Appendix A). These communities and their listing status under the EPBC Act are summarised below:

- Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain: Endangered.

- Banksia Woodlands of the Swan Coastal Plain ecological community: Endangered.
- Clay Pans of the Swan Coastal Plain: Critically Endangered.
- Empodisma peatlands of southwestern Australia: Endangered.
- Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain: Endangered.
- Shrublands and Woodlands on Perth to Gingin ironstone (Perth to Gingin ironstone association) of the Swan Coastal Plain: Endangered.
- Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community: Critically Endangered.

Paid DBCA database searches indicate that the Project Area does not intersect with the mapped boundaries or associated buffers of any State-listed TECs or priority ecological communities (PECs) (Figure 8). However, the searches indicate that the Project Area intersects an area where a Commonwealth-listed TEC, Empodisma peatlands of Western Australia, may occur. Notwithstanding this database search result, the flora and vegetation assessment undertaken by Umwelt (2024) concluded that no TECs, including the Commonwealth-listed Empodisma peatlands of Western Australia TEC, occur within the Project Area (Appendix C).

The nearest mapped occurrence of a State-listed TEC or PEC is the Banksia Woodlands of the Swan Coastal Plain, located approximately 1.7 km northeast of the Project Area.

Umwelt (2024) identified the Banksia Woodlands of the Swan Coastal Plain ecological community as the only TEC/PEC with the potential to occur within the survey area. Areas mapped as Banksia woodland are located south of the Project Area (as shown in Figure 5.4 of Appendix C). However, the woodland does not meet the EPBC Act conservation advice criteria for the TEC, due to its degraded condition, insufficient patch size and lack of connectivity with higher-quality occurrences (Appendix C).

Although the survey was conducted in July, outside the optimal survey and flowering period for the Swan Coastal Plain bioregion, Umwelt (2024) concluded that this did not represent a significant limitation to the assessment because it was sufficient to identify vegetation communities and potential habitat for significant flora (Appendix C).

4.7.1.3 Dieback

Glevan Consulting (2024) was unable to determine the dieback status of the CPP due to the degraded condition of vegetation and a lack of reliable indicator species (Appendix D). As a precaution, all disturbed soil and plant material should be treated as potentially infested. Tronox implements a Dieback Management Plan (Tronox, 2025) under MS 958 to minimise the spread of soil-borne pathogens.

The Project Area is located within an existing disturbed industrial footprint; however, construction activities have the potential to spread infested soil if appropriate hygiene controls are not implemented. Banksia Woodland south of the Project Area is susceptible to dieback.

4.7.2 Management

The Project has been designed in accordance with the mitigation hierarchy of avoidance, minimisation and management. The siting of the Proposed Infrastructure has sought to maximise the use of existing disturbed areas and previously cleared land. However, to ensure that bushfire hazard is suitably managed in the asset protection zone (APZ)

surrounding the BESS and transformer infrastructure. A total of up to 0.9 ha of native vegetation clearing is proposed within the Project Area to establish a bushfire management zone, including 0.69 ha of degraded to completely degraded Banksia woodland. This includes the removal and / or pruning to reduce bushfire risk to the proposed infrastructure.

A CEMP will be prepared and implemented to minimise impacts on existing flora and vegetation during construction. Measures will include:

- Limiting clearing and ground disturbance to the minimum area required for construction and operation of the BESS.
- Clearly defining and demarcating the Project Area prior to commencement of work to minimise the potential for indirect impacts to vegetation outside the Project Area.
- Avoiding the removal of mature native trees where practicable.
- Restricting vehicle access and material storage to designated areas to minimise dust generation and dust deposition on adjacent vegetation.
- Implementing erosion and sediment controls to stabilise exposed soils and minimise degradation of adjacent vegetated areas and potential for off-site movement of sediment.
- Managing the introduction and spread of weeds through good site hygiene and appropriate disposal of cleared vegetation.
- Dieback awareness, hygiene requirements and vegetation protection measures. Cognisance will be given to the existing Tronox Dieback Management Plan (Tronox, 2025).
- Reinstating and rehabilitating temporary disturbance areas following construction where practicable.

4.8 Terrestrial Fauna

4.8.1 Receiving Environment

A desktop review of the PMST database identified that 14 threatened fauna species, or their potential habitat, may occur, are likely to occur, or are known to occur within a 10 km radius of the Project Area (Appendix A), comprising:

- Eight birds.
- Two fish.
- Two insects.
- One mussel.
- One mammal.

Paid DBCA database searches did not identify any conservation significant fauna previously recorded within the Project Area. The nearest recorded occurrence of conservation significant fauna is *Westralunio carteri* (Carter's freshwater mussel), located approximately 0.35 km northwest of the site (Figure 9).

The CPP site supports predominantly degraded fauna habitat resulting from historical clearing, grazing and past land uses (Bamford Consulting Ecologists, 2024) (Appendix B). Bamford Consulting Ecologists (2024) surveyed for three species of black cockatoo, including:

- Carnaby's Black Cockatoo (*Zanda latirostris*) (Endangered).
- Baudin's Black Cockatoo (*Z. baudinii*) (Endangered).
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*) (Vulnerable).

The assessment determined that:

- The CPP is outside the range of Baudin's Black Cockatoo.
- Carnaby's Black Cockatoo and Forest Red-tailed Black Cockatoo use the broader CPP site intermittently for foraging, including the Banksia Woodland south of the Project Area and Marri Woodland 500 m northwest and southwest of the Project Area (Figure 3 of Appendix B).
- Most vegetation within the assessment area has low foraging value for black cockatoos, with only small, degraded patches of Banksia Woodland and Marri Woodland providing low to moderate quality foraging habitat.
- A total of 84 potential black cockatoo nest trees were identified in the assessment area (Figure 4 of Appendix B); however, only six trees contained hollows considered potentially suitable for nesting and no evidence of breeding or roosting was recorded within the assessment area. The closest tree with a potentially suitable hollow was located approximately 0.4 km northwest of the Project Area.
- Black cockatoos are occasional visitors to the area in low numbers and the broader CPP site does not contain significant breeding or roosting habitat.

Importantly, the proposed Project Infrastructure does not intersect with black cockatoo foraging, breeding or roosting habitat. However, the Banksia Woodland and Marri Woodland amounting to 0.7ha within the Project Area provides low to moderate quality black cockatoo foraging habitat.

Other fauna species of conservation significance considered likely to occur within the CPP site, but outside of the Project Area, were limited and included Peregrine Falcon (*Falco peregrinus*) and Rakali (*Hydromys chrysogaster*). The generally degraded condition of the vegetation was considered to reduce the likelihood of occurrence of most other EPBC Act-listed threatened fauna species and conservation significant species (Appendix B).

4.8.2 Management

The Project has been designed in accordance with the mitigation hierarchy of avoidance, minimisation and management. The siting of Proposed Infrastructure has sought to maximise the use of existing disturbed areas and previously cleared land. However, up to 0.9 ha of native vegetation, including 0.69 ha of Banksia woodland may be cleared (i.e., removed and / or pruned). In addition, 0.69 ha of planted Eucalypt trees may be cleared to facilitate the Project.

The Project Area supports low terrestrial fauna values due to its highly disturbed condition and lack of significant habitat features. Conservation-significant fauna values are largely confined to remnant native vegetation surrounding the Project Area, particularly Banksia and Marri woodlands that provide low to moderate quality foraging habitat for black cockatoos that occasionally visit the area in low numbers (Appendix B).

A CEMP will be prepared and implemented to minimise impacts on terrestrial fauna during construction. Measures will include:

- Limiting clearing and ground disturbance to the minimum area required for construction and operation of the BESS.

- Clearly defining and demarcating the Project Area prior to commencement of work to minimise the potential for indirect impacts to vegetation outside the Project Area.
- Avoiding the removal of mature native trees where practicable that may provide habitat or movement opportunities for fauna.
- Restricting vehicle movements to designated access tracks and implementing appropriate speed limits within construction areas.
- Undertaking a visual pre-clearing inspection of the disturbance area for Carnaby's Black Cockatoo and the Forest Red-tailed Black Cockatoo prior to clearing commencing.
- Ensuring no impacts that are attributable to the Project occur to potential black cockatoo breeding habitat, including potential nest trees identified during the Bamford Consulting Ecologists (2024) (Appendix B) assessment, which are located outside the Project Area.
- Implementing weed hygiene, erosion and sediment control measures to minimise indirect impacts on adjacent fauna habitat.
- Minimising fire risk through implementation of site-specific fire prevention and emergency response procedures.
- Managing waste and food scraps to avoid attracting pest fauna.
- Minimising vehicle movements outside designated work areas.
- Reinstating and rehabilitating temporary disturbance areas following construction where practicable.

4.9 Bushfire and Battery or Transformer Fire

4.9.1 Receiving Environment

The Project is located within a bushfire prone area as shown in the Department of Fire and Emergency Services (DFES) State Map of Bushfire Prone Areas (DFES, 2025). This is shown in Figure 10.

The Project presents a potential fire hazard in the unlikely event of battery failure or thermal runaway.

4.9.2 Management

While the proposed Project is not subject to assessment under *State Planning Policy 3.7 Bushfire*, a precautionary approach has been adopted, and a Bushfire Management Plan has been developed and will be implemented to manage bushfire risk associated with the Project (refer to Appendix E).

Detailed design of the Project will identify appropriate engineering controls, monitoring and detection systems and emergency shutdown functionality for a battery or transformer fire.

Fire risk mitigation measures will include compliance with relevant industry standards and manufacturer specifications, provision of adequate separation distances between BESS units and other infrastructure, and the installation of fire-rated barriers or fire walls where required to contain potential fire events and reduce the risk of escalation to adjacent equipment. The detailed design will also consider access requirements to facilitate emergency response and firefighting activities.

An EMS will be developed and implemented, incorporating operational procedures, inspection and maintenance requirements, and emergency response and incident management measures for BESS and transformer fire events. The EMS will support the rapid and effective response to incidents, minimising their duration and reducing the potential for adverse impacts to air quality, land, surface water and groundwater from fire-related emissions, contaminated firewater and hazardous material releases.

4.10 Air Quality

4.10.1 Receiving Environment

Air emissions from the CPP are regulated under DWER Operating Licence L5939/1988/11. The Licence includes requirements for the control, monitoring and reporting of process air emissions and dust, including stack emission limits, ambient air quality monitoring, dust management measures and periodic reporting to DWER (DWER, 2025). The closest residential sensitive receptor is located approximately 1.3 km northwest of the proposed BESS site.

4.10.2 Management

The Project is not expected to generate air emissions during normal operation and therefore presents a negligible risk to the receiving air environment. The principal air quality risk is associated with a battery fire or thermal runaway event; however, the likelihood of such an event is low due to the incorporation of battery management systems, thermal monitoring, emergency shutdown functions and fire protection measures.

Detailed design of the Project will incorporate appropriate prevention, detection and fire protection measures to minimise the likelihood of a battery fire occurring.

A CEMP will be prepared and implemented during construction to minimise impacts on air quality. Management measures will include:

- Limiting ground disturbance to the minimum area required for the Project.
- Implementing erosion and sediment control measures, including stabilising exposed soils and stockpiles and progressively rehabilitating disturbed areas, to minimise erosion and the generation of dust.
- Restricting vehicle movements, material storage and laydown areas to designated disturbance areas.
- Implementing dust suppression measures, such as water application to exposed surfaces, where required during dry or windy conditions.
- Applying appropriate speed limits and good housekeeping practices to minimise dust generation.
- Maintaining construction vehicles and equipment in good working order to minimise exhaust emissions.
- Investigating and responding to any air quality complaints associated with Project activities.

5.0 Summary and Conclusions

This EAR has assessed the environmental features of the Project Area, the potential environmental impacts associated with the proposed development of a BESS at the CPP,

the relevant environmental legislation, guidelines and standards, and whether environmental approvals are required for the Project.

Key findings include:

- The Project Area is located entirely within a highly modified industrial environment that has been historically cleared and developed for industrial use.
- The Project is not expected to conflict with existing CPP operations and will be developed and operated in a manner that is cognisant of the existing environmental management framework implemented by Tronox.
- No ESAs, conservation reserves, mapped wetlands or major watercourses occur within the Project Area; however:
    - The Ellen Brook Floodplain surrounds the Project Area.
    - The nearest ESA is located approximately 0.65 km southwest of the Project Area.
    - Multiple-use wetlands occur in the surrounding area.
    - Chandala Brook is located approximately 0.1 km west of the site.
    - Drains intersect the Project Area.
- The Project Area is located on a registered contaminated site; however, the proposed land use is consistent with the existing industrial classification.
- No direct impacts to conservation significant flora, TECs or PECs are anticipated.
- Potential dieback infestation and dieback-susceptible vegetation occur within the CPP site. All disturbed soil and plant material should be treated as potentially infested and managed in accordance with established dieback hygiene measures.
- Carnaby's Black Cockatoo and the Forest Red-tailed Black Cockatoo visit the CPP site occasionally in low numbers. The Project Area is adjacent to Banksia Woodlands which provide low to moderate-quality black cockatoo foraging habitat.
- The Project is located within a bushfire prone area.
- A total of up to 0.9 ha of native vegetation clearing is proposed within the Project Area to establish a bushfire management zone, including 0.69 ha of degraded to completely degraded Banksia woodland with low to moderate quality black cockatoo foraging habitat.
- The Project is not expected to generate routine air emissions or wastewater discharges during operation.
- Potential environmental impacts are largely limited to short-term construction activities and low-likelihood emergency scenarios, such as a battery fire or thermal runaway event.

These risks can be effectively managed through detailed design, implementation of a CEMP during construction and an EMS during operation. Detailed design of the Project will incorporate appropriate battery fire prevention, detection and containment. Potential impacts to groundwater and surface water will be minimised through the implementation of design measures including bunding and containment systems, stormwater and drainage controls, spill response provisions, erosion and sediment management, and ongoing inspection and maintenance programs.

The CEMP will incorporate controls for disturbance management, erosion and sediment control, dust suppression, contamination and spill management, weed and dieback hygiene,

fauna protection, waste management and rehabilitation of temporary disturbance areas. The EMS will include emergency response measures to minimise the likelihood and consequences of emergency events.

The Project does not require referral under Part IV of the EP Act. The Project can be implemented in a manner that will not significantly impact the EPA's environmental values and objectives through the application of mitigation hierarchy.

The Project does not constitute a prescribed premises activity requiring a works approval or licence under Part V of the EP Act. A documented EPBC Act self-assessment is considered sufficient to demonstrate that the Project is unlikely to have a significant impact on MNES and does not require referral under the EPBC Act.

Any native vegetation clearing required to facilitate the Project will be undertaken in accordance with the relevant provisions of Part V of the EP Act.

Accordingly, the Project is considered environmentally acceptable and capable of being developed and operated with negligible residual environmental impacts, subject to the implementation of the management measures identified in this EAR.

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Figures

Environmental Assessment Report

Chandala Battery Energy Storage System

Accenture Australia Pty Ltd

SLR Project No.: 675.073695.00001

30 July 2026

Figure 1: Site Location

Figure 2: Site Concept Plan

Figure 3: Environmentally Sensitive Areas

Figure 4: Acid Sulphate Soil and Contaminated Sites

Figure 5: Hydrology

Figure 6: Native Vegetation Extent

Figure 7: Significant Flora

Figure 8: Threatened and Priority Ecological Communities

Figure 9: Significant Fauna

Figure 10: Bushfire Prone Areas

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0 50 100 m

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:5,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Project Area

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

SITE LOCATION

SLR

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FIGURE 1

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 1_Site_Location

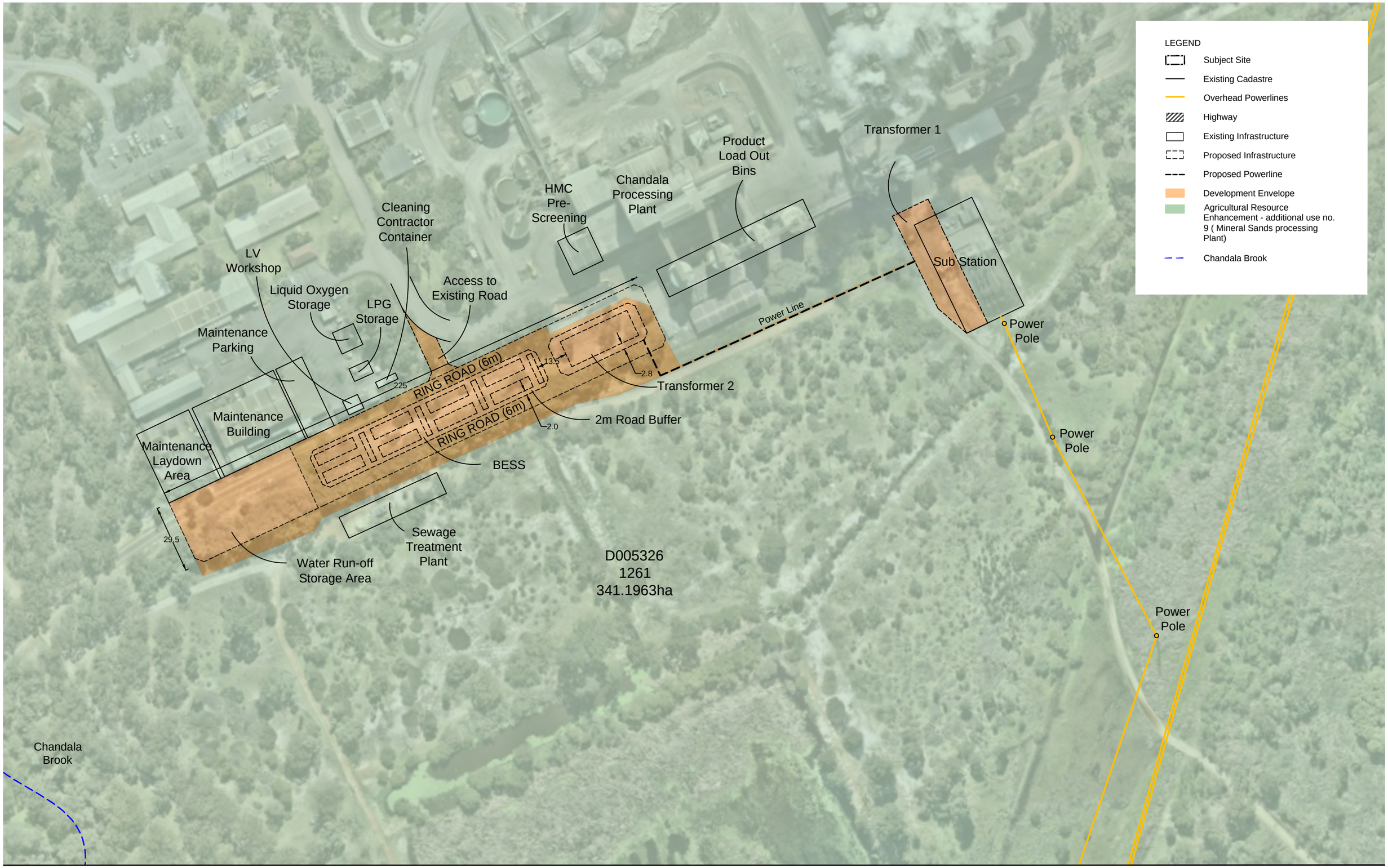

Figure 2 - Site Concept Plan

Lot 1261 (No. 722) Old Gingin Road, Muchea

Date: 29 Jul 2026 Scale: 1:1500 @ A3 1:750 @ A1 File: **675.07369 CP01A** Staff: JK GW Checked: CW

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0 125 250 m

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Project Area
- Environmentally Sensitive Areas

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

ENVIRONMENTALLY SENSITIVE AREAS

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FIGURE 3

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 3_Environmentally_Sensitive_Areas

Service Layer Credits:
Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, Geoscience Australia, NASA, NGA, USGS, Esri, USGS

0 125 250 m

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

Proposed Infrastructure

Project Area

Contaminated Sites

Contaminated - remediation required

Acid Sulfate Soil Risk

2 – Moderate to low risk of ASS occurring within 3m of natural soil surface but high to moderate risk of ASS beyond 3m of natural soil surface

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

ACID SULPHATE SOIL AND CONTAMINATED SITES

SLR

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FIGURE 4

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 4_Acid Sulphate Soil and Contaminated Sites

Service Layer Credits:
Harvested, SLIP Future, biology, coastal, conservation, ecology, environment, geomorphic, pir, swan, wetlands, DPAW, DBCA, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community,

0 125 250 m

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Project Area

Wetlands

- Conservation
- Multiple Use
- Resource Enhancement

Hydrography - Swan Coastal Plain (Detailed Mapping)

- Area Subject to Inundation
- Drain - major
- Earth Dam
- Tank
- Watercourse - major, non-perennial
- Watercourse - minor, non-perennial

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

HYDROLOGY

SLR

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FIGURE 5

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 5_Hydrology

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0 125 250 m

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Native Vegetation Extent
- Project Area

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

NATIVE VEGETATION EXTENT

SLR

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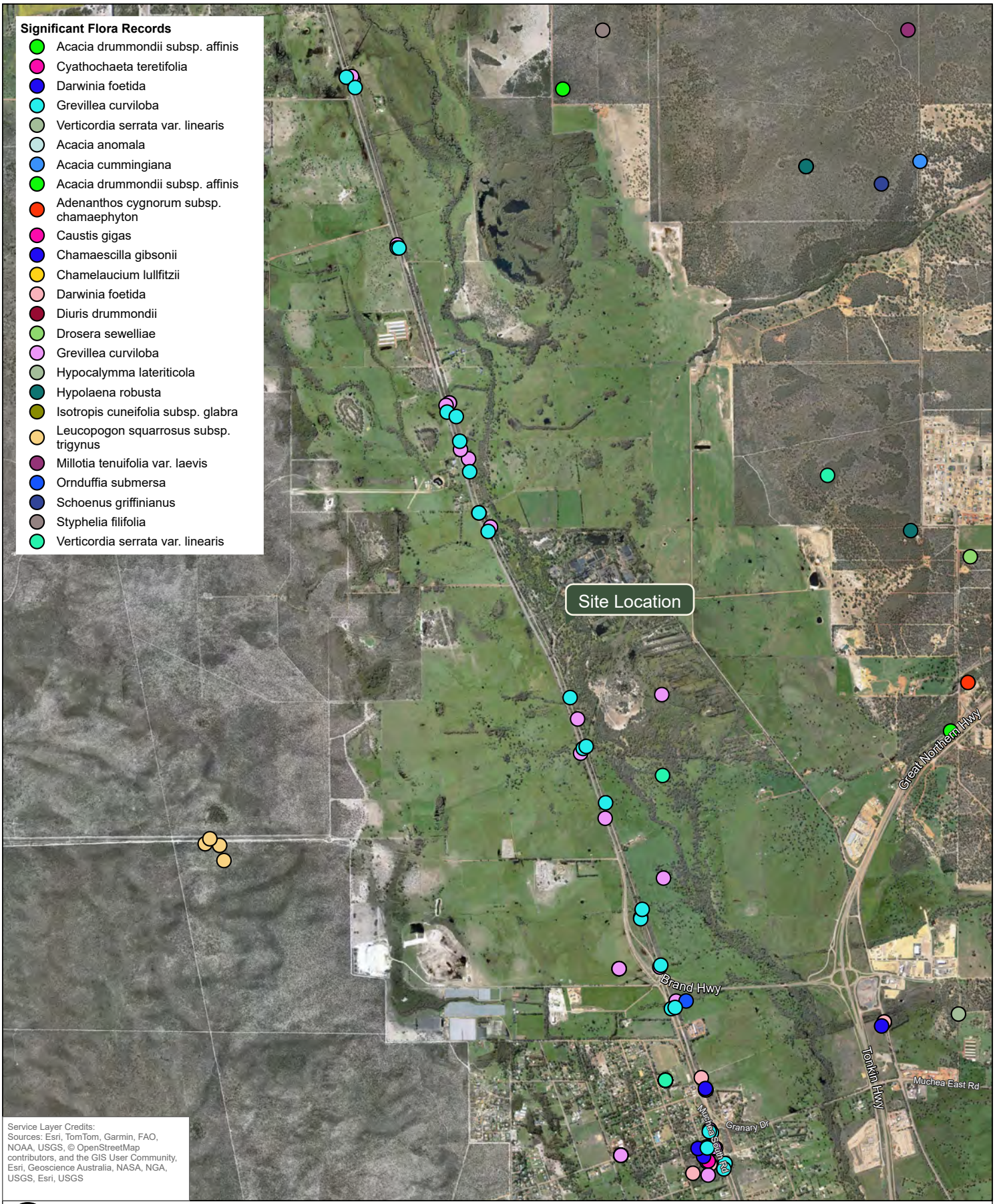
FIGURE 6

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 6_Native_Vegetation_Extent



0 0.5 1 km

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:50,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Project Area

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

SIGNIFICANT FLORA

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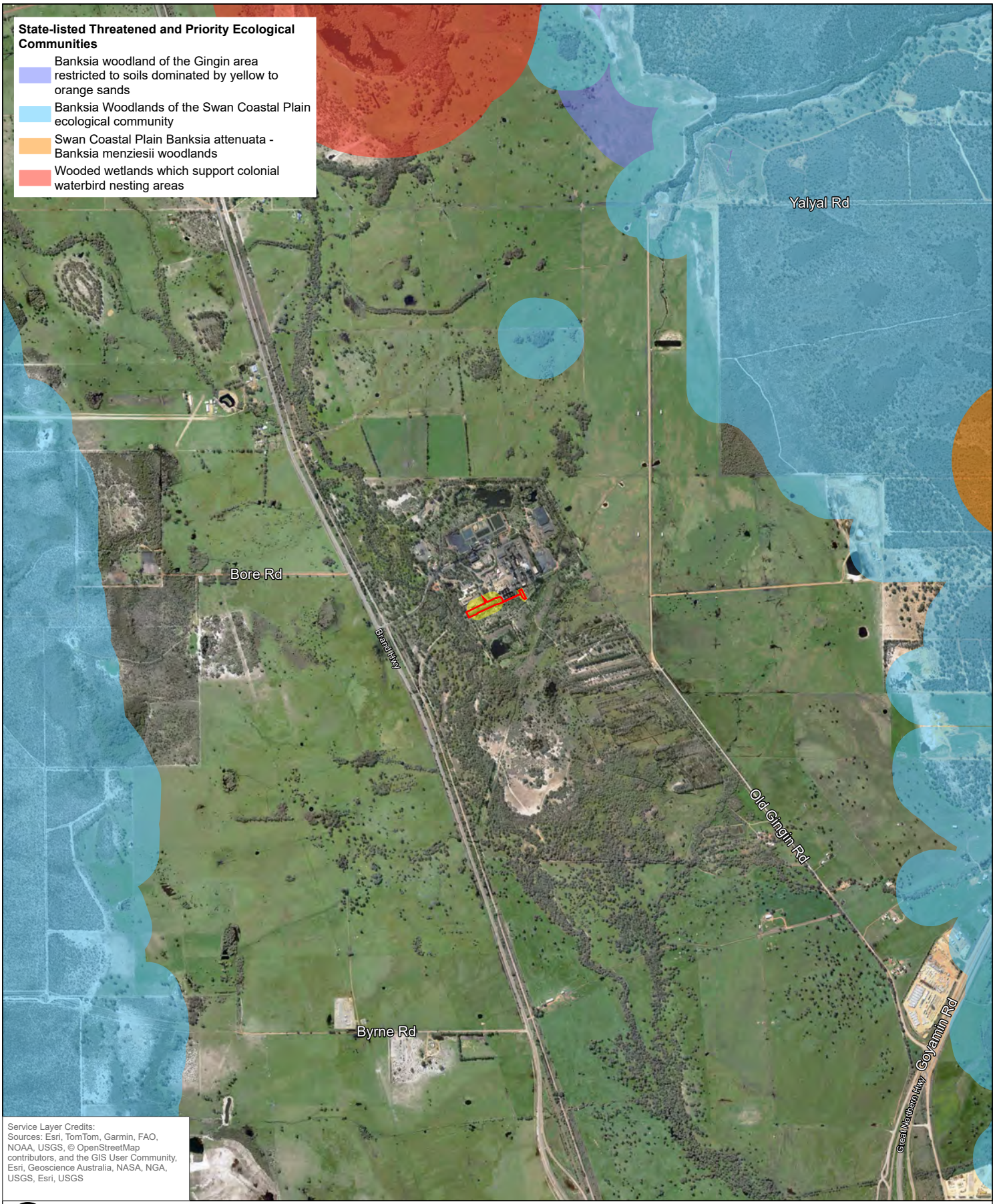
FIGURE 7

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 7_Significant_Flora



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0 0.5 1 km

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:30,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Project Area

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

THREATENED AND PRIORITY ECOLOGICAL COMMUNITIES

SLR

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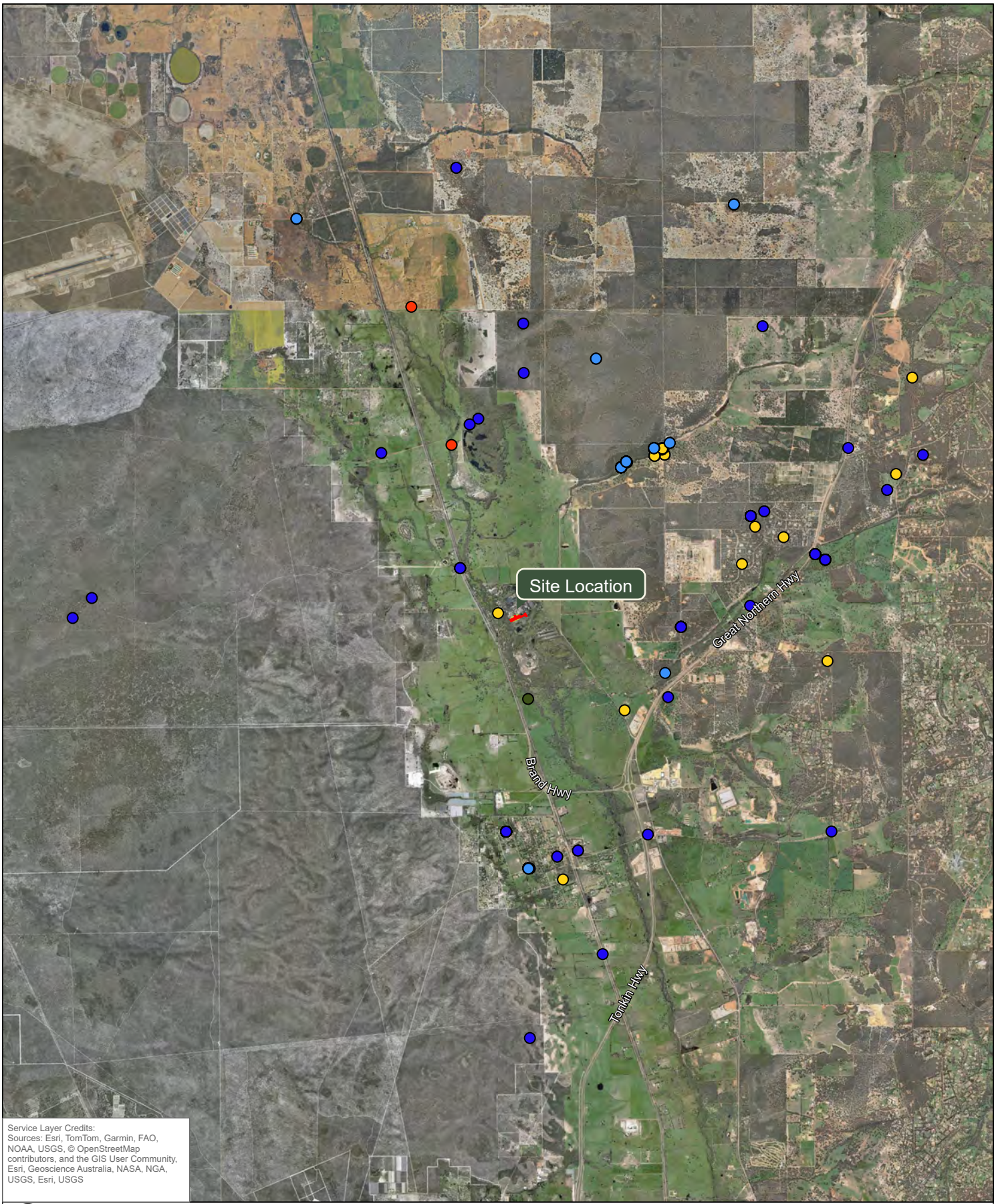
FIGURE 8

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 8-_Threatened_and_Priority_Ecological_Communities



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0 1 2 km

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:110,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Project Area

Significant Fauna Records

- Priority
- Specially Protected - Migratory
- Specially Protected - Other Specially Protected
- Threatened - Endangered
- Threatened - Vulnerable

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

SIGNIFICANT FAUNA

SLR

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FIGURE 9

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 9-_Significant_Fauna

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0 125 250 m

Coordinate System:	GDA 1994 MGA Zone 50
Scale:	1:10,000 at A4
Project Number:	675.073695.00005
Date Drawn:	30/07/2026
Drawn by:	JWP

LEGEND

- Proposed Infrastructure
- Project Area
- Bush Fire Prone Areas

CHANDALA SITE BESS ENVIRONMENTAL ASSESSMENT REPORT

BUSH FIRE PRONE AREAS

SLR

DISCLAIMER: All information within this document may be based on external sources. SLR Consulting Pty Ltd makes no warranty regarding the data's accuracy or reliability for any purpose.

FIGURE 10

Path: C:\Users\james.parker\OneDrive - SLR Consulting\APP - 360 - Tronox SFP BESS\GIS\Chandala_BESS\Chandala_BESS.aprx\Figure 10_Bushfire Prone Areas

Appendix A Chandala – Protected Matters Report

Environmental Assessment Report

Chandala Battery Energy Storage System

Accenture Australia Pty Ltd

SLR Project No.: 675.073695.00001

30 July 2026

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: 29-Jun-2026

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	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	41
Listed Migratory Species:	8

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:	3
Commonwealth Heritage Places:	None
Listed Marine Species:	12
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:	8
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	13
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

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
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In feature area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area	In buffer area only
Empodisma peatlands of southwestern Australia	Endangered	Community may occur within area	In feature area
Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Shrublands and Woodlands on Perth to Gingin ironstone (Perth to Gingin ironstone association) of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community may 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			
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In buffer area only

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
Calyptorhynchus banksii naso Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Leipoa ocellata Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
Zanda latirostris listed as Calyptorhynchus latirostris Carnaby's Black Cockatoo, Short-billed Black-cockatoo [87737]	Endangered	Breeding likely to occur within area	In feature area
FISH			
Galaxiella munda Western Dwarf Galaxias, Western Mud Minnow [79240]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Galaxiella nigrostriata Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat likely to occur within area	In feature area
INSECT			
Hesperocolletes douglasi Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area	In feature area
Leioproctus douglasiellus a short-tongued bee [66756]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
MAMMAL			

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dasyurus geoffroii Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat likely to occur within area	In feature area
OTHER			
Westralunio carteri Carter's Freshwater Mussel, Ambiguus Mussel [86266]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
Acacia anomala Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Andersonia gracilis Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area	In feature area
Anigozanthos viridis subsp. terraspectans Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Banksia mimica Summer Honeypot [82765]	Endangered	Species or species habitat may occur within area	In feature area
Caladenia huegelii King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Caleana dixonii listed as Paracaleana dixonii Sandplain Duck Orchid [87944]	Endangered	Species or species habitat may occur within area	In feature area
Calectasia elegans Elegant Tinsel Lily [88992]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Chamelaucium lullfitzii listed as Chamelaucium sp. Gingin (N.G.Marchant 6) Gingin Wax [92777]	Endangered (listed as Chamelaucium sp. Gingin	Species or species habitat likely to occur within area	In feature area
Conospermum densiflorum subsp. unicephalatum One-headed Smokebush [64871]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Darwinia foetida Muchea Bell [83190]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Diplolaena andrewsii [6601]	Endangered	Species or species habitat may 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
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area	In feature area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat may occur within area	In buffer area only
Grevillea althoferorum [64906]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea corrugata a shrub [65445]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea curviloba subsp. curviloba Curved-leaf Grevillea [64908]	Endangered	Species or species habitat likely to occur within area	In feature area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Hypocalymma sylvestre Chittering Myrtle [86384]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat may occur within area	In feature area
Ptychosema pusillum Dwarf Pea [11268]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Synaphea sp. Fairbridge Farm (D.Papenfus 696) Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra dedmaniarum Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area	In feature area
Thelymitra stellata Star Sun-orchid [7060]	Endangered	Species or species habitat likely to occur within area	In feature area
Thelymitra variegata Queen of Sheba [12582]	Critically Endangered	Species or species habitat may occur within area	In buffer area only

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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		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
Department of Defence		
Bullsbrook Obstruction Beacon No 3 [DD_1357]	WA	In buffer area only
Muchea Armament Range [DD_0964]	WA	In buffer area only
Muchea ILS Outer Marker North [DD_1465]	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

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Apus pacificus](#) Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
[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
[Haliaeetus leucogaster](#) White-bellied Sea-Eagle [943]		Species or species habitat likely to 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
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Pandion haliaetus](#) Osprey [952]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to 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
Barracca	Nature Reserve	WA	In buffer area only
Breera Road	Nature Reserve	WA	In buffer area only
Bullsbrook	Nature Reserve	WA	In buffer area only
Chandala	Nature Reserve	WA	In buffer area only
Timaru	Nature Reserve	WA	In buffer area only
Unnamed WA02336	Nature Reserve	WA	In buffer area only
Unnamed WA44622	Nature Reserve	WA	In buffer area only
Unnamed WA50678	Nature Reserve	WA	In buffer area only

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
South-West Forest Region of Western Australia	Western Australia	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
"Muchea 6" Clay Pit Expansion project	2022/09342		Assessment	In buffer area only
Clearing and development of Lot 9001 Rosewood Drive, Chittering, WA	2016/7759		Completed	In buffer area only
Gonneville Nickel-Copper-Platinum Group Element Mine Development Project	2024/09839		Assessment	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Muchea Silica Sand Project	2022/09370		Referral Decision	In buffer area only
Sand quarry development, Lot 2, Bingham Road, Bullsbrook, WA	2017/8104		Completed	In buffer area only
Controlled action				
Great Northern Highway-Bindoon Bypass, WA	2017/8035	Controlled Action	Post-Approval	In buffer area only
Great Northern Highway Muchea to Wubin Upgrade Stage 2 - Muchea North, WA	2016/7656	Controlled Action	Post-Approval	In buffer area only
Muchea Industrial Precinct, Part of Lot 102 Great Northern Highway, Muchea, WA	2017/8119	Controlled Action	Post-Approval	In buffer area only
Natural Gas Pipeline Expansion	2006/2813	Controlled Action	Post-Approval	In buffer area only
Perth-Darwin National Highway alignment (Swan Valley Section), WA	2013/7042	Controlled Action	Post-Approval	In buffer area only
Proposed Transport Depot & Warehouse Development - Lot 195 Great Northern Highway, Muchea	2017/7901	Controlled Action	Post-Approval	In buffer area only
Not controlled action				
Boral Bricks Western Australia Pty Ltd, Muchea East Road, Muchea, Western Australia	2019/8522	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	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 is 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 on the contents of this report.

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 point locations and environmental data layers.

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 when time permits.

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 breeding sites; and
- 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
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-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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Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

Appendix B Chandala Processing Plant Black Cockatoo and other MNES Assessment 2024

Environmental Assessment Report

Chandala Battery Energy Storage System

Accenture Australia Pty Ltd

SLR Project No.: 675.073695.00001

30 July 2026

Tronox

Chandala Processing Plant

Black-Cockatoo and other MNES Assessment

Large Flooded Gum in south of Chandala site (M. Bamford)

Prepared for: Tronox Chandala Processing Plant
742 Brand Hwy
Muchea, WA, 6501

Prepared by: Mike Bamford & Eliza-Joyce Lloyd
M.J. & A.R. Bamford Consulting Ecologists
23 Plover Way
Kingsley WA 6026

25th April 2024

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1 Introduction

The 341 ha Tronox Chandala site, where material from the Cooljarloo mineral sand mine is further processed before transport to Kwinana, is located approximately 60 km north of Perth. The site straddles the Chandala/Ellen Brook and a small tributary, Yal Yal Brook, and was already extensively cleared for agriculture (primarily used for livestock grazing) when the plant was developed in the late 1980s, but it retained some degraded riverine woodlands, some areas of dampland heath and some remnant patches of Banksia Woodland mixed with a tall shrubland of the native pine *Actinostrobus pyramidalis* (based upon observations made during a site visit by M. Bamford in 1988). Much of the site is low-lying with dark, peat-rich and seasonally waterlogged soils, but the plant itself is located on a low, sandy rise in the north. The site was de-stocked prior to development, and once the plant was established, there was an active programme of planting around the processing facility, and a trial arboretum was developed just to the south. There was also some wetland planting carried out at stormwater ponds and borrow pits (the latter on the northern edge of the plant). Apart from around the wetlands, much of the planting used non-local (ie largely eastern Australian) eucalypts. These are now particularly prominent around the plant site.

Tronox has proposed to expand the existing plant site and has identified several areas on the periphery of the site where this expansion could take place. Recognising that the proposed expansion areas may have values for fauna, and in particular species of conservation significance, and also recognising that an assessment for significant fauna has not been carried out since 1988/1989 (by M. Bamford), Tronox has requested Bamford Consulting Ecologists to undertake a significant fauna assessment of the site. This is to cover the whole 341 ha area but to focus on the exposed expansion areas and is to cover all species listed as of conservation significance under the federal *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act), but with a focus on the three black-cockatoo species. These three species are Carnaby's Black-Cockatoo (Endangered), Baudin's Black-Cockatoo (Endangered) and the Forest Red-tailed Black-Cockatoo (Vulnerable).

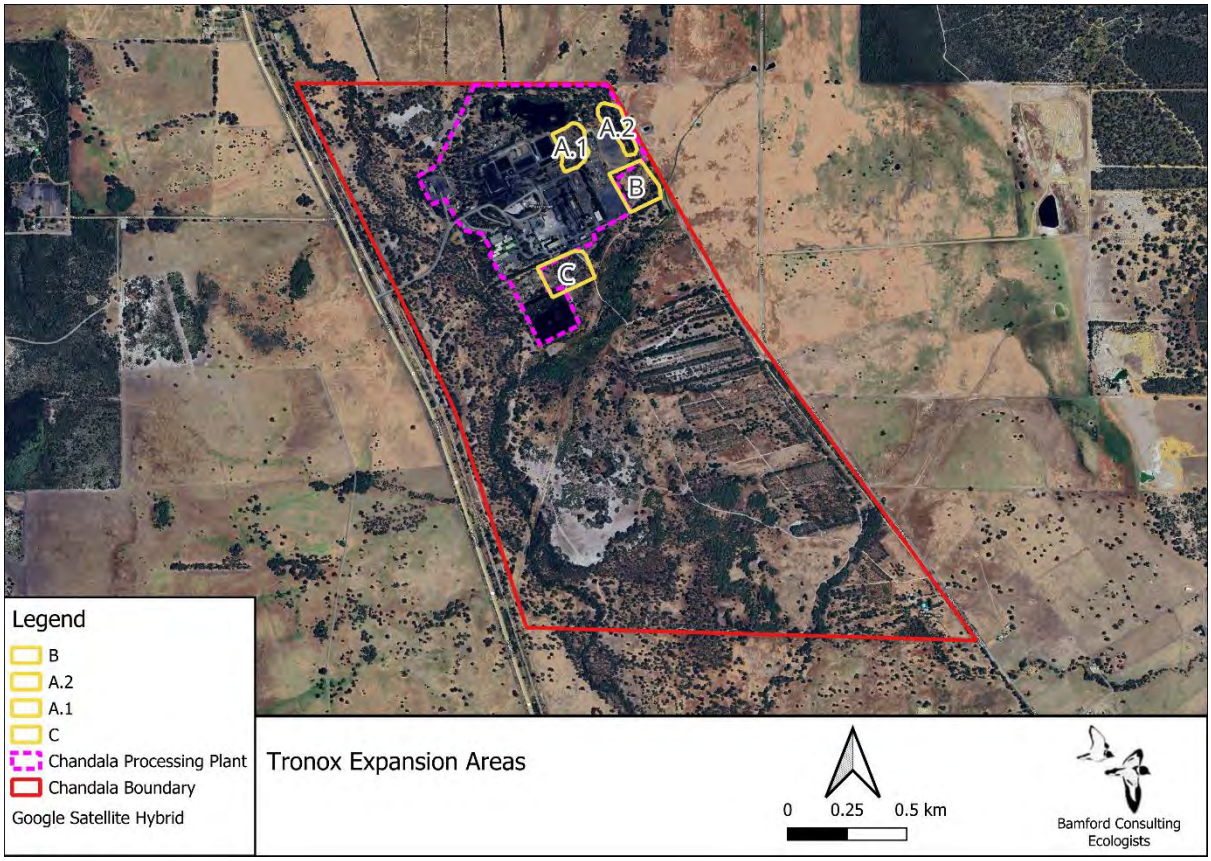

Figure 1 Proposed expansion areas (approximate locations) within the Chandala site visited by BCE personnel.

2 Methods

2.1 Field Investigations

2.1.1 Overview

Field investigations were undertaken by Dr Mike Bamford on 18th and 27th February 2024. The first date was spent in the plant site and proposed expansion areas, while the second date involved driving and walking across as much of the rest of the site as possible. On both occasions, the focus was on describing the general environment in terms of vegetation and soil types (Vegetation and Substrate Associations; VSA), and assessing habitat for black-cockatoos. Methods of assessment for black-cockatoos are outlined below.

In addition to the two visits made specifically for this project, Mike Bamford has visited the Chandala site on multiple occasions per year since about 1991. These visits have focussed mainly on wetland areas (borrow pits and stormwater ponds) for surveys of aquatic macro-invertebrates waterbirds and frogs. While each visit has been short (typically a few hours), it means that a lot of time has been spent on site making observations on fauna over a long period of time. This contributes to a general understanding of the fauna assemblage of the site.

2.1.2 Black-cockatoo habitat analysis

2.1.2.1 Guidelines

The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) provides guidelines for the referral of actions that may result in impact to black-cockatoos (for assessment under the EPBC Act). The survey and analysis reported here have been conducted with strong reference to both the existing guidelines (DAWE 2022) as well as the previous guidelines (DEE 2017). In addition, survey methodology followed the recommendations listed on the DCCEEW's Species Profile and Threats Database (DCCEEW 2024a, 2024b, 2024c). Ecological values for black-cockatoos within the site were based on the definitions of breeding habitat as per the EPBC Act referral guidelines for black-cockatoos (DAWE 2022).

The DBCA has also indicated that the methodology developed and applied previously by BCE (e.g. Bancroft and Bamford 2021), and as described below, is an acceptable approach to score nesting value.

2.1.2.2 Potential nest trees

The aim of the potential nest-tree surveys was to assess the survey area for potential hollow-bearing trees (suitable for black-cockatoo nesting). The majority of the survey area was inspected. The following information was recorded for every suitable tree[1] with a diameter at breast height (DBH) equal to or greater than 500 mm (or equal to or greater than 300 mm for *Eucalyptus accedens* and *E. wandoo*):

- tree location (hand held GPS, UTM Zone J50);
- tree species;
- life status (dead or alive);
- DBH (nearest 50cm); and
- nest-tree rank: trees were assessed (from the ground) for the potential presence/quality of nest-hollows and allocated a nesting rank (developed by BCE; described in

[1] the revised EPBC Act referral guidelines (DAWE 2022) note that "any species of tree may develop suitable hollows for breeding" however there are some species that are much more likely to provide breeding sites. These species are listed on the DCCEEW SPRAT database and were the focus of the field investigations here.

- Table 1).

Table 1. Ranking system for the assessment of potential nest-trees for black-cockatoos (revised 08/01/2021).

As per DCCEEW (2024c, 2024a, 2024b) guidance, a potential nest-tree is any tree with a diameter at breast height >500 mm (or >300 mm for *Eucalyptus accedens, E. salmonophloia* and *E. wandoo*). Note that black-cockatoos favour vertical hollows for the nest chamber, but the hollow entrance may be vertical (a chimney hollow), have a side entrance or have a horizontal spout entrance.

Rank	Description of tree and hollows/activity
1	Activity at hollow observed; adult (or immature) bird seen entering or emerging from hollow. Can also be used for a known nest tree active in the previous 12 months (although this should be noted in the description). Note that activity at a hollow does not absolutely mean that breeding is occurring unless a young bird in hollow is observed.
2	Hollow of suitable size visible with chew marks around entrance. Record if chew-marks are recent or old.
3	Potentially suitable hollow visible but no chew marks present at entrance; or potentially suitable hollow suspected to be present - as suggested by structure of tree, such as large, vertical trunk broken off at a height of >8m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in hollows <5m so in a Wheatbelt breeding site a lower criterion may be more appropriate.
4	Tree with large hollows or broken branches that might contain large hollows, but hollows or potential hollows (nest chamber) are not vertical or near-vertical; thus a tree with or likely to have hollows of sufficient size but not to have hollows of the angle preferred by Black-Cockatoos. Trees with low but otherwise suitable hollows can also be assigned a rank or 4, depending on the species of black-cockatoo likely to be present.
5	Tree lacking large hollows or broken branches that might have large hollows; a tree with more or less intact branches and a spreading crown.

2.1.2.3 Assessment of foraging value

The foraging value of the study area was assessed by calculating a foraging score for each VSA (areas of similar vegetation type/condition, see Appendix 1). The foraging score provides a numerical value that reflects the significance of vegetation as foraging habitat for black-cockatoos, and this numerical value is designed to provide the sort of information needed by federal DCCEEW, the state Department of Water and Environmental Regulation (DWER) and Department of Energy, Mines, Industry Regulation and Safety (DMIRS), and the WA Environmental Protection Authority (EPA) to assess impact significance and offset requirements. The foraging value (also referred to as 'habitat quality score ' (HQS)) of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has three components as detailed in Appendix 1. These three components are drawn from the DCCEEW offset calculator (DCCEEW, undated) but with the scoring approach developed by BCE:

- **A score out of six for the vegetation composition, condition and structure.**

This is based on the presence, abundance and condition of vegetation that is used for foraging by the black-cockatoo under consideration (as described in Appendix 1).

- **A score out of three for the context of the site.**
  The context score is a function of the proportion of native vegetation within the local area that lies within the site, and is also affected by the vegetation condition score (as described in Appendix 1). Context score is also sensitive to the presence of breeding nearby.
- **A score out of one for species density.**
  As described in Appendix 1, the species density score (out of 1) is assigned on the basis of observed or predicted regular presence of foraging birds. For example, birds may not be observed and foraging evidence may not be found during a short site visit, but if there are birds and/or foraging evidence nearby, and the habitat has a moderate to high vegetation condition score, then it is certain to be visited regularly by foraging birds and is given a density score of 1 accordingly. If birds or foraging evidence are not observed, and the regular presence of foraging birds is not expected, then the area is given a stocking rate score of 0.

The combination of the vegetation condition score, the context score and the species density score provides an overall foraging value score (the overall HQS) out of 10. A higher score represents better foraging value. A score out of 10 is presented for the purposes of aiding offset calculations. The approach to assigning scores for vegetation, context and species density are outlined in Appendix 1. Foraging value scores are calculated separately for different black-cockatoo species (Appendix 1) depending upon the vegetation present; thus a separate score is given for each VSA for each species.

An overall foraging score for the project area was calculated based on the individual HQS of each VSA and the proportion of the project area made up of each VSA. This provides an average weighted habitat quality score (HQS) for the site as a whole, which is always rounded up for comparative purposes; conventional rounding rules could lead to very different sites being considered to be similar.

Black-cockatoo foraging signs were also recorded in conjunction with the foraging value assessments. When foraging signs were observed, the location and tree species were recorded. Black-cockatoo foraging evidence may persist for some months or years after the foraging event. Factors that help to establish the time since foraging include: the colour of nuts/foliage, the degree of weathering or decay of debris, the presence of small fragments of nut debris, the position/compression of the foraging debris relative to surrounding vegetation and leaf litter, and the strength of the eucalypt smell emitted. Despite the absence of empirical data, four categories of foraging activity were recognised, based on the time since foraging:

(i) Active – where birds were observed in the act of foraging;
(ii) Recent – foraging signs (e.g. chewed nuts or vegetation) were ‘fresh’ (i.e. foraging was likely to have occurred within days to weeks). Recent foraging signs were typically green and/or with very little sign of weathering. Approximately less than four weeks old;
(iii) Intermediate – foraging was likely to have occurred within weeks to months previously. Approximately one to six months old; and

(iv) Old – foraging was likely to have occurred months to years previously. Approximately more than six months old.

2.1.2.4 Night roosts

A specific night roost survey was not undertaken in 2024, but evening surveys (for frogs) have been undertaken twice a year since 1991, including April each year. This is the time of year when black-cockatoos tend to roost in traditional sites. Therefore, roost surveys have effectively been carried out annually for over two decades. The Birdlife Australia Great Cocky Count takes places in April each year (since 2010) and the database up to 2022 (Birdlife Australia 2023) was accessed to check for nearby known roost sites.

2.2 Sources of Information

In addition to field observations made in 2024 and during previous site visits, information on significant fauna that could occur around the Chandala site was gathered from a number of sources. Tronox accessed the EPBC Protected Matters Search Tool (January 2024) which provided a list of 'Matters of National Environmental Significance (MNES – species and communities listed under the EPBC Act), while in 2018 BCE accessed a suite of databases (Naturemap, Birdata, Atlas of Living Australia, EPBC Protected Matters Search Tool) for a project area about 5km east of the Chandala site. This study also accessed several unpublished reports on fauna surveys undertaken in the general region (summarised by Bamford *et al.* 2022). In addition, and as noted above, black-cockatoo roost site data was accessed from the Birdlife Australia Great Cocky Count database (2023).

3 Observations

3.1 Site description and Vegetation types

The Chandala site was a partly-cleared farming property prior to the development of the Tronox processing plant in the late 1980s; in addition to extensive clearing, much of the native vegetation was degraded due to livestock grazing and trampling (M. Bamford, pers. obs, 1988). The site inspection carried out in February 2024 provided the opportunity to map current vegetation types. The mapping should be considered indicative only and is intended to identify key foraging areas for black-cockatoos, and is provided on Figure 2. Much of the vegetation is also a mosaic where otherwise distinctive vegetation types merge. Vegetation is described and discussed below, considering what was probably present originally and how the vegetation is distributed currently.

- A linear Forest of Flooded Gum *Eucalyptus rudis* and Freshwater Paperbark *Melaleuca rhaphiophylla* along Chandala/Ellen Brook. Mapped on Figure 2 as Chandala Brook and more or less intact, but with the understorey badly degraded by livestock (and probably high number of the Grey Kangaroo). Visible in the background of Plate 12.
- Flooded Gum Woodland to Forest over shrubs and herbaceous annuals on broad, seasonally damp alluvial flats of dark grey to black loam mostly to the west of the brook. Current distribution mapped on Figure 2 with examples on Plate 11 and Plate 12. See also cover photo. Generally badly degraded with almost total loss of understorey. Many of the trees are very small, which suggests this vegetation type may be regrowth from past clearing; therefor the original vegetation may have been slightly different.
- Modong (Stout Paperbark) *Melaleuca preissiana* over Damp Heath (*Regelia* and *Beaufortia* spp, some thickets of the native pine *Actinostrobus pyramidalis*) on seasonally damp, dark, sandy-loams to the east of the brook. Extensively cleared with current distribution approximated on Figure 2. This includes a patch within the plant site (Plate 1) and several larger patches to the south (Plate 3 and Plate 9). Remaining examples generally in good condition presumably because the thick heath resists degradation by livestock.
- Marri *Corymbia calophylla* Woodland over shrubs, often blending with Flooded Gum Woodland and Melaleuca over Damp Heath, tending to occur on slightly raised and sandier ground. Note Marri also scattered through the Flooded Gum Woodland and Melaleuca over Damp Heath. Probably once extensive but now confined to two small patches (Figure 2). In poor condition with almost total loss of native understorey (Plate 10).
- Freshwater Paperbark *Melaleuca rhaphiophylla* low Forest in winter-wet depressions. This lies mainly in the south-east (Figure 2 and see Plate 7); also occurs along Chandala/Ellen Brook where it merges with Flooded Gum Woodland.
- Banksia Woodland over a dense shrubby understorey on sandy soils. Mostly Slender Banksia or Piara *Banksia attenuata,* with a few Firewood Banksia *Banksia menziesii,* and occasional Prickly-bark *Eucalyptus todtiana* and Christmas Tree *Nuytsia floribunda*, which may be the only examples of these species across the Chandala site. This was probably never extensive as the banksias favour light, sandy soils which is limited to a slight rise in the general region of the plant site. One patch remains just

south of the plant site area (Figure 2; see Plate 5), and scattered banksias occur in the Paperbark over Damp Heath in the centre of the plant site area. The Banksia Woodland is in poor condition with badly degraded understorey.

- Arboretum. This was a trial of a variety of eucalypt and some other tree species, with the main arboretum in the east (Plate 13), but planted trees across much of the plant site (Plate 6) are also effectively an aroboretum, with non-native trees of uniform age over a grassy and weedy understorey. Planting occurred in the early 1990s so the trees are around 30 years old.
- Artificial and other wetlands. There are several such wetlands in the plant site area, including stormwater ponds (ie bunded areas for the storage of stormwater runoff) and borrow pits (a series in the north of the plant site where fill was extracted to create a sand pad for construction of infrastructure). The borrow pits filled with water and were planted to enhance their value for wetland wildlife. Stormwater Pond 1 (Plate 14), in the south of the plant site area, is more or less continuous with seasonally flooded flats associated with Yal Yal Brook, which flows across the site from east to west. All these wetlands have open water in winter but are dry or nearly dry in summer. The borrow pits have a fringe of planted Freshwater Paperbark and small areas of Bulrush *Typha* sp.. The stormwater ponds and the Yal Yal flats have extensive beds of Bulrush. Note that wetlands are not indicated on Figure 2.
- Cleared land. The overall Chandala site was extensively cleared (Plate 8), with some areas very open but other areas with remnant trees and bushes, and even regrowth.

3.2 Descriptions of proposed expansion sites

Four areas within the Chandala site were assessed for possible expansion with approximate locations illustrated on Figure 1. Three lie within the plant site area, and the fourth just to the south.

Area A.1. Adjacent to the borrow pits and retains an example of the native vegetation that lay across part of the plant site area. Most of this is Marri over Damp Heath, with scattered Slender Banksia/Piara, Prickly-bark and Christmas Tree (Plate 1). The vegetation is partly degraded.

Area A.2. Cleared land and some remnant and planted trees over weedy grasses near Old Gingin Road. Trees include one tall Marri stump that is a rank 3 potential nest tree for black-cockatoos (Plate 2).

Area B. Open grassland beneath major powerlines; small areas of planted eucalypts and some remnant paperbarks and Flooded Gums (Plate 3 and Plate 4).

Area C. Patch of banksia woodland to open woodland with completely degraded understorey (ie all grassy weeds). Mostly Slender Banksia, but few a Firewood Banksia, Holly-leaf Banksia *Banksia ilicifolia* and at least one Swamp Banksia *Banksia littoralis*. Presumably a remnant of the original woodland.

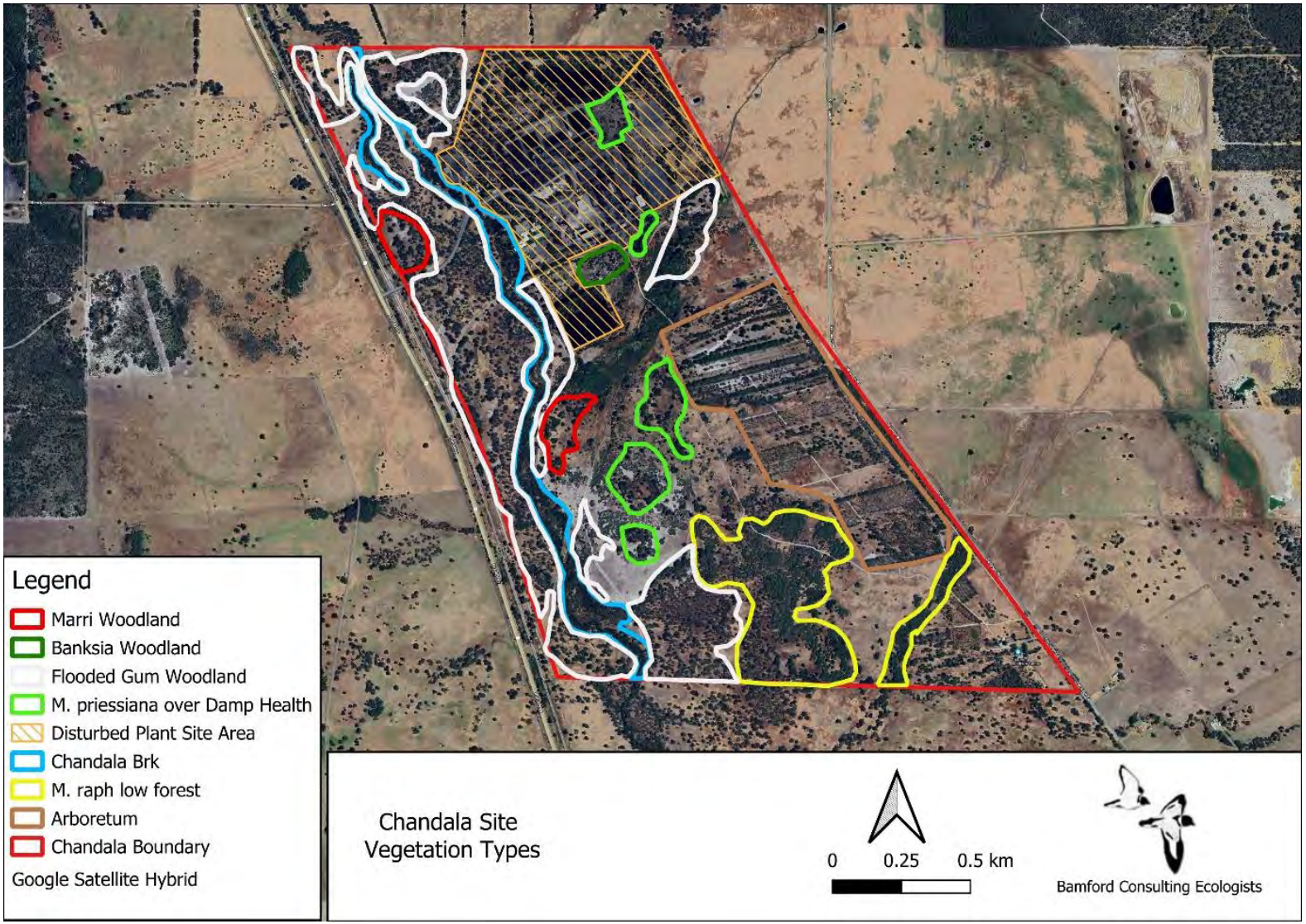

Figure 2 Broad vegetation types throughout Chandala site. Areas not mapped as a vegetation type are cleared land with scattered trees. The plant site area is not mapped in detail.

Plate 1 Area A.1. Remnant dampland vegetation, including *Melaleuca preissiana over damp heath and scattered Marri*. Photo credit: M. Bamford.

Plate 2 Area A.2. Planted eucalypts over weedy grasses, with a single stag trunk of Marri (wypt 1446). Photo credit: M. Bamford.

Plate 3 Area B with remnant paperbarks and grassland. Photo credit: M. Bamford

Plate 4 Area B Planted Flooded Gum with exotic Eucalyptus sp. Photo credit: M. Bamford.

Plate 5 Area C Banksia open woodland. Photo credit: M. Bamford.

Plate 6 Trees planted around processing plant site.

Plate 7 Paperbark swamp in south of the Chandala site. Photo credit: M. Bamford

Plate 8 Paddocks in south centre. Photo credit: M. Bamford

Plate 9 Melaleuca preissiana over dampland south of stormwater pond 1. P*hoto credit: M. Bamford*

Plate 10 Marri woodland just north of entrance road to Chandala site (401213mE, 6510722mN). Photo credit: M. Bamford

Plate 11 Flooded Gum woodland, majority small trees with freshwater paperbark along Chandala Brook. Photo credit: M. Bamford.

Plate 12 Flooded Gum woodland south of entrance road to Chandala site. Photo credit: M. Bamford.

Plate 13 Arboretum east of Chandala site (402955mE, 6509939mN). Photo credit: M. Bamford.

Plate 14 Stormwater Pond 1 with extensive beds of Bulrush Typha sp. Photo credit: M. Bamford.

3.3 Black-cockatoo assessment

3.3.1 Observations of black-cockatoos

The Chandala site lies within the range of Carnaby's and the Forest Red-tailed Black-Cockatoos, but outside the range of Baudin's Black-Cockatoo (DCCEEW 2024 a, b & c). BCE has recorded opportunistic records of landbirds on every visit to the Chandala site since August 2004; this involved Autumn and Spring surveys from Spring 2004 to Spring 2023, but encompassed monthly surveys from May 2005 to December 2006. Carnaby's was recorded on almost every survey from May 2005 to October 2008, then in September 2010 but not subsequently. The species was recorded in Autumn and Spring in 2005, 2006, 2007 and 2008, and therefore its absence from any survey since 2011 (inclusive) suggests that there was a fairly abrupt decline in its frequency of presence in the area in about 2009/2010. There were no records in 2024 but quite old (several months) foraging signs on Slender Banksia were found in proposed expansion areas A.1 and C (Figure 3; locations given in Appendix 4). This suggest that Carnaby's continues to visit the site, but probably infrequently and in small numbers, whereas prior to 2010 it appears it was a regular visitor. There is no obvious reason for this change, but it probably relates to some regional effect rather than to anything within the Chandala site.

Over the same period, the Forest Red-tailed Black-Cockatoo was recorded only in June 2010 and May 2021. In 2024, two birds flew across the plant entrance road on 27th February, while birds were reported by Tronox personnel a few weeks before. In addition, there were recent foraging signs on Marri fruit at six locations (Figure 3; locations given in Appendix 4). This suggest that in recent years the Forest Red-tail is becoming a moderately regular visitor to the site, and is targeting the scattered groves of Marri.

3.3.2 Assessment of foraging value (Habitat Quality Score (HQS)) for black-cockatoos

The foraging habitat assessments for Carnaby's and the Forest Red-tailed Black-Cockatoos are summarised in

Table 2. For both species, most of the Chandala site is of very low foraging value (total HQS of 1/10). These low value vegetation types are assigned a score of 1/6 for vegetation type as they will occasionally provide food, even if it is birds making brief visits to eat flowers, shoots or search for insect larvae under bark. Even paddocks can occasionally provide food. These low-ranking vegetation types, however, receive no added score for context or species presence as recommended in the guidance (Appendix 1). The only vegetation types with appreciable value for black-cockatoos is Marri Woodland (total HQS of 2/10 for Carnaby's and 4/10 for the Forest Red-tail, and Banksia Woodland (total HQS for Carnaby's of 3/10). These are based on vegetation condition and context/species presence scores. For both context and species presence, the areas of Marri and Banksia Woodland are small and in poor condition, and thus the allocation for context and species presence is low.

Table 2. Foraging scores for each vegetation type for Carnaby's Black-Cockatoo.

Vegetation and Substrate Association (VSA)	Veg'n (/6)	Context (/3)	Density (/1)	HQS (/10)
Linear Forest along Chandala/Ellen Brook	1	0	0	**1**
Flooded Gum Woodland to Forest	1	0	0	**1**
Melaleuca over Damp Heath	1	0	0	**1**
Marri Woodland	2	0	0	**2**
Freshwater Paperbark Low Forest	1	0	0	**1**
Banksia Woodland	3	0	0	**3**
Arboretum	1	0	0	**1**
Cleared Land	1	0	0	**1**
Artificial wetland	0	0	0	**0**

Table 3. Foraging scores for each vegetation type for the Forest Red-tailed Black-Cockatoo.

Vegetation and Substrate Association (VSA)	Veg'n (/6)	Context (/3)	Density (/1)	HQS (/10)
Linear Forest along Chandala/Ellen Brook	1	0	0	**1**
Flooded Gum Woodland to Forest	1	0	0	**1**
Melaleuca over Damp Heath	1	0	0	**1**
Marri Woodland	3	0	1	**4**
Freshwater Paperbark Low Forest	1	0	0	**1**
Banksia Woodland	1	0	0	**1**
Arboretum	1	0	0	**1**
Cleared Land	1	0	0	**1**
Artificial wetland	0	0	0	**0**

3.3.3 Breeding habitat for black-cockatoos

Potential nesting trees were assessed as outlined in section 2.1.2. The survey found 84 potential nest trees, of which the majority (66) had a rank of only 5, and thus were large trees with no suitable hollows. A further 12 trees were assigned a rank of 4, indicating possibly suitable hollows, with six trees ranked at 3, indicating the presence of hollows that appeared suitable. Details of trees are given in Appendix 3. Three of the rank 3 trees were noted as appearing to be particularly suitable (eg see Plate 2, illustrating tree at waypoint 1446 within proposed expansion area A.2., and cover photo of tree at waypoint 1480). One of these, a Flooded Gum at waypoint 1488 in the south of the Chandala site, possibly had old chew marks around the entrance to a hollow (which would be highly suggestive of use by a black-cockatoo), but it was difficult to see from the ground and the chew marks, if that is what they were, were clearly not recent.

The majority (43) of the potential nest trees were Marri, and the distribution of all potential nest trees is illustrated on Figure 4. With the exception of the rank 3 tree at waypoint 1446, all rank 3 and rank 4 trees lay outside the plant site and proposed expansion areas. There were

two clusters of trees, and notably rank 3 and rank 4 trees, that coincided with areas of Marri Woodland.

Breeding is known to occur around Bindoon, over 20km to the NNE, but the DBCA threatened species database has two confirmed breeding locations nearby, one about 2.5km SE and one about 10km ENE (Figure 5). Despite these nearby records, given the low numbers of observations of birds during spring, it seems unlikely that breeding birds are foraging in the area.

3.3.4 Black-cockatoo roosting

Roosting by black-cockatoos has never been recorded in the Chandala site despite evening surveys (evenings are when the birds aggregate to roost) throughout the year since the mid 1990s. The nearest known roosts in the Birdlife Australia Great Cocky Count database are plotted on Figure 5, with the closest roost (of Forest Red-tails) 6km to the south.

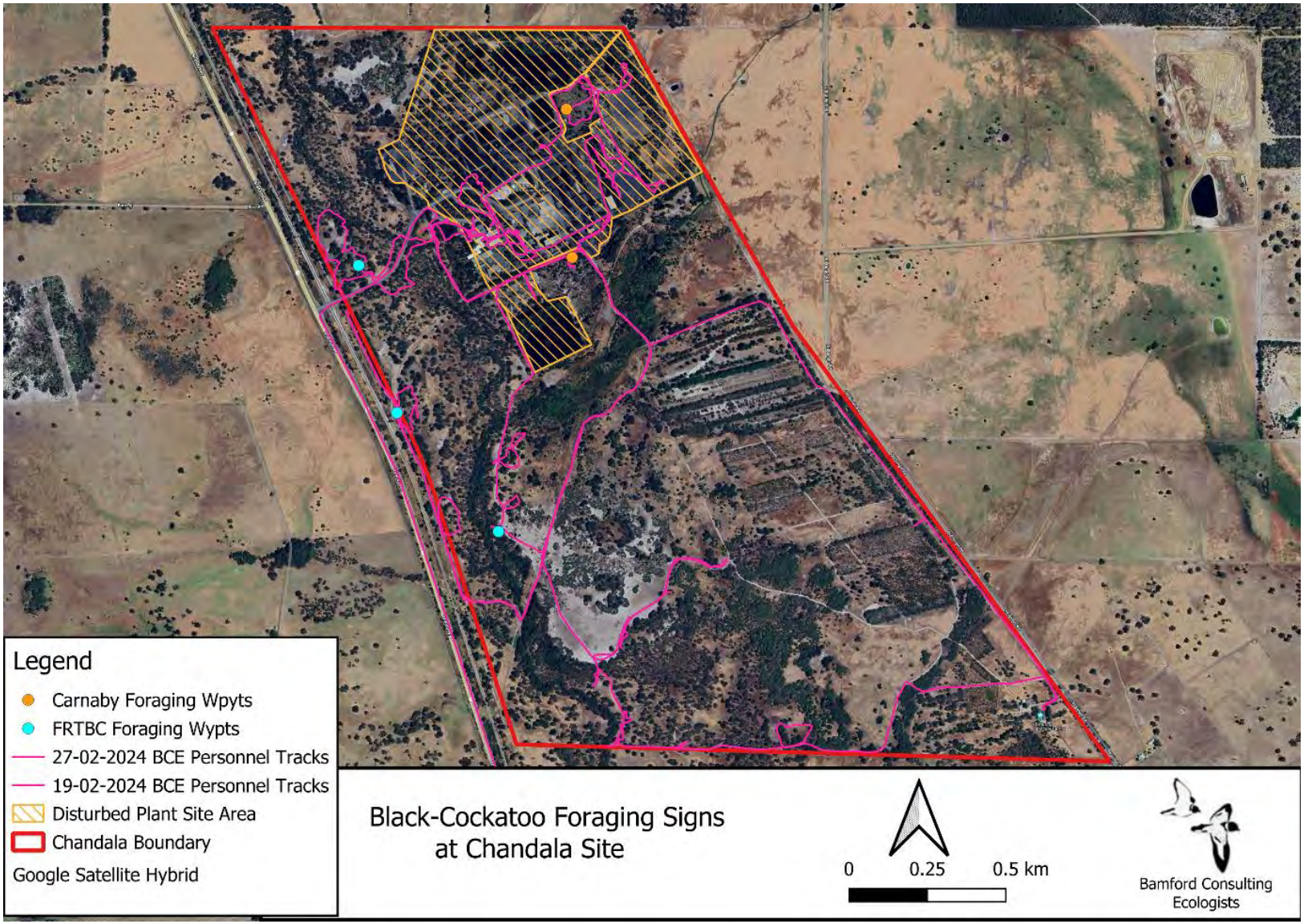

Figure 3 Black-Cockatoo foraging signs recorded during site visits, February 2024.

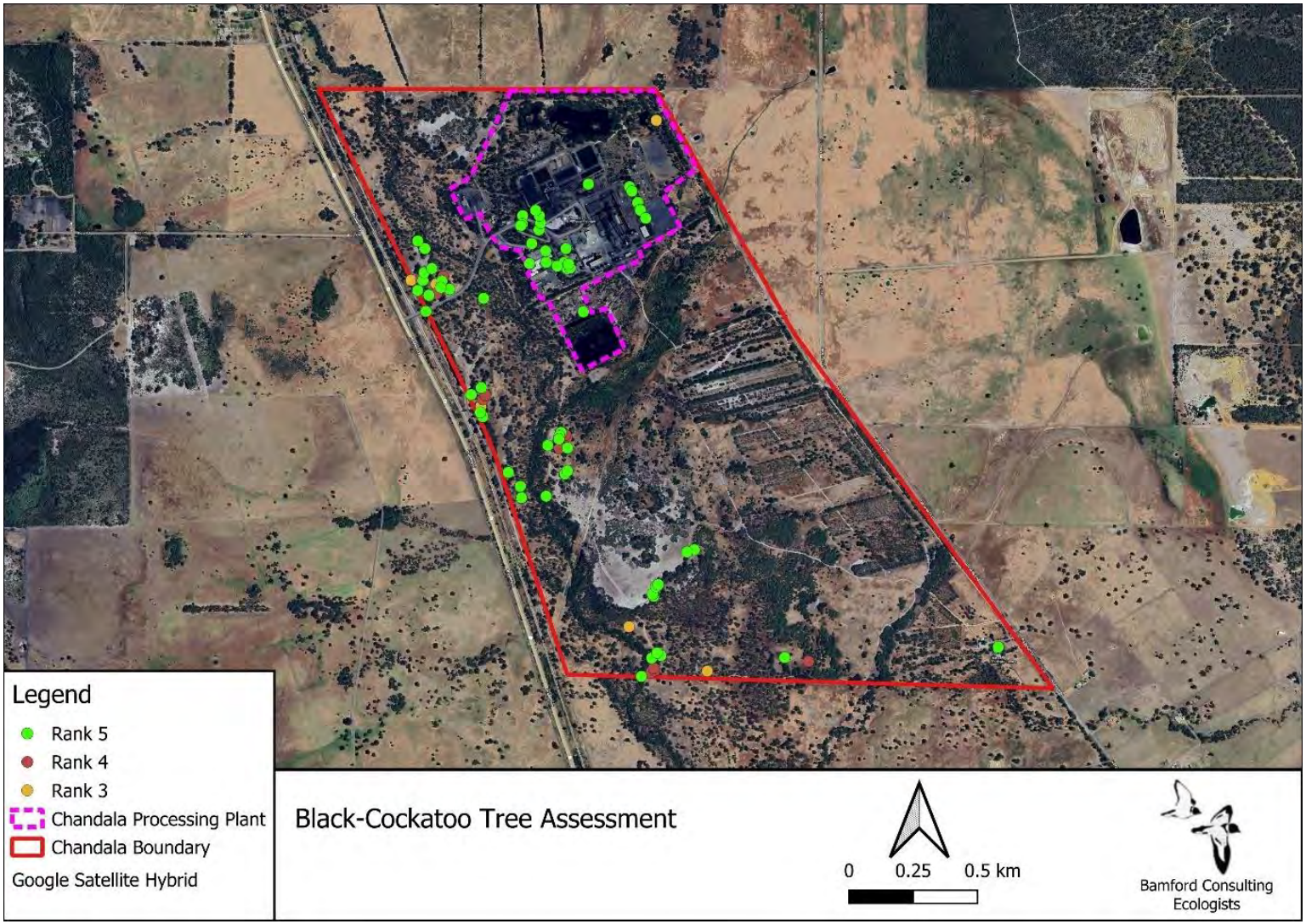

Figure 4 Black-cockatoo tree assessment. Trees recorded within survey area with DBH > 500mm and ranked according to BCE Black-Cockatoo scoring system in Table 1.

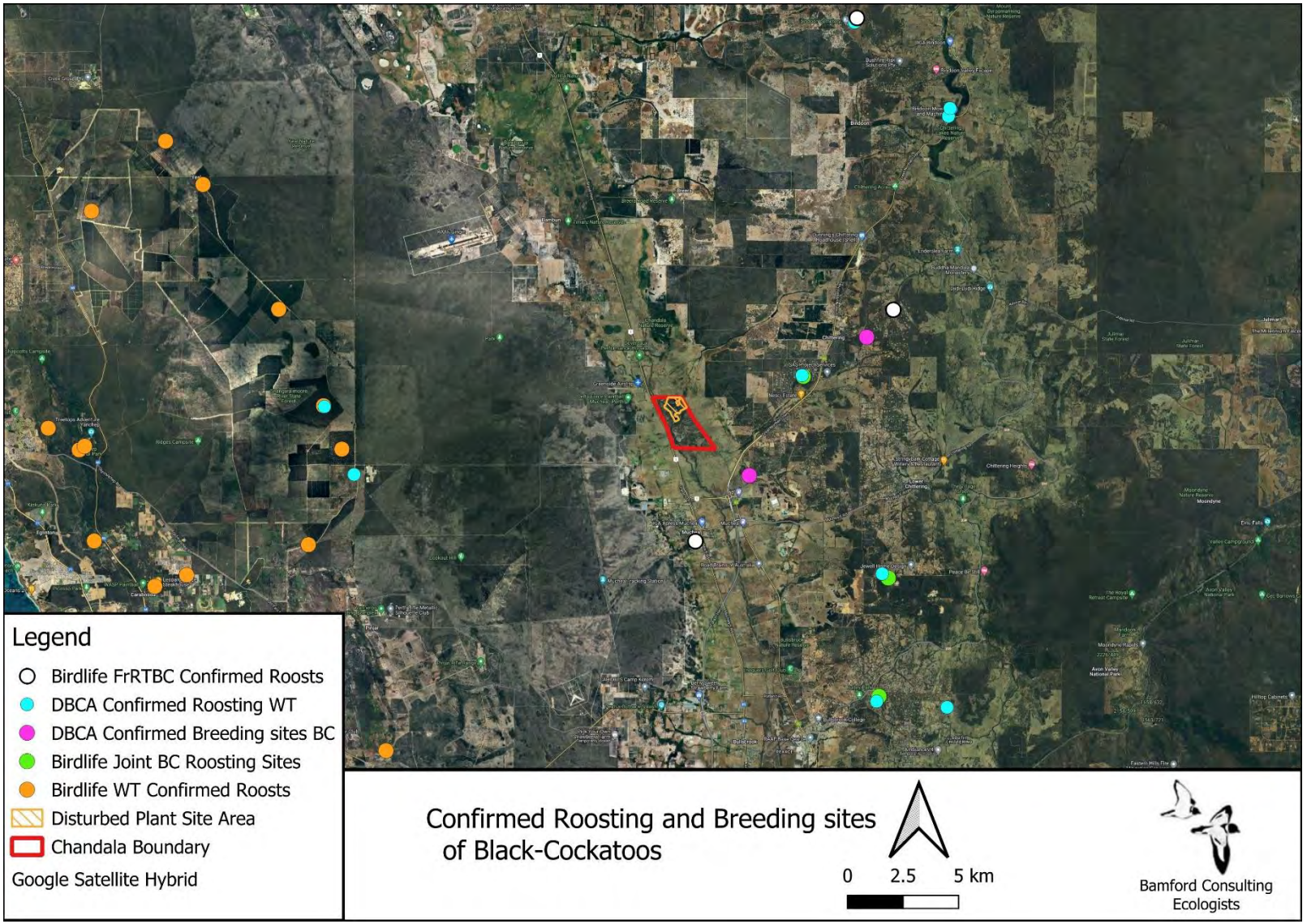

Figure 5 Confirmed roosting (Birdlife, the Great Cocky Count) and breeding (DBCA) sites of Black-Cockatoos. WT Black-Cockatoo roots are almost certainly Carnaby's.

3.4 Other MNES and significant species

The results of the search of the EPBC Act threatened species search tool, and of the database review varied out by Bamford *et al.* (2022) are presented in Appendix *5*. The EPBC database returned three Threatened Ecological Communities (TECs) and 16 species of MNES, while the overall dataset review returned three species listed under legislation (Conservation Significance level 1 (CS1), nine species listed as priority by the DBCA (Conservation Significance level 2 (CS2), and 35 species considered to be locally significant in the greater Perth area by Dell and Banyard (2000) (Conservation Significance level 3 (CS3).

Of the TECs, only Banksia Woodland is likely to be present and is represented on the Chandala site by one small patch that overlaps with expansion area C.

Of the 16 MNES species, five have been recorded on the Chandala site over the course of studies carried out by BCE. The Common Sandpiper and Common Greenshank have occasionally bee observed on the borrow pits in very small numbers (generally single birds), while both Carnaby's and the Forest Red-tailed Black-Cockatoos are present at least occasionally (as discussed above). In addition, a single *Galaxiella* was caught in the largest borrow pit during invertebrate sampling carried out in 1996. At the time, it was identified as *Galaxiella munda* (the Mud Minnow). This record indicates that the borrow pits are occasionally connected to the local drainage system during high water levels. Both species have small, isolated populations in the Ellen Brook to Gingin area (Allan *et al.* (2011). The Mud Minnow is listed as Vulnerable under the WA Biodiversity conservation Act, but is not listed under the EPBC Act. The remaining MNES species are considered highly unlikely to be present, due largely to the type and condition of the environment, and in particular the generally degraded nature of the vegetation.

Considering the species listed by Bamford *et al.* (2022), only one CS1 species, the Peregrine Falcon, is expected, and it has been recorded. A pair is occasionally seen over the borrow pits during waterbird surveys and on two occasions one of the birds struck down a waterbird. Peregrine Falcons range over a large area but this pair probably breeds somewhere in the general region. The species will use old nests of other species, such as the Australian Raven, so there is a slight chance they nest on the Chandala site. For other CS1 species, the Chandala site lacks suitable habitat. The Brush-tailed Phascogale may formerly have been present, but the vegetation is too degraded for it to still occur regularly.

Only one of the nine CS2 species is considered likely to be present, again due to poor habitat quality. This is the Rakali or Water-Rat, which might occasionally occur along Ellen/Chandala Brook.

The 35 species listed as CS3 include just nine species that have actually been recorded, but a further 12 species that might utilise the site at least occasionally. Species are listed as CS3 because they tend to disappear from disturbed/degraded landscapes, so the presence of some of these species indicates that the Chandala site has retained at least some of the more sensitive components of the local biodiversity. The presence of species such as the Splendid Fairy-wren, New Holland Honeyeater, White-browed Scrubwren and Red-capped Robin, which are all seen moderately regularly, is especially encouraging.

4 Summary and Conclusions

Tronox operates its mineral sands processing plant at the Chandala site and is proposing to expand the infrastructure area at the plant. Tronox has therefore requested Bamford Consulting Ecologists (BCE) to undertake a significant fauna assessment of the proposed expansion areas and the site overall, with a focus on the three threatened black-cockatoo species known from the broader area, but to include other species of conservation significance, and especially other Matters of National Environmental Significance (MNES).

The Chandala site was visited twice in February 2024 to document vegetation types, record trees that might have potential as nest trees for black-cockatoos, and to search for signs of foraging by black-cockatoos. In addition, the site has been visited on multiple occasions by BCE personnel since the early 1990s, and had been first visited in 1988, so it was possible to draw upon long-term fauna records to supplement observations made in 2024.

The Chandala site lies mostly on the floodplain of the Chandala/Ellen Brook; it had been extensively cleared for agriculture before being acquired by Tronox in the 1980s, and the vegetation had been degraded by livestock. The site was destocked by Tronox. There was some clearing and extraction of fill during development of the processing plant, and also some planting of largely non-native tree species, such that the current landscape consists of a mosaic of at least partly degraded native vegetation, areas of pasture, an extensive arboretum, planted non-native trees throughout the processing plant area, and both artificial (flooded borrow pits and stormwater ponds) and natural (Chandala/Ellen Brook, Yal Yal Brook and flood-prone flats) wetlands. The largest areas of native vegetation are Flooded Gum Woodlands on the riverine flats. The most notable native vegetation, especially for black-cockatoos, are small patches of Marri Woodland and Banksia Woodland.

The four expansion areas are all within or close to the existing processing plant area. Areas A.2 and B are largely cleared or support mostly planted, non-native trees, whereas areas A.1 and C support native vegetation; area A.1 supports Melaleuca over Damp Heath, with scattered banks and Marri, while area C supports the only intact (albeit degraded) patch of Banksia Woodland. This patch of Banksia Woodland would probably qualify as an example of the Banksia Woodland Threatened Ecological Community under the EPBC Act, but its small size and poor condition would need to be considered.

The Chandala site falls within the range of only Carnaby's and the Forest Red-tailed Black-Cockatoos, with both species recorded occasionally in past surveys; some evidence that Carnaby's was a more regularly visitor before 2009 than subsequently. Recent forage evidence of the Forest Red-tail was found in 2024, but only old foraging evidence of Carnaby's. Most of the native vegetation is of low foraging value for either species, but the small patch of Banksia Woodland is of low to moderate value for Carnaby's, and the Marri Woodland of low to moderate value for the Forest Red-tail. The survey for potential nest trees recorded 88 large trees that met the basic criterion of a potential nest tree, but only six trees possibly had suitable hollows (but no good evidence of recent breeding). There is no known roosting within the site, and the nearest known roost is 6km to the south. Overall, the two black-cockatoo species would appear to be only occasional visitors to the site, in small numbers, with only small areas of foraging habitat (Marri and Banksia Woodlands), and no sign that either breeds or roosts on the site. The Forest Red-tail is probably a slightly more regular visitor than Carnaby's.

Few other species of conservation significance have been recorded or are likely to use the site. Species of some interest are:

- Peregrine Falcon. A pair seen occasionally and thus the Chandala site would appear to be part of their foraging range.
- *Galaxiella* (minnow); either or both *G. nigrostriata* and *G. munda*. One of these recorded in the borrow pit and may be present occasionally in wetlands across the Chandala site.
- A suite of locally significant (but not listed) bird species.

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Appendices

Appendix 1. Scoring system for the assessment of foraging value of vegetation for Black-Cockatoos.

Bamford Consulting Ecologists

Revised 4th April 2021

Introduction

Application of the Offset Assessment Guide (offsets guide) developed by the federal environment department for assessing Black-Cockatoo foraging habitat requires the calculation of a score out of 10. The following system has been developed by Bamford Consulting Ecologists (BCE) with assistance from Quessentia Consulting to provide an objective scoring system that is practical and can be used by trained field zoologists with experience in the environments frequented by the species.

The foraging value score provides a numerical value that reflects the significance of vegetation as foraging habitat for Black-Cockatoos, and this numerical value is designed to provide the information needed by the Federal Department of Agriculture, Water and the Environment (DAWE) to assess impact significance and offset requirements. The foraging value of the vegetation depends upon the type, density and condition of trees and shrubs in an area and can be influenced by the context such as the availability of foraging habitat nearby. The BCE scoring system for value of foraging habitat has three components as detailed above. These three components are drawn from the DAWE offsets guide but the scoring approach was developed by BCE and includes a fourth (moderation) component.

Note that the scoring system can only be applied within the range of the species or at least where the species could reasonably be expected to occur based upon existing information.

Calculating the total score (out of 10) requires the following steps:

A. Site condition. Determining a score out of six for the vegetation composition, condition and structure; plus
B. Site context. Determining a score out of three for the context of the site; plus
C. Species stocking rate. Determining a score out of one for species density.
D. Determining the total score out of 10, which may require moderation for context and species density with respect to the site condition (vegetation) score. Moderation also includes consideration of pine plantations as a special case for foraging value.

The BCE scoring system places the greatest weight on site condition (scale of 0 to 6) because this has the highest influence on the foraging values of a site, which in turn is the fundamental driver in meeting ecological requirements for continued survival.

Site context has a lower weight (scale of 0 to 3) in recognition of the mobility of the species, which means they can access good foraging habitat even in fragmented landscapes, but allowing for

recognition of the extent of available habitat in a region and context in relation to activity (such as breeding and roosting). The application of scoring site context is further discussed below.

Species stocking rate is given a low weight (0 to 1) as it is a means only of recognising that a species may or may not be abundant at a site, but that abundance is dependent upon site condition and context and is thus not an independent variable. The abundance of a species is also sensitive to sampling effort, and to seasonal and annual variation, and is therefore an unreliable indicator of actual importance of a site to a species.

Calculation of scores and the moderation process are described in detail below.

A. Site condition. Vegetation composition, condition and structure scoring

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
0	No foraging value. No Proteaceae, eucalypts or other potential sources of food. Examples: • Water bodies (e.g. salt lakes, dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits) or with vegetation of no food value, such as some suburban landscapes. • Mown grass	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g. dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).	No foraging value. No eucalypts or other potential sources of food. Examples: • Water bodies (e.g. dams, rivers); • Bare ground; • Developed sites devoid of vegetation (e.g. infrastructure, roads, gravel pits).
1	Negligible to low foraging value. Examples: • Scattered specimens of known food plants but projected foliage cover of these is < 2%. This could include urban areas with scattered foraging trees; • Paddocks that are lightly vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source; • Blue Gum plantations (foraging by Carnaby's Black-Cockatoos has been reported but appears to be unusual).	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. This could include urban areas with scattered foraging trees.	Negligible to low foraging value. Scattered specimens of known food plants but projected foliage cover of these < 1%. Could include urban areas with scattered foraging trees.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
2	Low foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have < 10% projected foliage cover; • Woodland with tree banksias 2-5% projected foliage cover; • Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Open eucalypt woodland/mallee of small-fruited species; • Paddocks that are densely vegetated with melons or other known food-source weeds (e.g. *Erodium* spp.) that represent a short-term and/or seasonal food source.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g. Marri and Jarrah) 1-5% projected foliage cover; • Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); • Urban areas with scattered foraging trees.	Low foraging value. Examples: • Woodland with scattered specimens of known food plants (e.g. Marri, Jarrah) 1-5% projected foliage cover; • Marri-Jarrah Woodland with <10% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Woodland with <10% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants <10% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants <10% projected foliage cover (establishing food sources with good long-term viability); • Urban areas with scattered food plants such as Cape Lilac, *Eucalyptus caesia* and *E. erythrocorys*.

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
3	Low to Moderate foraging value. Examples: • Shrubland in which species of foraging value, such as shrubby banksias, have 10-20% projected foliage cover; • Woodland with tree banksias 5-20% projected foliage cover; • Woodland with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Eucalypt Woodland/Mallee of small-fruited species; • Eucalypt Woodland with Marri < 10% projected foliage cover.	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri) 5-20% projected foliage cover; • Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).	Low to Moderate foraging value. Examples: • Eucalypt Woodland with known food plants (especially Marri and Jarrah) 5-20% projected foliage cover; • Marri-Jarrah Woodland with 10-40% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 10-40% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 10-40% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 10-40% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
4	Moderate foraging value. Examples: • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) 20-40% projected foliage cover; • Woodland/low forest with tree banksias (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 20-40% projected foliage cover; • Eucalypt Woodland/Forest with Marri 20-40% projected foliage cover.	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability); • Orchards with highly desirable food sources (e.g. apples, pears, some stone fruits).	Moderate foraging value. Examples: • Marri-Jarrah Woodland/Forest with 20-40% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with 40-60% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants 40-60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants 40-60% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
5	Moderate to High foraging value. Examples: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with 40-60% projected foliage cover; • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have 40-60% projected foliage cover; • Marri-Jarrah Forest with 40-60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term). • Pine plantations with trees more than 10 years old (but see pine note below in moderation section).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).	Moderate to High foraging value. Examples: • Marri-Jarrah Forest with 40-60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover but vegetation condition reduced due to weed invasion and/or some tree deaths; • Sheoak Forest with > 60% projected foliage cover; • Parkland-cleared Eucalypt Woodland/Forest with known food plants >60% projected foliage cover (poor long-term viability without management); • Younger areas of (managed) revegetation with known food plants >60% projected foliage cover (establishing food sources with good long-term viability).

Site Score	Description of Vegetation Values		
	Carnaby's Black-Cockatoo	**Baudin's Black-Cockatoo**	**Forest Red-tailed Black-Cockatoo**
6	High foraging value. Example: • Banksia Low Forest (of key species *B. attenuata* and *B. menziesii*) with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term). • Kwongan/ Shrubland in which species of foraging value, such as shrubby banksias, have >60% projected foliage cover; • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).	High foraging value. Example: • Marri-Jarrah Forest with > 60% projected foliage cover and vegetation condition good with low weed invasion and/or low tree deaths (indicating it is robust and unlikely to decline in the medium term).

Vegetation structural class terminology follows Keighery (1994).

B. Site context.

Site Context is a function of site size, availability of nearby habitat and the availability of nearby breeding areas. Site context includes consideration of connectivity, although Black-Cockatoos are very mobile and will fly across paddocks to access foraging sites. Based on BCE observations, Black-Cockatoos are unlikely to regularly go over open ground for a distance of more than a few kilometres and prefer to follow tree-lines.

The maximum score for site context is 3, and because it is effectively a function of presence/absence of nearby breeding and the distribution of foraging habitat across the landscape, the following table, developed by Bamford Consulting in conjunction with the Department of the Environment and Energy (DEE; now DCCEEW), provides a *guide* to the assignation of site context scores. Note that 'local area' is defined as within a 15 km radius of the centre point of the study site. This is greater than the maximum distance of 12km known to be flown by Carnaby's Black-Cockatoo when feeding chicks in the nest.

Site Context Score	Percentage of the existing native vegetation within the 'local' area that the study site represents.	
	'Local' breeding known/likely	'Local' breeding unlikely
3	> 5%	> 10%
2	1 - 5%	5 - 10%
1	0.1 - 1%	1 - 5%
0	< 0.1%	< 1%

The table above provides weighting for where nearby breeding is known (or suspected) and for the proportion of foraging habitat within 15 km represented by the site being assessed. Some adjustments may be needed based on the judgement of the assessor and in relation to the likely function of the site. For example, a small area of foraging habitat (e.g. 0.5% of such habitat within 15 km) could be upgraded to a context of 2 if it formed part of a critical movement corridor. In contrast, the same sized area of habitat, of the same local proportion, could be downgraded if it were so isolated that birds could never access it.

C. Species density (stocking rate).

Species stocking rate is described as "the usage and/or density of a species at a particular site" in the offsets guide. The description also implies that a site supports a discrete population, which is unlikely in the case of very mobile black-cockatoos. Assignation of the species density score (0 or 1) is based upon the black-cockatoo species being either abundant or not abundant. A score of 1 is used where the species is seen or reported regularly and/or there is abundant foraging evidence. Regularly is when the species is seen at intervals of every few days or weeks for at least several months of the year. A score of 0 is used when the species is recorded or reported very infrequently and there is little or no foraging evidence. Where information on actual presence of birds is lacking, a species density score can be assigned by interpreting the landscape and the site

context. For example, a site with a moderate condition score that is part of a network of such habitat where a black-cockatoo species is known would get a species density score of 1 even without clear presence data, while a species density score of 0 can be assigned to a site where the level of usage can confidently be predicted to be low.

D. Moderation of scores for the calculation of a value out of 10.

The calculation out of 10 requires the vegetation characteristics (out of 6) to be combined with the scores given for context and species density. It is considered that the context and density scores are not independent of vegetation characteristics; otherwise habitat of absolutely no value for black-cockatoo foraging (such as concrete or a wetland) could get a foraging score out of 10 as high as 4 if it occurred in an area where the species breed (context score of 3) and are abundant (species density score of 1). Similarly, vegetation of negligible or low characteristics which could not support black-cockatoos could be assigned a score as high as 6 out of 10. In that case, the score of 6 would be more a reflection of nearby vegetation of high characteristics than of the foraging value of the negligible to low scoring vegetation. The Black-Cockatoos would only be present because of vegetation of high characteristics, so applying the context and species density scores to vegetation of low characteristics would not give a true reflection of their foraging value.

For this reason, the context and species density scores need to be moderated for the vegetation characteristic score to prevent vegetation of little or no foraging value receiving an excessive score out of 10. A simple approach is to assign a context and species density score of zero to sites with a Condition score of low (2), negligible (1) or none (0), on the basis that birds will not use such areas unless they are adjacent to at least low-moderate quality foraging habitat (≥3). The approach to calculating a score out of 10 can be summarised as follows:

Vegetation composition, condition and structure score	Context score	Species density score
3-6 (low/moderate to high value)	Assessed as per B above	Assessed as per C above
0-2 (no to low value)	0	0

Note that this moderation approach may require interpretation depending on the context. For example, vegetation with a condition score of 2 could be given a context score of 1 under special circumstances. Such as when very close to a major breeding area or if strategically located along a movement corridor.

Pine plantations

Pine plantations are an important foraging resource for Carnaby's Black-Cockatoo (only) but are not directly comparable with native vegetation. In comparing native vegetation with pine plantations for the purpose of calculating offsets, the following should be noted:

- Pine plantations are a commercial crop established with the intention of being harvested and thus have short-term availability (30-50 years), whereas native vegetation is available indefinitely if protected. Due to the temporary nature of pines as a food source, site condition and context differs between pines and native vegetation.
- Although pines provide a high abundance of food in the form of seeds, they are a limited food resource compared with native vegetation which provides seeds, insect larvae, flowers and nectar. The value of insect larvae in the diet of Carnaby's Black-Cockatoo has not been quantified, but in the vicinity of Perth, the birds forage very heavily on insect larvae in young cones of *Banksia attenuata* in winter, ignoring the seeds in these cones and seeds in older cones on the same trees (Scott and Black 1981; M. Bamford pers. obs.). This suggests that insect larvae are of high nutritional importance immediately prior to the breeding season.
- Pine plantations have very little biodiversity value other than their importance as a food source for Carnaby's Black-Cockatoos. They inhibit growth of other flora. While this is not a factor for direct consideration with respect to Carnaby's Black-Cockatoo, it is a factor in regional conservation planning of which offsets for the cockatoos are a part.

Taking the above points into consideration, it is possible to assign pine plantations a foraging value as follows:

- Site condition. The actual foraging value of pines is high. Stock *et al.* (2013) report that it takes nearly twice as many seeds of *Pinus pinaster* to meet the daily energy requirements for Carnaby's Black-Cockatoo compared with Marri, and three times as many *P. pinaster* seeds compared with Slender Banksia. However, pines are planted at a high density so the food supply per hectare can be high. Taking account of the lack of variety of food from pines, this suggests a site condition score of 4 or 5 out of 6 (5 is used in Section A above). As a source of food, pines are thus comparable to the best banksia woodland. This site condition score then needs to be adjusted to take account of the short-term nature of the food supply (for pine plantations to be harvested. Where pines are 'ornamental, such as in some urban contexts, they can be treated as with other trees in urban landscapes). The foraging value of a site after pines are harvested will effectively be 0, or possibly 1 if there is some retention. It is proposed that this should approximately halve the site condition score; young pine plantations could be redacted slightly less than old plantations on the basis that a young plantation provides a slightly longer term food supply. If a maximum site condition score of 5 is given, then a young plantation (>10 but <30 years old) could be assigned a score of 3, and an old plantation (>30 years old) could be assigned a score of 2. Plantations <10 years old and thus not producing large quantities of cones could also get a score of 2, but recognising they may increase in value.
- Site context. Although a temporary food source, pines can be very important for Carnaby's Black-Cockatoo in some contexts; they could be said to carry populations in areas where there is little native vegetation. The system for assigning a context score as outlined above (Section B) also applies to pines. Thus, a context score of 3 can be given where pines are

a significant proportion of foraging habitat (>5% if breeding occurs; >10% if no breeding), but where pines are a small part of the foraging landscape they will receive a context score of less than this.

- Species density. As outlined above (Section C), pines will receive a species density score of 1 where Carnaby's Black-Cockatoo are regular visitors. This is irrespective of an old plantation having a moderated condition score of 2.

Based on the above, pine plantations that represent a substantial part of the foraging landscape, such as in the region immediately north of Perth, would receive a total score (out of 10) of 6; young plantations in this area would receive a score of 7. In contrast, isolated and small plantations in rural landscapes could receive a score of just 2 if they are only a small proportion of foraging habitat and Carnaby's Black-Cockatoos are not regularly present.

Appendix 2. Opportunistic sightings during site visits in 2024.

Table 4 Opportunistic observations during site visits by BCE personnel.

Taxon	Species	Common Name
Birds	*Barnardius zonarius*	Australia Ringneck
	Purpureicephalus spurius	Red-capped Parrot
	Ocyphaps lophotes	Crested Pigeon
	Phaps chalcoptera	Common Bronzewing
	Malurus splendens	Splendid Fairy-wren.
	Gerygone fusca	Western Gerygone
	Smicrornis brevirostris	Weebill
	Anthochaera carunculate	Red Wattlebird
	Lichenostomus virescens	Singing Honeyeater
	Lichmera indistincta	Brown Honeyeater
	Acanthorhynchus superciliosus	Western Spinebill
	Phylidonyris novaehollandiae	New Holland Honeyeater
	Pachycephala rufiventris	Rufous Whistler
	Gymnorhina tibicen	Australian Magpie
	Cracticus torquatus	Grey Butcherbird
	Corvus coronoides	Australian Raven
	Zosterops lateralis	Silvereye
Mammals	*Macropus fuliginosus*	Western Grey Kangaroo
	Oryctolagus cuniculus	Rabbit
Reptiles	*Tiliqua rugosa*	Bobtail

Appendix 3. Locations and notes on trees with DBH>500mm within Chandala Site.

Wypt	Easting	Northing	Species	DBH	Rank	Notes
1446	402020.8	6511385.8	*Corymbia calophylla*	1000	3	dead ? Marri with 2 possible hollows
1459	401071.3	6510756.7	*Corymbia calophylla*	700	3	dead
1468	401168.7	6510743.1	*Corymbia calophylla*	700	3	dead
1480	402239.5	6509251.7	*Eucalyptus rudis*	2 x 500	3	good hollow just large enough. Photo
1488	401932.8	6509420.9	*Eucalyptus rudis*	800	3	good hollow with possible old chews. Photo
1514	401347.8	6510270.5	*Corymbia calophylla*	800	3	also photo
1452	401171.6	6510706.9	*Corymbia calophylla*	600	4	dead
1458	401109.5	6510760.8	*Corymbia calophylla*	700	4	
1465	401196.5	6510772.3	*Corymbia calophylla*	800	4	dead
1477	402633	6509292.7	*Corymbia calophylla*	900	4	a good hollow but only 6m
1482	402020.5	6509243.5	*eucalyptus ?camaldulensis*	600	4	
1483	402034.7	6509251.7	*Eucalyptus rudis*	700	4	possum hole?
1484	402031.3	6509261.1	*Eucalyptus rudis*	600	4	
1497	401655.5	6510110.5	*Corymbia calophylla*	900	4	
1499	401683.4	6510155.1	*Corymbia calophylla*	700	4	dead
1500	401678.6	6510162.7	*Corymbia calophylla*	700	4	dead
1515	401355.1	6510297	*Corymbia calophylla*	800	4	dead
1516	401364.8	6510313.1	*Corymbia calophylla*	600	4	
1424	401673.5	6510885.1	*Eucalyptus sp*	700	5	
1425	401666.8	6510831.1	*Eucalyptus sp*	600	5	
1426	401678.6	6510807.2	*Eucalyptus sp*	600	5	
1427	401690.3	6510809.9	*Eucalyptus sp*	600	5	
1428	401683.5	6510825.1	*Eucalyptus sp*	600	5	
1429	401640	6510816.9	*Eucalyptus sp*	600	5	
1430	401596.6	6510830.9	*Eucalyptus sp*	600	5	
1431	401594.1	6510875.7	*Eucalyptus sp*	500	5	
1432	401567.6	6510956.3	*Eucalyptus sp*	250	5	
1433	401573.7	6510983.1	*Eucalyptus sp*	700	5	
1434	401568.3	6511012	*Eucalyptus sp*	600	5	
1435	401553.9	6511032.1	*Eucalyptus sp*	600	5	
1436	401503.4	6511011.5	*Eucalyptus sp*	600	5	
1437	401502.3	6510978.9	*Eucalyptus sp*	600	5	
1438	401497.2	6510973.2	*Eucalyptus sp*	700	5	
1440	401951.5	6511066.5	*Eucalyptus sp*	600	5	rough barked eastern states
1441	401919.1	6511127.2	*Eucalyptus sp*	500	5	
1442	401928.2	6511110.5	*Eucalyptus sp*	2 x 400	5	
1443	401960.1	6511039.2	*Eucalyptus sp*	500	5	
1444	401962.6	6511036.1	*Eucalyptus sp*	500	5	
1445	401982.9	6511005.7	*Eucalyptus sp*	600	5	
1448	401758.1	6511136.1	*Eucalyptus sp*	500	5	

1448	401531.5	6510825.7	*Eucalyptus sp*	700	5	
1449	401540.1	6510903.4	*Eucalyptus sp*	500	5	
1450	401354.5	6510689	*Eucalyptus rudis*	500	5	
1451	401221	6510723.6	*Corymbia calophylla*	600	5	
1453	401142.5	6510697	*Corymbia calophylla*	500	5	FRtBC recent forage
1454	401140.8	6510699.5	*Corymbia calophylla*	700	5	FRtBC recent forage
1455	401130.2	6510636.6	*Eucalyptus sp*	600	5	
1456	401097.3	6510717.4	*Corymbia calophylla*	600	5	
1457	401117.5	6510755.9	*Corymbia calophylla*	600	5	dead
1461	401095.7	6510909.4	*Eucalyptus rudis*	500	5	
1462	401123.9	6510879.6	*Eucalyptus rudis*	500	5	
1463	401121.8	6510787	*Corymbia calophylla*	700	5	dead
1464	401152	6510802.7	*Corymbia calophylla*	500	5	dead
1466	401191.1	6510755	*Corymbia calophylla*	500	5	
1469	401187.3	6510729.8	*Corymbia calophylla*	600	5	
1471	401743.5	6510640.8	*Eucalyptus globulus*	600	5	and photo Yal Yal flats
1474	403371.6	6509355.3	*Eucalyptus sp*	500	5	
1478	402540.6	6509306.7	*Corymbia calophylla*	800	5	
1481	401982.7	6509228.6	*Eucalyptus rudis*	500	5	
1485	402022.3	6509299.7	*Eucalyptus rudis*	500	5	
1486	402058.6	6509310	*Eucalyptus rudis*	600	5	
1487	402043.3	6509320.4	*Eucalyptus rudis*	600	5	
1489	402028.3	6509539.7	*Corymbia calophylla*	600	5	
1490	402024.1	6509548.3	*Corymbia calophylla*	600	5	
1491	402036	6509576.9	*Corymbia calophylla*	500	5	
1492	402045.4	6509584.9	*Corymbia calophylla*	700	5	
1493	402184.6	6509721.6	*Corymbia calophylla*	700	5	
1494	402155.9	6509712.9	*Corymbia calophylla*	500	5	
1496	401609.6	6510121.1	*Corymbia calophylla*	900	5	
1498	401686.8	6510111.8	*Corymbia calophylla*	600	5	dead
1501	401663	6510171.6	*Corymbia calophylla*	500	5	
1502	401660.4	6510171.9	*Corymbia calophylla*	600	5	dead
1503	401655	6510159	*Corymbia calophylla*	600	5	dead
1504	401653	6510146.1	*Corymbia calophylla*	500	5	
1505	401677.3	6510011.1	*Corymbia calophylla*	600	5	
1506	401686.9	6510022.8	*Corymbia calophylla*	700	5	dead
1507	401605.4	6509924	*Corymbia calophylla*	800	5	
1509	401509.4	6509917.1	*Eucalyptus rudis*	2 x 500	5	
1510	401504.4	6509961.6	*Eucalyptus rudis*	600	5	
1511	401457	6510014.9	*Corymbia calophylla*	700	5	also recent FRtBC forage on Marri
1512	401355.5	6510229.9	*Corymbia calophylla*	700	5	
1513	401345.8	6510246.7	*Corymbia calophylla*	600	5	
1517	401348.8	6510342.5	*Corymbia calophylla*	500	5	
1518	401309.5	6510315.3	*Corymbia calophylla*	600	5	

Appendix 4. Waypoint locations and notes on foraging signs of Black-Cockatoos, February 2024.

Wypt	Easting	Northing	Notes
1439	401857.1	6510778.4	old forage by CBC on *B. attenuata* cones
1447	401834.5	6511247.8	old forage CBC on *B. attenuata* cones
1453	401142.5	6510697	*Corymbia calophylla* with FrtBC recent foraging signs
1454	401140.8	6510699.5	*Corymbia calophylla* with FrtBC recent foraging signs
1467	401176.8	6510746.2	*Corymbia calophylla* with FrtBC recent foraging signs
1508	401630.3	6509907.3	FRtBC forage recent Marri and photo *Eucalyptus rudis* and *Melaleuca sp.* along brook
1511	401457	6510014.9	*Corymbia calophylla* with FrtBC recent foraging signs
1519	401303.2	6510280.6	FRtBC recent forage Marri

CBC = Carnaby's Black-Cockatoo. FRtBC = Forest Red-tailed Black-Cockatoo

Appendix 5. MNES and other conservation significant species retuned from databases.

In the following tables, species recorded or considered highly likely to occur regularly on the Chandala site are presented in **bold**. Likewise, TECs considered present or likely to be present are indicated in **bold**. Species actually recorded are indicated with an asterisk.

5.1. Listed Threatened Ecological Communities (TECs) considered likely to occur within area

Community	Threatened category
Banksia Woodlands of the Swan Coastal Plain ecological community	**Endangered ***
Empodisma peatlands of southwestern Australia	Endangered
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered

5.2. Conservation significant species considered to be MNES (EPBC database).

Scientific Name	English Common Name	Migratory	Threatened Category
Actitis hypoleucos	**Common Sandpiper**	**X ***	
Tringa nebularia	**Common Greenshank**	**X ***	
Apus pacificus	Fork-tailed Swift	x	
Calidris acuminata	Sharp-tailed Sandpiper	x	Vulnerable
Calidris ferruginea	Curlew Sandpiper	x	Critically Endangered
Calidris melanotos	Pectoral Sandpiper	x	
Calyptorhynchus 49anksia naso	**Forest Red-tailed Black-Cockatoo**		**Vulnerable ***
Leipoa ocellata	Malleefowl		Vulnerable
Motacilla cinerea	Grey Wagtail	x	
Numenius madagascariensis	Eastern Curlew	x	Critically Endangered
Rostratula australis	Australian Painted-snipe		Endangered
Zanda latirostris* listed as *Calyptorhynchus latirostris	**Carnaby's Black-Cockatoo**		**Endangered ***
Galaxiella nigrostriata	**Black-striped Dwarf Galaxia**		**Endangered *?**
Dasyurus geoffroii	Chuditch		Vulnerable
Hesperocolletes douglasi	Douglas' Broad-headed Bee		Critically Endangered
Westralunio carteri	Carter's Freshwater Mussel		Vulnerable

5.3. Additional conservation significant species returned from regional database review (Bamford *et al.* 2022). These divided into three categories: CS 1 – listed under state and/or federal legislation (codes in parenthesis refer to threatened category under legislation); CS 2 – listed as Priority by DBCA in WA only; CS 3 – listed as locally significant in the greater Perth area by Dell and Banyard (2000).

English Name	Latin Name	Conservation status
Falco peregrinus	**Peregrine Falcon**	**CS1 (S7) ***
Calyptorhynchus (Zanda) baudinii	Baudin's Black-Cockatoo	CS1 (V, S2[e])
Phascogale tapoatafa wambenger	Brush-tailed Phascogale	CS1 (V, S3[v])
Ctenotus gemmula	Jewelled Sand-plain Skink	CS2 (P3)
Neelaps calonotos	Black-striped Snake	CS2 (P3)
Ninox connivens	Barking Owl	CS2 (P2)
Tyto novaehollandiae	Masked Owl	CS2 (P2)
Isoodon fusciventer	Quenda	CS2 (P5)
Notamacropus irma	Brush Walalby	CS2 (P4)
Hydromys chrysogaster	**Rakali, Water-Rat**	**CS2 (P4)**
Leioproctus contrarius	Short-tongued bee	CS2 (P3)
Glossurocolletes bilobatus	Short-tongued bee	CS2 (P2)
Phaps chalcoptera	**Common Bronzewing**	**CS3 ***
Lophoictinia isura	Square-tailed Kite	CS3
Haliastur sphenurus	**Whistling Kite**	**CS3 ***
Accipiter fasciatus	**Brown Goshawk**	**CS3**
Accipiter cirrocephalus	**Collared Sparrowhawk**	**CS3 ***
Aquila audax	**Wedge-tailed Eagle**	**CS3**
Hieraaetus morphnoides	**Little Eagle**	**CS3 ***
Falco berigora	**Brown Falcon**	**CS3**
Turnix varius	Painted Button-quail	CS3
Platycercus icterotis	Western Rosella	CS3
Malurus splendens	**Splendid Fairy-wren**	**CS3 ***
Malurus leucopterus	White-winged Fairy-wren	CS3
Malurus lamberti	Variegated Fairy-wren	CS3
Sericornis frontalis	**White-browed Scrubwren**	**CS3 ***
Smicrornis brevirostris	**Weebill**	**CS3**
Acanthiza chrysorrhoa	**Yellow-rumped Thornbill**	**CS3 ***
Acanthiza inornata	Western Thornbill	CS3
Acanthiza apicalis	**Inland Thornbill**	**CS3**
Anthochaera lunulata	**Western Wattlebird**	**CS3**
Glyciphila melanops	Tawny-crowned Honeyeater	CS3
Phylidonyris novaehollandiae	**New Holland Honeyeater**	**CS3 ***
Phylidonyris niger	**White-cheeked Honeyeater**	**CS3**
Ptilotula ornata	Yellow-plumed Honeyeater	CS3

Daphoenositta chrysoptera	Varied Sittella	CS3
Pachycephala fuliginosa	**Western Whistler**	**CS3**
Colluricincla harmonica	**Grey Shrike-thrush**	**CS3**
Artamus cinereus	**Black-faced Woodswallow**	**CS3 ***
Artamus cyanopterus	**Dusky Woodswallow**	**CS3**
Cracticus nigrogularis	Pied Butcherbird	CS3
Strepera versicolor	Grey Currawong	CS3
Myiagra inquieta	Restless Flycatcher	CS3
Petroica boodang	**Scarlet Robin**	**CS3**
Petroica goodenovii	**Red-capped Robin**	**CS3 ***
Eopsaltria georgiana	White-breasted Robin	CS3
Melanodryas cucullata	Hooded Robin	CS3

Appendix C Chandala Expansion Areas Flora and Vegetation Assessment

Environmental Assessment Report

Chandala Battery Energy Storage System

Accenture Australia Pty Ltd

SLR Project No.: 675.073695.00001

30 July 2026

umwelt
Environmental & Social Consultants

CHANDALA EXPANSION AREAS

Flora and Vegetation Assessment

FINAL

October 2024

CHANDALA EXPANSION AREAS

Flora and Vegetation Assessment

FINAL

Prepared by
Umwelt (Australia) Pty Limited
on behalf of
Tronox Management Pty Ltd

Project Director:	Cathy Godden
Project Manager:	Alison Saligari
Report No.	R01
Date:	October 2024

umwelt
Environmental & Social Consultants

This report was prepared using Umwelt's ISO 9001 certified Quality Management System.

Acknowledgement of Country

Umwelt would like to acknowledge the traditional custodians of the country on which we work and pay respect to their cultural heritage, beliefs, and continuing relationship with the land. We pay our respect to the Elders – past, present, and future.

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Executive Summary

Tronox Management Pty Ltd (Tronox) is investigating potential expansion of their Chandala mineral sands processing plant at Muchea (the Project), located approximately 50 kilometres (km) north-east of Perth (the Project). Umwelt were commissioned by Tronox to conduct a flora and vegetation assessment for the Project. The survey involved a reconnaissance survey as defined in Section 4.1 of the Environmental Protection Authority (EPA) *Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment*.

The field survey of the Survey Area was undertaken in July 2024. This assessment was an out of season survey, with the aim being to assess if the area is likely to support significant flora and vegetation, based on the species identifiable at time of survey, vegetation types present and condition of the vegetation. Three relevés and 57 vegetation observation points were surveyed in the Survey Area, with this data used to prepare structural vegetation classification and mapping (including vegetation condition mapping). No quadrats were surveyed (as per EPA 2016), due to both the timing of the survey (outside of the primary survey season, spring) and degraded nature of the vegetation present.

A total of 70 discrete vascular flora taxa were recorded in the Survey Area by the survey. A total of 20 introduced flora taxa were recorded within the Study Area by the survey. Of these, one is a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), being *Zantedeschia aethiopica* (Arum Lily). No listed significant flora taxa (excluding one planted occurrence of *Grevillea fililoba* (P1)) were recorded by the survey. *Grevillea fililoba* (P1) naturally occurs east of Geraldton, typically occurring on slopes, hills and breakaways, typically with laterite. This taxon is not naturally present in the Survey Area (planted), and therefore, the individual recorded is not considered to be significant.

An assessment of the likelihood of occurrence of significant flora taxa identified that all 65 significant flora taxa known to occur within the Desktop Study Area are considered unlikely to occur in the Survey Area. This was due to habitat not considered to be present, either through landforms/soil not present in the Survey Area, or through the vegetation condition being too degraded to support populations of these taxa (Degraded; Completely Degraded). The lower stratum of the vegetation throughout the Survey Area comprised predominantly of pasture weeds, with the mid and upper stratums also severely impacted by historical clearing activities and potential Phytophthora Dieback.

The vegetation of the Survey Area was mapped and described via structural classification from floristic and structural data recorded at relevés and vegetation observation points. Due to the long history of disturbance within the Survey Area, there were many areas that still possess tree or large shrub taxa, but have other structural layers comprised largely of introduced taxa, or with significantly reduced native taxon diversity and are no longer considered to represent intact remnant vegetation. The classification of vegetation was therefore divided into two categories: Vegetation Types (VTs) and Highly Modified Areas (HMAs). It is likely that many of the Highly Modified Areas are degraded versions of described VTs, however it is not possible to confidently align them given their condition. Two VTs and 12 highly modified areas were described and mapped in the Survey Area. The two VTs included VTs BW (Banksia Woodland) and CpRcS (*Callitris pyramidalis / Regelia ciliata* shrubland); both of which were mapped as Degraded to Completely Degraded.

The majority of the vegetation of the Survey Area was rated as Completely Degraded (16 ha / 29.5 % of the Survey Area), with the vegetation structure of these areas was no longer intact, comprising of weed species with isolated native trees and shrubs, or comprising of previously cleared areas with the majority of vegetation present being planted trees and shrubs. A total of 8.7 ha (16.1 % of the Survey Area) was rated as Degraded, with the vegetation structure severely impacted by multiple disturbances including partial clearing, aggressive weeds, grazing and potential Phytophthora Dieback. No vegetation within the Survey Area was considered to be in Good or better condition. A total of 29.4 ha of 'Cleared' land was mapped, representing 54.4 % of the Survey Area.

A qualitative assessment of the relevé data recorded during the current survey was undertaken to assess for the Swan Coastal Plain (SCP) Floristic Community Types (FCTs) potentially present within the Survey Area. It is considered that the vegetation mapped as BW is potentially representative of Gibson et. al. (1994) SCP FCTs 23a or 21c; however, the vegetation is too degraded to confidentially align an FCT. It is unlikely that assessment through the use of quadrat data collection and classification analyses would be confident in determining SCP FCT due to the poor condition of the vegetation and relative lack of understory taxa. FCTs 23 and 21c can form part of the EPBC listed Banksia Woodlands of the SCP Threatened Ecological Community (TEC). VT CpRcS was assessed via vegetation observation points. It is possible that this VT represents Gibson et. al. (1994) FCT 4; however, the vegetation structure has been impacted such that it is not possible to align this with an SCP FCT. FCT 4 is not considered to represent any listed TECs or Priority Ecological Communities (PECs).

Further spring assessment of the Survey Area is not considered to be necessary based on the severely impacted vegetation present, with no vegetation rated as Good or better, mapped within the Survey Area.

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1.0 Introduction

1.1 Project Overview

Tronox Management Pty Ltd (Tronox) is investigating potential expansion of their Chandala Mineral Sands processing plant at Muchea (the Project), located approximately 50 kilometres (km) north-east of Perth (the Project). Previous flora and vegetation assessments have been undertaken within this area by Western Botanical (2012, 2013).

Umwelt were commissioned by Tronox to conduct a flora and vegetation assessment for the Project, including assessment of presence of the EPBC listed Threatened Ecological Community '*Banksia Woodlands of the Swan Coastal Plain'* (also listed as a Priority Ecological Community by the Department of Biodiversity, Conservation and Attractions (DBCA)). This report documents the methods from the survey and presents the desktop assessment and results of the field survey.

1.2 Survey Area and Desktop Study Area Definitions

A Survey Area for the purposes of the flora and vegetation assessment was provided by Tronox. The Survey Area for the Project is shown on **Figure 1.1**. The Survey Area is approximately 54 hectares (ha) in size and consists of cleared areas adjacent to existing infrastructure and remnant vegetation.

For the purposes of the desktop study, including interrogation of databases and searches for relevant literature, a Desktop Study Area has also been defined, as shown on **Figure 1.1**. The Desktop Study Area encompasses the Survey Area with a 10 km buffer.

FIGURE 1.1
Project Location

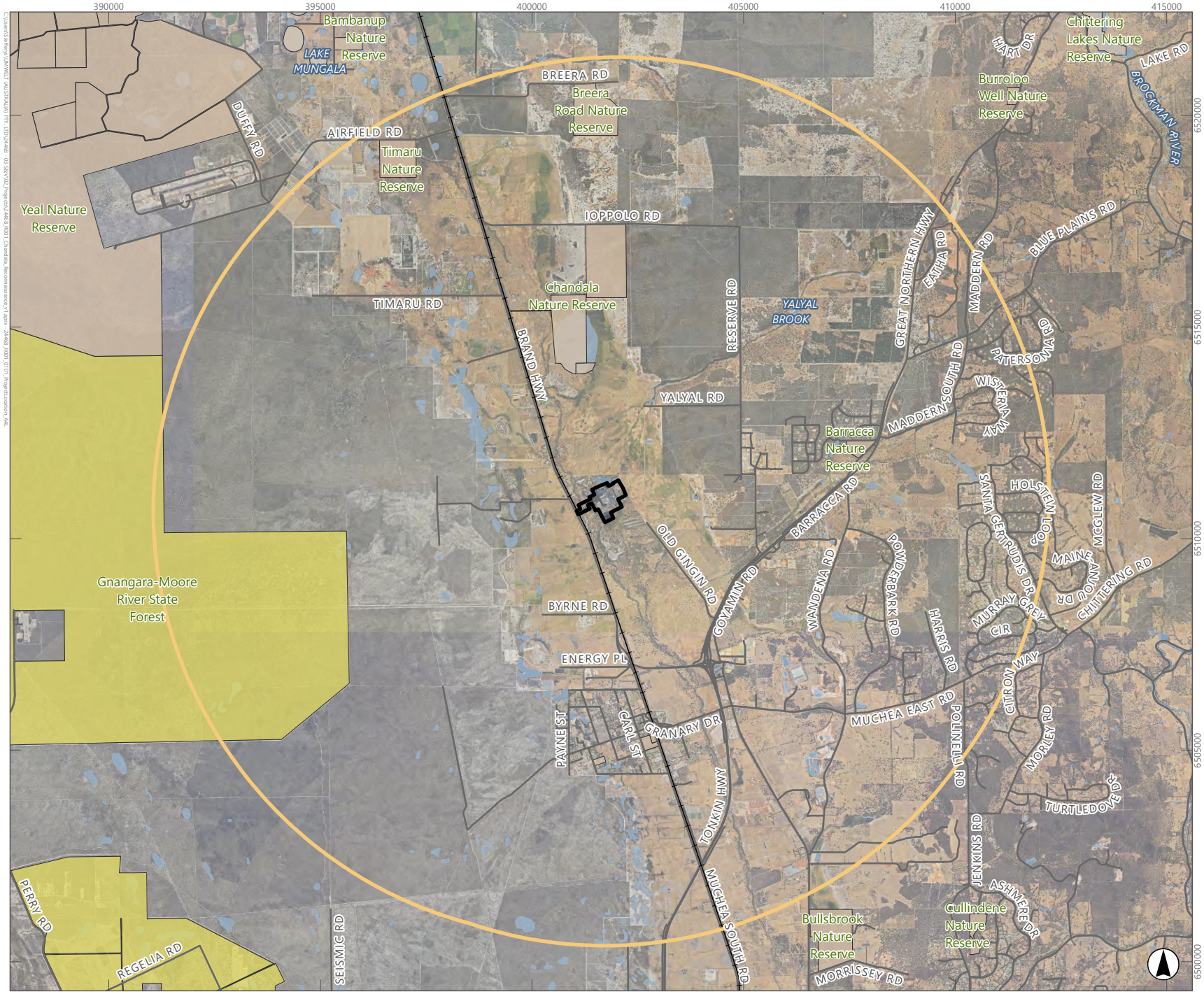

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Image Source: Landgate (2022-2024) | **Data Source:** Landgate (2024), DBCA (2024), Tronox (2024)

1.3 Aims and Objectives

The primary aim of the survey was to characterise the flora and vegetation values of the Survey Area to support future environmental approvals the Project.

The primary objectives of the flora and vegetation survey were:

- Opportunistic recording of the following significant flora taxa within the Survey Area that were identifiable at the time of the survey:
    - Listed Threatened Species (T) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (Commonwealth).
    - Threatened Flora (T) listed under the *Biodiversity Conservation Act 2016* (BC Act) (WA).
    - Priority Flora taxa (P) as classified by the WA Department of Biodiversity, Conservation and Attractions (DBCA).
    - Other significant flora taxa as defined by the WA Environmental Protection Authority (EPA) (2016a, 2016b).
- Undertake a likelihood of occurrence assessment of significant flora to identify areas which could potentially support any significant flora.
- Assess and describe vegetation types (VT) and associated vegetation condition in the Survey Area including spatial extent, and review for presence of significant flora taxa.
- Identify areas which could potentially support any significant flora that were not identifiable at the time of survey.
- Identification of areas that could potentially represent the following significant vegetation within the Survey Area:
    - Threatened Ecological Communities (TEC) listed under Commonwealth legislation or classified by DBCA and endorsed by the WA Minister for the Environment.
    - Priority Ecological Community (PEC) as classified by DBCA.
    - Other significant vegetation as defined by EPA (2016a, 2016b).

1.4 Level of Assessment

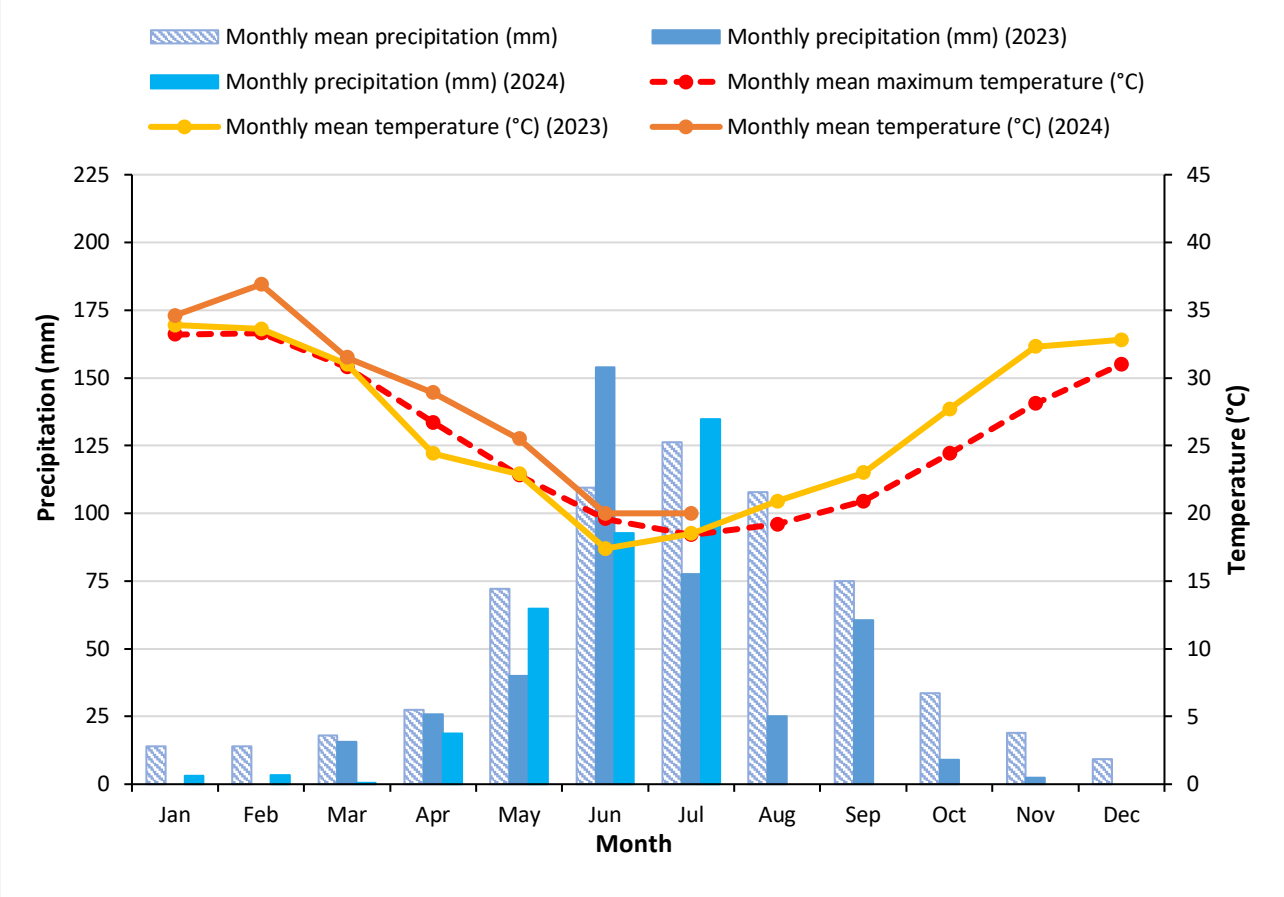
The flora and vegetation survey involved a reconnaissance survey as defined in Section 4.1 of the 'Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment' (EPA, 2016b). This level of survey is considered the appropriate level of survey, based on the disturbance history over the area and the timing of the survey (out of season survey as discussed in **section 3.3.1**).

2.0 Background

2.1 Climate

The Survey Area is located in the Swan Coastal Plain (SCP) region (Darling Botanical District), within the Southwest Botanical Province as defined by Beard (2015). The climate of the SCP region is classified as warm Mediterranean, with predominantly winter precipitation (600 –1000 millimetres (mm)) and five to six dry months per year (Beard, 2015).

Graph 2.1 presents monthly precipitation totals and monthly maximum temperature statistics for 2023–2024, as well as long-term average monthly precipitation and maximum temperature data recorded at Bureau of Meteorology (BoM) Gingin Aero station (station number: 9178; data from 1968–2024) (BoM, 2024), the most relevant meteorological station to the Survey Area with long-term climate data. Gingin receives an annual average of 611.1 mm of rainfall, the majority of which occurs from June to August. Long-term average monthly maximum temperatures generally peak from December to March (31 °C to 33°C). The rainfall received in the months prior to survey (April to July) was slightly below average (311 mm compared to the long-term average of 335 mm); daily maximum temperatures from January to July 2024 were slightly above the long-term averages.



Graph 2.1 Temperature and Precipitation for Gingin Aero (BoM, 2024)

2.2 Geology, Soils and Landscape

The Survey Area is located in the SCP region as defined by Beard (2015), which is broadly equivalent to the SCP Interim Biogeographic Regionalisation for Australia (IBRA) region; specifically within the Perth (SWA-2) IBRA subregion (Department of Climate Change, Energy, the Environment and Water (DCCEEW (2023)). The geology of the region is Mesozoic to recent sediments of the Perth Basin (Beard, 2015). The SCP subregion consists of a coastal plain of low-lying, often swampy areas and sandhills, with soils consisting of sands or swamp deposits as well as dissected country rising the duricrusted Dandaragan Plateau on Mesozoics consisting of mainly yellow sandy soils. The Survey Area occurs within the Pinjarra Soil-Landscape Zone of the Swan Province. The Pinjarra Zone consists of alluvial deposits (early Pleistocene to Recent) between the Bassendean Dunes Zone and the Darling Scarp, colluvial and shelf deposits adjacent to the Darling Scarp, with clayey to sandy alluvial soils with wet areas (Schoknecht et al., 2004).

Soil landscape mapping has been compiled across South-West WA by the Department of Primary Industries and Regional Development (DPIRD) (2022). The mapping is based on a compilation of the results of a variety of soil and soil-landscape surveys, considering general ecological information, vegetation physiognomy and composition, patterns of variation, conservation status, gradational association and land system representation. The Survey Area occurs over one soil landscape system; the Yanga System, which in the Survey Area consists of a total of five soil landscape units (**Table 2.1**, **Figure 2.1** (DPIRD, 2022)); the majority of the Survey Area has been mapped as the Yanga disturbed land, mine Phase, coinciding with the majority of the cleared land associated with the Chandala processing plant.

Table 2.1 Soil-Landscape Units and Phases of the Survey Area

System	Unit	Name	Description	Area (ha) in the Survey Area
Yanga System – 213Ya	213Ya_6x	Yanga 6x Phase	Flat plain with occasional low dunes. Yellowish brown duplex and poorly structured clay soils often with pans underlying. Low woodland with occasional tall E. rudis, *Melaleuca* spp., Teatree and *E. camaldulensis* and *Casuarina* spp.	1.6
	213Ya_8x	Yanga 8x Phase	Flat plain with occasional low dunes. Subject to seasonal inundation. Deep white and pale yellow sands interspersed with swamp and generally underlain by siliceous/humic pans at depth.	3.3
	213Ya_9x	Yanga 9x Phase	Flat plain with occasional low dunes. Subject to seasonal inundation. Humic and peaty sands, wet and semi-wet soils generally underlain by siliceous / humic pans at depth. *E. rudis*, *Melaleuca* spp., reeds and some *Banksia* on dunes.	0.2
	213Ya12x	Yanga 12x Phase	Drainage depressions in very gently sloping plain. Yellowish brown and grey sandy duplex soils which may have a gravelly matrix. Woodland of E. *rudis. E. camaldulensis* and *Melaleuca* spp.	10.2
	213YaX_MINE	Yanga disturbed land, mine Phase	Mine. Disturbed land.	38.7

Source: Soil Landscape Mapping - Best Available (DPIRD-027) (DPIRD, 2022)

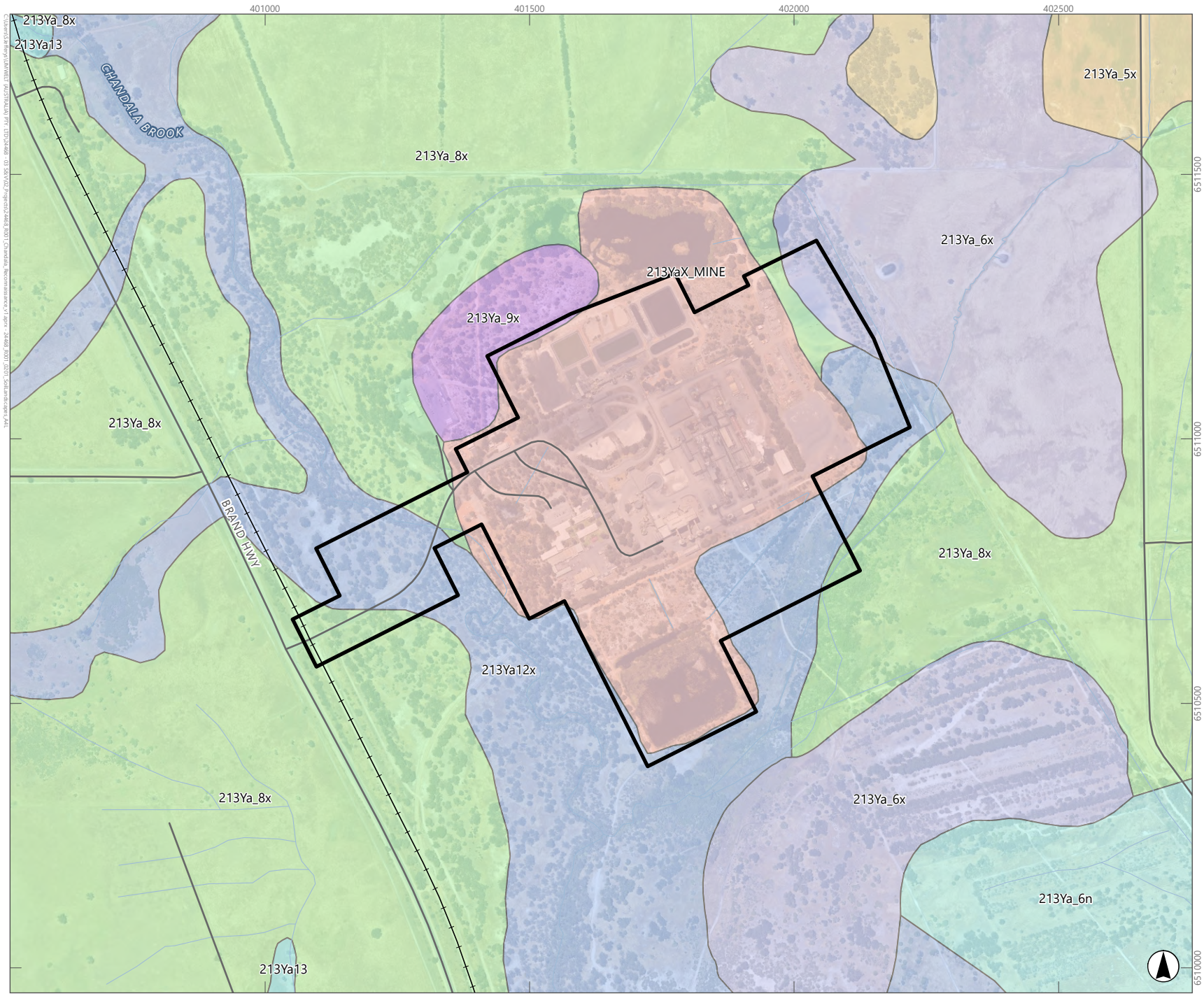


FIGURE 2.1
Soil Landscape Units of the Survey Area

Legend

- Survey Area
- Road
- Railway
- Watercourse

Soil Landscape Mapping

- 213Ya12x
- 213Ya13
- 213YaX_MINE
- 213Ya_5x
- 213Ya_6n
- 213Ya_6x
- 213Ya_8x
- 213Ya_9x

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Image Source: Landgate (2022) | **Data Source:** Landgate (2024), Tronox (2024), DPIRD (2022)

2.3 Land Tenure

The Survey Area is situated within the Shire of Chittering and comprises predominantly of private property (freehold), as well as a small area of rail reserve, as presented on **Figure 2.2**. The Survey Area is within General Purpose Lease G7000275, and also overlaps Exploration Licences E7005173 and E 7006425.

There are no DBCA reserves within the Survey Area; however, several reserves and part of a National Park occur within the Desktop Study Area (see **Figure 1.1**).

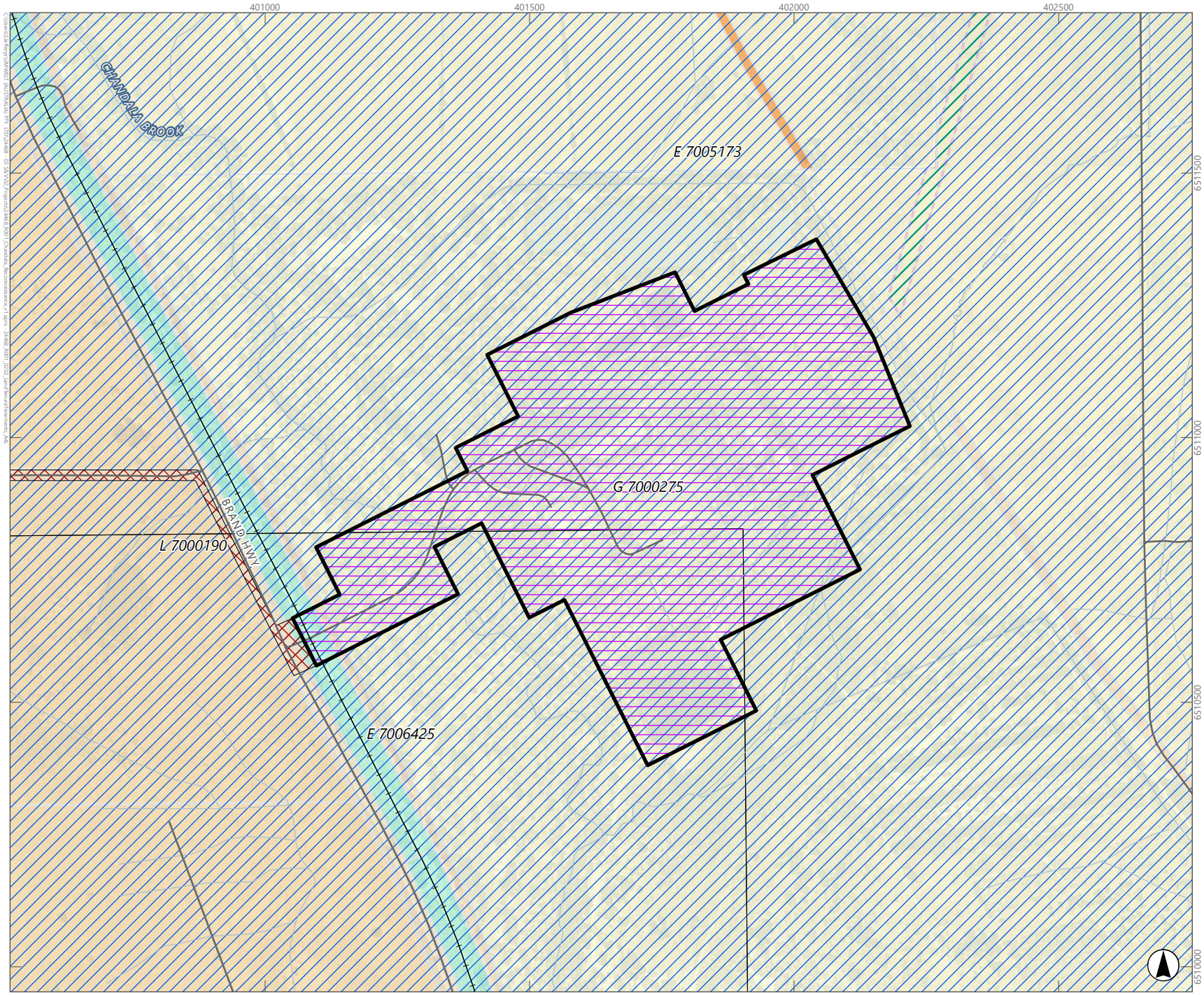

FIGURE 2.2
Land Tenure of the Survey Area

Legend

- Survey Area
- Road
- Railway
- Watercourse
- Property Boundary
- Easements
- Public Road
- Unallocated Crown Land; Closed Road
- Rail Reserve
- Crown Allotment (Type 2)
- Freehold
- Exploration Licence
- General Purpose Lease
- Miscellaneous Licence

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Image Source: Landgate (2022) | **Data Source:** Landgate (2024), Tronox (2024), DMIRS (2024)

3.0 Methods

3.1 Desktop Assessment

Prior to commencement of the field survey, a review of all publicly available flora and vegetation data relevant to the Survey Area was undertaken, as listed in **Table 3.1**. This included obtaining and reviewing copies of reports of previous biological surveys carried out within the vicinity of the Survey Area (where available), including searches via the Index of Biodiversity Surveys for Assessments (IBSA) database. Where Threatened Ecological Communities (TECs) or Priority Ecological Communities (PECs) were identified by the desktop assessment, appropriate DBCA or DCCEEW nomination/listing descriptions and recovery plans of the TEC or PEC were also reviewed as well as the '*Methods for survey and identification of Western Australian threatened ecological communities*' (DBCA, 2023a).

Table 3.1 Flora and Vegetation Desktop Assessment Searches

Source	Search Attributes	Search Purpose
Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (DCCEEW, 2024)	Database searched using a 10 km buffer around the Survey Area.	Identify Matters of National Environmental Significance (MNES), including Threatened flora and TECs listed under the EPBC Act, that occur or have the potential to occur within the Desktop Study Area.
DBCA Significant Flora Database (WA Herbarium Specimen Database and Threatened and Priority Flora (TPFL) Database) (search reference #08-0724FL) (DBCA, 2024b)	Database searched using Desktop Study Area (Survey Area boundary with a 10 km buffer applied). Search reference # 08-0724FL.	Obtain records of DBCA-listed significant flora within the Desktop Study Area.
DBCA Threatened and Priority Ecological Communities Database (search reference #1-0724EC) (DBCA, 2024a)	Database searched using Desktop Study Area (Survey Area boundary with a 10 km buffer applied). Search reference # 1-0724FL.	Obtain records of DBCA-classified TECs and/or PECs within the Desktop Study Area.
DBCA TEC and PEC lists (DBCA, 2023c, 2023e)	Review of DBCA-classified TECs and PECs mapped in proximity to the Survey Area.	Identify whether there are any additional DBCA-classified TECs or PECs that could occur within the Desktop Study Area.
2018 Statewide Vegetation Statistics incorporating the CAR Reserve Analysis (DBCA, 2019; DPIRD, 2019)	Survey Area.	Identify extent of Vegetation System Associations (pre-European vegetation mapping) within the Survey Area.
Previous flora and vegetation surveys conducted within or in the vicinity of the Survey Area (various sources). Searches within the following websites (but not limited to) were the IBSA database (DWER, 2024), DWER Clearing Permit System and EPA WA, Tronox supplied previous study information. **See Table 5.2 for the list of reports reviewed**	Desktop Study Area.	Identify previous flora and vegetation surveys which are relevant to the current Project.

3.2 Personnel and Licensing

Table 3.2 lists the personnel involved in both fieldwork and plant identifications for the flora and vegetation assessment. The field team leader has had significant previous experience (> 15 years) in conducting flora and vegetation surveys in WA, including similar flora surveys in the SCP region. Other field personnel have previous experience (> 5 years) in undertaking flora and vegetation surveys in WA (including the SCP).

All plant material was collected under the relevant *Flora Taking (Biological Assessment) Licence* (under Regulation 62 of the *Biodiversity Conservation Regulations 2018* (BC Regs)) and *Authorisation to Take or Disturb Threatened Species* (pursuant to Section 40 of the BC Act) as outlined in **Table 3.2**. Plant identifications were reviewed by a botanist with extensive previous experience (> 15 years) in flora of the SCP region.

Table 3.2 Personnel and Licensing Information

Personnel	Flora Collecting Permit (BC Regs/BC Act)	Role
Cathy Godden **BSc (Biology) (Hons)**	FB62000050-2 TFL 130-2122	Project Director / Field Team Leader
Emalyn Loudon **BAgrib (Agriculture) (Hons)**	-	Field Team Member
David Coultas **BSc (Environmental Biology) (Hons)**	NA	Plant identifications manager
Shibi Ullas Chandran **BSc (Zoology) Masters (Fisheries Biology and Aquaculture)**	NA	Plant identifications

3.3 Field Survey Methods

3.3.1 Survey Timing and Access

The field survey of the Survey Area was undertaken on the 17 and 19 of July 2024. The field survey does not coincide with the most appropriate time to survey in the South West province as per EPA Technical Guidance (EPA, 2016b), with flora and vegetation surveys in this region typically undertaken in spring (September to November), coinciding with when most of the taxa are in flower.

Due to survey timing requirements, sampling of the Survey Area with quadrats and subsequent analysis with the DBCA SCP datasets (a requirement for the identification of many TECs and PECs that occur on the SCP) was not undertaken during this assessment. It is considered that the reconnaissance survey will serve to identify any areas that may require sampling via quadrats (dependent on condition of the vegetation), and any suitable habitat for significant flora taxa.

The Survey Area was accessed by foot transects. Note that some parts of the Survey Area were not able to be accessed during the field survey due to being inundated with water; however, the vegetation in these areas was able to be visually assessed.

3.3.2 Sample Sites

Three relevés and 54 vegetation observation points were undertaken in the Survey Area, with an additional three vegetation observation points undertaken just outside the Survey Area. Sample site locations were recorded using handheld Global Positioning System (GPS) units (Geocentric Datum of Australia (GDA) 2020, Zone 50). The area of survey for relevés covered a radius of approximately 10 m around a central point. Dominant vascular flora taxa (native and introduced) that were visually identifiable in each stratum level were recorded. Specimens of unknown taxa encountered were collected for verification and identification purposes (see **Section 3.3.3**). The following additional information was recorded at the relevés:

- Personnel
- GPS coordinates at centre of relevé
- Site photograph
- Topography
- Soil colour and type (including the presence of any rock outcropping and surface stones)
- Vegetation condition (EPA, 2016b); scale presented in **Section 3.3.5**)
- Approximate time since fire
- Structural description of vegetation (see **Section 3.3.4**).

Vegetation observation points were recorded in areas where the vegetation had been highly modified. These points included recording a GPS location at the point where the notes were taken and a brief description of the vegetation, including dominant and characteristic taxa, vegetation condition (**Section 3.3.5**) and photograph. The notes were used to aid in describing the vegetation and condition within the Survey Area.

All traverses and sampling points (relevés and vegetation observation points) in the Survey Area are presented on **Figure 3.1**.

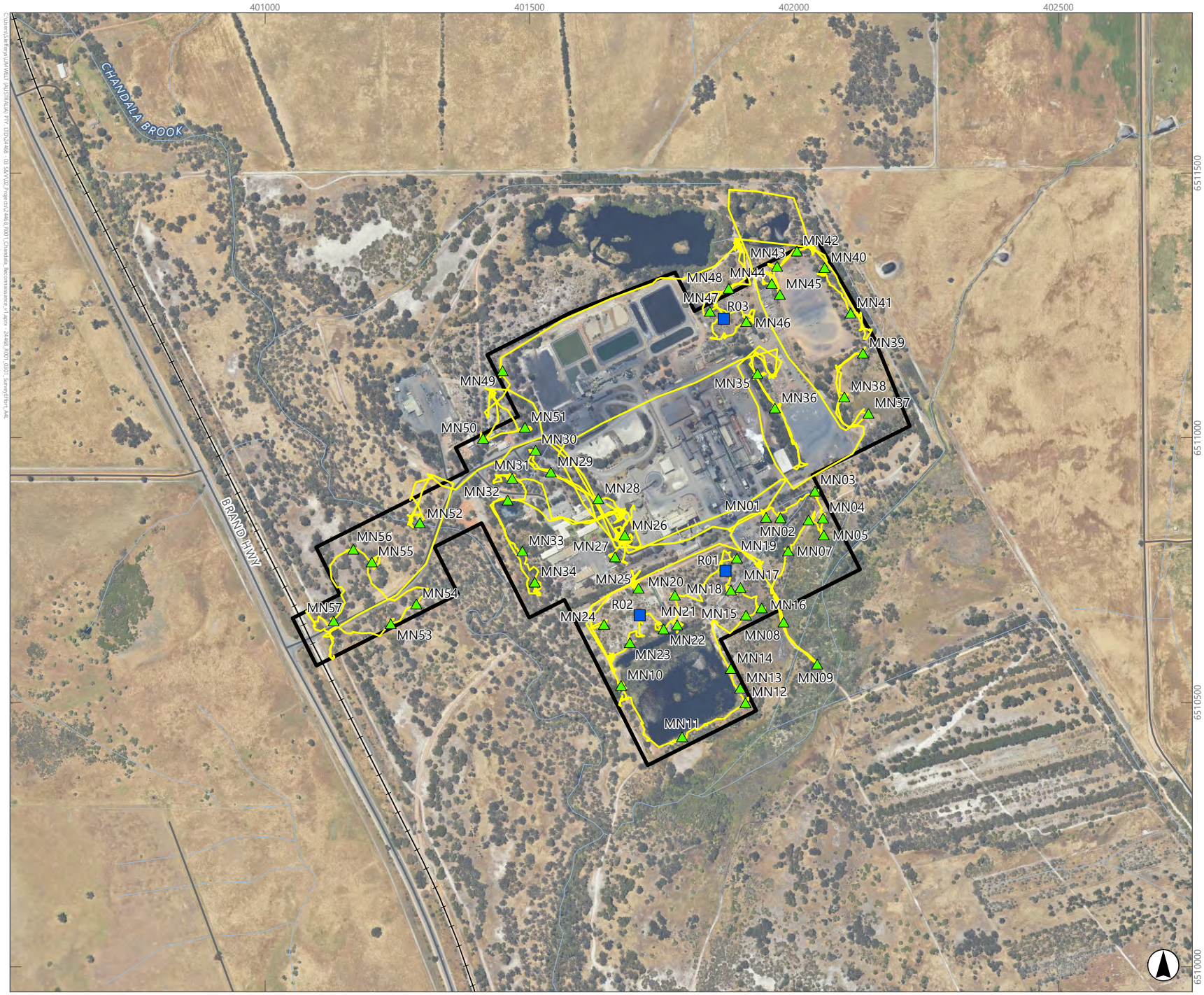

FIGURE 3.1
Survey Track Logs and Sampling Locations

Legend

- Survey Area
- Road
- Railway
- Watercourse
- Relevé
- Vegetation Mapping Note
- Track Log

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3.3.3 Plant Collection and Identification

Specimens of any unknown flora taxa encountered during the field survey were collected and pressed as per Western Australian Herbarium (WA Herbarium) guidelines (WA Herbarium, 2020). Plant identifications were undertaken at the WA Herbarium and reviewed by a Principal Ecologist – Botanist with extensive previous experience (> 15 years) in plant identifications for flora of the SCP region (**Section 3.2**). The identification of all flora taxa used the most up to date information available, including taxonomic keys published in books, journals and online, comparison with herbarium specimens, and consultation with taxonomic experts. External experts of particular families or genera were consulted for any specimens considered to be difficult to identify or of taxonomic interest, including botanists at the WA Herbarium.

Taxon nomenclature generally follows Florabase (WA Herbarium, 1998-), with all names checked against the current DBCA Max database to ensure their validity. However, in cases where names of plant taxa have been published recently in scientific literature but have not yet been adopted on Florabase due to time constraints, nomenclature in the published literature is followed. The conservation status of each taxon was checked against Florabase, which provides the most up-to-date information regarding the conservation status of flora taxa in WA.

As per section 7.2 of EPA Technical Guidance, specimens of interest, including significant flora taxa, taxa representing range extensions, potential new taxa, and key species in new occurrences of TECs and PECs will be sent to the WA Herbarium for consideration for vouchering as soon as practicable. However, this process is via donation, and the WA Herbarium may not voucher all specimens, in accordance with its own requirements. The specimen vouchering will be supported by completed Threatened and Priority Flora Report Forms (TPFRFs) submitted to DBCA (Species and Communities Branch) in the case of listed significant flora (i.e. Threatened and Priority flora taxa).

3.3.4 Vegetation Definition, Mapping and Description

Vegetation in the Survey Area was mapped and described using structural vegetation classification as described in Section 8.1 of the EPA Technical Guidance (EPA, 2016b). Vegetation community descriptions have been adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (Executive Steering Committee for Australian Vegetation Information (ESCAVI) , as stipulated by EPA (2016b). This model follows nationally-agreed guidelines to describe and represent vegetation types, so that comparable and consistent data are produced nation-wide.

The locations of the sample sites were used in conjunction with aerial photograph interpretation and field notes taken during survey to develop VT polygon boundaries. Mapping boundaries were delineated using aerial photography, and were then digitised using Geographic Information System (GIS) software.

3.3.5 Vegetation Condition Mapping

Vegetation condition was described using the vegetation condition scale presented in EPA Technical Guidance (2016b) for the South-West and Interzone Botanical Provinces (**Table 3.3**). Notes on vegetation condition were taken during the field survey during foot traverses undertaken within the Survey Area. Vegetation condition was also recorded at relevé and vegetation observation point locations. Vegetation condition category polygon boundaries were developed using this information in conjunction with introduced flora taxa location data and were digitised using GIS software as for vegetation polygon boundaries.

Table 3.3 Vegetation Condition Scale for the South-West and Interzone Botanical Provinces

Condition Ranking	Description
Pristine	Pristine or nearly so, no obvious signs of disturbance or damage caused by human activities since European settlement
Excellent	Vegetation structure intact, disturbance affecting individual species and weeds are non-aggressive species. Damage to trees caused by fire, the presence of non-aggressive weeds and occasional vehicle tracks
Very Good	Vegetation structure altered, obvious signs of disturbance. Disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing
Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing
Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. Disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds at high density, partial clearing, dieback and grazing
Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees and shrubs

3.3.6 Significant Flora

As per EPA definitions (2016a), flora taxa may be significant for a range of reasons, including, but not limited to the following:

- being identified as a Threatened or Priority species (formally listed significant taxa – includes taxa listed under both State and Commonwealth legislation, and classified as Priority by DBCA)
- being locally endemic or associated with a restricted habitat type (e.g. surface water or groundwater dependent ecosystems)
- being a new species or having anomalous features that indicate a potential new species
- being representative of the range of a species (particularly at the extremes of range, recently discovered range extensions, or isolated outliers of the main range)
- being an unusual species, including restricted subspecies, varieties or naturally occurring hybrids
- having a relictual status, being representative of taxonomic groups that no longer occur widely in the broader landscape.

Significant flora taxa recorded within the Survey Area are discussed in **Section 5.2.2** with reference to the above categories. Data including point locations and individuals of significant flora recorded in the Survey Area are also presented in this section.

DBCA (2020) presents conservation codes for DBCA-listed taxa. Further information about Commonwealth conservation categories is provided in Threatened Species Scientific Committee's (TSSC) 'Guidelines for assessing the conservation status of native species according to the *Environment Protection and Biodiversity Conservation Act 1999* and Environment Protection and Biodiversity Conservation Regulations 2000' (TSSC, 2021).

3.3.7 Significant Vegetation

As per EPA definitions (2016a), vegetation may be significant for a range of reasons, including, but not limited to the following:

- being identified as a TEC or PEC (formally listed significant vegetation – includes vegetation listed under Commonwealth or State legislation, or classified as a PEC by DBCA)
- having restricted distribution
- having a degree of historical impact from threatening processes
- playing a role as a refuge
- providing an important function required to maintain ecological integrity of a significant ecosystem.

As outlined in **Section 3.3.1**, due to survey timing, this assessment mapped and described the vegetation via structural vegetation classification via relevés and vegetation observation point data, with no floristic data analysis undertaken. This method does not align with the methods to be used when assessing the significance of vegetation on the southern SCP (as per DBCA's 'Vegetation survey methods and analysis to determine floristic community types on the southern Swan Coastal Plain' (DBCA, 2023b)), which involves analyses of quadrat data with the Gibson et al. (1994) and Keighery et al. (2012) datasets. A qualitative assessment of the Floristic Community Types (FCTs) described by the Gibson et al. (1994) study was undertaken in the resulting VTs mapped to ascertain the likelihood of significant vegetation occurring in the Survey Area, and if further assessment using quadrats is likely to be required based on the vegetation types present and condition of the vegetation.

3.4 Likelihood of Occurrence Assessment

Following the field survey, likelihood of occurrence assessments were completed for significant flora taxa and significant vegetation identified in this desktop assessment as potentially occurring within the Survey Area, according to the criteria presented in **Table 3.4**.

Table 3.4 Criteria for Assessing Likelihood of Occurrence – Flora and Vegetation

Category	Description
Known	The taxon/community is known occur in the Survey Area, through desktop review.
Possible	The taxon/community may occur in the Survey Area; habitat is present in the Survey Area; known range of the taxon/community includes the Survey Area or is in proximity to the Survey Area.
Unlikely	The taxon/community is not known to occur in the Survey Area; habitat is not known to be present in the Survey Area; range of taxon/community does not include the Survey Area.

Category	Description
Not Considered to be Present	The taxon/community was not recorded in the Survey Area and is not considered to be present.

Key diagnostic characteristics of relevant TEC or PEC Approved Conservation Advice; nomination/listing descriptions; recovery plans; and the '*Methods for survey and identification of Western Australian threatened ecological communities*' (DBCA, 2023a), were also reviewed (where available) when assessing the likelihood of occurrence of a significant vegetation community in the Survey Area.

4.0 Limitations

Table 4.1 presents the limitations of the flora and vegetation assessment of the Survey Area in accordance with the requirements of EPA Technical Guidance (EPA, 2016b). The survey timing is considered to be a potential minor limitation of the survey, but is otherwise not considered to have significantly impacted the results of the Reconnaissance level flora and vegetation survey.

Table 4.1 Limitations of the Flora and Vegetation Survey

Limitation	Outcome	Comment
Effort and Extent	Not a limitation	A Reconnaissance level survey was undertaken across the entire Survey Area. Three relevés and 57 vegetation observation points were recorded within the Survey Area. Three relevés are considered adequate to characterise the flora and vegetation of the Survey Area given the limited amount of remnant vegetation present and the condition of the Survey Area. Targeted survey for significant flora taxa was not undertaken as part of the survey, rather potential habitat for significant flora was recorded. Mapping of vegetation boundaries was undertaken using a combination of aerial photography and information collected at relevés and vegetation observation points. No constraints prevented appropriate sampling techniques (relevé establishment, foot traverses) being employed. Most areas were easy to access using roads and tracks. Some parts of the Survey Area were not able to be accessed during the field survey due to being inundated with water; however, the vegetation in these areas was able to be assessed visually. Data reliability is therefore considered to be relatively high.
Competency/experience of the team carrying out the survey	Not a limitation	The field team leader for the field survey has > 15 years' experience in conducting flora and vegetation surveys in the SCP, and field assistant has >5 years' experience conducting flora and vegetation surveys in the SCP. Information relating to identifying characteristics of significant flora taxa and vegetation identified by the desktop assessment as potentially occurring in the Survey Area was provided to all field team members prior to undertaking the field survey. The plant identifications were managed and reviewed by a Principal Ecologist – Botanist with > 15 years' experience in plant identification for flora of the South-West and SCP.
Proportion of flora identified, recorded and/or collected	Minor limitation	All vascular groups that were present in the Survey Area were sampled. A high proportion of perennial vascular taxa were recorded based on the intensity and method of survey. Annual vascular taxa were recorded where identifiable; however, additional annual taxa would be expected to be present in the Survey Area during the peak flowering season for the region (spring). Any unknown vascular taxa were collected, and identified by an experienced Principal Ecologist - Botanist.
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	Not a limitation	Good contextual information for the Survey Area was available prior to the survey. Sources of information used included government databases (DBCA, DCCEEW), as well as numerous general sources pertaining to the climate, geomorphology, flora and vegetation of the region, and flora and vegetation surveys previously conducted in the Desktop Study Area.

Limitation	Outcome	Comment
Timing/weather/ season/cycle	Minor limitation	The field survey was conducted in July 2024. This does not correspond to the optimum survey or flowering period for the SCP bioregion and is a minor limitation in terms of the reconnaissance survey. However, survey aimed to assess and search for potential significant vegetation and potential habitat for significant flora and is not a limitation in the context. of the aims of the assessment.
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	Not a limitation	There was evidence of significant impact to vegetation composition and structure throughout the Survey Area as a result of human activities, including clearing and very high levels of introduced (weed) taxa. However, these disturbances did not affect the results of the survey, with the vegetation able to be confidently described and mapped, and flora taxa mature enough to be easily identified or collected.
Remoteness and/or access problems	Not a limitation	The Survey Area was accessed either via roads and on foot. Some parts of the Survey Area were not able to be accessed during the field survey due to being inundated with water; however, the vegetation in these areas was able to be assessed visually. Therefore, this is not considered to be a limitation of this assessment.

5.0 Results

5.1 Desktop Assessment

5.1.1 Regional Vegetation

The Survey Area is located in the Swan Coastal Plain IBRA bioregion and Perth IBRA subregion (DCCEEW, 2023). The vegetation of WA as it was presumed to have existed prior to European settlement has been mapped at a scale of 1:250,000 as vegetation system associations (VSAs), with the Pre-European Vegetation spatial database created (Beard et al., 2013; DPIRD, 2019). The Survey Area occurs across two VSAs as summarised in **Table 5.1** and presented on **Figure 5.1**. **Table 5.1** also presents the current extent of each VSA in relation to its pre-European extent (within the Swan Coastal Plain IBRA bioregion), the percentage of the current extent of each VSA currently protected for conservation (as a proportion of the current extent, within the Swan Coastal Plain IBRA bioregion), and the Pre-European extent within the Survey Area (DBCA, 2019). Note that as per (DBCA, 2019), protected areas in this context are considered to be any areas listed in DBCA-Legislated Lands and Waters dataset as either Crown reserves or lands managed under Section 8A of the *Conservation and Land Management Act 1984* that have an International Union for Conservation of Nature (IUCN) category of I to IV.

All VSAs that occur within the Survey Area have between 10% and 20% of their pre-European extents remaining and they have very little to no areas reserved for conservation in the bioregion (**Table 5.1**).

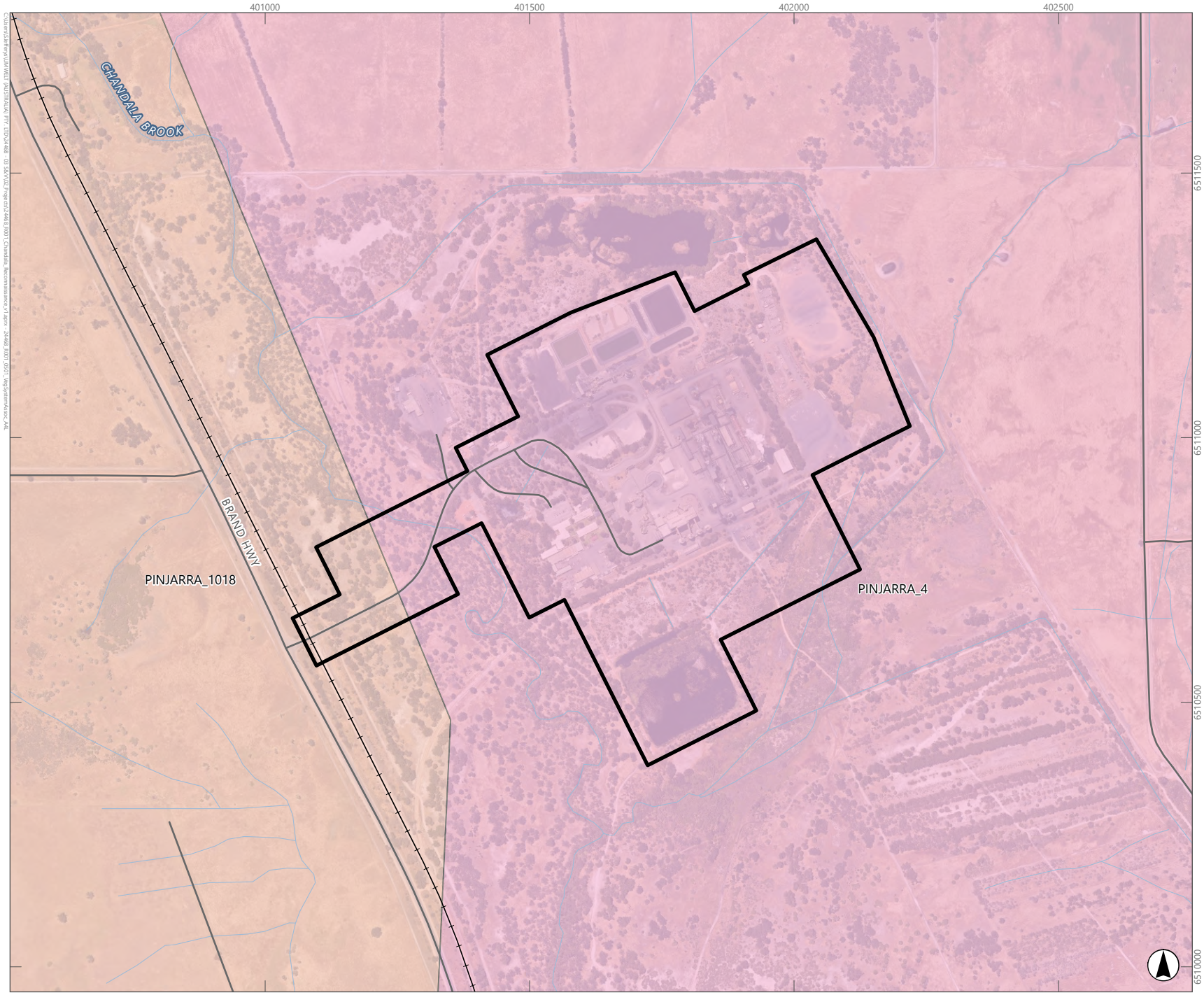
Table 5.1 Vegetation System Associations of the Survey Area

Vegetation System Association	Description*	Current Extent in the SCP bioregion (ha)*	Current Extent Remaining in the SCP bioregion (%)*	Current Extent Protected for Conservation in the SCP bioregion (%)*	Pre-European Extent in the Survey Area (ha)
Pinjarra_4	Medium woodland; marri & wandoo	1,237.66	11.64	1.17	51.0
Pinjarra_1018	Mosaic: Medium forest; jarrah-marri / Low woodland; banksia / Low forest; teatree / Low woodland; *Casuarina obesa*	2,444.87	17.39	0.72	3.1

** Source: 2018 DBCA Statewide Vegetation Statistics report (DBCA, 2019).*

^ Source: Pre-European Vegetation spatial dataset (DPIRD-006) (DPIRD, 2019).

FIGURE 5.1
Vegetation System Associations



Legend

- Survey Area
- Road
- Railway
- Watercourse

Vegetation System Association

- PINJARRA_4
- PINJARRA_1018

0 200 400

Metres

Scale 1:10,000 at A4
GDA2020 MGA Zone 50

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Image Source: Landgate (2022) | **Data Source:** Landgate (2024), Tronox (2024), DPIRD (2019)

5.1.2 Local Flora and Vegetation Surveys

The Survey Area itself is located within a cleared area, between large extents of remnant vegetation to both the west (including Gnangara – Moore River State Forest, Yeal Nature Reserve and Defence lands), and to the east (private property). Historically, the Survey Area was used for pasture and was grazed heavily by stock.

Table 5.2 lists a summary of the publicly available flora and vegetation surveys in within, and in the vicinity (within 5 km) of the Survey Area.

Table 5.2 Flora and Vegetation Surveys Previously Conducted Within and in the Vicinity of the Survey Area

Survey	Flora	Vegetation
Woodman Environmental (2014) Chandala Borefield Groundwater Drawdown Related Vegetation Monitoring 2014, Phase 1 – Multispectral Imagery Analysis and Field Verification • **Survey location: 1 km east of the Survey Area** • **Survey timing: February – March 2014**	• Flora surveyed opportunistically only • No significant flora recorded opportunistically	• 28 VTs sampled via 32 relevés • Vegetation at three point locations showed similarities with the 'Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain' TEC • Vegetation adjacent to two wetlands showed similarities to the '*Corymbia calophylla* - *Xanthorrhoea preissii* woodlands and shrublands of the Swan Coastal Plain' TEC
Landform Research (2020) Energy Place Muchea PMR Quarries • **Survey location: 3.5 km south of the Survey Area** • **Survey timing: March 2020**	• 23 vascular taxa • No significant flora taxa recorded • 13 weeds	• Two broad VTs recorded • No TECs or PECs recorded
Astron (2020) Telstra Muchea Cable Alignment • **Survey location: 3.5 km SW of the Survey Area** • **Survey timing: July 2020**	• 132 vascular flora taxa, from 33 families and 87 genera • 3 significant flora taxa - *Leucopogon squarrosus* subsp. *trigynus* (P2), *Styphelia filifolia* (P3), *Tripterococcus*? sp. Brachylobus (A.S. George 14234) (P4) • Eight introduced taxa	• Nine VTs sampled via 11 relevés • VTs 1, 2, 3, 6, 7, 8 and 9 inferred to be the Banksia Woodlands of the Swan Coastal Plain TEC • VTs 6 and 7 described as having affinities to Low lying *Banksia attenuata* woodlands or shrublands (floristic community type 21c)' (P3) and '*Banksia ilicifolia* woodlands (floristic community type 22)' (P3) • VTs 1, 2, 3, 8, and 8 described as having affinities to FCT 23b • VT 5 and part of VT 4 represent wetland or riparian vegetation

Survey	Flora	Vegetation
Eco Logical (2021) **Stage 3 Resleepering Project (Muchea)** • **Survey location: central part of corridor 0.5 km SW of the Survey Area** • **Survey timing: October 2021**	• 153 vascular flora taxa, from 48 families and 106 genera • Two significant flora taxa – *Grevillea curviloba* (T) and *Grevillea evanescens* (P1) • 56 weeds including four Declared Pests	• Eight vegetation communities mapped via 34 relevés • One patch of the Banksia Woodlands of the Swan Coastal Plain TEC mapped • 4 TECs identified as potentially occurring - Clay Pans of the SCP; *Corymbia calophylla - Xanthorrhoea preissii* woodlands and shrublands of the SCP, Shrublands and Woodlands on Muchea Limestone of the SCP; and Shrublands and Woodlands on Perth to Gingin ironstone (Perth to Gingin ironstone association) of the SCP
Landform Research (2017) WA Limestone Lots 2233 and 2238 • **Survey location: 2.3 km SW of the Survey Area** • **Survey timing: August 2016 and 2017**	• 56 vascular flora taxa • No significant flora taxa recorded • Three weed taxa recorded	• Four broad vegetation types mapped • No TECs or PECs recorded
Western Botanical (2012) Clearing Permit Survey of Chandala Processing Plant • **Survey location: overlaps the Survey Area** • **Survey timing: September 2012**	• 85 vascular flora taxa, from 26 families and 49 genera • One significant flora taxon - *Calothamnus graniticus* subsp. *leptophyllus* (P4) • 17 weed taxa including one Declared Pest: *Zantedeschia aethiopica*	• 18 vegetation associations mapped • No TECs or PECs recorded
Western Botanical (2013) **Chandala Processing Plant** • **Survey location: overlaps Survey Area** • **Survey timing: April 2013**	• 56 vascular flora taxa, from 19 families and 37 genera • No significant flora taxa recorded • 17 weed taxa including one Declared Pest: *Zantedeschia aethiopica*	• 17 vegetation associations mapped including seven mapped by Western Botanical (2012) • No TECs or PECs recorded

5.1.3 Previous Vegetation Mapping Within and Adjacent to the Survey Area

Two previous flora and vegetation surveys were carried out over the Chandala Processing Plant by Western Botanical (2012, 2013), including partially within the Survey Area. A number of rehabilitation planted and remnant vegetation associations were mapped over project area including 14 of these within the Survey Area. **Appendix A** lists the 28 vegetation associations along with vegetation condition notes from those surveys.

Overall, the vegetation condition of the vegetation mapped by Western Botanical was determined to be Degraded due to past grazing and clearing. Ground storey weed invasion is widespread throughout the project areas. Western Botanical also noted that some areas were likely to be affected by Dieback.

5.1.4 Significant Flora

A total of 26 Threatened flora and 39 Priority flora have been recorded in the Desktop Study Area from database and literature searches (outlined in **Section 5.1**) and these are listed in **Table 5.3**. The results of the DBCA WAHerb and TPFL database searches (#08-0724FL) listed 10 Threatened Flora and 37 Priority flora species as occurring within the Desktop Study Area and are presented on **Figure 5.2**. Literature searches identified an additional two priority flora species as occurring in the Desktop Study Area from previous surveys (with a total of one Threatened Flora and five Priority flora recorded from previous surveys conducted in the Desktop Study Area).

Searches of relevant DCCEEW databases for MNES listed under the EPBC Act using the PMST, identified 25 flora listed as Threatened Species under the EPBC Act, or habitat for such species, that are known, are likely to, or may occur within the Desktop Study Area (DCCEEW, 2024). The full results of the DCCEEW database search are presented in **Appendix B**.

There are no current records of significant flora taxa from within the Survey Area.

Table 5.3 Significant Flora Taxa Known from or Potentially Occurring Within the Desktop Study Area

Taxon	Status	Flowering Period	Habitat	Source
Acacia anomala	T (EPBC & WA - VU)	August to September	Lateritic soils. Slopes.	DBCA, DCCEEW
Acacia cummingiana	P3	May, June, August	Grey or yellow sand, lateritic gravel. Sandplains, lateritic breakaways.	DBCA
Acacia drummondii* subsp. *affinis	P3	June to September, December	Laterite, slopes or flats.	DBCA
Adenanthos cygnorum* subsp. *chamaephyton	P3	July, September to December, January	Grey sand, lateritic gravel.	DBCA
Andersonia gracilis	T (EPBC - EN, WA - VU)	September to November	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	DCCEEW
Anigozanthos humilis* subsp. *chrysanthus	P4	July to October	Grey or yellow sand.	DBCA
Anigozanthos viridis* subsp. *terraspectans	T (EPBC & WA - VU)	August to September	Grey sand, clay loam. Winter-wet depressions.	DCCEEW
Banksia mimica	T (EPBC - EN, WA - VU)	December to February	White or grey sand over laterite, sandy loam.	DCCEEW
Caladenia huegelii	T (EPBC - EN, WA - CR)	September to October	Grey or brown sand, clay loam.	DCCEEW
***Caleana dixonii* (*Paracaeleana dixonii*)**	T (EPBC - EN, WA - VU)	October to January	Grey sand over granite.	DCCEEW

Taxon	Status	Flowering Period	Habitat	Source
Calothamnus graniticus* subsp. *leptophyllus	P4	June to August	Clay over granite, lateritic soils. Hillsides.	Western Botanical
Caustis gigas	P2	May	White or grey sand.	DBCA
Chamaescilla gibsonii	P3	August to November	Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	DBCA
Chamelaucium lullfitzii	T (EPBC - EN, WA - VU)	September to December	Usually orange-yellow sand (occasionally grey), sometimes with gravel, on hill slopes.	DBCA, DCCEEW,
Conospermum densiflorum* subsp. *unicephalatum	T (EPBC & WA - EN)	September to November	Clay soils. Low-lying areas.	DCCEEW
Cyathochaeta teretifolia	P3	January, July, September	Grey sand, sandy clay. Swamps, creek edges.	DBCA
Darwinia foetida	T (EPBC - CR, WA - EN)	September to December, February	Plains, loam soil, road drain / drainage line, winter wet areas, ridge crest	DBCA, DCCEEW,
Diplolaena andrewsii	T (EPBC & WA - EN)	July to October	Loam, clay. Granite outcrops & hillsides.	DCCEEW
Diuris drummondii	T (EPBC - VU, WA - EN)	November to January	Swamps, often in shallow water.	DBCA
Diuris micrantha	T (EPBC & WA - VU)	September to October	Brown loamy clay. Winter-wet swamps, in shallow water.	DCCEEW
Diuris purdiei	T (EPBC & WA - EN)	September to October	Grey-black sand, moist. Winter-wet swamps.	DCCEEW
Drakaea elastica	T (EPBC - EN, WA - CR)	October to November	White or grey sand. Low-lying situations adjoining winter-wet swamps.	DCCEEW
Drosera occidentalis	P4	October to December or January	Seasonally wet swamp, damp flats, depressions and seppage lines	DBCA
Drosera sewelliae	P2	October to December	Laterite & silica sand soils.	DBCA
Eleocharis keigheryi	T (EPBC & WA - VU)	August to November	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	DCCEEW
***Eryngium pinnatifidum* subsp. Palustre (G.J. Keighery 13459)**	P3	October to November	Winter-wet flats. Brown sandy loam Clay, sandy clay. Claypans, seasonally wet flats.	DBCA
Eucalyptus leprophloia	T (EPBC & WA - EN)	August to October	White or grey sand over laterite. Valley slopes.	DCCEEW

Taxon	Status	Flowering Period	Habitat	Source
Grevillea althoferorum* subsp. *fragilis	T (EPBC - EN, WA - CR)	September to November	Flat to undulating plains, grey-yellow sand.	DBCA, DCCEEW (listed as *G. althoferorum*)
Grevillea candolleana	P2	August to October	Laterite, lateritic loam. Hillsides.	DBCA
Grevillea corrugata	T (EPBC - EN, WA - VU)	August to September	Slopes, brownish loamy soils with laterite. Road verges.	DCCEEW
Grevillea curviloba	T (EPBC & WA - EN)	August to October	Grey sand, sandy loam. Winter-wet heath.	DBCA, DCCEEW (both subsp. listed in PMST are recently known as *G. curviloba*), Eco Logical
Grevillea evanescens	P1	March, June to November	Winter-wet flats, brown light clay or clay loam.	DBCA, Eco Logical
Hibbertia glomerata* subsp. *ginginensis	P2	July to September	Slopes, hills and rises with brown sand or clay, laterite	DBCA
Hypocalymma lateriticola	P1	August, September	Grey or yellow sand, lateritic gravel.	DBCA
Hypocalymma sylvestre	T (EPBC & WA - EN)	August	Yellow-brown sandy loam. Woodland on lateritic hilltop.	DBCA, DCCEEW
Hypolaena robusta	P4	September to October	White sand. Sandplains.	DBCA
Isotropis cuneifolia* subsp. *glabra	P3	September	Sand, clay loam. Winter-wet flats.	DBCA
Leucopogon squarrosus* subsp. *trigynus	P2	June, July, September	White, grey sand. Dune, seasonally wet flats, low-lying flats.	DBCA, Astron
Macarthuria keigheryi	T (EPBC & WA - EN)	September to December, February to March	White or grey sand. Flats, plains	DCCEEW
Meionectes tenuifolia	P3	September to December	Seasonally inundated areas, edges of wetlands. Clay or clayey loam over laterite.	DBCA
Millotia tenuifolia* var. *laevis	P2	September to October	Granite or laterite soils.	DBCA
Myriophyllum echinatum	P3	September to November	Clay. Winter-wet flats.	DBCA
***Netrostylis* sp. Chandala (G.J. Keighery 17055)**	P2	July, October, November	Peat sand. Swamp edges, damplands, brook and mound spring.	DBCA

Taxon	Status	Flowering Period	Habitat	Source
Ornduffia submersa	P4	September to October	Black-grey sandy clay in seasonally inundated wetlands.	DBCA
Persoonia rudis	P3	September to December, January	White, grey or yellow sand, often over laterite.	DBCA
Platysace ramosissima	P3	November to February	Sandy clay soils, usually on flats or plains, often near wetlands.	DBCA
Poranthera moorokatta	P2	September to November	Slopes and plains, damp areas. Grey or white sand. Grey or white silica sand in open spaces between shrubs, not in shaded areas or in areas of high litter cover.	DBCA
Ptychosema pusillum	T (EPBC & WA - VU)	August to October	Sand. Rises.	DBCA; DCCEEW
Rumex drummondii	P4	August to November	Winter-wet disturbed areas.	DBCA
Schoenus griffinianus	P4	September to October	Sandy soils, usually on flats, plains.	DBCA
Stylidium longitubum	P4	October to December	Claypans, sometimes slightly saline.	DBCA
Stylidium squamellosum	P2	October to November	Brown to red-brown clay loam. Winter-wet habitats and depressions, open woodland, shrubland.	DBCA
Stylidium striatum	P4	October to November	Lateritic soils on hill slopes.	DBCA
Styphelia allittii	P3	March to June, August	Uplands, outcrops, lateritic hills gravelly yellow sandy soil.	DBCA
Styphelia filifolia	P3	February to June	Sand, sometimes winter damp.	DBCA, Astron
Synaphea grandis	P4	October to November	Low rises with laterite gravel and boulders, grey-brown-yellow sandy soil.	DBCA
***Synaphea* sp. Fairbridge Farm (D. Papenfus 696)**	T (EPBC & WA - CR)	October	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	DCCEEW
Thelymitra dedmaniarum	T (EPBC & WA - CR)	November to December	Granite outcrops on slopes.	DCCEEW
Thelymitra pulcherrima	P2	July, August	Breakaways, sand health to laterite ridge, lateritic hill, low lying hill between dunes.	DBCA
Thelymitra stellata	T (EPBC & WA - EN)	October to November	Lateritic soils on hill tops and breakaways.	DBCA, DCCEEW
Thelymitra variegata^	T (WA - CR)	June to September	Sandy clay, sand, laterite.	DBCA

Taxon	Status	Flowering Period	Habitat	Source
***Tripterococcus* sp. Brachylobus (A.S. George 14234)**	P4	February to April, October to December	Winter damp flat, depressions, wetlands with grey soil. Plains. Peaty sand over clay.	Astron
Verticordia lindleyi* subsp. *lindleyi	P4	May or November to January	Sand, sandy clay. Winter-wet depressions.	DBCA
Verticordia rutilastra	P3	September to November	Sand & lateritic gravel. Hills.	DBCA
Verticordia serrata* var. *linearis	P3	September to October	White sand, gravel. Open woodland.	DBCA

Data sources are: Astron – Astron (2020); Eco Logical – Eco Logical (2021); DBCA – DBCA (2024b); DCCEEW – DCCEEW (2024), Western Botanical – Western Botanical (2012)

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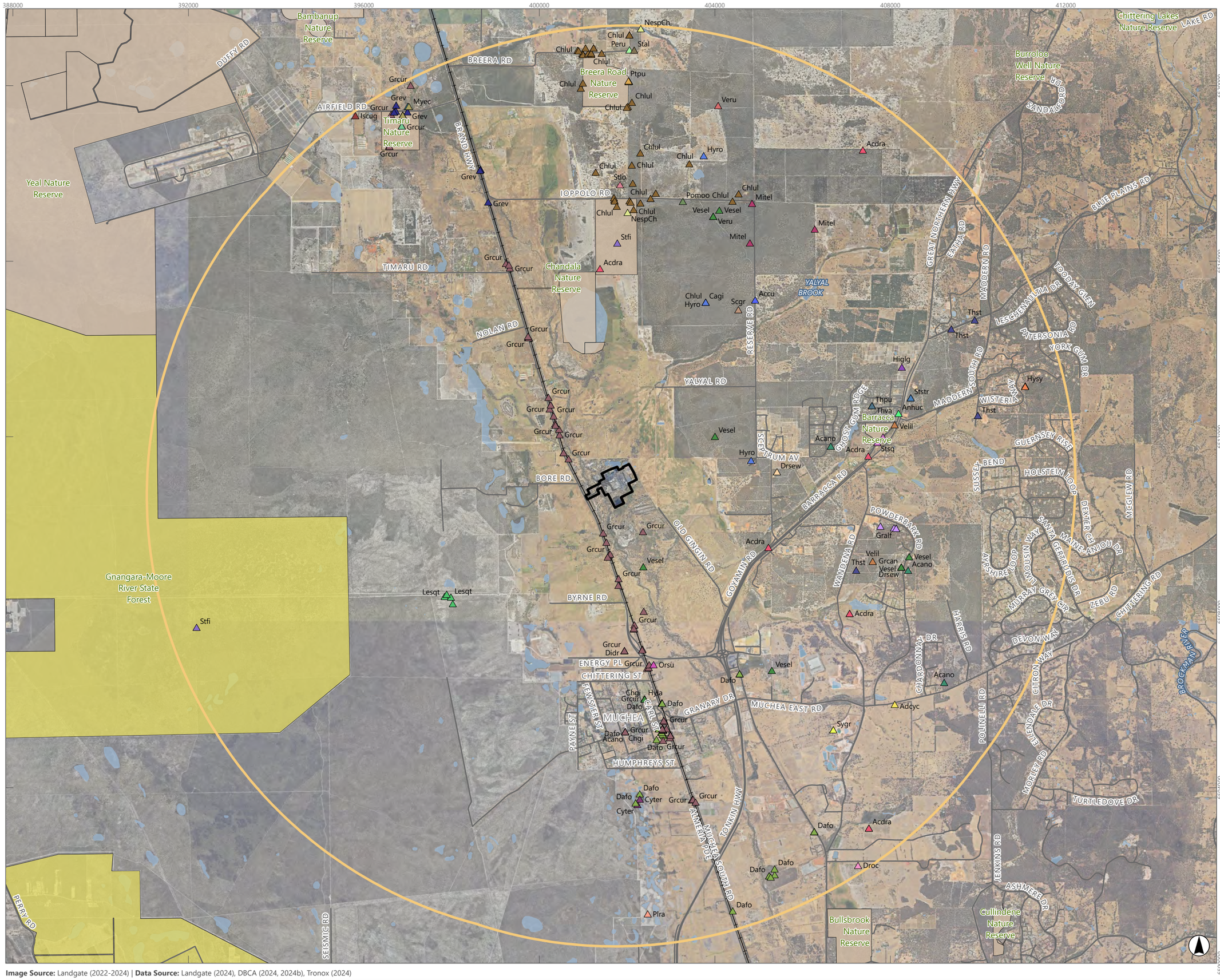
FIGURE 5.2

Significant Flora Taxa within the Desktop Study Area



Legend

- Desktop Study Area
- Survey Area
- Road
- Railway
- Watercourse
- Nature Reserve
- State Forest

0 1.6 3.2

Kilometres

Scale: 1:80,000 at A3
GDA2020 MGA Zone 50

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Image Source: Landgate (2022-2024) | **Data Source:** Landgate (2024), DBCA (2024, 2024b), Tronox (2024)

Significant Flora (DBCA, 2024b)

- Acano *Acacia anomala* (T)
- Accu *Acacia cummingiana* (P3)
- Acdra *Acacia drummondii* subsp. *affinis* (P3)
- Adcyc *Adenanthos cygnorum* subsp. *chamaephyton* (P3)
- Anhuc *Anigozanthos humilis* subsp. *chrysanthus* (P4)
- Cagi *Caustis gigas* (P2)
- Chgi *Chamaescilla gibsonii* (P3)
- Chlul *Chamelaucium lullfitzii* (T)
- Cyter *Cyathochaeta teretifolia* (P3)
- Dafo *Darwinia foetida* (T)
- Didr *Diuris drummondii* (T)
- Droc *Drosera occidentalis* (P4)
- Drsew *Drosera sewelliae* (P2)
- ErpiP *Eryngium pinnatifidum* subsp. Palustre (G.J. Keighery 13459) (P3)
- Gralf *Grevillea althoferorum* subsp. *fragilis* (T)
- Grcan *Grevillea candolleana* (P2)
- Grcur *Grevillea curviloba* (T)
- Grev *Grevillea evanescens* (P1)
- Higlg *Hibbertia glomerata* subsp. *ginginensis* (P2)
- Hyla *Hypocalymma lateriticola* (P1)
- Hyro *Hypolaena robusta* (P4)
- Hysy *Hypocalymma sylvestre* (T)
- Iscug *Isotropis cuneifolia* subsp. *glabra* (P3)
- Lesqt *Leucopogon squarrosus* subsp. *trigynus* (P2)
- Mete *Meionectes tenuifolia* (P3)
- Mitel *Millotia tenuifolia* var. *laevis* (P2)
- Myec *Myriophyllum echinatum* (P3)
- NespCh *Netrostylis* sp. Chandala (G.J. Keighery 17055) (P2)
- Orsu *Ornduffia submersa* (P4)
- Peru *Persoonia rudis* (P3)
- Plra *Platysace ramosissima* (P3)
- Pomoo *Poranthera moorokatta* (P2)
- Ptpu *Ptychosema pusillum* (T)
- Rudr *Rumex drummondii* (P4)
- Scgr *Schoenus griffinianus* (P4)
- Stlo *Stylidium longitubum* (P4)
- Stsq *Stylidium squamellosum* (P2)
- Ststr *Stylidium striatum* (P4)
- Stal *Styphelia allittii* (P3)
- Stfi *Styphelia filifolia* (P3)
- Sygr *Synaphea grandis* (P4)
- Thpu *Thelymitra pulcherrima* (P2)
- Thst *Thelymitra stellata* (T)
- Thva *Thelymitra variegata* (T)
- Velil *Verticordia lindleyi* subsp. *lindleyi* (P4)
- Veru *Verticordia rutilastra* (P3)
- Vesel *Verticordia serrata* var. *linearis* (P3)

FIGURE 5.2

LEGEND: Significant Flora Taxa within the Desktop Study Area

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5.1.5 Significant Vegetation

The results of the DBCA TEC and PEC Database search and DCCEEW's PMST returned 13 significant communities that have records in the Desktop Study Area as summarised in **Table 5.4** and presented in **Figure 5.3**. As outlined in **Table 5.4** many of these significant communities are listed by both WA and the Commonwealth, often under slightly different names, or the WA community often forms a component of a Commonwealth community; for example, four such significant communities listed in WA commonly form part of the Commonwealth 'Banksia woodlands of the Swan Coastal Plain ecological community' TEC (**Table 5.4**).

The definitions, categories and criteria for TECs and PECs are presented on the DBCA Threatened Species and Communities website (DBCA, 2023f).

Table 5.4 Significant Vegetation Known from the Desktop Study Area

Ecological Community	EPBC Act Status	WA Status	Source*
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Critically Endangered	DCCEEW
***Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. 1994)**	Endangered^	Critically Endangered	DBCA
Clay Pans of the Swan Coastal Plain	Critically Endangered	-	DCCEW
Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)	Endangered	Critically Endangered	DBCA
Empodisma peatlands of southwestern Australia	Endangered	-	DCCEEW
Perth to Gingin Ironstone Association	Endangered	Critically Endangered	DBCA; DCCEEW
Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Endangered	DBCA; DCCEEW
Swan Coastal Plain *Banksia attenuata - Banksia menziesii* woodlands ('floristic community type 23b')	Endangered^	P3	DBCA
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	P3	DBCA; DCCEEW
Banksia woodland of the Gingin area restricted to soils dominated by yellow to orange sands	Endangered^	P2	DBCA
Wooded wetlands which support colonial waterbird nesting areas	-	P2	DBCA
Southern Swan Coastal Plain *Eucalyptus gomphocephala - Agonis flexuosa* woodlands (floristic community type 25)	Critically Endangered / Endangered#	P3	DBCA
Tuart (*Eucalyptus gomphocephala*) woodlands and forests of the Swan Coastal Plain ecological community	Critically Endangered	P3	DCCEEW

**Data sources are: Astron – Astron (2020); Eco Logical – Eco Logical (2021); DBCA – DBCA (2024b); DCCEEW – DCCEEW (2024), Western Botanical – Western Botanical (2012)*
^Commonly a component of 'Banksia Woodlands of the Swan Coastal Plain ecological community' (Endangered)
^Can be a component of the Endangered Banksia Woodlands of the Swan Coastal Plain EPBC listed TEC, or the Tuart woodlands and forests of the Swan Coastal Plain EPBC listed TEC)

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FIGURE 5.3

DBCA Significant Vegetation Records from the Desktop Study Area

388000 392000 396000 400000 404000 408000 412000

6520000 6516000 6512000 6508000 6504000 6500000

Bambanup Nature Reserve
DUFFY RD
BREERA RD
Breera Road Nature Reserve
Chittering Lakes Nature Reserve
LAKE RD
Burroloo Well Nature Reserve
SANDALWOOD RD
AIRFIELD RD
Timaru Nature Reserve
Yeal Nature Reserve
IOPPOLO RD
BRAND HWY
BLUE PLAINS RD
GREAT NORTHERN HWY
EATHA RD
MADDERN RD
TIMARU RD
Chandala Nature Reserve
RESERVE RD
YALYAL BROOK
TOODAY GLEN
LESCHENAULTIA DR
PATERSONIA DR
YORK GUM DR
NOLAN RD
YALYAL RD
MADDERN SOUTH RD
WISTERIA AV
GHOST GUM RDGE
Barracca Nature Reserve
SEDUM AV
GUERNSEY RISE
BORE RD
SUSSEX BEND
HOLSTEIN LOOP
BARRACCA RD
DEXTER CH
MCGLEW RD
SANTA GERTRUDIS DR
MAINE-ANJOU DR
OLD GINGIN RD
GOOMIN RD
WANDENA RD
ARSHIRE LOOP
LIMOUSIN WAY
MURRAY GREY CIR
ZEBU RD
CHITTERING RD
Gnangara-Moore River State Forest
BYRNE RD
POWDERBARK RD
CHARDONNAY DR
HARRIS RD
DEVON WAY
BROCKMAN RIVER
ENERGY PL
CHITTERING ST
FEWSTER ST
CARR ST
GRANARY DR
PAYNE ST
ARCHIBALD ST
HUMPHREYS ST
MUCHEA EAST RD
POLINELLI RD
ELLENDALE DR
CITRON WAY
ALMERIA PDE
JONKIN HWY
MORLEY RD
TURTLEDOVE DR
JENKINS RD
ASHMERE DR
MUCHEA SOUTH RD
PERRY RD
SEISMIC RD
Bullsbrook Nature Reserve
Cullindene Nature Reserve

Legend

- Desktop Study Area
- Survey Area
- Road
- Railway
- Watercourse
- Nature Reserve
- State Forest

Significant Vegetation (DBCA, 2024a)

- Banksia Woodlands of the Swan Coastal Plain ecological community (WA - P3, Comm - EN)
- Banksia woodland of the Gingin area restricted to soils dominated by yellow to orange sands (WA - P2)
- Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain) (WA - BCACE, Comm - EN)
- Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain (WA - BCAE, Comm - EN)
- Perth to Gingin Ironstone Association (WA - BCACE, Comm - EN)
- SCP20a: Banksia attenuata woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. 1994) (WA - BCACE, Comm - EN)
- SCP23b: Swan Coastal Plain Banksia attenuata - Banksia menziesii woodlands (WA - P3, Comm - EN)
- SCP25: Southern Eucalyptus gomphocephala-Agonis flexuosa woodlands (WA - P3)
- Wooded wetlands which support colonial waterbird nesting areas (WA - P2)

0 1.6 3.2

Kilometres

Scale: 1:80,000 at A3
GDA2020 MGA Zone 50

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5.2 Field Survey

5.2.1 Vascular Flora Census

A total of 70 discrete vascular flora taxa were recorded in the Survey Area by the reconnaissance survey. The taxa represent 24 families and 44 genera. The most well-represented families were Myrtaceae (28 taxa), Asteraceae (six taxa), Fabaceae (5 taxa) and Poaceae (5 taxa). A total of 20 taxa were introduced (See **Section 5.2.4**).

A full list of taxa recorded by the survey is presented in **Appendix C**, with raw relevé data and parameters presented in **Appendix D** and vegetation mapping observation notes presented in **Appendix E**.

Note that several collections could not be identified to species level due to poor material; none of these are considered likely to represent significant flora taxa.

5.2.2 Significant Flora

No listed significant flora (excluding one planted occurrence of *Grevillea fililoba* (P1) - discussed below) were recorded during the field survey of the Study Area. No other taxa recorded in the Study Area are considered to represent significant flora for any other reason (as per EPA (2016a, 2016b)).

Grevillea fililoba (P1) is listed as P1 by DBCA (2023d), which is only known from a limited range, east of Geraldton, typically occurring on slopes, hills and breakaways on loamy soils, in association with laterite (WA Herbarium, 1998-). Within the Survey Area the taxon was recorded in a flat area on grey sand, which had been largely historically disturbed, was deemed to be planted and not considered to be naturally present in the Study Area. Therefore, this taxon is not considered to be significant and it is not discussed further in this report in the context of significant flora.

5.2.3 Likelihood of Occurrence of Significant Flora Taxa

Appendix B presents an assessment of the likelihood of occurrence of significant taxa within the Survey Area. This list includes significant taxa identified as occurring (or potentially occurring within the Desktop Study Area prior to survey (listed in **Table 5.3**). The assessment considered whether a taxon was identifiable at the time of survey, the known range of the taxon, if habitat is present in the Survey Area, proximity of known records to the Survey Area, when determining the potential for a taxon to occur in the Survey Area.

A total of 65 taxa have been assessed within **Appendix F** including 26 Threatened flora and 39 Priority flora taxa. None of these taxa were recorded within the Survey Area by the survey, and 17 taxa were not identifiable at the time of survey. It is considered that the 48 remaining taxa were identifiable during the survey, either because the survey period coincides with the taxon's flowering period, or the taxon can be identified reliably when in fruit or sterile. The survey included walk throughs of all major vegetation units both discernible through aerial photography and with reference to the original mapping undertaken by Western Botanical (2013); whilst a full census of plant taxa was not undertaken, opportunistic taxa were recorded or collected for identification through this process.

The likelihood of occurrence assessment identified that all 65 taxa are considered unlikely to be occur in the Survey Area, due to potential habitat is not considered to be present, and with the Study Area also being outside the known distribution of some taxa (as listed in **Appendix F**). Potential habitat was considered with respect to the type of habitat and also the condition of habitat present, with the entirety of the Survey Area mapped as Degraded or Completely Degraded, and subject to historical disturbance vectors including clearing, replanting, grazing and potential Phytophthora Dieback (see **Section 5.2.6**). The lower stratum of the vegetation of the Survey Area comprised throughout predominantly of pasture weeds, with the majority of the mid and upper stratums also severely impacted by historical disturbance. It was therefore considered unlikely that the vegetation could be potential habitat for any of the significant flora identified by the desktop assessment.

5.2.4 Introduced Taxa

A total of 20 introduced flora taxa were recorded within the Survey Area by the current survey, as listed in **Table 5.5**. It should be noted that this does not represent a comprehensive survey of all introduced flora taxa / locations in the Survey Area, as this was beyond the scope of this survey. In addition, as this survey was undertaken out of season, it is likely that more introduced taxa would be present in the Survey Area in spring.

The significance of the recorded introduced flora taxa, with reference to the ecological impact and invasiveness ratings for each introduced taxon as per 'Ecological Impact and Invasiveness Ratings from the Department of Parks and Wildlife for the Swan Region' (DBCA, 2016) is also presented in **Table 5.5**. One of the recorded introduced flora taxa is a Declared Pest under the *Biosecurity and Agriculture Management Act 2007* (BAM Act), being *Zantedeschia aethiopica*. No Weed of National Significance (WoNS) as per Weeds Australia (2024) were recorded during the survey.

Several other taxa considered to be serious weeds were also recorded in the Survey Area. *Eragrostis curvula* (African Lovegrass) was recorded during the survey at vegetation observation points. This taxon is a widespread and serious weed of road verges and disturbed ground from Carnarvon to the Nullarbor, and is highly invasive (DBCA, 2016; Hussey et al., 2007). *Ehrharta calycina* (Perennial Veldt Grass) was also noted at a number of vegetation observation points. It is known to be a significant weed, occurring extensively within roadsides and bushland on sandy soils from Geraldton to Esperance, and is particularly common on the SCP, where it is one of the most serious bushland weeds and a significant fire hazard (Hussey et al., 2007). These taxa are rated as High for ecological impact and Rapid for invasiveness (DBCA, 2016).

Overall, eight introduced taxa recorded in the Survey Area by the survey are rated as having 'High' ecological impact (including *Ixia* sp.; of the four species of Ixia assessed by the DBCA (2016), three were rated as 'Unknown' and one was rated as 'High') (**Table 5.5**). Taxa with this ecological impact rating are considered significant weeds capable of causing acute disruption of ecological processes, as well as dominating and/or significantly altering the vegetation structure, composition and function of ecosystems. Nine introduced taxa recorded in the Survey Area are rated as having 'Rapid' invasiveness in native vegetation (DBCA, 2016).

Table 5.5 Introduced Flora Taxa Recorded in the Survey Area

Taxon	Common Name	Significance	Ecological Impact^	Invasiveness^
Acacia iteaphylla	Flinders Range wattle		Not rated	Note rated
Acacia podalyriifolia	Queensland Silver Wattle		High	Moderate
Arctotheca calendula	Cape Weed		Medium	Moderate
Briza maxima	Blowfly Grass		Low	Moderate
Callitriche stagnalis	Common Starwort		Unknown	Rapid
Casuarina cunninghamiana **subsp. *cunninghamiana***	River Sheoak		Low	Slow
Dittrichia graveolens	Stinkwort		Medium	Rapid
Ehrharta calycina	Perennial Veldt Grass		High	Rapid
Eragrostis curvula	African Lovegrass		High	Rapid
Eucalyptus botryoides	Bangalay		High	Moderate
Eucalyptus grandis	Flooded Gum		Not rated	Note rated
Eucalyptus leucoxylon	White Ironbark		Not rated	Note rated
Gladiolus caryophyllaceus	Pink Gladiolus		High	Rapid
Hypochaeris glabra	Smooth Cats Ear		High	Rapid
***Ixia* sp.**	Ixia		High / Unknown	Rapid
Jacaranda mimosifolia	Jacaranda		Not rated	Note rated
Poa annua	Winter Grass		Unknown	Unknown
Rumex conglomeratus	Clustered Dock		Unknown	Rapid
Ursinia anthemoides	Ursinia		Unknown	Rapid
Zantedeschia aethiopica	Arum Lily	Declared Pest	High	Moderate

^Ecological impact and invasiveness sourced from DBCA (2016)

5.2.5 Vegetation

The vegetation of the Survey Area was mapped and described via structural classification from floristic and structural data recorded at relevés and vegetation observation points. Due to the long history of disturbance within the Survey Area, there are many areas that still possess tree or large shrub taxa, but have other structural layers comprised largely of introduced taxa, or with significantly reduced native taxon diversity. Such areas have clearly been highly modified since European settlement and are no longer considered to represent intact remnant vegetation. To account for this, the classification of vegetation has been divided into two categories: VTs and Highly Modified Areas (HMA). It is likely that many of the Highly Modified Areas are degraded versions of described VTs, however it is not possible to confidently align them given their condition.

Two VTs were described and mapped in the Survey Area, covering a total area of 5.1 ha (9.4 % of the Survey Area). There were 12 HMAs described and mapped in the Survey Area, covering a total area of 19.6 ha (36.2 % of the Survey Area). VTs are described in **Table 5.6** and HMAs are described in **Table 5.7,** with mapping presented on **Figure 5.4.**

Areas where natural vegetation has been completely removed (isolated trees and shrubs may be present), have been mapped as 'Cleared' (Cl). This includes roads, road verges and cleared areas associated with the Chandala processing plant. A total of 29.4 ha of 'Cleared' land was mapped, representing 54.4 % of the Study Area (**Figure 5.4**).

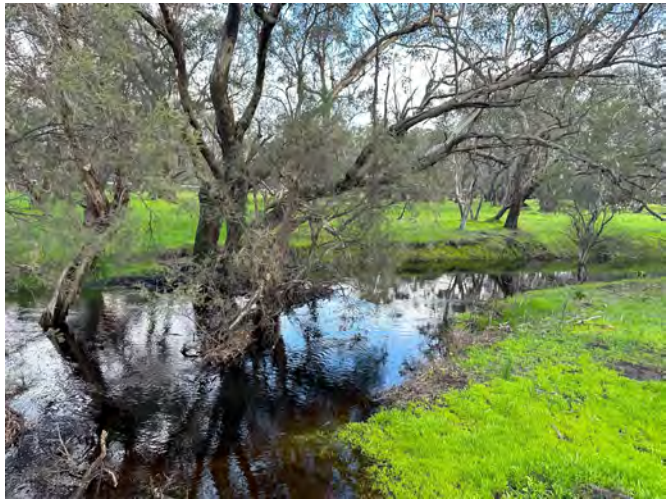
Table 5.6 Description of Vegetation Types Mapped in the Survey Area

VT	Description	Photograph
BW	**Community Name:** Banksia woodland **Description:** *Banksia attenuata, Banksia menziesii* and *Eucalyptus todtiana* woodland over *Melaleuca trichophylla*, *Melaleuca seriata* and *Xanthorrhoea preissii* isolated shrubs over mixed herbs and pasture weeds on flats and plains. **Area mapped:** 3.8 ha **Sampling:** 3 relevés (R01, R02, R03); 6 vegetation observation points (MN17, MN19, MN20, MN24, MN25, MN47)	 **Photo 5.1 Relevé R01**
CpRcS	**Community Name:** *Callitris pyramidalis / Regelia ciliata* shrubland **Description:** *Callitris pyramidalis, Regelia ciliata* and *Astartea scoparia* shrubland over weeds on flats. **Area mapped:** 1.3 ha **Sampling:** 4 vegetation observation points (MN07, MN15, MN16, NM18)	 **Photo 5.2 Vegetation Observation Point MN07**

Table 5.7 Description of Highly Modified Area Mapped in the Survey Area

HMA	Description	Photograph
AsSTdR	**Community Name:** *Acacia saligna* shrubland / *Typha domingensis* rushland **Description:** Isolated shrubs of *Acacia saligna* over open to closed rushland of *Typha domingensis* over pasture weeds on flats and in drainage lines. **Area mapped:** 0.9 ha **Sampling:** 2 vegetation observation points (MN04, MN05, MN21)	 **Photo 5.3 Vegetation Observation Point MN05**
CcW	**Community Name:** *Corymbia calophylla* woodland **Description:** *Corymbia calophylla* woodland over pasture weeds on flats and plains. Subject to intensive historical clearing processes and also contains planted Eucalyptus. **Area mapped:** 2.5 ha **Sampling:** 2 vegetation observation points (MN46, MN55)	 **Photo 5.4 Vegetation Observation Point MN55**

HMA	Description	Photograph
EcEsAS	**Community Name:** *Eucalyptus camaldulensis* / *Eucalyptus sideroxylon* woodland artificial sump **Description:** Planted *Eucalyptus camaldulensis* and *Eucalyptus sideroxylon* woodland surrounding artificial sump. **Area mapped:** 0.4 ha **Sampling:** 1 vegetation observation point (MN32)	 **Photo 5.5 EcEsAS – Vegetation Observation Point MN32**

HMA	Description	Photograph
ErW	**Community Name:** *Eucalyptus rudis* woodland **Description:** *Eucalyptus rudis* woodland over *Melaleuca rhaphiophylla* woodland over pasture weeds on flats and drainage lines. **Area mapped:** 3.1 ha **Sampling:** 5 vegetation observation points (MN39, MN52, MN54, MN56, MN57) **Variation:** More degraded areas of this VT lack or have significantly reduced cover of the *Melaleuca rhaphiophylla* woodland – this taxon tends to be more prominent in drainage lines	 **Photo 5.6 ErW – Vegetation Observation Point MN54**  **Photo 5.7 ErW – Vegetation Observation Point MN52**

HMA	Description	Photograph
ErWRW	**Community Name:** *Eucalyptus rudis* woodland revegetated wetland **Description:** Low woodland of *Eucalyptus rudis* over *Astartea scoparia*, *Melaleuca leucandra*, *Melaleuca rhaphiophylla* and *Melaleuca viminea* subsp. *viminea* shrubland on inundated wetlands. *Note: this area has been subject to historical community revegetation projects and is a revegetated/replanted landscape.* **Area mapped:** 1.5 ha **Sampling:** 2 vegetation observation points (MN33, MN34)	 **Photo 5.8 ErWRW – Vegetation Observation Point MN33**
MFG	**Community Name:** Mixed forbland and grassland **Description:** Low forbland and grassland of mixed species on flats. Highly modified and subject to historical clearing processes. **Area mapped:** 0.2 ha **Sampling:** 1 vegetation observation point (MN04)	 **Photo 5.9 MFG – Vegetation Observation Point MN04**

HMA	Description	Photograph
MpW	**Community Name:** *Melaleuca preissiana* woodland **Description:** Low woodland to open woodland of *Melaleuca preissiana* and occasionally *Melaleuca viminea* subsp. *viminea,* over pasture weeds on flats and depressions. This community was noted to often have planted *Eucalyptus* trees. Note the furthest eastern polygon was not assessed during this survey due to lack of access (flooded). That portion was most likely to be in better condition than the areas assessed. **Area mapped:** 1.3 ha **Sampling:** 4 vegetation observation points (MN10, MN11, MN12, MN23)	 **Photo 5.10 Vegetation Observation Point MN10**
MrW	**Community Name:** *Melaleuca rhaphiophylla* woodland **Description:** *Melaleuca rhaphiophylla* open woodland over pasture weeds on flats and seasonally inundated wetlands. *Typha domingensis* rushland present in wetter areas. Highly modified and subject to historical clearing processes. **Area mapped:** 1.3 ha **Sampling:** 5 vegetation observation points (MN37, MN38, MN43, MN44, MN45)	 **Photo 5.11 MrW – Vegetation Observation Point MN37**

HMA	Description	Photograph
PCq	**Community Name:** Planted *Calothamnus quadrifidus* shrubland **Description:** Planted *Calothamnus quadrifidus* and *Melaleuca ryeae* shrubs over weeds on flats. Highly modified. **Area mapped:** 0.08 ha **Sampling:** 1 vegetation observation point (MN01)	 **Photo 5.12 PCqS – Vegetation Observation Point MN01**
PE	**Community Name:** Planted Eucalyptus woodland **Description:** Planted *Eucalyptus* trees over weeds on flats. These areas constituted planted gardens and landscapes within the operations and administration areas, as well as closer to Brand Highway. **Area mapped:** 4.3 ha **Sampling:** 8 vegetation observation points (MN22, MN26, MN27, MN28, MN35, MN36, MN50, MN51)	 **Photo 5.13 Vegetation Observation Point MN28**

HMA	Description	Photograph
PENV	**Community Name:** Planted Eucalyptus trees over native vegetation **Description:** Planted Eucalyptus trees over sparse remnant native trees and/or shrubs on flats. These areas were highly disturbed and included planted *Eucalyptus* trees over sparse remaining native taxa. **Area mapped:** 3.9 ha **Sampling:** 12 vegetation observation points (MN06, MN10, MN11, MN12, MN14, MN29, MN30, MN31, MN40, MN41, MN42, MN49)	 **Photo 5.14 Vegetation Observation Point MN30**
XpS	**Community Name:** *Xanthorrhoea preissii* isolated shrubs **Description:** Remnant isolated *Xanthorrhoea preissii* over weeds on plains.Highly modified and subject to historical clearing processes. **Area mapped:** 0.2 ha **Sampling:** 1 vegetation observation point (MN02)	 **Photo 5.15 Vegetation Observation Point MN02**

FIGURE 5.4

Vegetation Types and Other Areas Mapped in the Survey Area

401000 401200 401400 401600 401800 402000 402200

6511400 6511200 6511000 6510800 6510600 6510400

Legend

- Survey Area
- Road
- Railway

Vegetation Type

- BW
- CpRcS

Other Areas Described

- AsSTdR
- CcW
- EcEsAS
- ErW
- ErWRW
- MFG
- MpW
- MrW
- PCq
- PE
- PENV
- XpS
- C

0 80 160

Metres

Scale: 1:4,000 at A3
GDA2020 MGA Zone 50

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Vegetation Type

	BW	*Banksia attenuata, Banksia menziesii* and *Eucalyptus todtiana* woodland over *Melaleuca trichophylla*, *Melaleuca seriata* and *Xanthorrhoea preissii* isolated shrubs over herbs and pasture weeds on flats and plains
	CpRcS	*Callitris pyramidalis, Regelia ciliata* and *Astartea scoparia* shrubland over weeds on flats

Other Areas Described

	AsSTdR	Isolated shrubs of *Acacia saligna* over open to closed rushland of *Typha domingensis* over pasture weeds on flats and in drainage lines
	CcW	*Corymbia calophylla* woodland over pasture weeds on flats and plain
	EcEsAS	Planted *Eucalyptus camaldulensis* and *Eucalyptus sideroxylon* woodland surrounding artificial sump
	ErW	*Eucalyptus rudis* woodland over *Melaleuca rhaphiophylla* woodland over pasture weeds on flats and drainage lines
	ErWRW	Low woodland of *Eucalyptus rudis* over *Astartea scoparia*, *Melaleuca leucandra*, *Melaleuca rhaphiophylla* and *Melaleuca viminea* subsp. *viminea* shrubland on inundated wetlands
	MFG	Low forbland and grassland of mixed species on flats
	MpW	Low woodland to open woodland of *Melaleuca preissiana* and occasionally *Melaleuca viminea* subsp. *Viminea* over pasture weeds on flats and depressions
	MrW	*Melaleuca rhaphiophylla* open woodland over pasture weeds on flats and seasonally inundated wetlands
	PCq	Planted *Calothamnus quadrifidus* and *Melaleuca ryeae* shrubs over weeds on flats
	PE	Planted Eucalyptus trees over weeds on flats
	PENV	Planted Eucalyptus trees over sparse remnant native trees and/or shrubs on flats
	XpS	Remnant isolated *Xanthorrhoea preissii* over weeds on plains
	C	Cleared land

FIGURE 5.4

LEGEND: Vegetation Types and Other Areas Mapped in the Survey Area

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5.2.6 Vegetation Condition

Table 5.8 presents the vegetation condition areas mapped within the Survey Area, with the condition mapping polygons presented on **Figure 5.5**. Areas mapped as Cleared land are not rated, as the vegetation condition rating is applied to vegetated lands only. As mentioned previously, a total of 29.4 ha (54.4 % of the Survey Area) was mapped as cleared by the survey.

The majority of the vegetation of the Survey Area was rated as Completely Degraded, with a total of 16 ha (29.5 % of the Survey Area) of Completely Degraded vegetation mapped within the Survey Area. The vegetation structure of these areas was no longer intact, comprising of weed species with isolated native trees and shrubs, or comprising of previously cleared areas with the majority of vegetation present being planted trees and shrubs.

The remainder of vegetation within the Survey Area was rated as Degraded, with a total of 8.7 ha (16.1 % of the Survey Area) of Degraded vegetation mapped within the Survey Area. The structure of this vegetation was severely impacted by multiple disturbances. Impacts included partial clearing, aggressive weeds, grazing and potential Phytophthora Dieback. No vegetation within the Survey Area was considered to be in Good or better condition.

Table 5.8 Vegetation Condition Areas Mapped within the Survey Area

Type	Code	Area Mapped (ha)		
		Degraded	Completely Degraded	Total
VT	BW	3.0	0.8	3.8
	CpRcS	0.8	0.5	1.3
HMA	AsSTdR	0.7	0.1	0.9
	CcW	0.6	1.8	2.5
	EcEsAS		0.4	0.4
	ErW	0.2	2.9	3.1
	ErWRW	1.5		1.5
	MFG		0.2	0.2
	MpW	1.3	0.0	1.3
	MrW	0.1	1.2	1.3
	PCq		0.1	0.1
	PE		4.3	4.3
	PENV	0.4	3.5	3.9
	XpS		0.2	0.2
	Cleared	NA	NA	29.4
Total		**8.7**	**16.0**	**54.1**
Percentage of Survey Area		**16.1**	**29.5**	**45.6**

FIGURE 5.5

Vegetation Condition and Introduced Flora of the Survey Area

401000 401200 401400 401600 401800 402000 402200

6511400 6511200 6511000 6510800 6510600 6510400

Legend

- Survey Area
- Road
- Railway

Vegetation Condition

- D Degraded
- CD Completely degraded
- C Cleared land

Label

- Acit **Acacia iteaphylla*
- Acpo **Acacia podalyriifolia*
- Arc **Arctotheca calendula*
- Brma **Briza maxima*
- Cas **Callitriche stagnalis*
- Cacc **Casuarina cunninghamiana* subsp. *cunninghamiana*
- Dig **Dittrichia graveolens*
- Ehc **Ehrharta calycina*
- Ercu **Eragrostis curvula*
- Eub **Eucalyptus botryoides*
- Eug **Eucalyptus grandis*
- Eul **Eucalyptus leucoxylon*
- Glc **Hypochaeris glabra*
- Hyg **Hypochaeris glabra*
- Ixi **Ixia* sp.
- Jam **Jacaranda mimosifolia*
- Poan **Poa annua*
- Ruc **Rumex conglomeratus*
- Ura **Ursinia anthemoides*
- Zaa **Zantedeschia aethiopica*

0 80 160

Metres

Scale: 1:4,000 at A3
GDA2020 MGA Zone 50

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5.2.7 Swan Coastal Plain Floristic Community Types

The current procedure recommended by DBCA for determining FCTs on the southern SCP is to establish and survey quadrats in the appropriate season and carry out analyses with the Gibson et. al. (1994) and Keighery et.al. (2012) datasets as per the '*Methods for survey and identification of Western Australian threatened ecological communities*' procedure (2023b). The current survey does not comply with this procedure as it was an out of season survey and the timing was not suitable to undertake a quadrat survey of the flora and vegetation; as per **Section 1.3**, one of the aims of the current assessment was to identify whether there is a requirement for a spring quadrat assessment, based on the vegetation present in the Survey Area and the condition of the vegetation.

The majority of the Survey Area has been cleared or disturbed (as per **Section 5.2.6**), with 12 types of Highly Modified Areas mapped (such areas no longer considered to represent intact remnant vegetation) and two VTs mapped, including BW and CpRcS. The vegetation condition of the Survey Area was rated as Degraded to Completely Degraded by the current survey (including the three VTs mapped), as per the condition scale presented in EPA (2016b), with the vegetation of the Survey Area severely impacted by multiple disturbances (see **Section 5.2.6**). In addition to the survey being outside of the prime season (Spring), due to the degraded nature of the vegetation native species richness was considered inadequate to provide suitable data for statistical analysis, with the vegetation sampled via relevés rather than quadrats (as per DBCA (2023b)).

A qualitative assessment of the relevé data recorded during the current survey was undertaken to assess for the SCP FCTs potentially present within the Survey Area. The description of each FCT and the typical / common species described in the Gibson et. al. (1994) report was reviewed. A summary of this review is presented in **Table 5.9**. VT CpRcS was assessed via vegetation observation points. It is possible that this VT represents Gibson et. al. (1994) FCT 4; however, the vegetation structure has been impacted such that it is not possible to align this with an SCP FCT.

The qualitative assessment of the three relevés assessed during the survey (all within the vegetation mapped as VT BW) indicates that the relevés are potentially representative of SCP FCTs 23a or 21c. However, the vegetation was too degraded to confidently align to a particular FCT (suitable quadrat data also required to perform this task). Although there were no Banksia trees recorded in relevé R02, there were Banksia trees in close proximity, and there were several other taxa in the relevé which indicate the area potentially represents FCTs 23a or 21c. FCTs 23 and 21c form part of the '*Banksia Woodlands of the Swan Coastal Plain ecological community'* (discussed in **Section 5.2.8.2**). In addition, these FCTs are listed Priority 3 PECs (DBCA, 2023c). The potential for these PECs to be present within the Survey Area with respect to the condition of the vegetation is discussed further in **Section 5.2.8.1**.

Table 5.9 Summary of Comparison of Typical Habitat Features to Determine Relationships of Study Area Relevés to the Swan Coastal Plain Floristic Community Types

Relevé	Dominant Taxa	Relevé Parameters	Determination
R01	*Banksia attenuata* *Banksia ilicifolia* *Banksia menziesii* *Eucalyptus todtiana* *Macrozamia riedlei* *Melaleuca ryeae* *Melaleuca trichophylla* *Xanthorrhoea preissii*	**VSA:** Pinjarra_4 **Land System:** Yanga System **Landform:** flat **Soil / Substrate:** white sand **Condition:** Degraded	**Inconclusive – possibly FCT 21c or 23b** Several of the dominant taxa are common taxa in many FCT 21c and 23b quadrats. These FCTs are known to occur in the general vicinity of the Survey Area. However, vegetation of the relevé is too degraded to infer an SCP FCT with certainty.
R02	*Eucalyptus todtiana* *Macrozamia riedlei* *Melaleuca ryeae* *Regelia ciliata* *Xanthorrhoea preissii*	**VSA:** Pinjarra_4 **Land System:** Yanga System **Landform:** flat **Soil / Substrate:** white sand **Condition:** Degraded	**Inconclusive – possibly FCT 21c or 23b** Several of the dominant taxa are common taxa in many FCT 21c and 23b quadrats. These FCTs are known to occur in the general vicinity of the Survey Area. However, vegetation of the relevé is too degraded to infer an SCP FCT with certainty.
R03	*Banksia attenuata* *Banksia menziesii* **Eucalyptus leucoxylon* *Eucalyptus todtiana* *Melaleuca seriata* *Xanthorrhoea preissii*	**VSA:** Pinjarra_4 **Land System:** Yanga System **Landform:** flat **Soil / Substrate:** grey sand **Condition:** Degraded	**Inconclusive – possibly FCT 21c or 23b** Several of the dominant taxa are common taxa in many FCT 21c and 23b quadrats. These FCTs are known to occur in the general vicinity of the Survey Area. However, vegetation of the relevé is too degraded to infer an SCP FCT with certainty.

5.2.8 Significant Vegetation

5.2.8.1 Significant Vegetation of the Survey Area

The desktop assessment identified 13 listed significant vegetation communities that have records (or could potentially occur) within the Desktop Study Area (**Section 5.1.5**). Of these, one was identified by the flora and vegetation assessment in the Survey Area, being the 'Banksia Woodlands of the Swan Coastal Plain ecological community' TEC. This TEC is listed under the EPBC Act but is listed as a PEC (P3) by DBCA. This significant vegetation community is discussed in further detail in **Section 5.2.8.2**.

DBCA has acknowledged that in general, a vegetation condition threshold of 'Good' is applied to State listed TECs, in that areas of TECs are generally no longer considered to be extant where vegetation condition is poorer than 'Good'. However, they state that there can be exceptions to this, for example where much of the remaining area of a TEC is in relatively poor condition (V. English pers. comm., 2022). In addition, in some cases, this contradicts the definition of TECs at a Federal level, with some Federally listed TECs having no minimum condition thresholds. Based on this, degraded areas of all the significant communities recorded within the Survey Area are not considered to be occurrences of the community, with the exception of the Banksia Woodlands of the Swan Coastal Plain TEC which can also include degraded areas in accordance with the conservation advice (DoEE, 2016) for the community.

5.2.8.2 Banksia Woodlands of the Swan Coastal Plain TEC

The 'Banksia Woodlands of the Swan Coastal Plain ecological community' is listed as a PEC in WA, and as a TEC under the EPBC Act. DBCA state that the description, area and condition thresholds that apply to the EPBC-listed TEC also apply to the PEC (DBCA, 2023c); therefore, these are discussed together in the context of the EPBC-listed TEC. Note that a number of other DBCA-listed TECs and PECs (based on SCP FCTs from the Gibson et al. (1994) study) also form part of the EPBC-listed TEC; such other communities present in the Survey Area are discussed in **Section 5.2.9**.

The Approved Conservation Advice for this community (DoEE, 2016) stipulates a stepwise process for identifying occurrences of the TEC community. These steps are followed in the context of identifying whether vegetation of the Survey Area represents this TEC, as outlined below.

The first step involves key diagnostic characteristics (location and physical environment, soils and landform, structure, and composition). The Survey Area satisfies the first two key diagnostic characteristics, as it occurs within the SCP IBRA bioregion, and contains areas of well drained, low nutrient soils on sandplain landforms. With regard to the remaining two key diagnostic characteristics, the Banksia Woodland VT (BW) is considered to have a basic low woodland structure dominated by a combination of *Banksia attenuata* and *Banksia menziesii*; however, the understorey lacks a diverse sclerophyllous shrub and herbaceous ground layer, with limited native taxa present in the mid and lower stratums of this VT. Furthermore, the condition of VT BW does not meet the minimum patch size and condition requirements stipulated in the conservation advice, with the area mapped as Degraded, nor does the VT qualify as the TEC on the basis that the patch may be degraded but contributes to the overall function of the ecological community (and other environmental components) across the landscape.

There is an area of Banksia Woodland immediately north of the northern patch of VT BW which may be considered to be in Good condition (outside of the Survey Area) (see vegetation observation point VMN 48 in **Appendix E**. Western Botanical (2012) mapped a polygon of *Banksia menziesii* and *Banksia attenuata*, open woodland in this area, covering a total area of 0.3 ha. No further Banksia woodland vegetation associations were mapped in the northern polygon of the Western Botanical project area. The area of VT BW bordering this area (within the Survey Area), as mapped by the current survey is 0.5 ha. Therefore, the combined area of these two Banksia woodland vegetation communities do not meet the minimum patch size and condition requirements stipulated in the conservation advice, with the minimum size of a patch rated as Good being 2 ha (DoEE, 2016). Furthermore, the areas of VT BW mapped within the Survey Area are isolated (based on field observations during the current survey, polygons mapped by Western Botanical (2012, 2013) and aerial photography of the surrounding areas), and do not contribute to diversity or connectivity of areas of the TEC in better condition. Therefore, the Banksia Woodlands of the Swan Coastal Plain TEC is not considered to occur in the Survey Area.

5.2.9 Likelihood of Occurrence of Significant Vegetation

Appendix G presents an assessment of the likelihood of occurrence of significant vegetation within the Survey Area as per **Section 3.4**. Of the nine significant ecological communities recorded in the Desktop Study Area, none are considered to be present in the Survey Area based on the vegetation types, substrate and vegetation condition.

6.0 Conclusions and Recommendations

The reconnaissance survey of the Survey Area was conducted in July 2024 which does not correspond to the optimum survey or flowering period for the SCP bioregion. However, survey aimed to assess and search for potential significant vegetation and potential habitat for significant flora. Additional annual taxa would be expected to be present in the Survey Area during the peak flowering season for the region (spring).

The survey recorded 70 discrete vascular flora taxa, including 20 introduced taxa. The species richness is considered to be lower than what would typically be recorded on the SCP due to the condition of the vegetation. No significant flora were recorded during the survey of the Survey Area. *Grevillea fililoba* (P1) was recorded at one locations; however, this individual was planted, and is therefore not considered to be significant. An assessment of likelihood of occurrence of significant flora identified in the desktop assessment considered all significant taxa to be unlikely to be occur in the Survey Area, due to potential habitat not considered to be present, and with the Study Area also being outside the known distribution of some taxa. Potential habitat was considered with respect to the type of habitat present and also the condition of habitat present, with the entirety of the Survey Area mapped as Degraded or Completely Degraded and the lower stratum comprising of predominantly pasture weeds.

Two VTs and 12 Highly Modified Areas were described and mapped in the Survey Area. These areas were rated as Degraded or Completely Degraded, with the structure of the vegetation considered to be severely impacted by multiple disturbances, or no longer intact. Of the vegetation types described, VT BW is considered to have a basic low woodland structure dominated by a combination of *Banksia attenuata* and *Banksia menziesii*; as per the diagnostic characteristics for Approved Conservation Advice for Banksia Woodlands of the Swan Coastal Plain ecological community (DoEE, 2016). However, the understorey lacks a diverse sclerophyllous shrub and herbaceous ground layer, with limited native taxa present in the mid and lower stratums of this VT. In addition, the condition of VT BW does not meet the minimum patch size and condition requirements stipulated in the conservation advice, with the area mapped as Degraded, nor does the VT qualify as the TEC on the basis that the patch may be degraded but contributes to the overall function of the ecological community (and other environmental components) across the landscape. The areas mapped are isolated, and do not contribute to diversity or connectivity of areas of the TEC in better condition. Therefore, the Banksia Woodlands of the Swan Coastal Plain TEC is not considered to occur in the Survey Area.

An assessment of the likelihood of occurrence of significant vegetation within the Survey Area found that of the nine ecological communities identified by the desktop assessment, none are considered to be present in the Survey Area based on the vegetation types, substrate and vegetation condition recorded in the Survey Area.

Overall, further spring assessment of the Survey Area is not considered to be necessary based on the severely impacted vegetation present, with no vegetation rated as Good or better, mapped within the Survey Area.

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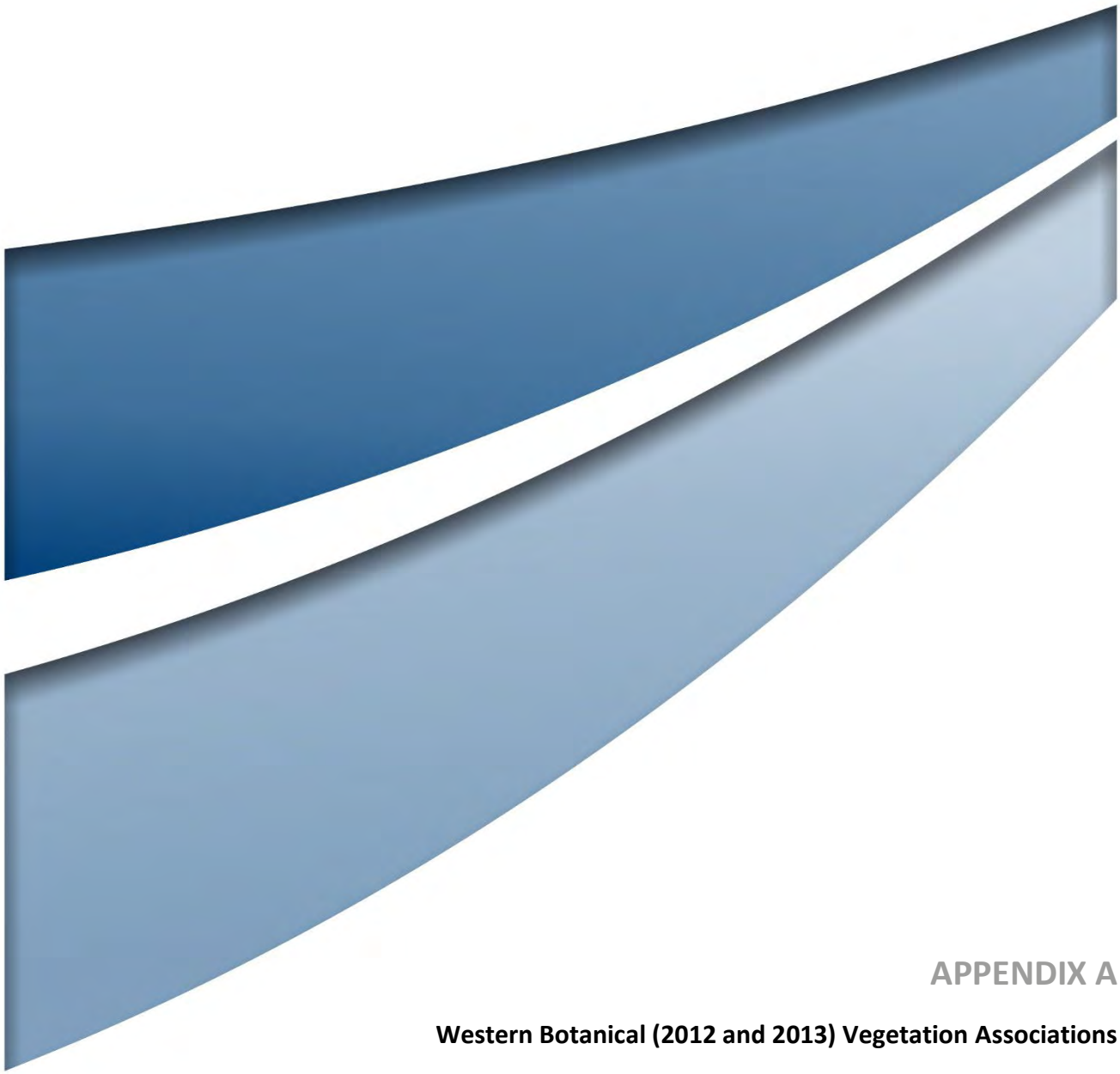


APPENDIX A

Western Botanical (2012 and 2013) Vegetation Associations

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
EPW	Eucalyptus Planted Woodland	Variable mix of planted Eucalypt (**E. botryoides*, *E. camaldulensis* subsp. *obtusa*, *E. caesia*, *E. maculata*, *E. macrandra*, *E. urna*, and *E. gomphocephala*) open woodland to woodland over variable mix of **Ehrharta longiflora*, **Arctotheca calendula*, **Ursinia anthemoides*, **Zantedeschia aethiopica* grassland/herbland.	Very Degraded. Entirely cleared pasture lands dominated by ground stratum weeds with rehabilitative Eucalypt plantings. An anthropogenic vegetation association with almost no original flora remaining.	2012, 2013
EPEtOW	Eucalyptus Plantings in *Eucalyptus todtiana* Open Woodland	Planted *Eucalyptus camaldulensis* subsp. *obtusa* amongst scattered remnant *Eucalyptus todtiana* Open Woodland over *Xanthrohoea priesii* sparse shrubland over **Ehrharta longiflora* grassland.	Degraded. A dispersed remnant stand of *Eucalyptus todtiana* woodland now dominated by planted *E. camaldulensis* subsp. *obtusa* and numerous single specimens of planted mid stratum species. Ground stratum dominated by weeds.	2012
EPBW	Eucalyptus Plantings in Banksia Woodland	Variably distributed mixed Eucalypt plantings (*E. botryoides*, *E. conferruminata*, *E. camaldulensis* subsp. *obtusa*), *Banksia attentuata*, *B. menziesii* Woodland over occasional *Xanthorhoea priesii* shrubs over **Ehrharta longiflora*, **Arctotheca calendula*, (with **Briza maxima* and **Ehrharta calycina* along northern strip of southern polygon) grassland/herbland. **Mapped within the Survey Area.**	Degraded to Very Degraded. An anthropogenic vegetation association dominated by mixed Eucalypt plantings within degraded remnant Banksia woodland. Ground stratum composed of weeds.	2012, 2013
MpAfPW	*Melaleuca preissiana* and *Agonis flexuosa* Planted Woodland	Lakeside planting of *Melaleuca preissiana* and *Agonis flexuosa* woodland over occasional *Melaleuca* aff. *quinquenervia*, *Callistemon phoeniceus*, *Juncus kraussii*, over **Ehrharta longiflora*, and **Cotula coronopifolia* grassland (above water line).	Very Degraded. An anthropogenic vegetation association bordering artificial lakes. However, appears to robustly protect lake banks.	2012

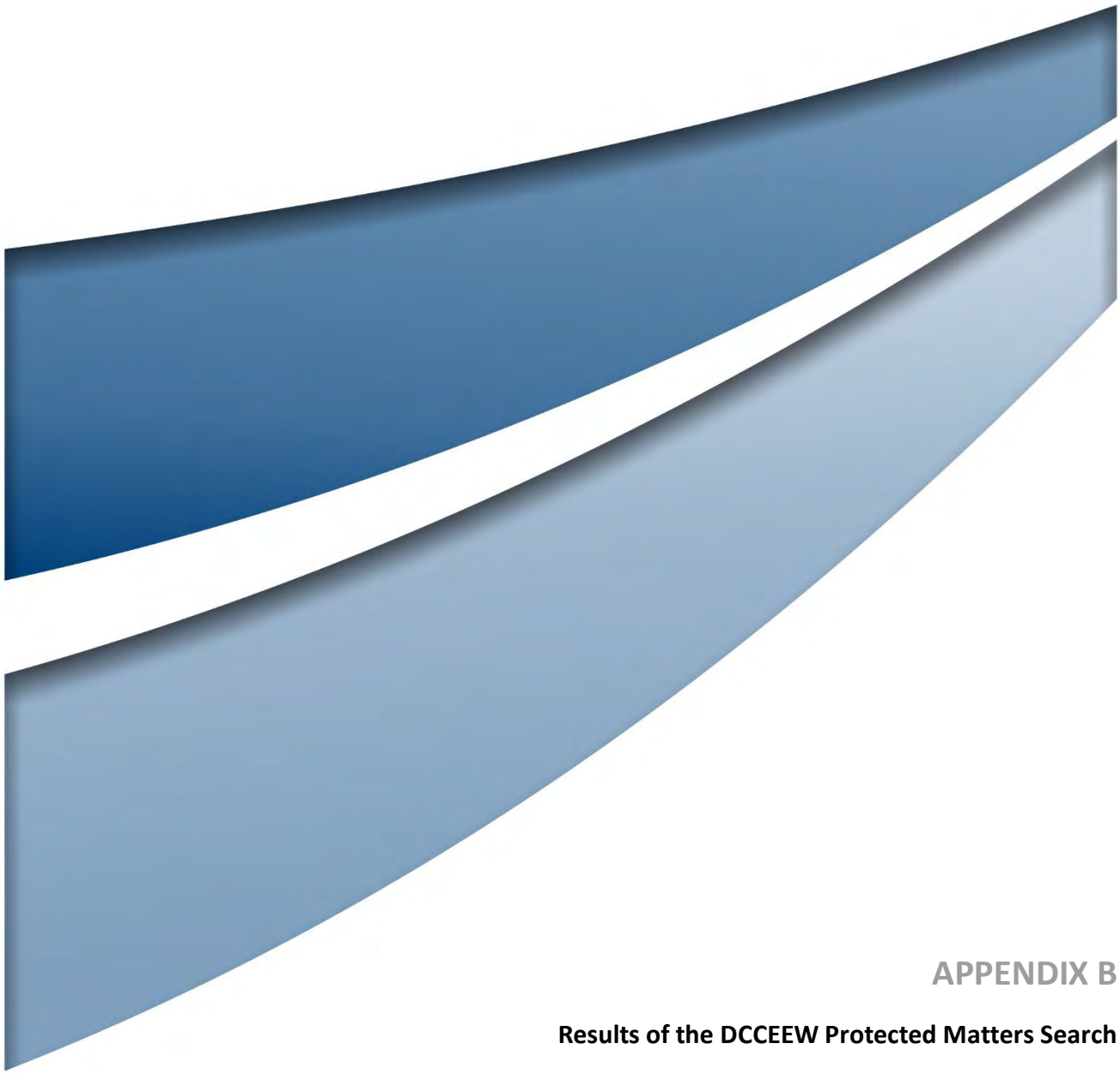
Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
CcW	*Corymbia calophylla* Woodland	*Corymbia calophylla* open woodland to woodland over *Xanthorrhoea preisii* and *Acacia saligna* (senescent) scattered low shrubland over **Ehrharta longiflora* dense grassland with occasional *Podotheca gnaphalioides* and **Zantedeschia aethiopica*. **Mapped within the Survey Area.**	Degraded. Remnant woodland highly impacted by past grazing. Upper stratum intact with sparse degraded mid stratum and weed-dominated ground stratum.	2012
ErW	*Eucalyptus rudis* Woodland	*Eucalyptus rudis* subsp. *rudis* open woodland to woodland over very occasional *Xanthorrhoea preissii* and *Hypocalymma angustifolia* over **Ehrharta longiflora* grassland with occasional **Arctotheca calendula* and **Zantedeschia aethiopica*.	Degraded to Good. Remnant woodland highly impacted by past grazing, upper stratum intact with sparse degraded mid stratum and a weed-dominated ground stratum.	2012
EtW	*Eucalyptus todtiana* Woodland	*Eucalyptus todtiana* woodland over *Regelia ciliata* scattered low shrubland over **Ehrharta longiflora*, **Hypochaeris glabra*, **Zantedeschia aethiopica* grassland/herbland.	Degraded. Loss of mid stratum with ground stratum composed of weeds.	2012
AsLW	*Acacia saligna* Low Woodland	Senescing *Acacia saligna* low woodland to open woodland over **Ehrharta longiflora*, **Arctotheca calendula*, **Zantedeschia aethiopica*, **Romulea rosea* var. *australis* grassland/herbland.	Degraded to Very Degraded. *Acacia saligna* is senescing (~60% dead), no mid stratum remains, ground stratum composed of weeds.	2012
AsRcT	*Acacia saligna* and *Regelia ciliata* Thicket	*Acacia saligna* thicket over *Regelia ciliata*, *Hypochalymma angustifolia* low heath over variable mix of *Drosera glanduligera*, **Moraea flaccida*, **Ehrharta longiflora*, **Arctotheca calendula* sparse grassland/herbland. **Mapped within the Survey Area.**	Good. Upper stratum and mid stratum intact though floristically simple, moderate weed density in ground stratum.	2012, 2013
AsBaBmOW	*Acacia saligna*, *Banksia attenuata*, and *Banksia menziesii* Open Woodland	*Acacia saligna* (with scattered *Banksia attenuata* and *B. menziesii*) open woodland over Juncus pallidus scattered sedgeland over **Ehrharta longiflora* (and occasional **Eragrostis curvula*) grassland. **Mapped within the Survey Area.**	Very Degraded to Degraded. Post-earthworks disturbance vegetation lining the artificial drainage ditch of the south boundary of the southern polygon.	2012, 2013

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
BmBaRcOW	*Banksia menziesii*, *Banksia attenuata*, *Regelia ciliata* Open Woodland	*Banksia menziesii, Banksia attenuata* open woodland over *Xanthorrhoea preissii*, *Regelia ciliata* scattered shrubland over *Hibbertia vaginata*, *Dasypogon bromeliifolius* scattered dwarf shrubland over **Ehrharta longiflora*, *Podotheca gnaphalioides*, **Hypochaeris glabra*, **Ursinia anthemoides*, and scattered **Zantedeschia aethiopica* grassland/herbland. **Mapped within the Survey Area**.	Degraded. Upper stratum structure intact, but mid stratum largely removed and floristically simple due to past grazing. Ground stratum dominated by weeds.	2012, 2013
BxErMrOW	Mixed Banksia, *Eucalyptus rudis*, and *Melaleuca ryeae* Open Woodland	*Banksia attenuata*, *Banksia menziesii*, *Banksia ilicifolia*, (and scattered *Eucalyptus rudis* subsp. *rudis*) open woodland over *Xanthorrhoea preisii*, *Acacia saligna*, *Macrozamia fraseri* scattered shrubland over *Melaleuca ryeae* and *Dasypogon bromeliifolius* scattered dwarf shrubland over variable mixed **Ehrharta longiflora*, *Podotheca gnaphalioides*, **Arctotheca calendula*, and **Hypochaeris glabra* grassland/herbland. **Mapped within the Survey Area.**	Degraded. Upper stratum structure reasonably intact, but mid stratum largely removed and floristically simple due to past grazing. Ground stratum dominated by weeds. Dead and dying Banksias and *E. rudis* subsp. *rudis* suggest possibility of Dieback (Phytophthora) widespread within this association.	2012, 2013
XpMrLH	*Xanthorrhoea preisii* and *Melaleuca ryeae* Low Heath	*Xanthorrhoea preisii* and *Calitris pyramidalis* open low shrubland over *Melaleuca ryeae* low heath to shrubland over **Ehrharta longiflora* and **Arctotheca calendula* grassland with occasional **Zanthedeschia aethiopica*.	Good. Moderate disturbance to mid stratum probably due to past grazing with a weed dominated ground stratum.	2012
RcLH	*Regelia ciliata* Low Heath	*Melaleuca preissiana*, *Acacia saligna*, *Callitris pyramidalis* scattered shrubland over *Regelia ciliata* low heath over variable mix of *Drosera glanduligera*, **Moraea flaccida*, **Ehrharta longiflora*, **Arctotheca calendula*. **Mapped within the Survey Area.**	Degraded to Good. Structure reasonably intact but with ground stratum dominated by weeds. Rabbit warrens abundant.	2012, 2013
RcLS	*Regelia ciliata* Low Shrubland	*Regelia ciliata* (variably senescent) with occasional *Kunzea glabrescens* low open shrubland to shrubland over **Ehrharta longiflora*, **Arctotheca calendula*, **Hypochaeris glabra*, **Zantedeschia aethiopica* grassland/herbland.	Degraded. Shrubland composition simple with ground stratum completely dominated by weeds.	2012

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
EpODS	*Eremaea pauciflora* Open Dwarf Shrubland	Very scattered woodland of *Banksia attenuata*, *B. menziesii,* and planted *Eucalyptus* sp. over *Acacia saligna* (standing and fallen dead) and *Macrozamia fraseri* scattered shrubland over *Eremaea pauciflora* var. *pauciflora* open dwarf shrubland over *Podotheca gnaphalioides*, **Ehrharta longiflora*, **Ursinia anthemoides*, **Arctotheca calendula* herbland.	Degraded. Appears to have been mechanically disturbed in the past, followed by limited plantings of *Eucalyptus* sp. (supportive stakes present) and natural regeneration. Ground stratum dominated by weeds.	2012
PaMH	*Pentameris airoides* Mixed Herbland	Mixed, seasonally wet, open herbland composed of **Pentameris airoides* subsp. *airoides*, *Podotheca gnaphalioides*, **Ursinia anthemoides*, *Crassula colorata* var. *colorata*, **Hypochaeris glabra*, and *Drosera glanduligera*.	Degraded. Herbland dominated by weed species.	2012
JpDL	Sparse *Juncus pallidus* Drainage Line	Wet depressions often with anthropogenic drainage lines. Occasional remnant *Melaleuca preissiana* over sparse *Juncus pallidus* sedgeland over **Arctotheca calendula* (30%), **Moraea flaccida* (20%), and **Zantedeschia aethiopica* herbland. **Mapped within the Survey Area.**	Very Degraded. Dominated by ground layer weed species with no remnant vegetation beside occasional *Melaleuca preissiana* and sparse *Juncus pallidus*.	2012
EPAW	Eucalypt plantings in Acacia Woodland	Variably distributed mixed eucalypt plantings (*Eucalyptus botryoides*, *Eucalyptus conferruminata*, *Eucalyptus dendromorpha*, *Eucalyptus rudis* subsp. *rudis*, *Eucalyptus leucoxylon*) and *Acacia saligna* woodland, over **Ehrharta longiflora* and **Hordeum* sp. low open grassland. **Mapped within the Survey Area.**	Degraded. Ground stratum dominated by weeds with rehabilitation mixed eucalypt and *Acacia saligna* plantings.	2013
PCqMcS	Planted *Calothamnus quadrifidus* and *Melaleuca cordata* Shrubland	Planted *Calothamnus quadrifidus* and *Melaleuca cordata* tall shrubland, over **Eragrostis curvula* and **Ehrharta longiflora* mid open grassland. **Mapped within the Survey Area.**	Degraded. Planted upper stratum intact with no mid stratum and a weed dominated ground stratum.	2013

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
AsCpS	*Acacia saligna* and *Callitris pyramidalis* Shrubland	*Acacia saligna* tall sparse shrubland over *Callitris pyramidalis*, *Hypocalymma angustifolium* and *Melaleuca ryeae* mid closed shrubland, over *Dielsia stenostachya* and **Hordeum* sp. low open sedgeland/grassland. **Mapped within the Survey Area.**	Good. Upper stratum with many burnt tall shrubs. Mid stratum healthy, with a few weed species in the ground stratum.	2013
MpS	*Melaleuca preissiana* Shrubland	*Melaleuca preissiana* tall open shrubland to shrubland (with variable mix of planted *Eucalyptus grandis* and *Acacia saligna*), over *Regelia ciliata*, *Typha domingensis* and *Juncus pallidus* mid shrubland/tall rushland/sedgeland over **Ehrharta longiflora* low grassland. **Mapped within the Survey Area.**	Good. Upper and mid strata intact with few weed species within the ground stratum.	2013
XpSS	*Xanthorrhoea preissii* Sparse Shrubland	An area that has been previously partially cleared and planted. *Eucalyptus* sp. (unidentified, planted trees) low isolated trees, over *Xanthorrhoea preissii* mid sparse shrubland, over **Ehrharta longiflora* low open grassland. **Mapped within the Survey Area.**	Degraded. Large areas of disturbed bare soil. All strata very patchy with no solid cover spanning all three strata. Weeds present in the ground stratum.	2013
CpLH	**Conyza parva* Low Herbland	*Acacia saligna* tall isolated shrubs, over **Conyza parva* low herbland, over **Hordeum* sp. and **Cynodon dactylon* low grassland.	Very Degraded. Upper stratum and mid stratum largely removed. Ground stratum dominated by weeds. Originally completely cleared for powerline access.	2013
CcSH	*Cotula coronopifolia* Sparse Herbland	Area subject to inundation and waterlogging. **Cotula coronopifolia* low sparse herbland, over **Hordeum* sp. and **Polypogon monspeliensis* low open grassland.	Very Degraded. Upper stratum and mid stratum removed. Ground stratum dominated by weeds.	2013
DsLS	*Dielsia stenostachya* Low Sedgeland	**Conyza parva*, *Juncus pallidus* and *Typha domingensis* tall herbland/sedgeland/rushland, over *Dielsia stenostachya* low closed sedgeland.	Very Degraded. Upper and mid strata removed but ground stratum intact, dominated by weeds.	2013

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
TdR	Typha domingensis Rushland	*Acacia saligna* and *Melaleuca preissiana* tall isolated shrubs, over *Typha domingensis* tall closed rushland, over **Paspalum dilatatum*, **Conyza parva* sparse shrubland/grassland and scattered small clumps of **Zantedeschia aethiopica* (Arum Lily).	Good. Upper stratum scattered but reasonably intact. Mid stratum present. Scattered weeds in the ground stratum. Mostly cleared for powerlines.	2013
TdDL	*Typha domingensis* Drainage Line	Flowing drainage line with isolated *Melaleuca preissiana* and *Acacia saligna* tall shrubs, over *Typha domingensis* tall closed rushland, over **Ehrharta longiflora* low open grassland and scattered **Zantedeschia aethiopica* (Arum Lily).	Good. Upper and mid strata present with scattered weeds throughout the ground stratum.	2013
Cpwr / CPint	Cleared for Powerlines / Cleared for Plant	Cleared for powerlines and road access. Weed species sprouting (**Arctotheca calendula*, **Solanum nigrum*, **Sonchus asper*, **Hordeum* sp., **Eragrostis curvula*, and **Ehrharta longiflora*) Cleared for plant. Contains scattered weed grass species (**Hordeum* sp., **Eragrostis curvula*, and **Ehrharta longiflora*). **Mapped within Survey Area.**	Very degraded. All strata levels removed.	2023



APPENDIX B

Results of the DCCEEW Protected Matters Search

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: 13-Aug-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	None
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	7
Listed Threatened Species:	38
Listed Migratory Species:	8

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:	10
Commonwealth Heritage Places:	None
Listed Marine Species:	12
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:	8
Regional Forest Agreements:	1
Nationally Important Wetlands:	1
EPBC Act Referrals:	13
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

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
Assemblages of plants and invertebrate animals of tumulus (organic mound) springs of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered	Community likely to occur within area	In feature area
Clay Pans of the Swan Coastal Plain	Critically Endangered	Community likely to occur within area	In buffer area only
Empodisma peatlands of southwestern Australia	Endangered	Community may occur within area	In feature area
Shrublands and Woodlands on Muchea Limestone of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Shrublands and Woodlands on Perth to Gingin ironstone (Perth to Gingin ironstone association) of the Swan Coastal Plain	Endangered	Community known to occur within area	In buffer area only
Tuart (Eucalyptus gomphocephala) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered	Community may 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			
Botaurus poiciloptilus			
Australasian Bittern [1001]	Endangered	Species or species habitat may occur within area	In buffer area only

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
[Calyptorhynchus banksii naso](#) Forest Red-tailed Black-Cockatoo, Karrak [67034]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Leipoa ocellata](#) Malleefowl [934]	Vulnerable	Species or species habitat likely to occur within area	In feature area
[Numenius madagascariensis](#) Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
[Rostratula australis](#) Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area	In feature area
[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
FISH			
[Galaxiella nigrostriata](#) Blackstriped Dwarf Galaxias, Black-stripe Minnow [88677]	Endangered	Species or species habitat known to occur within area	In feature area
INSECT			
[Hesperocolletes douglasi](#) Douglas' Broad-headed Bee, Rottnest Bee [66734]	Critically Endangered	Species or species habitat may occur within area	In feature area
MAMMAL			
[Dasyurus geoffroii](#) Chuditch, Western Quoll [330]	Vulnerable	Species or species habitat known to occur within area	In feature area
[Macroderma gigas](#) Ghost Bat [174]	Vulnerable	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
OTHER			
Westralunio carteri			
Carter's Freshwater Mussel, Freshwater Mussel [86266]	Vulnerable	Species or species habitat likely to occur within area	In feature area
PLANT			
Acacia anomala			
Grass Wattle, Chittering Grass Wattle [8153]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Andersonia gracilis			
Slender Andersonia [14470]	Endangered	Species or species habitat likely to occur within area	In feature area
Anigozanthos viridis subsp. terraspectans			
Dwarf Green Kangaroo Paw [3435]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Banksia mimica			
Summer Honeypot [82765]	Endangered	Species or species habitat may occur within area	In feature area
Caladenia huegelii			
King Spider-orchid, Grand Spider-orchid, Rusty Spider-orchid [7309]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Caleana dixonii listed as Paracaleana dixonii			
Sandplain Duck Orchid [87944]	Endangered	Species or species habitat may occur within area	In feature area
Chamelaucium lullfitzii listed as Chamelaucium sp. Gingin (N.G.Marchant 6)			
Gingin Wax [92777]	Endangered (listed as Chamelaucium sp. Gingin	Species or species habitat known to occur within area	In feature area
Conospermum densiflorum subsp. unicephalatum			
One-headed Smokebush [64871]	Endangered	Species or species habitat may occur within area	In buffer area only
Darwinia foetida			
Muchea Bell [83190]	Critically Endangered	Species or species habitat known to occur within area	In feature area
Diplolaena andrewsii			
[6601]	Endangered	Species or species habitat may occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Diuris micrantha Dwarf Bee-orchid [55082]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Diuris purdiei Purdie's Donkey-orchid [12950]	Endangered	Species or species habitat may occur within area	In feature area
Drakaea elastica Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid [16753]	Endangered	Species or species habitat likely to occur within area	In feature area
Eleocharis keigheryi Keighery's Eleocharis [64893]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Eucalyptus leprophloia Scaly Butt Mallee, Scaly-butt Mallee [56712]	Endangered	Species or species habitat may occur within area	In buffer area only
Grevillea althoferorum [64906]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea corrugata a shrub [65445]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Grevillea curviloba subsp. curviloba Curved-leaf Grevillea [64908]	Endangered	Species or species habitat known to occur within area	In feature area
Grevillea curviloba subsp. incurva Narrow curved-leaf Grevillea [64909]	Endangered	Species or species habitat known to occur within area	In feature area
Hypocalymma sylvestre chittering Myrtle [86384]	Endangered	Species or species habitat known to occur within area	In buffer area only
Macarthuria keigheryi Keighery's Macarthuria [64930]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Ptychosema pusillum			
Dwarf Pea [11268]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
Synaphea sp. Fairbridge Farm (D.Papenfus 696)			
Selena's Synaphea [82881]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Thelymitra dedmaniarum			
Cinnamon Sun Orchid [65105]	Endangered	Species or species habitat may occur within area	In feature area
Thelymitra stellata			
Star Sun-orchid [7060]	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
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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus			
Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

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
Defence		
Defence - GIN GIN SATELLITE AIRFIELD [50112]	WA	In buffer area only
Defence - MUCHEA ARMAMENT RANGE [50094]	WA	In buffer area only
Defence - MUCHEA ARMAMENT RANGE [50091]	WA	In buffer area only
Defence - MUCHEA ARMAMENT RANGE [50069]	WA	In buffer area only
Defence - MUCHEA ARMAMENT RANGE [50071]	WA	In buffer area only
Defence - MUCHEA ARMAMENT RANGE [50073]	WA	In buffer area only
Defence - MUCHEA ARMAMENT RANGE [50088]	WA	In buffer area only
Defence - MUCHEA ARMAMENT RANGE [50095]	WA	In buffer area only
Defence - PEARCE - AP6 OBSTRUCTION BEACON NO.3 [50241]	WA	In buffer area only
Unknown		
Commonwealth Land - [50856]	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

Scientific Name	Threatened Category	Presence Text	Buffer Status
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
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
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to 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
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area	In buffer area only

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to 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
Barracca	Nature Reserve	WA	In buffer area only
Breera Road	Nature Reserve	WA	In buffer area only
Bullsbrook	Nature Reserve	WA	In buffer area only
Chandala	Nature Reserve	WA	In buffer area only
Timaru	Nature Reserve	WA	In buffer area only
Unnamed WA02336	Nature Reserve	WA	In buffer area only
Unnamed WA44622	Nature Reserve	WA	In buffer area only
Unnamed WA50678	Nature Reserve	WA	In buffer area only

Regional Forest Agreements	[Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
South West WA RFA	Western Australia	In buffer area only

Nationally Important Wetlands		[Resource Information]
Wetland Name	State	Buffer Status
Chandala Swamp	WA	In buffer area only

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
"Muchea 6" Clay Pit Expansion project	2022/09342		Assessment	In buffer area only
Gonneville Nickel-Copper-Platinum Group Element Mine Development Project	2024/09839		Assessment	In feature area

Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Muchea Silica Sand Project	2022/09370		Referral Decision	In buffer area only
Controlled action				
Clearing and development of Lot 9001 Rosewood Drive, Chittering, WA	2016/7759	Controlled Action	Further Information Request	In buffer area only
Great Northern Highway-Bindoon Bypass, WA	2017/8035	Controlled Action	Post-Approval	In buffer area only
Great Northern Highway Muchea to Wubin Upgrade Stage 2 - Muchea North, WA	2016/7656	Controlled Action	Post-Approval	In buffer area only
Muchea Industrial Precinct, Part of Lot 102 Great Northern Highway, Muchea, WA	2017/8119	Controlled Action	Post-Approval	In buffer area only
Natural Gas Pipeline Expansion	2006/2813	Controlled Action	Post-Approval	In buffer area only
Perth-Darwin National Highway alignment (Swan Valley Section), WA	2013/7042	Controlled Action	Post-Approval	In buffer area only
Proposed Transport Depot & Warehouse Development - Lot 195 Great Northern Highway, Muchea	2017/7901	Controlled Action	Post-Approval	In buffer area only
Sand quarry development, Lot 2, Bingham Road, Bullsbrook, WA	2017/8104	Controlled Action	Assessment Approach	In buffer area only
Not controlled action				
Boral Bricks Western Australia Pty Ltd, Muchea East Road, Muchea, Western Australia	2019/8522	Not Controlled Action	Completed	In buffer area only
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	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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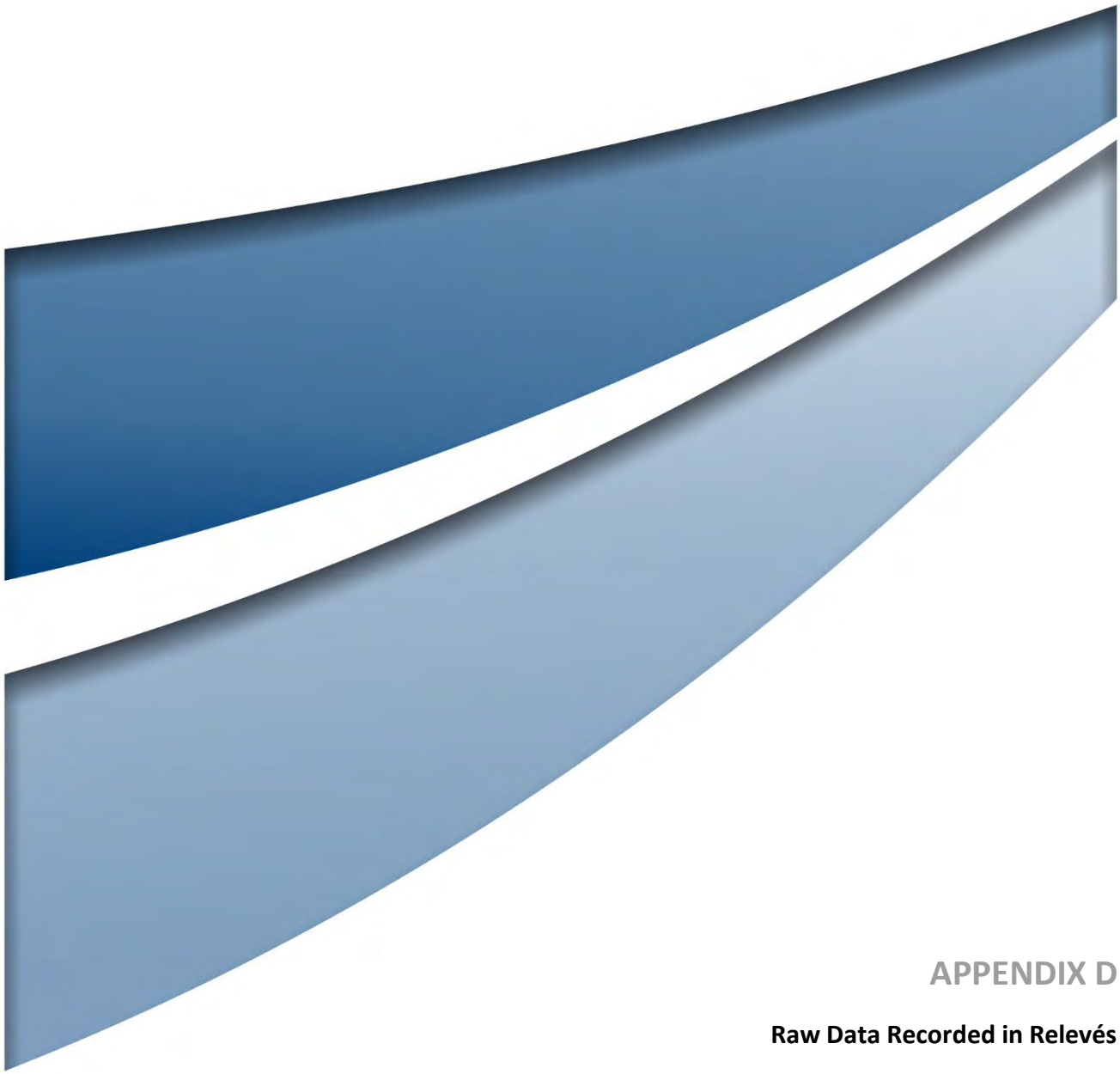
Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

APPENDIX C

Vascular Plant Taxa Recorded in the Survey Area

Family	Taxon
Araceae	**Zantedeschia aethiopica*
Asteraceae	**Arctotheca calendula*
	**Dittrichia graveolens*
	**Hypochaeris glabra*
	Myriocephalus ?helichrysoides
	Podotheca sp.
	**Ursinia anthemoides*
Bignoniaceae	**Jacaranda mimosifolia*
Casuarinaceae	**Casuarina cunninghamiana* subsp. *cunninghamiana*
	Casuarina obesa
Chenopodiaceae	*Dysphania pumilio*
Crassulaceae	*Crassula decumbens*
Cupressaceae	*Callitris pyramidalis*
Dasypogonaceae	*Dasypogon bromeliifolius*
Fabaceae	**Acacia iteaphylla*
	**Acacia podalyriifolia*
	Acacia saligna
	Acacia sessilispica
	Jacksonia sternbergiana
Iridaceae	**Gladiolus caryophyllaceus*
	**Ixia* sp.
Juncaceae	*Juncus pallidus*
Lamiaceae	*Westringia dampieri*
Lauraceae	*Cassytha racemosa* forma *racemosa*
Myrtaceae	*Agonis flexuosa*
	Astartea scoparia
	Callistemon glaucus
	Calothamnus quadrifidus subsp. *quadrifidus*
	Calothamnus rupestris
	Corymbia calophylla
	**Eucalyptus botryoides*
	Eucalyptus camaldulensis
	Eucalyptus gomphocephala
	**Eucalyptus grandis*
	**Eucalyptus leucoxylon*
	Eucalyptus macrandra

Family	Taxon
	Eucalyptus rudis
	Eucalyptus sp. (planted)
	Eucalyptus todtiana
	Eucalyptus utilis
Myrtaceae cont.	*Kunzea glabrescens*
	Melaleuca concreta
	Melaleuca leucandra
	Melaleuca nesophila
	Melaleuca preissiana
	Melaleuca rhaphiophylla
	Melaleuca ryeae
	Melaleuca seriata
	Melaleuca striata
	Melaleuca trichophylla
	Melaleuca viminea subsp. *viminea*
	Regelia ciliata
Orchidaceae	*Caladenia* sp.
Plantaginaceae	**Callitriche stagnalis*
Poaceae	**Briza maxima*
	**Ehrharta calycina*
	**Eragrostis curvula*
	Paspalidium sp.
	**Poa annua*
Polygonaceae	*Muehlenbeckia adpressa*
	**Rumex conglomeratus*
Proteaceae	*Banksia attenuata*
	Banksia ilicifolia
	Banksia menziesii
	Grevillea fililoba (P1) (planted)
Restionaceae	*Desmocladus ?flexuosus*
Santalaceae	*Exocarpos sparteus*
Typhaceae	*Typha domingensis*
Xanthorrhoeaceae	*Xanthorrhoea preissii*
Zamiaceae	*Macrozamia riedlei*



APPENDIX D

Raw Data Recorded in Relevés

Site Name:	R01
Site Type:	RELEVE
Survey Date:	17/07/2024
GPS Location:	GDA94 Zone 50 401869.3E 6510746.79N
Landform Type:	Flat
Slope Class:	Very Gently Inclined (1°)
Aspect:	SE
Soil Type:	Sand
Soil Colour:	White (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	0%
Vegetation Condition:	Southern Vegetation Condition - 5 - Degraded
Disturbance:	Grazing, Clearing, Weeds, Animal, Proximity to refinery (other)
Fire:	5
Habitat:	Low open woodland (to 4 m) over sparse shrubs (to 1 m) over low herbs / grasses (to 0.1 m)
Comments:	Pasture weeds (including ?*Ehrharta* sp.) - 60% cover

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
**Arctotheca calendula*	0.1	5
Banksia attenuata	4	6
Banksia ilicifolia	1	1
Banksia menziesii	4	6
Crassula decumbens	0.1	3
Eucalyptus todtiana		
**Hypochaeris glabra*	0.1	5
Macrozamia riedlei	2	1
Melaleuca ryeae	1	1
Melaleuca trichophylla		
Podotheca sp.	0.1	2
Xanthorrhoea preissii	1	2

PHOTOS

Site Name:	R02
Site Type:	RELEVE
Survey Date:	17/07/2024
GPS Location:	GDA94 Zone 50 401707.07E 6510662.78N
Landform Type:	Flat
Slope Class:	Very Gently Inclined (1°)
Aspect:	WNW
Soil Type:	Sand
Soil Colour:	White (other)
Rock Outcrop:	No bedrock exposed
CF Abundance:	0%
Vegetation Condition:	Southern Vegetation Condition - 5 - Degraded
Disturbance:	Grazing, Clearing, Weeds, Animal
Fire:	>5 years
Habitat:	Isolated trees over open heath (to 1.5 m) over herb / grass layer (0.1 m)
Comments:	Pasture weeds (including ?*Ehrharta* sp.) - 15% cover

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
**Arctotheca calendula*	0.1	10
Eucalyptus todtiana	6	1
**Hypochaeris glabra*	0.1	5
Macrozamia riedlei	1.5	1
Melaleuca ryeae	0.7	1.5
Podotheca sp.	0.1	5
Regelia ciliata	1.5	15
Xanthorrhoea preissii	1.5	7

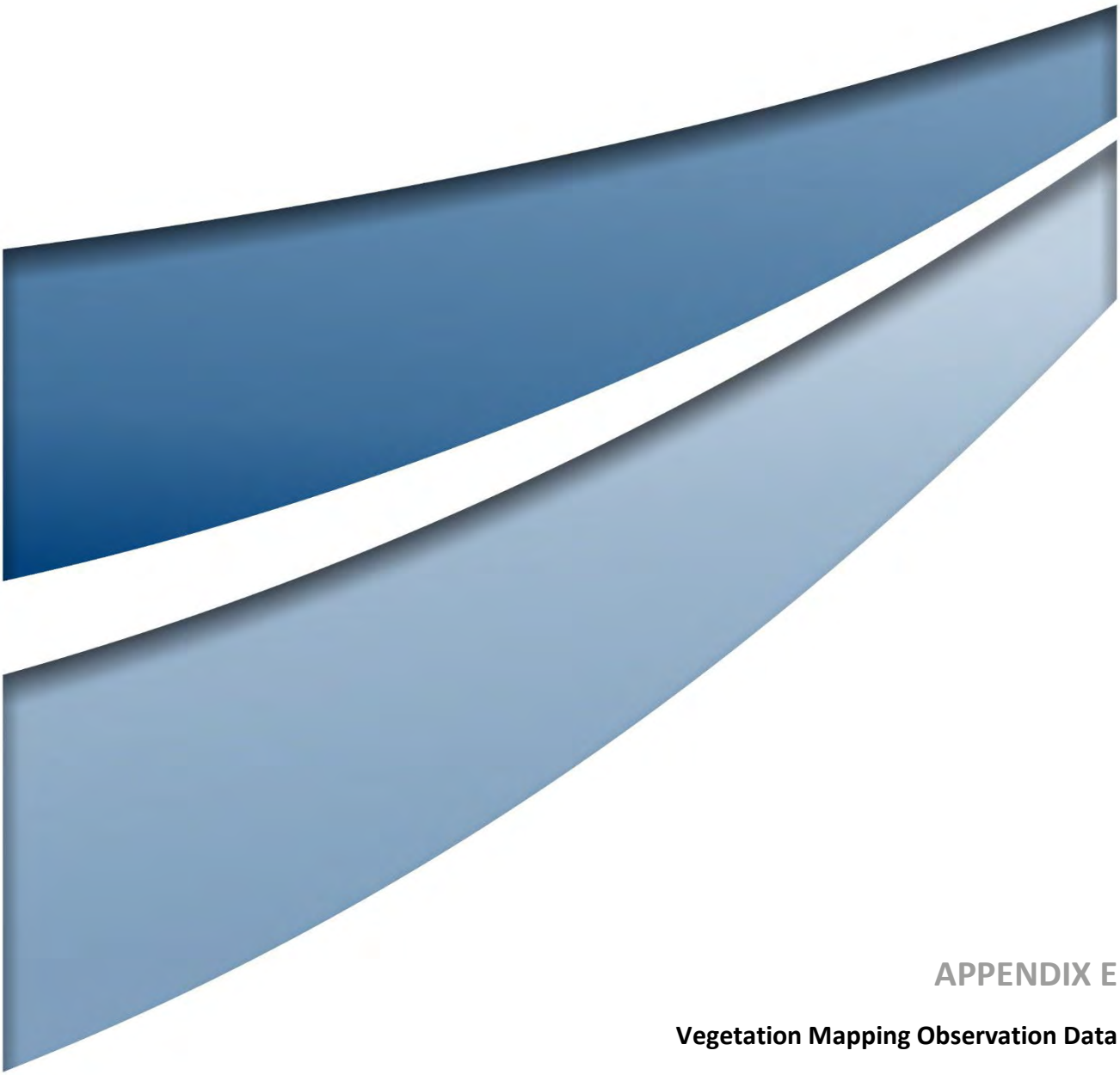
PHOTOS

Site Name:	R03
Site Type:	RELEVE
Survey Date:	17/07/2024
GPS Location:	GDA94 Zone 50 401865.94E 6511223.2N
Landform Type:	Flat
Slope Class:	Level (0°)
Soil Type:	Sand
Soil Colour:	Grey
Rock Outcrop:	No bedrock exposed
CF Abundance:	0%
Vegetation Condition:	Southern Vegetation Condition - 5 - Degraded
Disturbance:	Grazing, Clearing, Weeds, (other) - Proximity to plant
Fire:	>5 years
Habitat:	Very open woodland (to 5 m) over very open shrubland (to 1 m) over weedy understorey
Comments:	*Ehrharta* sp. and *Sonchus* sp. present

SPECIES LIST

Taxon Name	Avg. Height	Cover Alive
**Arctotheca calendula*	0.1	5
Banksia attenuata	4	4
Banksia menziesii	5	4
**Eucalyptus leucoxylon*	4	0.1
Eucalyptus todtiana	5	4
**Gladiolus caryophyllaceus*	0.5	0.1
**Hypochaeris glabra*	0.1	5
**Ixia* sp.	0.3	0.1
Melaleuca seriata	1	5
**Poa annua*	0.1	5
Podotheca sp.	0.1	5
Xanthorrhoea preissii	1	6
**Zantedeschia aethiopica*	0.2	0.2

PHOTOS



APPENDIX E

Vegetation Mapping Observation Data

GPS Locations are GDA94, Zone 50

VMN	Easting	Northing	Description
MN01	401946	6510849	Completely Degraded, grey sand, wet but not flooded. Originally mapped as planted *Calothamnus quadrifidus*, *Melaleuca ryeae*, many introduced grasses; *Acacia sessilispica*, **Eragrostis curvula.*
MN02	401973	6510848	Completely Degraded, grey sand. *Xanthorrhoea preissii*, very low density, many introduced grasses.
MN03	402038	6510899	Completely degraded, grey sand. *Eucalyptus camaldulensis*, **Eucalyptus leucoxylon*, **Zantedeschia aethiopica*; weedy understorey.
MN04	402054	6510848	Completely Degraded, dark grey loamy sand, wet. **Ixia sp.*, *Acacia saligna* (to W of WP). *Typha domingensis* under powerline.
MN05	402055	6510816	Dense *Typha domingensis* under power line, very wet (inundated), Good to Degraded. **Callitriche stagnalis*, *Myriocephalus ?helichrysoides*, **Zantedeschia aethiopica*, *Acacia saligna* on perimeter of *Typha domingensis.*
MN06	402026	6510844	Originally mapped as EPAW. Planted *Eucalyptus camaldulensis* over *Melaleuca concreta*, **Ixia sp.*, degraded understorey.
MN07	401988	6510786	Dense *Callitris pyramidalis* – much death; *Astartea scoparia*, *Melaleuca ryeae*, minor grassy/weedy incursion.
MN08	401979	6510651	Outside of survey area. *Typha domingensis*- dominated wetland, **Zantedeschia aethiopica*, **Callitriche stagnalis.*
MN09	402043	6510572	Outside of survey area. *Typha domingensis*, **Zantedeschia aethiopica*
MN10	401672	6510531	Degraded. *Melaleuca rhaphiophylla*, *Eucalyptus camaldulensis*, *Eucalyptus gomphocephala*, *Acacia saligna* (sump side of track). Most veg planted, over introduced pasture grasses. *Melaleuca preissiana*, *Casuarina obesa*, *Regelia ciliata*, *Caladenia* sp., all species very sparse. *Ursinia anthemoides*, *Hypochaeris glabra*, *Astartea scoparia.*
MN11	401787	6510435	Degraded, kangaroo evidence. *Melaleuca viminea* subsp. *viminea* over introduced pasture grasses, occasional *Acacia saligna* on sump side, **Zantedeschia aethiopica*, limestone gabions on s side, limestone on track. *Melaleuca preissiana*, occasional *Eucalyptus gomphocephala*, *Eucalyptus* sp. planted.
MN12	401907	6510499	Degraded. Very wet, standing water. *Melaleuca preissiana*, *Acacia saligna*, *Melaleuca viminea* subsp. *viminea*, *Eucalyptus rudis*, **Zantedeschia aethiopica* over pasture weeds, **Ixia sp.* lots of dead *Acacia saligna.*
MN13	401897	6510526	Degraded/Completely Degraded, planted *Eucalyptus camaldulensis*, **Zantedeschia aethiopica*, pasture weeds, a lot of dead *Acacia saligna.*
MN14	401879	6510564	**Eucalyptus botryoides.*
MN15	401908	6510664	Degraded. *Callitris pyramidalis* (2.5 m), *Regelia ciliata* (mostly dead, 1 m - 40% alive, 2% dead), **Zantedeschia aethiopica*, *Hypochaeris glabra*, *Podotheca* sp, *Xanthorrhoea preissii*; annual pasture grasses.
MN16	401938	6510678	Degraded. *Callitris pyramidalis* over pasture weeds, **Hypochaeris glabra*, **Sonchus* sp. **Acacia saligna.* To east is power line/wetland + *Melaleuca concreta* over weeds.
MN17	401898	6510717	Degraded, man-made drainage to north. *Banksia menziesii* (several trees newly dead), pasture weeds. Occasional *Xanthorrhoea preissii* + *Regelia ciliata* + *Callitris pyramidalis*, **Ixia sp.*, **Hypochaeris glabra.*
MN18	401880	6510712	Drainage - *Callitris pyramidalis, Regelia ciliata*, *Juncus pallidus*, *Astartea scoparia*, weedy grasses, *Hypochaeris glabra*, *Eucalyptus rudis.*

VMN	Easting	Northing	Description
MN19	401891	6510772	Degraded. Patch of *Kunzea glabrescens*, dead *Regelia ciliata* (to 1.5 m) (very dense small thicket to 3 m); very few weeds (due to less light), right next to track/disturbance (historical) by machinery.
MN20	401773	6510702	Completely degraded. Historically impacted area; was originally *Banksia* woodland (dead). *Melaleuca ryeae* to 0.5 m, alive *Banksia attenuata/ Banksia menziesii* to north; drain to west.
MN21	401778	6510646	Degraded. *Typha domingensis* in drain, weedy banks with **Rumex* sp. *Acacia saligna*, *Eucalyptus rudis*, *Eucalyptus camaldulensis.*
MN22	401752	6510638	Completely Degraded. *Eucalyptus grandis* patch + near drain with planted *Acacia* species.
MN23	401688	6510612	*Melaleuca preissiana*, planted Eucalypts, *Regilia ciliata*, weedy understorey grasses/herbs, *Acacia saligna*, *Kunzea glabrescens* - No Banksia species.
MN24	401640	6510647	Degraded. *Eucalyptus todtiana* (to 6 m, 5%); *Banksia attenuata*, *Banksia menziesii* (to 3.5 m, 3.5%); *Xanthorrhoea preissii*, *Melaleuca ryeae* (to 1 m), *Regelia ciliata*, *Banksia ilicifolia* over pasture weeds (*Ehrharta* sp., *Hypochaeris glabra*), **Zantedeschia aethiopica.* Many dead Banksia logs, evidence of burning. Dense *Banksia* along northern Very degraded understorey. *Muehlenbeckia adpressa.*
MN25	401705	6510715	Degraded. *Banksia attenuata*, *Banksia menziesii* (on southern side, occasional deaths) with *Eucalyptus todtiana*, occasional *Xanthorrhoea preissii* over pasture weeds, **Eucalyptus leucoxylon*, *Macrozamia riedlei*, *Eucalyptus* sp. (planted). Opposite side of fence is *Eucalyptus camaldulensis*, occasional *Banksia menziesii*, *Agonis flexuosa* (planted) over weeds. *Melaleuca striata* – planted.
MN26	401679	6510816	Completely Degraded. Planted Eucalyptus spp. over weeds (**Ehrharta* sp., *?*Cotula* sp., **Hypochaeris glabra*, **Paspalidum sp.*. *Eucalyptus camaldulensis*, *Eucalyptus* sp. (planted), *Eucalyptus grandis* (dead), *Eucalyptus camaldulensis, *Jacaranda mimosifolia*, *Melaleuca nesophila*, *Callistemon glaucus*, *Eucalyptus utilis* (planted).
MN27	401661	6510774	Completely Degraded. Planted *Eucalyptus camaldulensis* over weeds (**Ehrharta* sp., **Arctotheca calendula*). *Caladenia* sp., **Ehrharta calycina*, *Calothamnus rupestris*, *Chamelaucium uncinatum* (planted).
MN28	401629	6510884	Completely Degraded. Planted *Eucalyptus camaldulensis* over weeds (**Hypochaeris glabra*, **Ursinia anthemoides*, **Ehrharta* sp., **Arctotheca calendula*, **Ehrharta calycina*, GOK (R01-01), **Paspalidum sp.*
MN29	401539	6510935	Completely degraded: same as MN28 + *Eucalyptus sideroxylon.*
MN30	401510	6510976	*Regelia ciliata*, dead *Banksia attenuata* (1x alive), *Xanthorrhoea preissii* on north side of drain. Planted *Melaleuca leucandra.*
MN31	401466	6510923	Planted Eucalyptus species dominated by *Eucalyptus camaldulensis*. *Regelia ciliata* (mix of healthy and dead), *Banksia menziesii, Westringia dampieri*, *Dasypogon bromeliifolius*, *Xanthorrhoea preissii*, *Melaleuca preisiana*, *Calothamnus rupestris*, *Callitris pyramidalis, Acacia saligna*, *Grevillea fililoba* (P1) – planted, over weeds (dominated by *Ehrharta* sp.).
MN32	401457	6510882	*Typha* sp., *Acacia saligna*, planted *Eucalyptus sideroxylon* + *Eucalyptus camaldulensis* over weedy pasture spp. Man-made sump area.
MN33	401485	6510786	Degraded. Wetland with mechanical disturbance, mix of planted + natural species. *Eucalyptus rudis* (5 m), thicket of *Astartea scoparia*, *Melaleuca preissiana*, *Melaleuca rhaphiophylla*, *Melaleuca viminea* subsp. *viminea*.

VMN	Easting	Northing	Description
			Pasture weeds (*Ehrharta* sp., *Hypochaeris glabra*ra), **Ixia sp.*, **Zantedeschia aethiopica*. *Melaleuca leucandra*, **Acacia iteaphylla*. Rabbits.
MN34	401509	6510727	Continuation of wetland, *Eucalyptus rudis* open woodland with scattered *Melaleuca preissiana* + *Astartea scoparia* over pasture weeds. Occasional planted Eucalyptus sp, *Regelia ciliata*, *Desmocladus ?flexuosus*, *Exocarpos sparteus*, **Ursinia anthemoides.*
MN35	401930	6511121	Planted **Eucalyptus grandis*, occasional shrubs over weeds grasses/pasture weeds. *Calothamnus quadrifidus*, **Briza maxima*, **Eragrostis curvula*. *Melaleuca ryeae*, **Eucalyptus utilis*, *Acacia saligna.*
MN36	401963	6511056	Completely degraded. *Eucalyptus *sideroxylon* and planted Agonis flexuosa over weeds. **Acacia iteaphylla*. **Zantedeschia aethiopica* in drain adjacent to shed + **Paspalum* sp.
MN37	402140	6511046	Wetland/pond, pasture weeds. **Eragrostis curvula*, *Melaleuca rhaphiophylla*, *Typha domingensis*. Completely degraded. Rabbits.
MN38	402094	6511077	Planted Eucalyptus trees with *Agonis flexuosa*, *Melaleuca rhaphiophylla* on edges of wetland, pasture weeds (**Ehrharta* sp., **Arctotheca calendula*, **Hypochaeris glabra*) **Zantedeschia aethiopica*, *Melaleuca viminea* subsp. *viminea*, **Acacia podalyriifolia.*
MN39	402129	6511159	*Completely Degraded.* **Eucalyptus macrandra* - planted along fenceline. *Eucalyptus rudis* low woodland over pasture weeds. **Ixia sp.*, **Arctotheca calendula.*, **Hypochaeris glabra*, **Zantedeschia aethiopica.*
MN40	402057	6511321	**Eucalyptus macrandra*, *Melaleuca preissiana*, *Eucalyptus rudis*, **Eucalyptus camaldulensis*, **Eucalyptus grandis* over weeds (*Ehrharta* sp., **Ursinia anthemoides*). Completely degraded.
MN41	402106	6511235	*Eucalyptus rudis*, *Eucalyptus camaldulensis*, **Eucalyptus grandis* (all planted) over weeds (*Hypochaeris glabra*, *Arctotheca calendula*, *Ehrharta* sp., *Ursinia anthemoides*). Completely degraded.
MN42	402004	6511352	Similar to MN40 and MN41.
MN43	401967	6511324	*Melaleuca rhaphiophylla* on low area, pasture weeds, **Zantedeschia aethiopica, *Rumex conglomeratus*. Green waste pile, soil disturbance.
MN44	401957	6511291	Small degraded area of *Melaleuca rhaphiophylla* (to 4 m) with planted *Eucalyptus camaldulensis* over weeds (**Ehrharta* calycinus, **Sonchus* sp.), *Juncus pallidus*), *Melaleuca concreta.* Area is damp, moss present.
MN45	401972	6511270	Similar notes to MN44.
MN46	401909	6511219	Degraded. Woodland (to 12 m) over open shrubland (to 4 m) over sparse shrubs (0.5 m) over introduced grasses/herbs. *Corymbia calophylla*, *Acacia saligna*, *Melaleuca preissiana*, *Jacksonia sternbergiana* (2 m), *Regelia ciliata*, **Zantedeschia aethiopica*, **Ehrharta* sp., **Hypochaeris glabra*ra.
MN47	401840	6511238	Degraded. *Banksia attenuata*, *Banksia menziesii* (some nearly dead) *Xanthorrhoea preissii*, *Melaleuca seriata*, *Dasypogon bromeliifolius*, same weeds as R03, significant weedy understorey. *Eucalyptus todtiana* (not as many as R03), *Regelia ciliata*, *Melaleuca trichophylla.*
MN48	401875	6511282	Good. *Banksia attenuata* (dead and alive), *Corymbia calophylla*, *Melaleuca preissiana*, *Xanthorrhoea preissii*(2.5 m)(6%), *Dasypogon bromeliifolius*, *Melaleuca seriata* (10%), *Cassytha racemosa* forma *racemosa*. Significant weedy understorey per R03. Note this location is immediately north and outside of the Survey Area.
MN49	401448	6511126	Planted *Eucalyptus camaldulensis* along road edge. Occasional *Xanthorrhoea preissii* + weedy grasses.

VMN	Easting	Northing	Description
MN50	401411	6510999	Completely Degraded. Planted *Eucalyptus camaldulensis;* 1 x remnant *Eucalyptus marginata*, **Casuarina cunninghamiana* subsp. *cunninghamiana.* Weedy understorey.
MN51	401490	6511019	Completely Degraded. Planted trees over weedy understorey. *Eucalyptus camaldulensis*, *Corymbia calophylla* (remnants), **Zantedeschia aethiopica*, *Calothamnus* (unknown sp.) *Agonis flexuosa.*
MN52	401291	6510839	Completely Degraded (cleared, weeds, kangaroos). *Eucalyptus rudis*, *Melaleuca rhaphiophylla* (8 m) over weedy pasture grasses (*Arctotheca calendula, *Ixia sp., *Ehrharta* sp., **Oxalis* sp., **Dittrichia graveolens*, *Dysphania pumilio.* Trees fringe the creekline.
MN53	401236	6510648	Planted *Eucalyptus camaldulensis*, *Eucalyptus macrandra*, occasional *Corymbia calophylla* over pasture weeds. Completely degraded understorey (**Ehrharta* sp., **Ixia sp.*, **Ursinia anthemoides*).
MN54	401285	6510685	Start of *Eucalyptus rudis* in area influenced by the creek. Very weedy understorey (**Ixia sp.*, pasture weeds*).* Completely Degraded.
MN55	401201	6510765	Open *Corymbia calophylla* woodland (8 m, 10%), over weedy understorey (**Arctotheca calendula*, **Ursinia anthemoides*, **Ehrharta* sp., **Lupinus* sp., *Podotheca* sp. (80% weed cover). *Eucalyptus rudis* to creekline to north vehicle track. *Desmocladus ?flexuosus.*
MN56	401166	6510789	*Melaleuca preissiana*, *Melaleuca rhaphiophylla*, *Eucalyptus rudis* with occasional *Corymbia calophylla* to north towards creek.
MN57	401129	6510653	Patch of *Eucalyptus rudis*, weedy understorey, *Desmocladus ?flexuosus*, *Astartea scoparia.*

APPENDIX F

Likelihood of Occurrence of Significant Flora Taxa

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Acacia anomala	T (EPBC & WA - VU)	August to September	Perennial, shrub	Lateritic soils. Slopes.	4.5 km E	Yes	Unlikely: habitat not considered to be present
Andersonia gracilis	T (EPBC - EN, WA - VU)	September to November	Perennial, shrub	White/grey sand, sandy clay, gravelly loam. Winter-wet areas, near swamps.	No records within 10 km of Survey Area	Yes	Unlikely: suitable habitat not considered to be present; not known from the vicinity of the Desktop Study Area
Anigozanthos viridis* subsp. *terraspectans	T (EPBC & WA - VU)	August to September	Perennial, herb	Grey sand, clay loam. Winter-wet depressions.	No records within 10 km of Survey Area	Yes	Unlikely: suitable habitat not considered to be present; not known from the vicinity of the Desktop Study Area
Banksia mimica	T (EPBC - EN, WA - VU)	December to February	Perennial, shrub	White or grey sand over laterite, sandy loam.	No records within 10 km of Survey Area	Yes	Unlikely: habitat not considered to be present; not known from the vicinity of the Desktop Study Area
Caladenia huegelii	T (EPBC - EN, WA - CR)	September to October	Perennial, herb	Grey or brown sand, clay loam.	No records within 10 km of Survey Area	No	Unlikely: suitable habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
***Caleana dixonii* (*Paracaleana dixonii*)**	T (EPBC - EN, WA - VU)	October to January	Perennial, herb	Grey sand over granite.	No records within 10 km of Survey Area	No	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Chamelaucium lullfitzii	T (EPBC - EN, WA - VU)	September to December	Perennial, shrub	Usually orange-yellow sand (occasionally grey), sometimes with gravel, on hill slopes.	4.1 km NE	Yes	Unlikely: habitat not considered to be present

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Conospermum densiflorum* subsp. *unicephalatum	T (EPBC & WA - EN)	September to November	Perennial, shrub	Clay soils. Low-lying areas.	No records within 10 km of Survey Area	Yes	Unlikely: suitable habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Darwinia foetida	T (EPBC - CR, WA - EN)	September to December, February	Perennial, shrub	Plains, loam soil, road drain / drainage line, winter wet areas, ridge crest.	4.6 km S	Yes	Unlikely: suitable habitat not considered to be present
Diplolaena andrewsii	T (EPBC & WA - EN)	July to October	Perennial, shrub	Loam, clay. Granite outcrops & hillsides.	No records within 10 km of Survey Area	Yes	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Diuris drummondii	T (EPBC - VU, WA - EN)	November to January	Perennial, herb	Swamps, often in shallow water.	3.3 km S	No	Unlikely: suitable habitat not considered to be present
Diuris micrantha	T (EPBC & WA - VU)	September to October	Perennial, herb	Brown loamy clay. Winter-wet swamps, in shallow water.	No records within 10 km of Survey Area	No	Unlikely: suitable habitat not considered to be present
Diuris purdiei	T (EPBC & WA - EN)	September to October	Perennial, herb	Grey-black sand, moist. Winter-wet swamps.	No records within 10 km of Survey Area	No	Unlikely: suitable habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Drakaea elastica	T (EPBC - EN, WA - CR)	October to November	Perennial, herb	White or grey sand. Low-lying situations adjoining winter-wet swamps.	No records within 10 km of Survey Area	No	Unlikely: suitable habitat not considered to be present; not known from the vicinity of the Desktop Study Area

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Eleocharis keigheryi	T (EPBC & WA - VU)	August to November	Perennial, sedge	Clay, sandy loam. Emergent in freshwater: creeks, claypans.	No records within 10 km of Survey Area	Yes	Unlikely: suitable habitat not considered to be present; not known from the vicinity of the Desktop Study Area
Eucalyptus leprophloia	T (EPBC & WA - EN)	August to October	Perennial, mallee	White or grey sand over laterite. Valley slopes.	No records within 10 km of Survey Area	Yes	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Grevillea althoferorum subsp. ***fragilis***	T (EPBC - EN, WA - CR)	September to November	Perennial, shrub	Flat to undulating plains, grey-yellow sand.	5.7 km E	Yes	Unlikely: suitable habitat not considered to be present
Grevillea corrugata	T (EPBC - EN, WA - VU)	August to September	Perennial, shrub	Slopes, brownish loamy soils with laterite. Road verges.	No records within 10 km of Survey Area	Yes	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Grevillea curviloba	T (EPBC & WA - EN)	August to October	Perennial, shrub	Grey sand, sandy loam. Winter-wet heath.	0.6 km S (Eco Logical and TPFL)	Yes	Unlikely: habitat not considered to be present; not recorded during survey
Hypocalymma sylvestre	T (EPBC & WA - EN)	August	Perennial, shrub	Yellow-brown sandy loam. Woodland on lateritic hilltop.	9.1 km E	Yes	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Macarthuria keigheryi	T (EPBC & WA - EN)	September to December, February to March	Perennial, herb	White or grey sand. Flats, plains.	No records within 10 km of Survey Area	Yes	Unlikely: habitat not considered to be present; not known from the vicinity of the Desktop Study Area (note – area has also not been burnt in a long time)
Ptychosema pusillum	T (EPBC & WA - VU)	August to October	Perennial, herb	Sand. Rises.	8.8 km N	No	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
***Synaphea* sp. Fairbridge Farm (D. Papenfus 696)**	T (EPBC & WA - CR)	October	Perennial, shrub	Sandy with lateritic pebbles. Near winter-wet flats, in low woodland with weedy grasses.	No records within 10 km of Survey Area	Yes	Unlikely: suitable habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Thelymitra dedmaniarum	T (EPBC & WA - CR)	November to December	Perennial, herb	Granite outcrops on slopes.	No records within 10 km of Survey Area	No	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Thelymitra stellata	T (EPBC & WA - EN)	October to November	Perennial, herb	Lateritic soils on hill tops and breakaways.	5.4 km SE	No	Unlikely: habitat not considered to be present
Thelymitra variegata	T (WA - CR)	June to September	Perennial, herb	Sandy clay, sand, laterite.	5.6 km E	No	Unlikely: suitable habitat not considered to be present; Survey Area is outside of the known distribution of this taxon

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Grevillea evanescens	P1	March, June to November	Perennial, shrub	Winter-wet flats, brown light clay or clay loam.	5.1 km N (Eco Logical), 6.7 km N (DBCA searches)	Yes	Unlikely: suitable habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Hypocalymma lateriticola	P1	August, September	Perennial, shrub	Grey or yellow sand, lateritic gravel.	4.4 km S	Yes	Unlikely: suitable habitat not considered to be present
Caustis gigas	P2	May	Perennial, sedge	White or grey sand.	4.1 km NE	Yes	Unlikely: suitable habitat not considered to be present
Drosera sewelliae	P2	October to December	Perennial, herb	Laterite & silica sand soils.	3.2 km E	No	Unlikely: habitat not considered to be present
Grevillea candolleana	P2	August to October	Perennial, shrub	Laterite, lateritic loam. Hillsides.	6.3 km E	Yes	Unlikely: habitat not considered to be present
Hibbertia glomerata* subsp. *ginginensis	P2	July to September	Perennial, shrub	Slopes, hills and rises with brown sand or clay, laterite.	6.6 km E	Yes	Unlikely: habitat not considered to be present
Leucopogon squarrosus* subsp. *trigynus	P2	June, July, September	Perennial, shrub	White, grey sand. Dune, seasonally wet flats, low-lying flats.	3.1 km SW (Astron), 3.8 km SW (WAHERB)	Yes	Unlikely: suitable habitat not considered to be present
Millotia tenuifolia* var. *laevis	P2	September to October	Annual, herb	Granite or laterite soils.	5.8 km NE	No	Unlikely: habitat not considered to be present
***Netrostylis* sp. Chandala (G.J. Keighery 17055)**	P2	July, October, November	Perennial, sedge	Peat sand. Swamp edges, damplands, brook and mound spring.	5.7 km N	Yes	Unlikely: suitable habitat not considered to be present

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Poranthera moorokatta	P2	September to November	Annual, herb	Slopes and plains, damp areas. Grey or white sand. Grey or white silica sand in open spaces between shrubs, not in shaded areas or in areas of high litter cover.	6.1 km S	No	Unlikely: suitable habitat not considered to be present
Stylidium squamellosum	P2	October to November	Perennial, herb	Brown to red-brown clay loam. Winter-wet habitats and depressions, open woodland, shrubland.	5.5 km E	Yes	Unlikely: suitable habitat not considered to be present
Thelymitra pulcherrima	P2	July, August	Perennial, herb	Breakaways, sand health to laterite ridge, lateritic hill, low lying hill between dunes.	5.6 km E	Yes	Unlikely: habitat not considered to be present
Acacia cummingiana	P3	May, June, August	Perennial, shrub	Grey or yellow sand, lateritic gravel. Sandplains, lateritic breakaways.	4.7 km NE	Yes	Unlikely: suitable habitat not considered to be present
Acacia drummondii* subsp. *affinis	P3	June to September, December	Perennial, shrub	Laterite, slopes or flats.	3.4 km SE	Yes	Unlikely: habitat not considered to be present
Adenanthos cygnorum* subsp. *chamaephyton	P3	July, September to December, January	Perennial, shrub	Grey sand, lateritic gravel.	7.7 km SE	Yes	Unlikely: suitable habitat not considered to be present
Chamaescilla gibsonii	P3	August to November	Perennial, herb	Clay to sandy clay. Winter-wet flats, shallow water-filled claypans.	4.6 km S	Yes	Unlikely: suitable habitat not considered to be present

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Cyathochaeta teretifolia	P3	January, July, September	Perennial, sedge	Grey sand, sandy clay. Swamps, creek edges.	5.5 km S	Yes	Unlikely: suitable habitat not considered to be present
Eryngium pinnatifidum **subsp. Palustre (G.J. Keighery 13459)**	P3	October to November	Perennial, herb	Winter-wet flats. Brown sandy loam Clay, sandy clay. Claypans, seasonally wet flats.	9.1 km N	Yes	Unlikely: suitable habitat not considered to be present
Isotropis cuneifolia **subsp. *glabra***	P3	September	Perennial, herb	Sand, clay loam. Winter-wet flats.	4.4 km S	Yes	Unlikely: suitable habitat not considered to be present
Meionectes tenuifolia	P3	September to December	Annual, herb	Seasonally inundated areas, edges of wetlands. Clay or clayey loam over laterite.	9.3 km N	No	Unlikely: suitable habitat not considered to be present
Myriophyllum echinatum	P3	September to November	Annual, herb	Clay. Winter-wet flats.	9.4 km N	No	Unlikely: suitable habitat not considered to be present
Persoonia rudis	P3	Sepetmber to December, January	Perennial, shrub	White, grey or yellow sand, often over laterite.	9.5 km N	Yes	Unlikely: suitable habitat not considered to be present
Platysace ramosissima	P3	November to February	Perennial, herb	Sandy clay soils, usually on flats or plains, often near wetlands.	9.3 km S	Yes	Unlikely: suitable habitat not considered to be present
Styphelia allittii	P3	March to June, August	Perennial, shrub	Uplands, outcrops, lateritic hills gravelly yellow sandy soil.	9.5 km N	Yes	Unlikely: habitat not considered to be present
Styphelia filifolia	P3	February to June	Perennial, shrub	Sand, sometimes winter damp.	7.7 km W (Astron), 5 km N (WAHERB)	Yes	Unlikely: suitable habitat not considered to be present

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Verticordia rutilastra	P3	September to November	Perennial, shrub	Sand & lateritic gravel. Hills.	6 km N	Yes	Unlikely: habitat not considered to be present
Verticordia serrata* var. *linearis	P3	September to October	Perennial, shrub	White sand, gravel. Open woodland.	1.5 km S, 2 km E	Yes	Unlikely: habitat not considered to be present
Anigozanthos humilis* subsp. *chrysanthus	P4	July to October	Perennial, herb	Grey or yellow sand.	6.3 km E	Yes	Unlikely: suitable habitat not considered to be present
Calothamnus graniticus* subsp. *leptophyllus	P4	June to August	Perennial, shrub	Clay over granite, lateritic soils. Hillsides.	Planted individual was located by WB within Chandala Processing Plant project area <50 m from current Survey Area; closest WA Herb record >40 km S	Yes	Unlikely: habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Drosera occidentalis	P4	October to December or January	Perennial, herb	Seasonally wet swamp, damp flats, depressions and seepage lines.	9.8 km SE	No	Unlikely: suitable habitat not considered to be present; Survey Area is outside of the known distribution of this taxon
Hypolaena robusta	P4	September to October	Perennial, herb	White sand. Sandplains.	2.6 km E	Yes	Unlikely: suitable habitat not considered to be present
Ornduffia submersa	P4	September to October	Perennial, aquatic herb	Black-grey sandy clay in seasonally inundated wetlands.	3.7 km S	Yes	Unlikely: suitable habitat not considered to be present

Species	Rank	Flowering Period	Habit	Habitat	Closest Known Distance to Survey Area	Identifiable During Survey	Likelihood of Occurrence
Rumex drummondii	P4	August to November	Perennial, herb	Winter-wet flats and creek edges with black peaty sand or dark brown sandy loam, sometimes over limestone.	9.2 km N	Yes	Unlikely: habitat not considered to be present
Schoenus griffinianus	P4	September to October	Perennial, sedge	Sandy soils, usually on flats, plains.	4.3 km NE	Yes	Unlikely: suitable habitat not considered to be present
Stylidium longitubum	P4	October to December	Annual, herb	Claypans, sometimes slightly saline.	6.4 km N	No	Unlikely: habitat not considered to be present
Stylidium striatum	P4	October to November	Perennial, herb	Lateritic soils on hill slopes.	6.5 km E	Yes	Unlikely: habitat not considered to be present
Synaphea grandis	P4	October to November	Perennial, shrub	Low rises with laterite gravel and boulders, grey-brown-yellow sandy soil.	7 km SE	Yes	Unlikely: habitat not considered to be present
***Tripterococcus* sp. Brachylobus (A.S. George 14234)**	P4	February to April, October to December	Perennial, herb	Winter damp flat, depressions, wetlands with grey soil. Plains. Peaty sand over clay.	8.7 km W (Astron)	Yes	Unlikely: suitable habitat not considered to be present
Verticordia lindleyi* subsp. *lindleyi	P4	May or November to January	Perennial, shrub	Sand, sandy clay. Winter-wet depressions.	5.6 km SE	Yes	Unlikely: suitable habitat not considered to be present

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
EPW	Eucalyptus Planted Woodland	Variable mix of planted Eucalypt (*_E. botryoides_, _E. camaldulensis_ subsp. _obtusa_, _E. caesia_, _E. maculata_, _E. macrandra_, _E. urna_, and _E. gomphocephala_) open woodland to woodland over variable mix of *_Ehrharta longiflora_, *_Arctotheca calendula_, *_Ursinia anthemoides_, *_Zantedeschia aethiopica_ grassland/herbland.	Very Degraded. Entirely cleared pasture lands dominated by ground stratum weeds with rehabilitative Eucalypt plantings. An anthropogenic vegetation association with almost no original flora remaining.	2012, 2013
EPEtOW	Eucalyptus Plantings in _Eucalyptus todtiana_ Open Woodland	Planted _Eucalyptus camaldulensis_ subsp. _obtusa_ amongst scattered remnant _Eucalyptus todtiana_ Open Woodland over _Xanthrohoea priesii_ sparse shrubland over *_Ehrharta longiflora_ grassland.	Degraded. A dispersed remnant stand of _Eucalyptus todtiana_ woodland now dominated by planted _E. camaldulensis_ subsp. _obtusa_ and numerous single specimens of planted mid stratum species. Ground stratum dominated by weeds.	2012
EPBW	Eucalyptus Plantings in Banksia Woodland	Variably distributed mixed Eucalypt plantings (_E. botryoides_, _E. conferruminata_, _E. camaldulensis_ subsp. _obtusa_), _Banksia attentuata_, _B. menziesii_ Woodland over occasional _Xanthorhoea priesii_ shrubs over *_Ehrharta longiflora_, *_Arctotheca calendula_, (with *_Briza maxima_ and *_Ehrharta calycina_ along northern strip of southern polygon) grassland/herbland.	Degraded to Very Degraded. An anthropogenic vegetation association dominated by mixed Eucalypt plantings within degraded remnant Banksia woodland. Ground stratum composed of weeds.	2012, 2013
MpAfPW	_Melaleuca preissiana_ and _Agonis flexuosa_ Planted Woodland	Lakeside planting of _Melaleuca preissiana_ and _Agonis flexuosa_ woodland over occasional _Melaleuca_ aff. _quinquenervia_, _Callistemon phoeniceus_, _Juncus kraussii_, over *_Ehrharta longiflora_, and *_Cotula coronopifolia_ grassland (above water line).	Very Degraded. An anthropogenic vegetation association bordering artificial lakes. However, appears to robustly protect lake banks.	2012
CcW	_Corymbia calophylla_ Woodland	_Corymbia calophylla_ open woodland to woodland over _Xanthorrhoea preisii_ and _Acacia saligna_ (senescent) scattered low shrubland over *_Ehrharta longiflora_ dense grassland with occasional _Podotheca gnaphalioides_ and *_Zantedeschia aethiopica_.	Degraded. Remnant woodland highly impacted by past grazing. Upper stratum intact with sparse degraded mid stratum and weed-dominated ground stratum.	2012

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
ErW	*Eucalyptus rudis* Woodland	*Eucalyptus rudis* subsp. *rudis* open woodland to woodland over very occasional *Xanthorrhoea preissii* and *Hypocalymma angustifolia* over **Ehrharta longiflora* grassland with occasional **Arctotheca calendula* and **Zantedeschia aethiopica*.	Degraded to Good. Remnant woodland highly impacted by past grazing, upper stratum intact with sparse degraded mid stratum and a weed-dominated ground stratum.	2012
EtW	*Eucalyptus todtiana* Woodland	*Eucalyptus todtiana* woodland over *Regelia ciliata* scattered low shrubland over **Ehrharta longiflora*, **Hypochaeris glabra*, **Zantedeschia aethiopica* grassland/herbland.	Degraded. Loss of mid stratum with ground stratum composed of weeds.	2012
AsLW	*Acacia saligna* Low Woodland	Senescing *Acacia saligna* low woodland to open woodland over **Ehrharta longiflora*, **Arctotheca calendula*, **Zantedeschia aethiopica*, **Romulea rosea* var. *australis* grassland/herbland.	Degraded to Very Degraded. *Acacia saligna* is senescing (~60% dead), no mid stratum remains, ground stratum composed of weeds.	2012
AsRcT	*Acacia saligna* and *Regelia ciliata* Thicket	*Acacia saligna* thicket over *Regelia ciliata*, *Hypochalymma angustifolia* low heath over variable mix of *Drosera glanduligera*, **Moraea flaccida*, **Ehrharta longiflora*, **Arctotheca calendula* sparse grassland/herbland.	Good. Upper stratum and mid stratum intact though floristically simple, moderate weed density in ground stratum.	2012, 2013
AsBaBmOW	*Acacia saligna*, *Banksia attenuata*, and *Banksia menziesii* Open Woodland	*Acacia saligna* (with scattered *Banksia attenuata* and *B. menziesii*) open woodland over Juncus pallidus scattered sedgeland over **Ehrharta longiflora* (and occasional **Eragrostis curvula*) grassland.	Very Degraded to Degraded. Post-earthworks disturbance vegetation lining the artificial drainage ditch of the south boundary of the southern polygon.	2012, 2013
BmBaRcOW	*Banksia menziesii*, *Banksia attenuata*, *Regelia ciliata* Open Woodland	*Banksia menziesii, Banksia attenuata* open woodland over *Xanthorrhoea preissii*, *Regelia ciliata* scattered shrubland over *Hibbertia vaginata*, *Dasypogon bromeliifolius* scattered dwarf shrubland over **Ehrharta longiflora*, *Podotheca gnaphalioides*, **Hypochaeris glabra*, **Ursinia anthemoides*, and scattered **Zantedeschia aethiopica* grassland/herbland.	Degraded. Upper stratum structure intact, but mid stratum largely removed and floristically simple due to past grazing. Ground stratum dominated by weeds.	2012, 2013

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
BxErMrOW	Mixed Banksia, *Eucalyptus rudis*, and *Melaleuca ryeae* Open Woodland	*Banksia attenuata*, *Banksia menziesii*, *Banksia ilicifolia*, (and scattered *Eucalyptus rudis* subsp. *rudis*) open woodland over *Xanthorrhoea preisii*, *Acacia saligna*, *Macrozamia fraseri* scattered shrubland over *Melaleuca ryeae* and *Dasypogon bromeliifolius* scattered dwarf shrubland over variable mixed **Ehrharta longiflora*, *Podotheca gnaphalioides*, **Arctotheca calendula*, and **Hypochaeris glabra* grassland/herbland.	Degraded. Upper stratum structure reasonably intact, but mid stratum largely removed and floristically simple due to past grazing. Ground stratum dominated by weeds. Dead and dying Banksias and *E. rudis* subsp. *rudis* suggest possibility of Dieback (Phytophthora) widespread within this association.	2012, 2013
XpMrLH	*Xanthorrhoea preisii* and *Melaleuca ryeae* Low Heath	*Xanthorrhoea preisii* and *Calitris pyramidalis* open low shrubland over *Melaleuca ryeae* low heath to shrubland over **Ehrharta longiflora* and **Arctotheca calendula* grassland with occasional **Zanthedeschia aethiopica*.	Good. Moderate disturbance to mid stratum probably due to past grazing with a weed dominated ground stratum.	2012
RcLH	*Regelia ciliata* Low Heath	*Melaleuca preissiana*, *Acacia saligna*, *Callitris pyramidalis* scattered shrubland over *Regelia ciliata* low heath over variable mix of *Drosera glanduligera*, **Moraea flaccida*, **Ehrharta longiflora*, **Arctotheca calendula*.	Degraded to Good. Structure reasonably intact but with ground stratum dominated by weeds. Rabbit warrens abundant.	2012, 2013
RcLS	*Regelia ciliata* Low Shrubland	*Regelia ciliata* (variably senescent) with occasional *Kunzea glabrescens* low open shrubland to shrubland over **Ehrharta longiflora*, **Arctotheca calendula*, **Hypochaeris glabra*, **Zantedeschia aethiopica* grassland/herbland.	Degraded. Shrubland composition simple with ground stratum completely dominated by weeds.	2012
EpODS	*Eremaea pauciflora* Open Dwarf Shrubland	Very scattered woodland of *Banksia attenuata*, *B. menziesii,* and planted *Eucalyptus* sp. over *Acacia saligna* (standing and fallen dead) and *Macrozamia fraseri* scattered shrubland over *Eremaea pauciflora* var. *pauciflora* open dwarf shrubland over *Podotheca gnaphalioides*, **Ehrharta longiflora*, **Ursinia anthemoides*, **Arctotheca calendula* herbland.	Degraded. Appears to have been mechanically disturbed in the past, followed by limited plantings of *Eucalyptus* sp. (supportive stakes present) and natural regeneration. Ground stratum dominated by weeds.	2012
PaMH	*Pentameris airoides* Mixed Herbland	Mixed, seasonally wet, open herbland composed of **Pentameris airoides* subsp. *airoides*, *Podotheca gnaphalioides*, **Ursinia anthemoides*, *Crassula colorata* var. *colorata*, **Hypochaeris glabra*, and *Drosera glanduligera*.	Degraded. Herbland dominated by weed species.	2012

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
JpDL	Sparse *Juncus pallidus* Drainage Line	Wet depressions often with anthropogenic drainage lines. Occasional remnant *Melaleuca preissiana* over sparse *Juncus pallidus* sedgeland over **Arctotheca calendula* (30%), **Moraea flaccida* (20%), and **Zantedeschia aethiopica* herbland.	Very Degraded. Dominated by ground layer weed species with no remnant vegetation beside occasional *Melaleuca preissiana* and sparse *Juncus pallidus*.	2012
EPAW	Eucalypt plantings in Acacia Woodland	Variably distributed mixed eucalypt plantings (*Eucalyptus botryoides*, *Eucalyptus conferruminata*, *Eucalyptus dendromorpha*, *Eucalyptus rudis* subsp. *rudis*, *Eucalyptus leucoxylon*) and *Acacia saligna* woodland, over **Ehrharta longiflora* and **Hordeum* sp. low open grassland.	Degraded. Ground stratum dominated by weeds with rehabilitation mixed eucalypt and *Acacia saligna* plantings.	2013
PCqMcS	Planted *Calothamnus quadrifidus* and *Melaleuca cordata* Shrubland	Planted *Calothamnus quadrifidus* and *Melaleuca cordata* tall shrubland, over **Eragrostis curvula* and **Ehrharta longiflora* mid open grassland.	Degraded. Planted upper stratum intact with no mid stratum and a weed dominated ground stratum.	2013
AsCpS	*Acacia saligna* and *Callitris pyramidalis* Shrubland	*Acacia saligna* tall sparse shrubland over *Callitris pyramidalis*, *Hypocalymma angustifolium* and *Melaleuca ryeae* mid closed shrubland, over *Dielsia stenostachya* and **Hordeum* sp. low open sedgeland/grassland.	Good. Upper stratum with many burnt tall shrubs. Mid stratum healthy, with a few weed species in the ground stratum.	2013
MpS	*Melaleuca preissiana* Shrubland	*Melaleuca preissiana* tall open shrubland to shrubland (with variable mix of planted *Eucalyptus grandis* and *Acacia saligna*), over *Regelia ciliata*, *Typha domingensis* and *Juncus pallidus* mid shrubland/tall rushland/sedgeland over **Ehrharta longiflora* low grassland.	Good. Upper and mid strata intact with few weed species within the ground stratum.	2013
XpSS	*Xanthorrhoea preissii* Sparse Shrubland	An area that has been previously partially cleared and planted. *Eucalyptus* sp. (unidentified, planted trees) low isolated trees, over *Xanthorrhoea preissii* mid sparse shrubland, over **Ehrharta longiflora* low open grassland.	Degraded. Large areas of disturbed bare soil. All strata very patchy with no solid cover spanning all three strata. Weeds present in the ground stratum.	2013

Code	Name	Vegetation Description	Vegetation Condition	Western Botanical Survey
CpLH	**Conyza parva* Low Herbland	*Acacia saligna* tall isolated shrubs, over **Conyza parva* low herbland, over **Hordeum* sp. and **Cynodon dactylon* low grassland.	Very Degraded. Upper stratum and mid stratum largely removed. Ground stratum dominated by weeds. Originally completely cleared for powerline access.	2013
CcSH	*Cotula coronopifolia* Sparse Herbland	Area subject to inundation and waterlogging. **Cotula coronopifolia* low sparse herbland, over **Hordeum* sp. and **Polypogon monspeliensis* low open grassland.	Very Degraded. Upper stratum and mid stratum removed. Ground stratum dominated by weeds.	2013
DsLS	*Dielsia stenostachya* Low Sedgeland	**Conyza parva*, *Juncus pallidus* and *Typha domingensis* tall herbland/sedgeland/rushland, over *Dielsia stenostachya* low closed sedgeland.	Very Degraded. Upper and mid strata removed but ground stratum intact, dominated by weeds.	2013
TdR	Typha domingensis Rushland	*Acacia saligna* and *Melaleuca preissiana* tall isolated shrubs, over *Typha domingensis* tall closed rushland, over **Paspalum dilatatum*, **Conyza parva* sparse shrubland/grassland and scattered small clumps of **Zantedeschia aethiopica* (Arum Lily).	Good. Upper stratum scattered but reasonably intact. Mid stratum present. Scattered weeds in the ground stratum. Mostly cleared for powerlines.	2013
TdDL	*Typha domingensis* Drainage Line	Flowing drainage line with isolated *Melaleuca preissiana* and *Acacia saligna* tall shrubs, over *Typha domingensis* tall closed rushland, over **Ehrharta longiflora* low open grassland and scattered **Zantedeschia aethiopica* (Arum Lily).	Good. Upper and mid strata present with scattered weeds throughout the ground stratum.	2013

APPENDIX G

Significant Vegetation and Likelihood of Occurrence

Ecological Community	Status	Description	Likelihood of Occurrence
***Banksia attenuata* woodlands over species rich dense shrublands (floristic community type 20a as originally described in Gibson et al. 1994)**	Commonwealth – EN, WA - CR	The community has been recorded from sands near Koondoola and Banksia Grove, and at the base of the Darling Scarp between Wannamal and Maddington. This community is generally very species rich. It is usually dominated by *Banksia attenuata* (slender banksia), occasionally with *Eucalyptus marginata* (jarrah) with *Bossiaea eriocarpa* (common brown pea), *Conostephium pendulum* (pearl flower), *Hibbertia huegelii*, *Hibbertia hypericoides* (yellow buttercups), *Petrophile linearis* (pixie mops), *Scaevola repens*, *Stirlingia latifolia* (blueboy), *Mesomelaena pseudostygia* and *Alexgeorgea nitens* being common in the understorey. The community is also known as 'floristic community type 20a' as originally described in Gibson N., Keighery B.J., Keighery G.J., Burbidge A.H. and Lyons M.N. (1994) A floristic survey of the southern Swan Coastal Plain (unpublished report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia (Inc.)).	**Not Considered to be Present**: The nearest buffer of this TEC is located 4 km NW of the Survey Area. *Banksia attenuata* was recorded in VT BW within the Survey Area by the survey. Prior to disturbances, this VT may have been this TEC but removal of the mid to ground stratum has led to almost complete loss of the mid and lower strata. Structurally, the TEC will often have a highly species-rich understorey of sclerophyllous shrubs and a herbaceous ground layer which is not present at this location. As patches of this TEC must meet at least the Good Condition category threshold, this TEC is not considered to be present in the Survey Area.
Banksia woodland of the Gingin area restricted to soils dominated by yellow to orange sands	WA – P2	Species-rich Banksia woodlands on deep yellow-red sands that appear restricted to the western Dandaragan Plateau. The vegetation is described as scattered *Eucalyptus todtiana* and *Eucalyptus calophylla* over *Banksia menziesii* and *Banksia attenuata* low open woodland over *Jacksonia sternbergiana* and *Adenanthos cygnorum* high open shrubland over *Allocasuarina humilis* and *Chamelaucium lullfitzii* (DRF) open shrubland over *Eremaea pauciflora* and *Astroloma xerophyllum* low shrubland over *Mesomelaena pseudostygia* open sedgeland.	**Not Considered to be Present**: The nearest buffer of this TEC is located 2 km N-NW of the Survey Area. *Eucalyptus todtiana*, *Corymbia calophylla*, *Banksia attenuata*, *Banksia menziesii, Eremaea pauciflora* and *Jacksonia sternbergiana* were recorded by Western Botanical and/or Umwelt however vegetation units described and mapped do not otherwise match this description. Soil landscape mapping unit mapping within the Survey Area is dominated by deep white and pale yellow sands, yellowish brown duplex and poorly structured clay soils, yellowish brown and grey sandy duplex soils which may have a gravelly matrix and humic and peaty sands. Surveys conducted in and adjacent to the Survey Area have not recorded yellow to orange sands.

Ecological Community	Status	Description	Likelihood of Occurrence
Banksia Woodlands of the Swan Coastal Plain ecological community	Commonwealth - EN, WA - P3	Canopy is most commonly dominated or co-dominated by *Banksia attenuata* and/or *B. menziesii*. Other Banksia species that can dominate in the community are *B. prionotes* or *B.ilicifolia*. It typically occurs on well drained, low nutrient soils on sandplain landforms, particularly deep Bassendean and Spearwood sands and occasionally on Quindalup sands; it is also common on sandy colluvium and aeolian sands of the Ridge Hill Shelf, Whicher Scarp and Dandaragan Plateau and, in other less common scenarios. The description, area and condition thresholds that apply to the EPBC-listed TEC of the same name, also apply to this Priority ecological community.	**Not Considered to be Present**: Numerous buffers occur within 10 km of the Survey Area with the nearest buffer of this TEC located 0.7 km N of the Survey Area. *Banksia attenuata*, *B. ilicifolia* and *B. menziesii* have been within the Survey Area by in VT BW. The vegetation condition has been mapped as Degraded. Prior to historical clearing and other disturbances, this VT would have represented this TEC. As patches of this TEC must meet at least the Good Condition category threshold, this TEC is not considered to be present in the Survey Area. There is an area of Banksia Woodland immediately north of the northern patch of VT BW which may be considered to be in Good condition (outside of the Survey Area). However, this does not meet the minimum patch size and condition requirements stipulated in the conservation advice(DoEE, 2016) as discussed in **Section 5.2.8.2**.
Communities of Tumulus Springs (Organic Mound Springs, Swan Coastal Plain)	Commonwealth - EN, WA - CR	The community occurs in tumulus springs (organic mound springs) on the Swan Coastal Plain. The habitat of the mound springs is characterised by continuous discharge of groundwater in raised areas of peat. The peat and surrounds provide a stable, permanently moist series of microhabitats, with a high level of heterogeneity of invertebrate fauna assemblages between sites. Groups commonly represented include Ostracoda, Nematoda, Cladocera, Copepoda, Oligochaeta, Tardigrada, Turbellaria and Insecta. Typical and common native vascular plant species associated with the tumulus springs are the trees *Banksia littoralis* (swamp banksia), *Melaleuca preissiana* (moonah) and *Eucalyptus rudis* (flooded gum), and the shrubs *Taxandria linearifolia* (swamp peppermint), *Pteridium esculentum* (bracken fern), *Astartea scoparia* (common astartea) and *Cyclosorus interruptus* (swamp shield-fern).	**Not Considered to be Present:** The nearest buffer of this TEC is located 3.5 km S of the Survey Area. *Melaleuca preissiana*, *Eucalyptus rudis* and *Astartia scoparia* were recorded within the Survey Area by the survey including artificial lakes and in Degraded condition. Artificial wetlands occur within and adjacent to the Survey Area but there is no evidence of mound springs or raised areas of peat. This TEC is not considered to be present in the Survey Area.

Ecological Community	Status	Description	Likelihood of Occurrence
Perth to Gingin Ironstone Association	Commonwealth - EN, WA - CR	The community occurs on ironstone soils in the Perth area and is characterised by massed everlastings. Many of the plant species present are specifically adapted to shallow seasonal inundation, specifically the rich herb layer present in late winter and early spring which is a major distinguishing characteristic of the community. The daisies *Rhodanthe manglesii*, *Rhodanthe spicata* and *Myriocephalus helichrysoides* dominate. Other common herbs include *Tribonanthes variabilis* (southern tiurndin), *Stylidium longitubum* (jumping jacks) (priority 4) and *Isotropis cuneifolia* subsp. glabra (priority 3). A very open shrub layer is typical with common shrubs *Melaleuca viminea* (mohan), *Banksia sessilis* (parrot bush), *Acacia saligna* (orange wattle), *Jacksonia furcellata* (grey stinkwood), *Grevillea curviloba* (endangered) and *Kunzea recurva*.	**Not Considered to be Present**: The nearest buffer of this TEC is located 6 km NW of the Survey Area. No ironstone soils occur within the Survey Area and the Survey Area does not contain areas that are species rich in herbs. This TEC is not considered to be present in the Survey Area.
Shrublands and woodlands on Muchea Limestone of the Swan Coastal Plain	Commonwealth & WA - EN	The community occurs on the heavy soils of the eastern side of the Swan Coastal Plain and has been recorded between Beermullah and Wokalup. Known patches include wetland and well-drained habitats, in a variety of landforms. It is defined on the basis of substrates with a limestone influence. Many of the species are commonly associated with the limestone soils that occur on the coast, and do not generally occur further inland. Typical and common native species in areas of best developed limestone are: the tree *Casuarina obesa* (swamp sheoak); the mallees *Eucalyptus decipiens* (redheart) and *Eucalyptus foecunda* (narrow-leaved red mallee); the shrubs *Melaleuca huegelii* (chenille honey-myrtle), *Alyogyne huegelii* (lilac hibiscus), *Grevillea curviloba* (endangered), *Grevillea evanescens* (priority 1) and *Melaleuca systena* (coastal honeymyrtle); and the herb *Thysanotus arenarius* (sand-dune fringed lily). Where the limestone substrate is less well developed and limestone may occur as nodules or chunks, the flora assemblages can be influenced by other characteristics of the substrate, such as clay content, with the presence of calcicoles such as *Thysanotus arenarius*, *Gahnia trifida* (coast saw-sedge), *Eremophila glabra* (tar bush) and *Melaleuca brevifolia* (mallee honey-myrtle) providing evidence of the limestone	**Not Considered to be Present**: The nearest buffer of this TEC is located 3.5 km S of the Survey Area. No substrates with a limestone influence are known to occur in the Survey Area or were otherwise recorded during the survey. Flora assemblages and species common to this TEC have not been recorded within the Survey Area by Western Botanical (2012, 2013) or by the current survey. This TEC is not considered to be present in the Survey Area.

Ecological Community	Status	Description	Likelihood of Occurrence
		influence. *Melaleuca huegelii* shrublands, *Eucalyptus decipiens* mallee, *Casuarina obesa* woodlands and *Melaleuca brevifolia*, *Melaleuca systena* or *Melaleuca viminea* shrublands have been recorded on Muchea Limestone.	
Southern Swan Coastal Plain *Eucalyptus gomphocephala - Agonis flexuosa* woodlands (floristic community type 25)	WA - P3	Woodlands of *Eucalyptus gomphocephala - Agonis flexuosa* south of Woodman Point. Recorded from the Karrakatta, Cottesloe and Vasse units. Dominants other than tuart were occasionally recorded, including *Corymbia calophylla* at Paganoni block and *Eucalyptus decipiens* at Kemerton. Banksias found in this community include *Banksia attenuata*, *B. grandis* and *B. littoralis*. Tuart formed the overstorey nearby however.	**Not Considered to be Present**: The nearest buffer of this TEC is located 4.9 km S of the Survey Area. Western Botanical (2012) and Umwelt recorded *Eucalyptus gomphocephala* and *Agonis flexuosa* at Chandala, both of which have been planted. The Survey Area is outside of the natural range of both of these taxa. None of the vegetation associations mapped by Western Botanical or by the current survey contained a dominant overstorey layer of Tuart. This PEC is not considered to be present in the Survey Area.
Swan Coastal Plain *Banksia attenuata - Banksia menziesii* woodlands ('floristic community type 23b')	Commonwealth - EN, WA - P3	These woodlands occur in the Bassendean system, from Melaleuca Park to Gingin. Occurs in reasonably extensive Banksia woodlands north of Perth. FCT 23b (Gibson et al., 1994) - Typical or common trees in the community are *Banksia attenuata* and *Banksia menziesii* Common shrub layers include *Bossiaea eriocarpa*, *Calytrix flavescens*, *Eremaea pauciflora*, *Petrophile linearis*, *Philotheca spicata* and sedges and herbs *Alexgeorgea nitens*, *Anigozanthos humilis*, *Burchardia congesta*, *Lomandra hermaphrodita*, *Lyginia barbata*, *Patersonia occidentalis*, *Schoenus curvifolius*, *Stylidium repens* and *Xanthosia huegelii*.	**Not Considered to be Present**: Five buffers occur within 10 km of the Survey Area with the nearest buffer of this TEC located 2.5 km E of the Survey Area. *Banksia attenuata* and *B. menziesii* have been recorded adjacent to the Survey Area by Western Botanical (2012) and the current survey, in Degraded condition. Prior to disturbances, these VTs may have represented this TEC however floristic composition has been lost. As patches of this TEC must meet at least the Good Condition category threshold, this PEC is not considered to be present in the Survey Area.
Wooded wetlands which support colonial waterbird nesting areas	WA - P2	Chandala, Booragoon Lake, unnamed wetland near Pinjarra, McCarleys Swamp. This type differs from the listed 'Perched wetlands of the Wheatbelt region with extensive stands of *Casuarina obesa* and *Melaleuca strobophylla*' ('Toolibin-type' wetlands) in that the Wheatbelt type is Casuarina, rather than Melaleuca dominated. Also, Toolobin Lake type is now brackish-saline (formerly fresh-brackish), whereas this type are currently fresh-brackish.	**Not Considered to be Present**: The nearest buffer of this TEC is located 2.1 km N of the Survey Area. Wetlands within and immediately adjacent to the Survey Area are artificial / man-made and the vegetation is Degraded to Completely Degraded. No VTs dominated by *Casuarina obesa* or *Melaleuca strobophylla* were mapped within the Survey Area. This PEC is not considered to be present in the Survey Area.

umwelt
Environmental & Social Consultants

Umwelt (Australia) Pty Limited

T| 1300 793 267 E| info@umwelt.com.au www.umwelt.com.au

Appendix D Chandala Processing Plant 2024 – Phytophthora Dieback occurrence assessment

Environmental Assessment Report

Chandala Battery Energy Storage System

Accenture Australia Pty Ltd

SLR Project No.: 675.073695.00001

30 July 2026

Tronox

Chandala Processing Plant 2024

Phytophthora Dieback occurrence assessment – Version 2.0

GLEVAN
CONSULTING

Client	*Tronox*
Report name	*Chandala Processing Plant*

This report has been prepared in accordance with the scope of work agreed between Tronox and Glevan Consulting and contains results and recommendations specific to the agreement. Results and recommendations in this report should not be referenced for other projects without the written consent of Glevan Consulting.

Procedures and guidelines stipulated in various manuals, particularly Phytophthora Dieback Interpreters Manual for lands managed by the Department (DBCA), are applied as the base methodology used by Glevan Consulting in the delivery of the services and products required by this scope of work. These guidelines, along with overarching peer review and quality standards ensure that all results are presented to the highest standard.

Glevan Consulting has assessed areas based on existing evidence presented at the time of assessment. The Phytophthora pathogen may exist in the soil as incipient disease. Methods have been devised and utilised that compensate for this phenomenon; however, very new centres of infestation, that do not present any visible evidence, may remain undetected during the assessment.

Executive Summary

Glevan Consulting was commissioned by Tronox Management Pty Ltd (Tronox) to conduct an assessment of the Chandala Processing Plant property for the presence of Phytophthora Dieback. The property comprises approximately 347.5 Hectares (ha) and was assessed on January 18, 2024 by Simon Robinson.

The entire property (347.5 ha) of the study area was excluded from assessment due to being degraded or devoid of native vegetation. There are occasional pockets of vegetation containing reliable indicator species, however these areas are also too degraded to determine the dieback status. The areas containing reliable indicator species exhibited obvious signs of vegetation decline, including recent indicator species deaths. Two of the recent deaths were sampled and both produced a negative result, indicating that the decline is not related to Phytophthora dieback.

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1 Introduction

Glevan Consulting was commissioned by Tronox Management Pty Ltd (Tronox) to conduct an assessment of the Chandala Processing Plant property for the presence of Phytophthora Dieback. The property comprises approximately 347.5 Hectares (ha) and was assessed on January 18, 2024 by Simon Robinson. Mr Robinson is accredited by the Department of Biodiversity, Conservation & Attractions (DBCA) in the detection, diagnosis and mapping of the Dieback disease. This accreditation recognises the skills and experience of Mr Robinson.

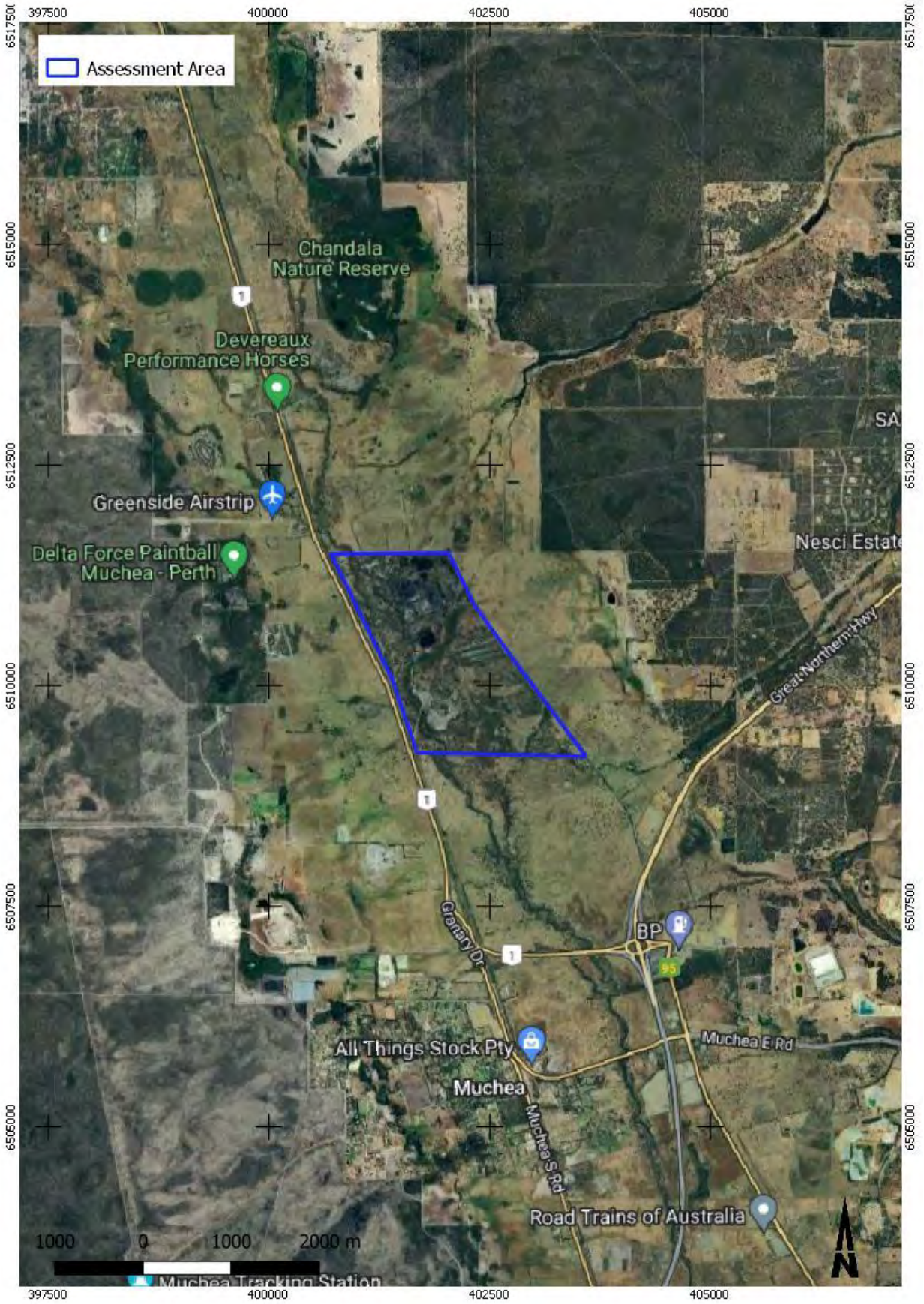

Figure 1 - Assessment area location

2 Background

Thousands of Australian native plant species are susceptible to Phytophthora Dieback—a destructive disease caused by the pathogen *Phytophthora cinnamomi* and other Phytophthora species. This disease is a major threat to Australia's biodiversity, placing important plant species at risk of death, local extirpation or even extinction. Its dramatic impact on plant communities can also result in major declines in some insect, bird and animal species due to the loss of shelter, nesting sites and food sources. Phytophthora Dieback can cause permanent damage to ecosystems. Once an area is infested with the pathogen, eradication is usually impossible. Awareness that human activity can easily spread the pathogen. will help prevent an increase in the extent of this disease. (Commonwealth of Australia, 2018)

Phytophthora is a microscopic water mould that belongs to the class Oomycetes. Oomycetes organisms are filamentous and absorptive and reproduce both sexually and asexually. *Phytophthora's* are considered parasitic. It behaves largely as a necrotrophic pathogen causing damage to the host plant's root tissues because of infection and invasion (Department of Parks and Wildlife, 2015). The pathogen infects a host when it enters at a cellular level and damages the cell structure.

Phytophthora Dieback is the result of interaction between three physical components forming a 'disease triangle': the pathogen (*Phytophthora species*), the environment and the host. All three components are needed for the disease to develop over time.

The relationship between the presence of *Phytophthora* and the development of Phytophthora Dieback disease is variable based on the susceptibility of native plant species and the different environmental characteristics, landform types and rainfall zones across bioregions.

3 Materials and methods

3.1 The assessment area

Areas within the study area will be excluded from assessment if the vegetation is suffering from significant disturbance. This disturbance (**Table 1**) is based on Vegetation Condition Scales (Keighery, 1994). The remaining area, including area outside of the study area if necessary, will be categorised post assessment into Phytophthora Dieback occurrence categories (**Table 2**).

Table 1 - Keighery Vegetation Condition Scale

Scale		Vegetation condition
1	Pristine	Pristine or nearly so; no obvious signs of disturbance.
2	Excellent	Vegetation structure intact; disturbance affecting individual species and weeds are non-aggressive species.
3	Very good	Vegetation structure altered; obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
6	Completely degraded	The structure of the vegetation is no longer intact, and the area is completely or almost completely without native species. These areas are often described as 'parkland cleared' with the flora comprising weed or crop species with isolated native trees or shrubs.

Table 2 - Phytophthora Dieback assessment for vegetation condition

Vegetation Condition	Phytophthora occurrence category
• Naturally vegetated areas. • Keighery disturbance rating of 3 or less • Phytophthora occurrence categorisation is possible	Infested - Determined to have plant disease symptoms consistent with the presence of *Phytophthora cinnamomi.*
	Uninfested - Determined to be free of plant disease symptoms that indicate the presence of *P. cinnamomi*
	Uninterpretable - Undisturbed areas where susceptible plants are absent, or too few to make a determination of the presence or absence of *P. cinnamomi.*
	Not yet resolved.
Vegetation structure temporarily altered.	Temporarily Uninterpretable - Areas of disturbance where natural vegetation is likely to recover.
• Vegetation structure severely altered. • Keighery disturbance rating 4 or greater. • Phytophthora occurrence assessment is not possible	Excluded.

3.2 The assessment method

All Phytophthora Dieback detection, diagnosis and mapping will be performed to standards and procedures defined in FEM047 Chapter 6. These procedures are grounded on the presence in the vegetation of Indicator Species, and the observance of deaths in these plants. An indicator species is a plant species that is reliably susceptible to *Phytophthora cinnamomi*. Indicator species deaths (ISDs) alone do not necessarily indicate disease presence and it is necessary to consider all environmental and ecological factors that may be present. These other factors, as listed in FEM047 (Department of Parks and Wildlife, 2015) include:

- Chronology of deaths
- Pattern of deaths
- Topographical position
- Vectoring – causal agencies, and
- Biomass and biological diversity reduction.

Other causes of plant deaths need to be considered when determining the presence of Phytophthora Dieback, including (from FEM047):

- Armillaria luteobubalina
- various cankers
- insects
- drought, wind scorch and frost
- salinity and waterlogging
- fire and lightning
- senescence and competition
- physical damage
- herbicides and chemical spills.

The assessment was conducted using standards defined by Chapter 8, FEM047. Prior to assessment, all relevant information relevant to the project will be assembled to assist the interpretation process (as defined in Chapter 7, FEM047). This information may include previous assessments of the area, history of burning and possible other disturbances.

3.3 Collection of evidence of Phytophthora Dieback

During the assessment process, the collection of evidence to support the field diagnosis is recorded using a tablet running the Field Maps application. Waypoints are recorded at locations to show evidence of:

- where field diagnosis is certain or almost certain of Phytophthora Dieback infestation
- healthy indicator species where field diagnosis is almost certain of the site being uninfested
- sites with too few or devoid of indicator species, thus supporting uninterpretable classification
- areas of disturbance, which are temporarily uninterpretable or excluded from assessment.

Additional waypoints recorded include:

- Points located at soil and tissue sample sites with *Phytophthora cinnamomi* result;
- Points located at sites known to be infested by Phytophthora species other than *Phytophthora cinnamomi*;
- Points located where field diagnosis is certain or almost certain of Armillaria
- points requiring soil and tissue sampling
- points located where samples have been taken, results pending
- points located at ISDs
- points that need to be revisited for further examination.

3.4 Demarcation

The Phytophthora Dieback occurrence categories will be demarcated in the field using the appropriate flagging tape (**Table 3**) tied to the vegetation at an appropriate buffer width (as defined in Chapter 10, FEM047).

Table 3 - Demarcation flagging colours

Boundary	Tape colour and width
Phytophthora Dieback Infested	Fluoro pink 25 mm
Uninterpretable, Temporarily Uninterpretable and Excluded (when required)	Pink and black striped ('tiger tape') 25 mm
Uninterpretable against excluded and Temporarily Uninterpretable	Double band pink and black tiger tape 25 mm
Armillaria infestation	Not usually demarcated, but if required, double flagging of white and fluoro pink 25mm.
Other *Phytophthora* spp.	Fluoro orange 25 mm

Any soil and tissue samples taken during the assessment will be to standards and prescriptions defined in Chapter 11 of FEM047. All samples are analysed in the Vegetation Health Services (DBCA) laboratory using best-practice techniques.

3.5 Determining Protectable areas

Protectable areas will be:

- Determined to be Uninfested, Uninterpretable or Temporarily Uninterpretable
- Situated in areas receiving more than 600 millimetres rainfall a year or those that are water-gaining sites in the 400- to 600-millimetres a year rainfall range
- Both positioned in the landscape and of sufficient size such that it is adjudged that the pathogen will not autonomously engulf them in the short term (greater than four hectares with an axis greater than 100 metres)
- Areas of high conservation and/or socio-economic value (for example, areas with a known population of a susceptible species of threatened flora)
- Areas where human vectors are controllable. (Department of Parks and Wildlife, 2015).

4 Results

4.1 Disease distribution

The entire property (347.5 ha) of the study area was excluded from assessment due to being degraded or devoid of native vegetation.

4.2 Disease symptoms and expression

No Phytophthora dieback infestations were observed during the assessment.

4.3 Other *Phytophthora* species

Several other *Phytophthora* species exist and have been recorded from assessments conducted in Western Australia. These species are identified using DNA analysis by the Centre for Phytophthora Science and Management (CPSM) at Murdoch University following the identification of the presence of a *Phytophthora* species in baiting analysis performed by Vegetation Health Service (VHS) at the Department of Biodiversity, Conservation and Attractions (DBCA).

No infestations caused by other species of Phytophthora were observed during the assessment.

4.4 Armillaria Rot Disease

Armillaria Rot Disease (ARD) is caused by the indigenous fungus *Armillaria luteobubalina,* which is endemic to the south-west of Western Australia. The impact of the fungus on the vegetation may range from single dead plants to complete devastation of understorey and overstorey species. No evidence indicating the presence of ARD was observed during the assessment.

4.5 Allocation of categories

Table 4 - Assessment area statement

Category	Area (ha)	Protectable Area (ha)	% of total area
Infested	0.00	0.00	0
Uninfested	0.00	0.00	0
Uninterpretable	0.00	0.00	0
Assessed Area	0.00	0.00	
Excluded Area	347.50	0.00	

4.6 Sample results

Taking a soil and tissue sample from dead and dying plants is an integral part of assessment – although in some cases sampling is not essential. Sample results provide evidence to support field diagnostic decisions. The following table (**Table 5**) shows the need for sampling to assist the disease diagnosis process (Department of Parks and Wildlife, 2015).

Table 5 - Determination of requirement for sampling

Observable factors indicating likelihood of *Phytophthora cinnamomi* presence				
ISD type	Multiple	Cluster	Scattered	Isolated
Species	Some or most indicator species	Any indicator plant	Any indicator plant	Any indicator plant
Pattern development	Obvious			Not obvious
Chronology	Obvious			Not obvious
Topographic situation	Gully/flat	Lower to mid slope	Mid slope to upper slope	Ridge
Causal agent	Obvious			Not obvious
Requirement for soil and tissue sample	Low	High	High	Low

Samples may also be taken for the following strategic reasons:

- Supporting infested field diagnosis
- Incipient, subtle or cryptic disease in apparent uninfested sites
- Altering mapped infested area boundaries

Five soil and tissue sample were taken during the assessment, the results of which are presented in **Section 8.1**.

5 Discussion

While the vegetation across the entire Chandala property is degraded, there are occasional pockets of vegetation containing reliable indicator species. However, these areas are also degraded and have little or no understorey, meaning that the dieback status cannot be determined. The areas containing reliable indicator species exhibited obvious signs of vegetation decline, including recent indicator species deaths. Two of the recent deaths were sampled and both produced a negative result, indicating that the decline is not related to Phytophthora dieback.

Given the lack of understorey and midstorey vegetation across the property, it is unlikely that it will be possible to perform Phytophthora Dieback occurrence mapping at the site in the foreseeable future. As such, periodic assessments at standard intervals (i.e. annually or triennially) are not recommended for the site. It may still be possible to recover *Phytophthora* through soil and tissue sampling and prove that the pathogen is present. As such, the best approach would be for interpreters to attend site when Tronox environmental staff have observed suspicious new deaths amongst susceptible plants and take samples. It should be noted that due to the sparse coverage of reliable indicator species, it will probably only be possible to state that the pathogen is present at the actual sample site. It is unlikely that it will be possible to map the exact extent of any infestations that are identified.

Because the dieback status of the property is unknown, there are no hygiene boundaries, however, it is recommended that any soil and plant material removed from the area be treated as potentially infested and not placed in other areas containing protectable vegetation.

6 Bibliography

Commonwealth of Australia. (2018). *Threat abatement plan for disease in natural ecosystems caused by Phytophthora cinnamomi.*

DEC. (2013). *Phytophthora Disease Interpretation Report TRONOX Chandala Borefields.* Department of Environment and Conservation.

Department of Parks and Wildlife. (2015). *FEM047 Phytophthora Dieback Interpreter's Manual for lands managed by the department.* Unpublished.

Glevan. (2019). *Chandala Borefields Phytophthora Dieback Occurrence Assessment.*Unpublished report for Tronox Management Pty Ltd.

Keighery, B. (1994). *Bushland Plant Survey: a Guide to Plant Community Survey for the Community.* Wildflower Society of WA (Inc.).

7 Appendices

7.1 Sample summary

Sample	Plant Sampled	Easting	Northing	Result
1	*Xanthorrhoea preissii*	401601	6511280	Negative
2	*Banksia menziesii*	401776	6510218	Negative

Two soil and tissue samples were taken during this assessment, both of which returned a negative result for *P. cinnamomi*.

7.2 Phytophthora Dieback Occurrence map

The provided map is the Phytophthora Dieback occurrence map.

The study area is displayed as a blue boundary line. The following categories are also shown (if present in the study area):

- Excluded (shown as uncoloured). Areas of high disturbance where natural vegetation has been cleared and is unlikely to recover to a level that is interpretable.
- Infested (shown as a red). Determined from the assessment to have plant disease Phytophthora Dieback.
- Uninfested (shown as green). Determined from the assessment to be free of plant disease Phytophthora Dieback.
- Uninterpretable (shown as a purple). Undisturbed areas where susceptible plants are absent, or too few to decide the presence or absence of Phytophthora Dieback.
- Not yet resolved (shown as pale blue). Phytophthora occurrence diagnosis cannot be made at the time of assessment because of inconsistent or incomplete evidence.
- Temporarily Uninterpretable (shown as grey). Areas of disturbance where natural vegetation is likely to recover.

Additional spatial data that may be shown include:

- Sample location with result
- Proposed Clean on Entry Points.

Phytophthora Dieback is a dynamic disease with autonomous spread of the pathogen not expected to be more than three metres a year upslope in average conditions. In unusual circumstances, such as heavy spring, summer or autumn rainfall, the spread of the disease may be rapid and breach the buffers. These buffers however provide the best chance of hygienic operating conditions within protectable areas over a set twelve-month period. The information on Phytophthora occurrence maps then becomes obsolete.

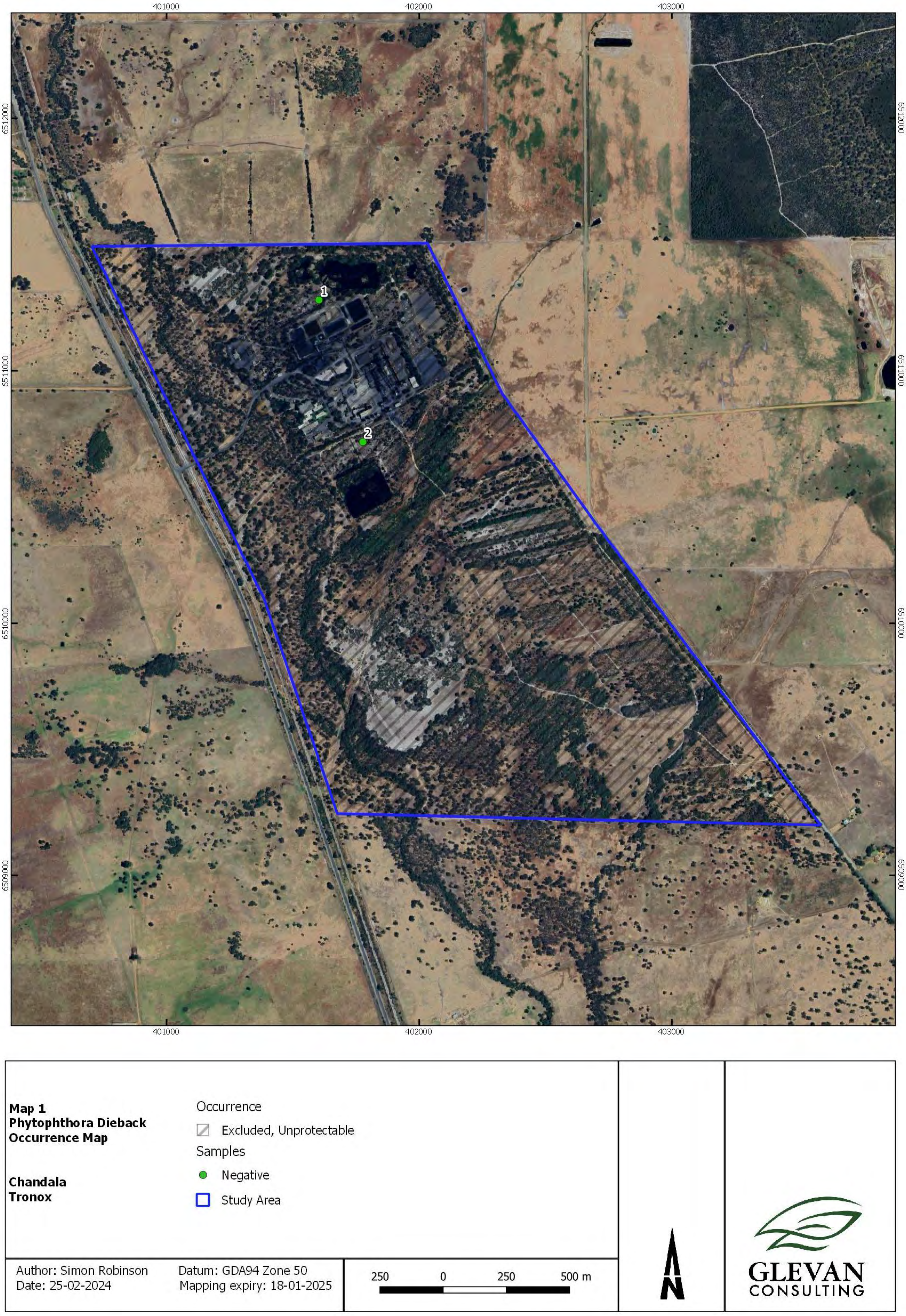

Figure 2 - Phytophthora Dieback Occurrence Map

Mapping Metadata

DATASET DESCRIPTION	
Title	Chandala Borefields
Data Created	18/01/24
Date Last Updated	01/03/23
Abstract	Contains Phytophthora Dieback occurrence information and sample locations.
Purpose	Dieback assessment.
Document Number	GC-24-0500
Contact Organisation	Glevan Consulting
Contact Name	Simon Robinson
Contact Position	Phytophthora Dieback Interpreter
Contact Phone	0427 113 336
Contact Email	Simon.Robinson@glevan.com.au
Lineage	All field data recorded using ESRI Collector on a GPS enabled tablet.
Datum / Coordinate System	GDA94 Zone 50
Geographic Description	Chandala Processing Plant located off Brand Hwy, Muchea WA.
Restrictions	Data is valid until February 2024.

7.3 Shapefile spatial data

The shapefiles used to produce the occurrence map have been provided in the attached zip file named Chandala_Processing_Plant_2024_Dieback_Shapefiles.

Appendix E Bushfire Management Plan (Renewables) Tronox (Chandala) BESS Facility

Environmental Assessment Report

Chandala Battery Energy Storage System

Accenture Australia Pty Ltd

SLR Project No.: 675.073695.00001

30 July 2026

Report

Bushfire Management Plan (Renewables)

LOCATION: TRONOX (CHANDALA) BESS FACILITY

ADDRESS: 722 (LOT M1261) OLD GINGIN ROAD, MUCHEA WA

Project Ref 264527/ N26-0211 Issue C

3 August 2026

DOCUMENT ISSUE APPROVAL

Project Title:	Bushfire Management Plan (Renewables)
Project Location:	Tronox (Chandala) BESS Facility
Project Address:	722 (Lot M1261) Old Gingin Road, Muchea WA
Project No:	264527
Report No:	N26-0211
Issue:	C
Date:	3 August 2026
Distribution:	Client
	Covey Associates

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Author:

Linden Wears
Senior Bushfire Engineer

BSc, GradDip (Fire Safety Eng.), GradDip (Bushfire Protection)
BPAD Level 3 Accredited Bushfire Practitioner

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1 Introduction

1.1 Proposed Development

A Battery Energy Storage System (BESS) facility and associated infrastructure at Lot 1261 (No.722) Old Gingin Road, Muchea is lodging a development application (DA) for development within the existing Tronox Chandala Processing Plant (the subject site).

This project constitutes part of the Tronox Decarbonisation Project, which seeks to develop an environmentally friendly and cost-effective power system for the synthetic rutile process.

The proposed BESS development is expected to include the following infrastructure (see Figure 1-1):

- ***Battery Energy Storage System (BESS)***
    - 4 BESS modules expected to store up to 38 MW/322MWh each
        - Each BESS module contains 8 DC containers and 1 AC skid
    - The BESS modules will be a centralised BESS arrangement occupying approximately 15 m x 105 m area within the nominated BESS compound (29.5 m x 225 m) is located on the southern side of the existing Chandala facility.
- ***Transformers***
    - Addition of up to two transformers as follows:
        - A new transformer co-located with the proposed BESS (Transformer 2)
        - A new transformer (Transformer 1) located next to the existing switchyard, located 180 m east of the BESS compound.
    - Both transformers are expected to be designed and constructed in accordance with relevant Australian Standards.
- ***Internal roads***
- ***Fencing***
- ***Firewater infrastructure***
    - Likely to be extended to BESS compound from existing onsite hydrant system

There are no buildings proposed as part of the proposed BESS development, and there will be no staff required for the operation BESS. Any attendance to the BESS is to be for routine maintenance and any troubleshooting or repairs, and would be conducted by specialist contractors or existing Tronox staff.

The existing facility is manned 24 hours a day, 7 days a week, and there is expected to be Tronox staff at the plant at all times.

1.2 Site description

The proposed BESS is to be sited in the southern portion of existing Chandala facility, which forms a part of the processing sequence that Tronox implements to turn raw mineral sands into finish products (zircon, rutile, leucoxene and activated carbon). The Chandala facility includes three major plants: a dry mill, which separates the minerals; a synthetic rutile plant, which upgrades ilmenite into high-quality synthetic rutile; and a residue management plant. Additionally, there is also a number of administration, maintenance and support buildings and areas that form the existing facility.

The existing facility predominantly occupies the north-eastern portion of Lot M1261, with the following infrastructure also noted onsite:

- Existing switchyard along the southern part of the existing facility
- Existing Western Power owned transmission lines extend from the switchyard, to the north-east and south-west within a 20-25 m easement
- Existing railway extending from silos on the southern part of the existing facility, west and then south-west to the existing railway running parallel with the Brand Highway (but doesn't appear to connect to this railway line)
    - This onsite railway has not been used for over 20 years and has been disconnected from the main railway in excess of 10 years
    - The onsite railway is associated with an existing easement, however is not fully sited within the easement, especially at the subject site.

The proposed BESS compound and Transformer 2 is located immediately south of the existing maintenance buildings, partially over the existing railway line, in an area that isn't cleared of vegetation other than the old railway line. Most land within the subject site, and surrounding it to the south-west, south and east, is forest or scrub vegetation. Land to the north is primarily existing non-vegetated buildings, infrastructure and roads, or managed landscaping.

Transformer 1 is proposed within the existing switchyard, and this site is currently cleared of vegetation, and surrounded by grassland, scrub and forest vegetation.

Slopes across the site appear to be shallow (less than 5 degrees) and descending from the slightly higher existing facility, to lower lying areas to the south and west.

Public road access to the existing site is largely via the main entrance to the facility from Brand Highway to the west. This entrance road provides access to the main administration area, but also extends into the existing facility through security-controlled entrances.

Additionally, there is an alternative vehicular access from Old Gingin Road to the east, however this is connected to the existing facility by narrower unsealed track, and is generally rarely used (see Figure 1-2).

Internal vehicular access within the Chandala facility is currently via existing sealed and unsealed roads, which are used by a variety of light and heavy vehicles.

There is no known reticulated town main water supply currently provided to the existing site, nor is there any existing street hydrants. The site has an existing fire hydrant system that serves the majority of the plant and administration areas, that includes:

- 1 combined process/firewater tank
    - Overall capacity of up to 1735 kL, but currently kept to 60% of this (approximately 1041 kL)
    - 415 kL of overall capacity is kept as firewater reserve at the bottom of tank
- 2 fire pumpsets to two fire hydrant ring mains as follows:
    - Mineral Separation Plant (MRP) ring main
    - Synthetic Rutile Plant (SRP) ring main
- Fire hydrants and fire hose reels off each ring main, providing coverage of the existing facility

In addition to the fixed firewater systems, the existing facility has the following onsite fire appliances:

- 1 Fire Truck with 3000 L tank, rear mount pump, fire branches and hoses, and various firefighting and communication equipment.

- 1 Light Fire Tanker (4WD) with 800 L tank, small pump, hose reel, extinguishers, and various firefighting and communication equipment.
- 1 Mobile Fire Trailer, with 500 L tank and small pump and hose reel; and
- 1 Emergency Response Vehicle with fire branches and hoses, and various firefighting and communication equipment.

1.3 Purpose

1.3.1 Current Bushfire Regulatory Requirements

The entire subject site is currently designated as bushfire prone (Area 2) as per the *Map of Bush Fire Prone Areas* (DFES 2026; see Figure 1-3), however as no habitable buildings are proposed as part of this DA, there is no trigger to assess the proposal against '*State Planning Policy 3.7: Bushfire*' (SPP 3.7; Western Australian Planning Commission (WAPC) 2024) and the WA '*Planning for Bushfire Guidelines For the implementation of State Planning Policy 3.7 Bushfire*' (the WA PBG; WAPC 2024).

Application of SPP3.7 and the WA PBG is only required for "habitable buildings" as defined in WA Planning Regulations, in addition to hazardous, flammable and/or combustible materials associated with the development, however the proposed renewable energy infrastructure (e.g. BESS and transformers) is not considered "habitable building", therefore assessment is not triggered.

The following is also noted for renewable energy facilities:

- As compliance with SPP 3.7 and the WA PBG isn't triggered for proposed renewable energy infrastructure, there is no statutory requirement for this infrastructure to comply with any specific requirements.
- The Department of Planning, Lands and Heritage (DPLH) are currently in the process of drafting a WA Renewable Code and Guidelines, which is expected to address wind, solar, BESS and transmission infrastructure, however at this time, they have only produced a draft of these documents for wind farms which is not applicable to this project. The timing of the preparation and release of these documents is currently unconfirmed.
- The Western Australian Planning Commission (WAPC) have previously released a Position Statement on Renewable Energy Facilities (principally for wind turbine and solar array systems), and while not specifically applicable to this project, it does provide the following high-level guidance:
    - The objectives of the position statement include facilitate appropriate development of renewable energy facilities while minimising any potential impact upon the environment, natural landscape, and urban areas
    - Wind turbines and solar arrays in bushfire prone areas should be designed and maintained so they are not a bushfire risk to surrounding bushland, and where possible should not be in bushfire prone areas with an 'extreme' bushfire hazard level or bushfire attack level (BAL) - 40 or BAL- Flame Zone.
    - A minimum 10 metres clearance to combustible vegetation in the form of an Asset Protection Zone (APZ) is recommended, which should be managed in a low threat state, in accordance with the WA PBG.
- Current referral advice typically provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the WA PBG, however application of the Country Fire Authority (CFA) *Design Guidelines for Renewable Energy Facilities v4.4* (the CFA Renewable Guidelines; CFA 2025) from Victorian fire brigade, currently provides the best design guidance for renewable energy facilities at this stage.

  - It is noted that the CFA Renewable Guidelines currently has no formal status in WA through SPP 3.7 and the WA PBG.
- The Shire of Chittering (the Shire) currently doesn't have any Local Planning Policies applicable to BESS development.

1.3.2 Project Bushfire Compliance and Reporting Approach

Based on the regulatory requirements detailed in Section 1.3.1, the following bushfire assessment and reporting approach is proposed:

- As there are no buildings proposed as part of the DA, nor are Covey aware of any Local Planning Policies or other planning instruments that trigger assessment of bushfire risk to the proposed BESS development, there is no requirement to produce bushfire reporting to accompany the DA.
- Voluntary assessment and mitigation of the bushfire risk to the development given the importance of bushfire risk in the proposed location;
- To address the above, Covey proposes voluntary adoption of the CFA Design Guidelines, documented in this Bushfire Management Plan, to:
  - Guide the development of the proposed bushfire risk management strategy and mitigation measures for the renewable energy infrastructure, and
  - Provide a technical benchmark with which to establish that bushfire risk has been managed to appropriate level for renewable energy infrastructure, noting the following:
    - The CFA Design Guidelines are a Victorian publication, and where relevant, Western Australian standards and specifications will be adopted
    - Aspects of the CFA Design Guidelines are aimed at both onsite infrastructure fires and bushfire risk management, and while Covey is primarily addressing the bushfire-relevant requirements of the CFA Design Guidelines, managing the potential for onsite renewable energy infrastructure fire to limit the opportunity for bushfire ignition and escape is also considered important part of bushfire risk management.

The focus of this BMP is to apply and demonstrate voluntary compliance of the proposed renewable energy infrastructure with the Model Requirements of the CFA Renewable Guidelines.

- *Covey notes that this BMP doesn't seek to achieve strict compliance with the Model Requirements of CFA Design Guidelines, but in lieu of any other detailed design guidance, use of it to provide a framework for bushfire assessment with some technical benchmarks to inform the bushfire risk management strategy for renewable energy infrastructure. Notwithstanding, where deviations have been made from the concepts of the CFA Design Guidelines, this has been justified in this BMP.*

1.4 Other plans/reports

There are no known bushfire reports or assessments that have been prepared previously for the subject site.

Covey note that the following reports accompany this DA submission:

- Environmental assessment reports
- Noise assessment reports

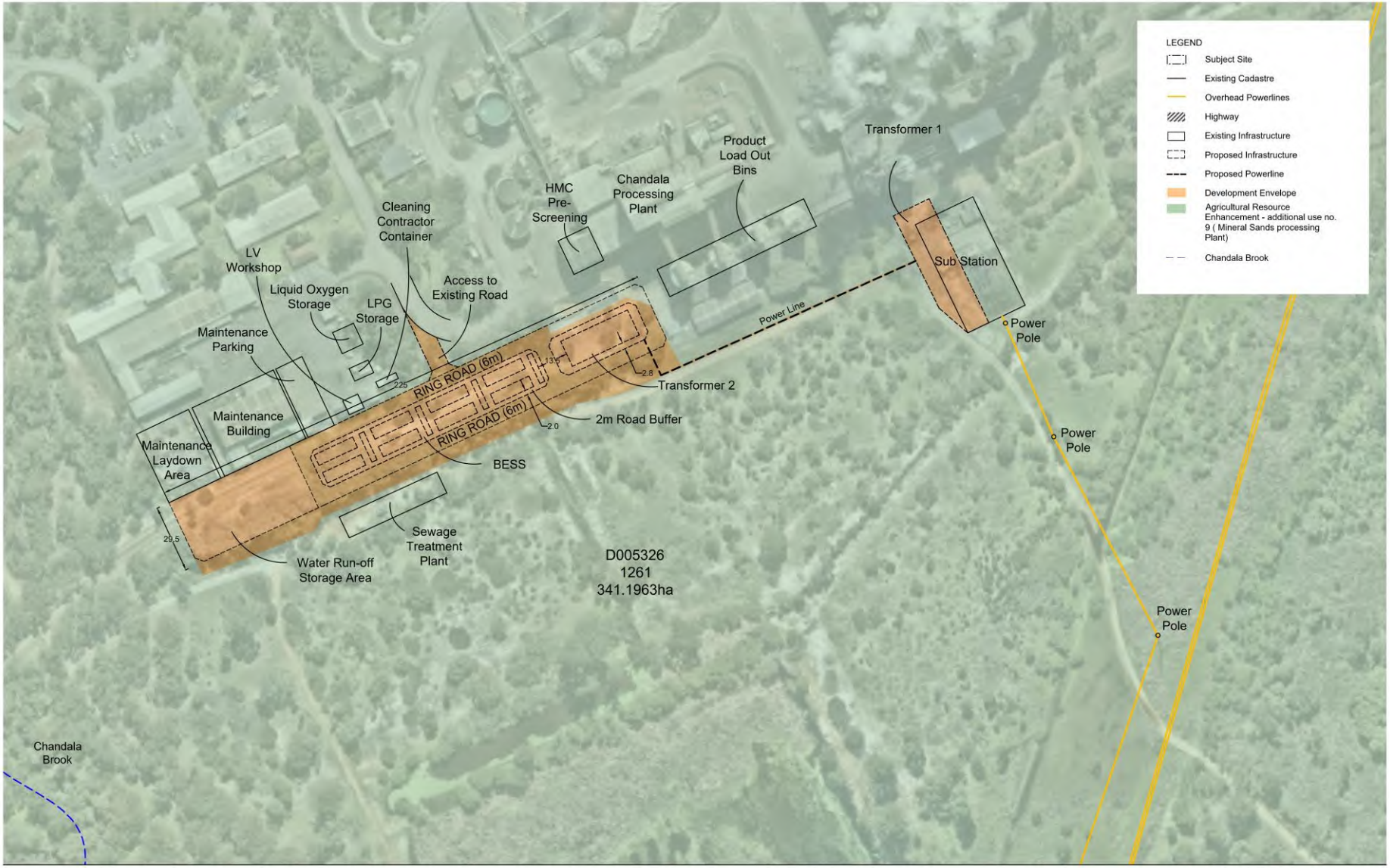

Figure 1-1. Development Layout

Legend

Mitigation Measures

- Existing Fire Hydrant System Infrastructure
- Proposed Development

Internal Road

- Internal Road
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre

0 90 180 270 Metres

covey

Tronox (Chandala) - BESS Facility

Site Overview

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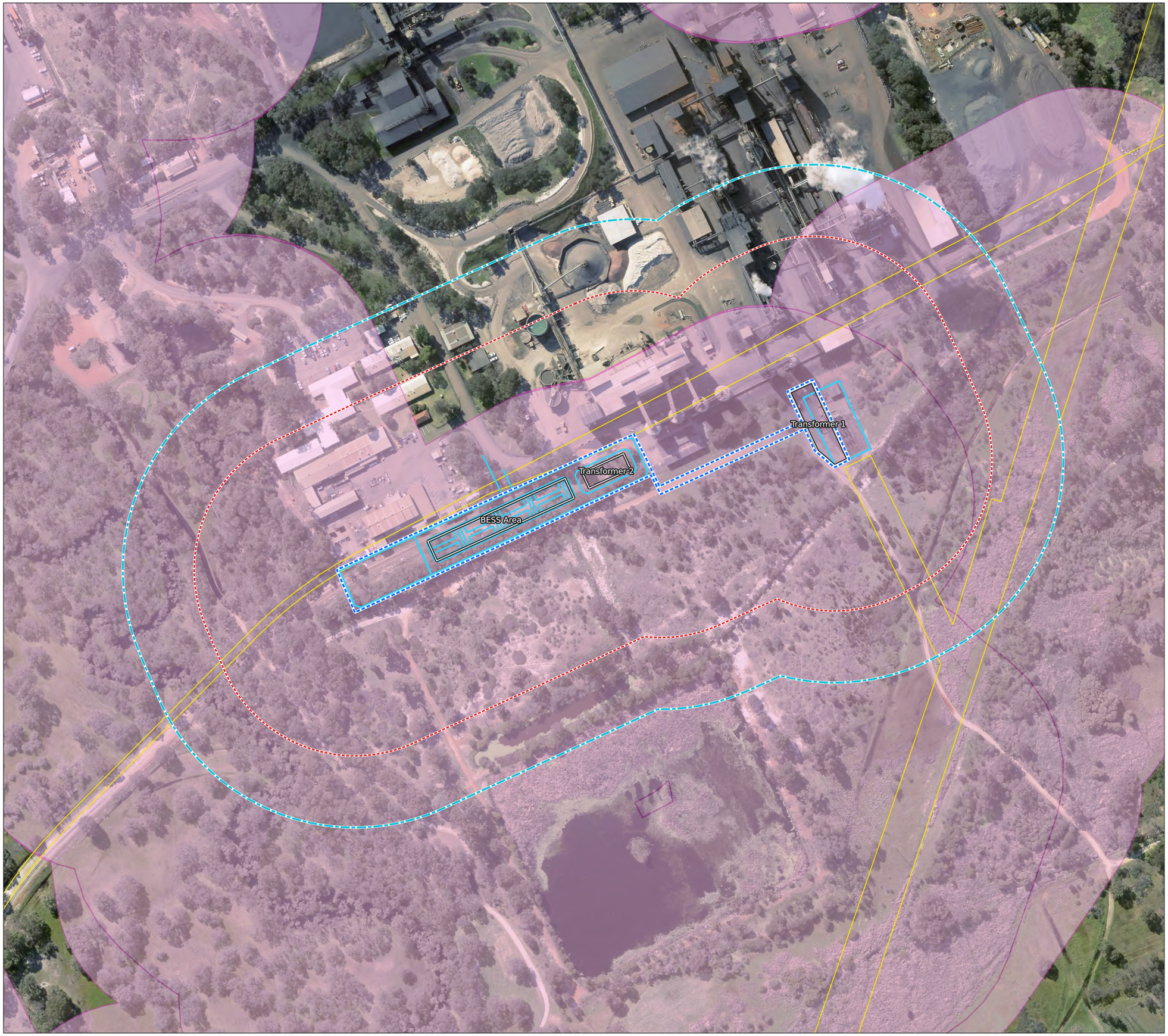

Legend

- Proposed Development
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Bushfire Prone Area 2

0 40 80 120 Metres

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Tronox (Chandala) - BESS Facility

Designated Bushfire Prone Areas

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2 Environmental Considerations

2.1 Native vegetation - modification and clearing

The proposed development is expected to require clearing of vegetation to enable construction of BESS infrastructure and implementation of the nominated Asset Protection Zones.

Covey understands that an Environmental Consultant to review the impacts of the proposal on environmental values and address under relevant legislation.

Notwithstanding, Covey assumes that all relevant environmental and heritage studies will be conducted, and that all required environmental and heritage approvals will be obtained prior to commencing any on-site vegetation modification or clearing required to construct the development or implement the onsite Asset Protection Zones.

2.2 Revegetation / Landscape Plans

No revegetation is proposed within the bushfire assessment areas, however some revegetation is proposed in the southern portion of the property as part of environmental obligations associated with the project.

All vegetation modification and management are to be conducted in accordance with the requirements detailed in Section 5.2 of this BMP, including compliance with the APZ standards from the WA PBG (see Appendix B) and requirements for low threat vegetation and managed landscaping in accordance with AS 3959 Clause 2.2.3.2 (f) (see Appendix C).

3 Bushfire assessment

Although no buildings are proposed as part of this DA, the suitability of the proposed renewable energy infrastructure siting from a bushfire risk perspective, is best assessed through use of a BAL assessment to achieve target BAL ratings (or target radiant heat flux).

On this basis, this section details the post-development vegetation and BAL contour mapping for the proposed renewable energy infrastructure.

3.1 Assessment inputs

3.1.1 Vegetation classification

Covey assessed classified vegetation and exclusions within 150 m of the subject site through on-ground verification, conducted on 17 June 2026 in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix A and Table 1 and depicted on Figure 3-1.

3.1.2 Effective Slope

Covey assessed effective slope under classified vegetation through on-ground verification on 17 June 2026 in accordance with AS 3959. Results were cross-referenced with 2 m contour data depicted on Figure 3-1, and are summarised in Table 1.

Site observations near the BESS and new transformer areas were that land is elevated to the north and north-west was relatively flat, and descends to the west, south and south-east, resulting in classified vegetation having an assessed effective slope of downslope 0° – 5°.

3.1.3 Summary of Inputs

Table 1 summarises the anticipated post-development vegetation classifications and exclusions within 150 m of the proposed BESS compound and transformers, following completion of development works and implementation of Asset Protection Zones. The post-development vegetation classifications/exclusions and effective slope are illustrated on Figure 3-1.

Table 1: Post-development vegetation classifications/exclusions and effective slope (within 150 m of BESS compound & Transformers)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class A Forest	Downslope >0–5°	Trees greater than 6 m high at maturity (and often 10-30 m), dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey.
2	Class D Scrub	Downslope >0–5°	Scrub vegetation, generally between 2 m and <6m high, generally associated with banksia woodland south of the subject site.

Vegetation plot	Vegetation classification	Effective slope	Comments
3	Class C Shrubland	Downslope >0–5°	Shrubland vegetation <2 m high, typically associated with reeds in low-lying drainage areas south of the subject site.
4	Class G Grassland	Downslope >0–5°	Unmanaged grassland >100mm in height
5	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	Existing non-vegetated land, including buildings, infrastructure, roads and carparks.
6	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing managed low threat landscaping within the facility, and including non-vegetated elements such as paths.
7	Excluded – Low threat (Clause 2.2.3.2 [f])	N/A	Existing low threat landscaping that is located within the proposed APZ, and will be subject to some modification and management to comply with APZ standards for the operational life of the project.
8	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	Existing vegetation within the BESS compound and the surrounding 10 m in addition to Transformer 2 pad and proposed new internal road, that is to be established and maintained in a non-vegetated state for the operational life of the project.
9	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing vegetation within the BESS compound, Transformer 1 and 2 APZs, but further than 10 m the BESS compound and not within Transformer pads, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

3.2 Assessment outputs

3.2.1 Bushfire Attack Level (BAL) contour assessment

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed future development and subsequently informs the standard of construction and/or setbacks required for the proposed development to potentially withstand such impacts.

Covey has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the BESSand transformer envelopes (see Figure 3-2).

The Method 1 procedure was conducted for all plots, with the methodology incorporating the following factors:

- state-adopted FDI 80 rating;
- vegetation classification;
- effective slope; and,
- distance maintained between proposed development areas and the classified vegetation.

The BAL contours are based on:

- the vegetation classifications and effective slope observed at the time of inspection; and,
- the anticipated post-development vegetation based on proposed on-site clearing extent, and resultant vegetation exclusions and separation distances, achieved to implement the proposed development and nominated Non-Vegetated Zones and Asset Protection Zones.

The results of the BAL contour assessment are detailed in Table 2 and illustrated in Figure 3-2.

Table 2: BAL contour assessment results (to proposed BESS compound & Transformers)

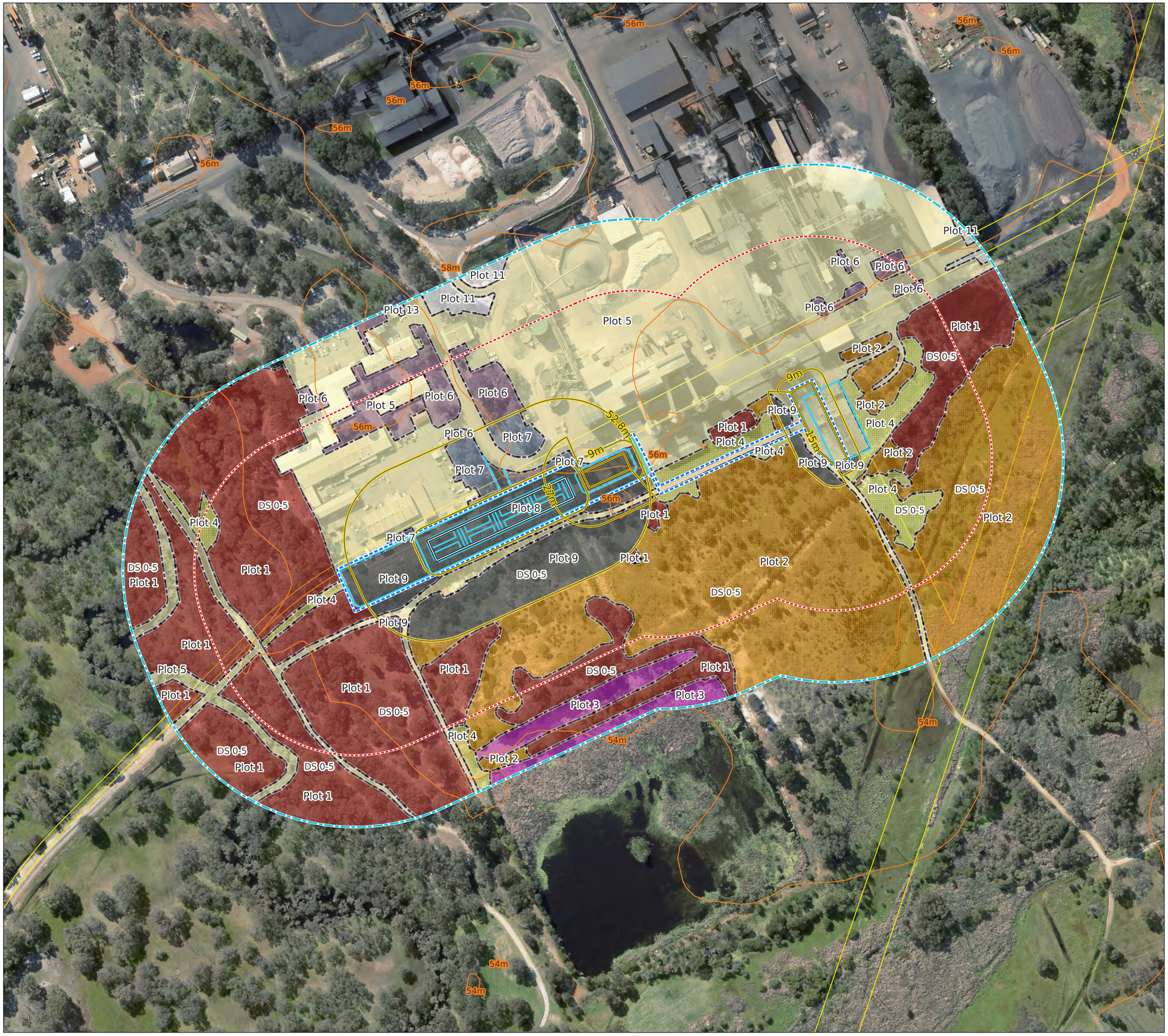
Plot	Vegetation classification	Effective slope	Calculation method	Separation (m)	BAL
1	Class A Forest	Downslope >0–5°	Method 1	33.5 m	BAL–29
2	Class D Scrub	Downslope >0–5°	Method 1	15 m	BAL–29
3	Class C Shrubland	Downslope >0–5°	Method 1	>100 m	BAL–Low
4	Class G Grassland	Downslope >0–5°	Method 1	15 m	BAL–19
5	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	N/A	N/A	N/A
6	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A
7	Excluded – Low threat (Clause 2.2.3.2 [f])	N/A	N/A	N/A	N/A
8	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	N/A	N/A	N/A
9	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A

Table 3 lists the BAL applicable to infrastructure within the proposed development.

Table 3: BAL applicable to proposed infrastructure

Infrastructure	Initial BAL	APZ	Revised BAL
BESS Compound	BAL–FZ	• 52.8 m wide NVZ/APZ extending from the external perimeter of the BESS Compound. • All land within the BESS Compound, and the 10 m surrounding the compound, is to be non-vegetated.	BAL-12.5 (10 kW/m^2)
Transformer 1	BAL–FZ	• 9 m to 15 m wide NVZ/APZ extending from the external perimeter of the Transformer 1. • All land within the Transformer 1 pad (and the existing switchyard) is to be non-vegetated land.	BAL-29
Transformer 2	BAL–FZ	• 9 m to 27 m wide NVZ/APZ extending from the external perimeter of the Transformer 2. • All land within the Transformer 2 pad is to be non-vegetated land.	BAL-29

Should there be any changes in development design or classified vegetation extent that results in a modified BAL outcome, then the BAL contours will need to be reassessed.



Legend

- Proposed Development
- Contours
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- A. Forest
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(a)
- Excluded Clause 2.2.3.2(e)
- Excluded Clause 2.2.3.2(f)
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

0 40 80 120 Metres

covey

Tronox (Chandala) - BESS Facility

Post-Development Vegetation and Effective Slope

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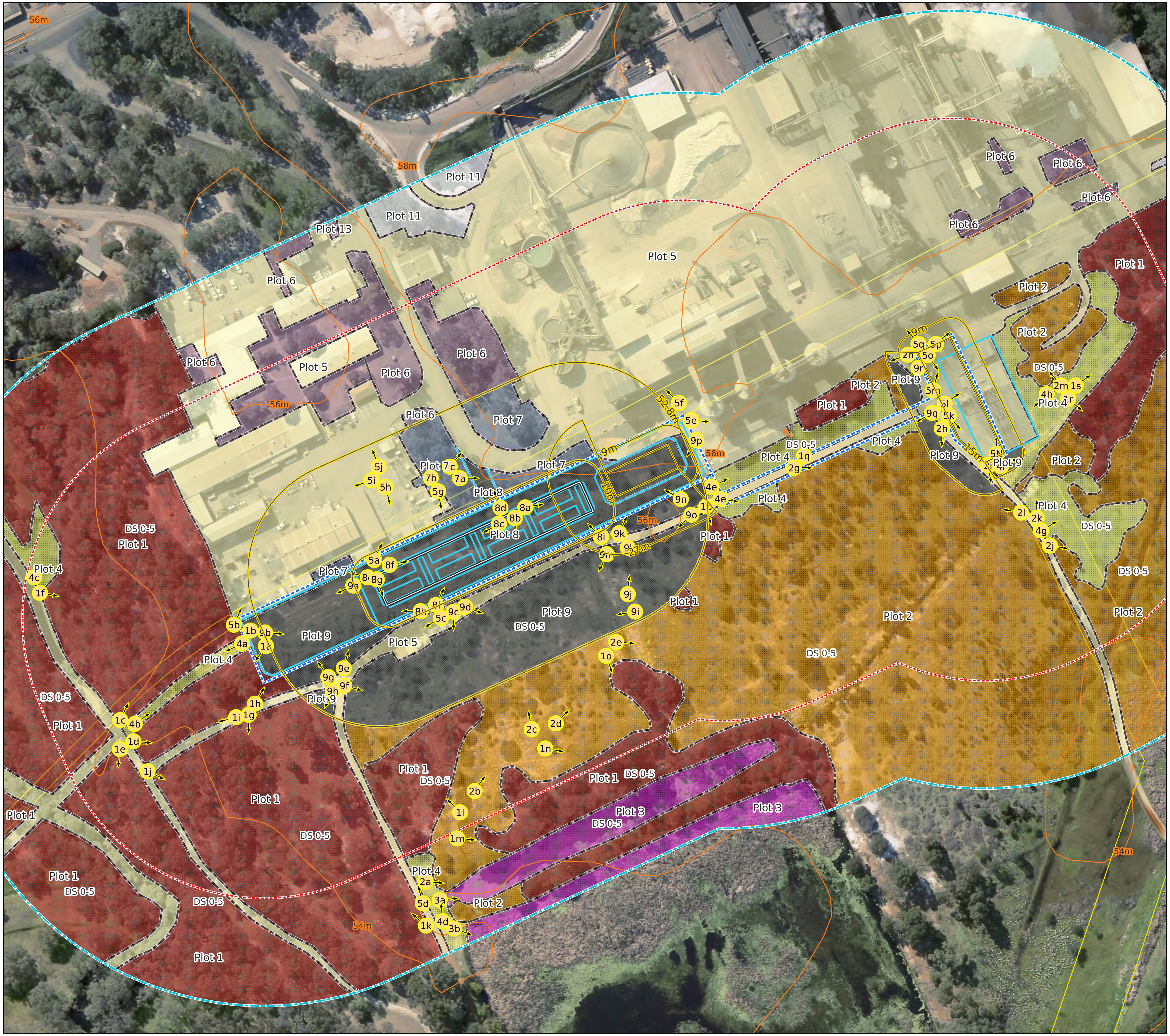

Legend

- Photo Location
- Proposed Development
- Contours
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- A. Forest
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(a)
- Excluded Clause 2.2.3.2(e)
- Excluded Clause 2.2.3.2(f)
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

0 20 40 60 Metres

covey

Tronox (Chandala) - BESS Facility

Post-Development Vegetation and Effective Slope (zoomed)

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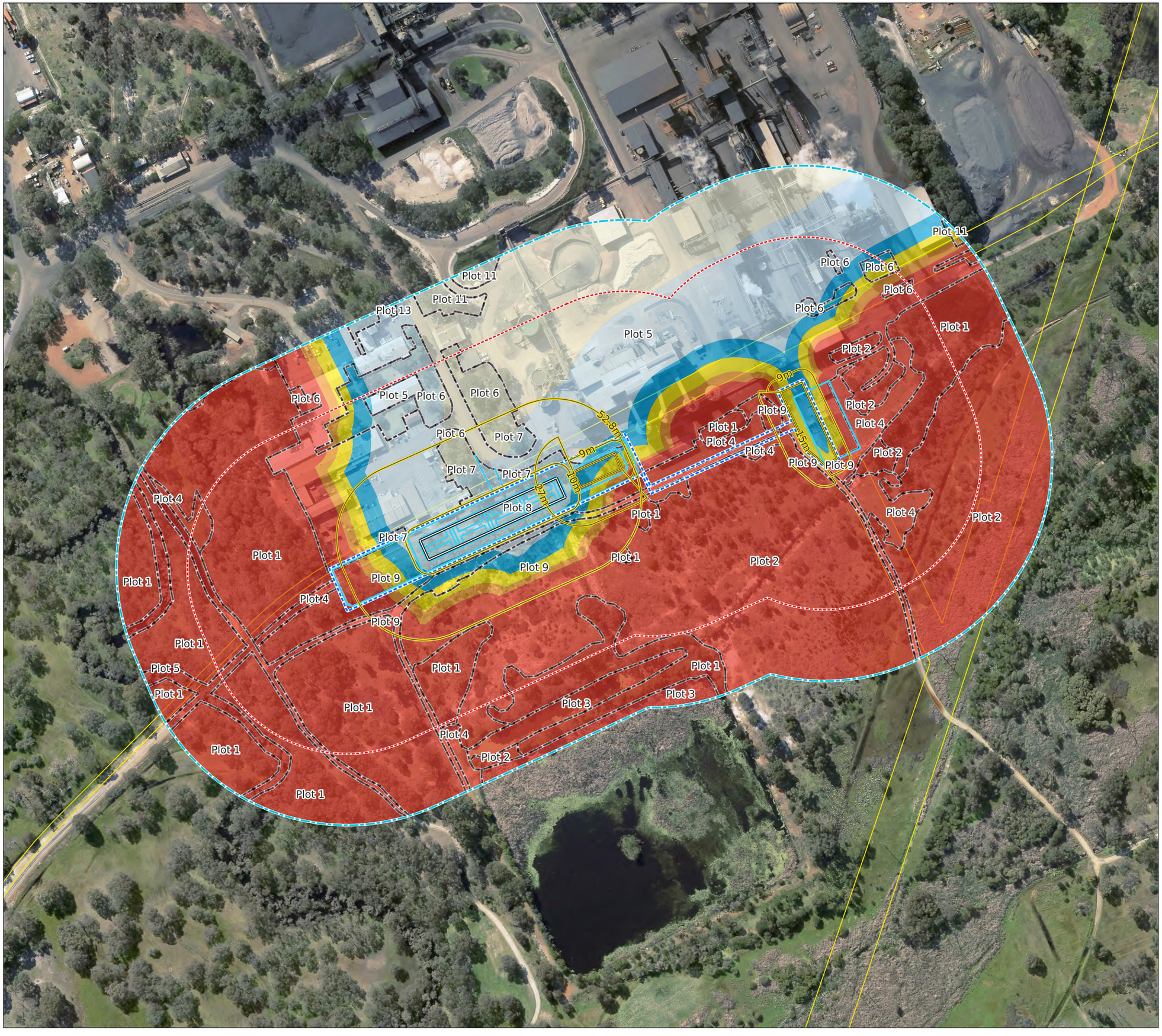

Legend

- Proposed Development
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

0 40 80 120 Metres

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Tronox (Chandala) - BESS Facility

Post-Development BAL Contour Plan

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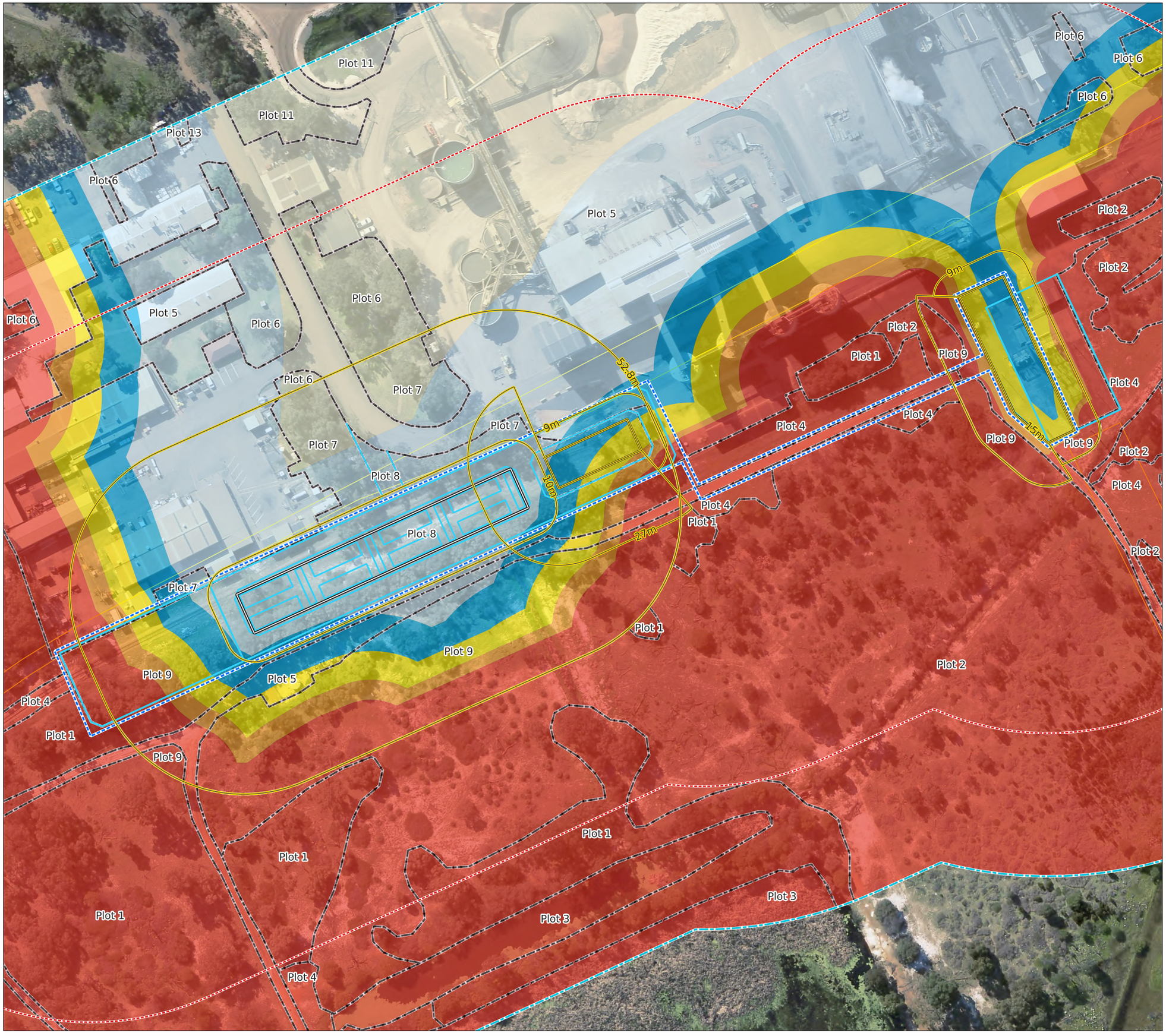

Legend

- Proposed Development
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

0 20 40 60 Metres

covey

Tronox (Chandala) - BESS Facility

Post-Development BAL Contour Plan (zoomed)

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3.3 Likelihood of Bushfire Impact

The likelihood of bushfire impact on renewable energy facilities is tied to the potential for bushfires to impact the site. To provide some guidance on this, historical bushfires have been depicted on Plates 1 and 2, using the following publicly available datasets:

- Firewatch which is a Landgate service that uses satellite remote sensing imagery to detect fire hotspots and burnt areas, to track live bushfires but also to review the broad extent of past fire events from 1989 to present day.
    - There have been numerous large bushfires west of Brand Highway, within the continuous forest vegetation within Gnangara-Moore River State Forest and adjacent conservation reserves
        - Only one appears to have crossed Brand Highway approximately 5 km to the north
        - The closest these bushfires have come to the Chandala facility is about 2.5 km away.
    - There have been a number of larger fires to the east of Brand Highway, but these have been over 10 km from the site, typically east and north of Chittering ,and south-east of Bullsbrook.
    - Two fires on the eastern side of Brand Highway have ignited closer than 10 km to the site, but both have been smaller fires that appear to have been contained:
        - In 2024 there was a 310 ha fire to the east of Muchea, about 3.5 km from Chandala facility
        - In 2023, there was a 385 ha fire near Lower Chittering, that was about 9 km from the facility.
- DBCA Fire History dataset which contains a collection of records of fire events (prescribed burns and bushfire) which were captured on departmental-managed land, and where available non-department managed land in Western Australia. The earliest records available are from 1937.
    - This dataset depicts a similar fire history of that from Firewatch, with numerous large bushfires west of Brand Highway, although the closest that they spread toward the Chandala is about 1.25 km.
    - Fires to the east of Brand Highway are also similar to Firewatch, with larger bushfires over 8 to 10 km from the site, other than the following:
        - In 2020 and 2021, two small ignitions occurred south of the facility along Brand Highway, approximately 900 m to 1.5 km from the site.
        - In 2019, a small fire occurred along Brand Highway, about 2 km to the north
        - In 2017 a 95 ha fire occurred near Chandala Nature Reserve, about 2.5 km to the north

In addition to the above, Tronox personnel have noted that a bushfire approached the facility directly from the west side of Brand Highway in 2025, which the onsite Emergency Response Team responded to.

The historical data depicts that while bushfires have regularly occurred in the local area, a significant number occur in the existing reserves containing remnant vegetation. Where the fire ignite in agricultural land, or spread from the reserves, these fires appear to generally be contained to relatively small-scale fires, likely due to lack of fuel (if harvesting has occurred) or due to being predominantly grassfires with reduced fire behaviour, that are more easily suppressed by local fire brigades and pastoralists, who are generally adept at managing these types of fires.

While there appear to be few historical bushfires within the site, the presence of such large bushfires to the west of Brand Highway, highlights that a combination of unfavourable conditions can support significant

destructive bushfire behaviour. Additionally, the potential for ignition events along Brand Highway, also presents another potential risk for smaller fires to ignite closer to the site.

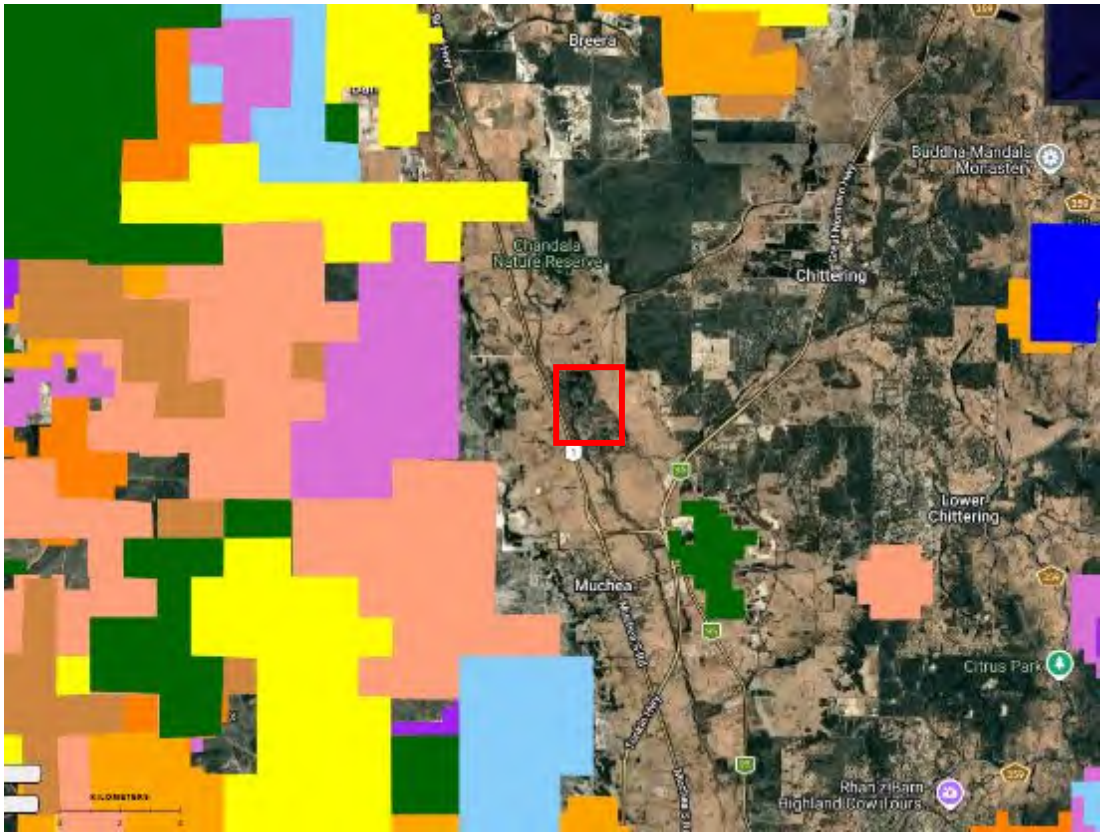


Figure 3-3. Bushfire History (Firewatch 2026)

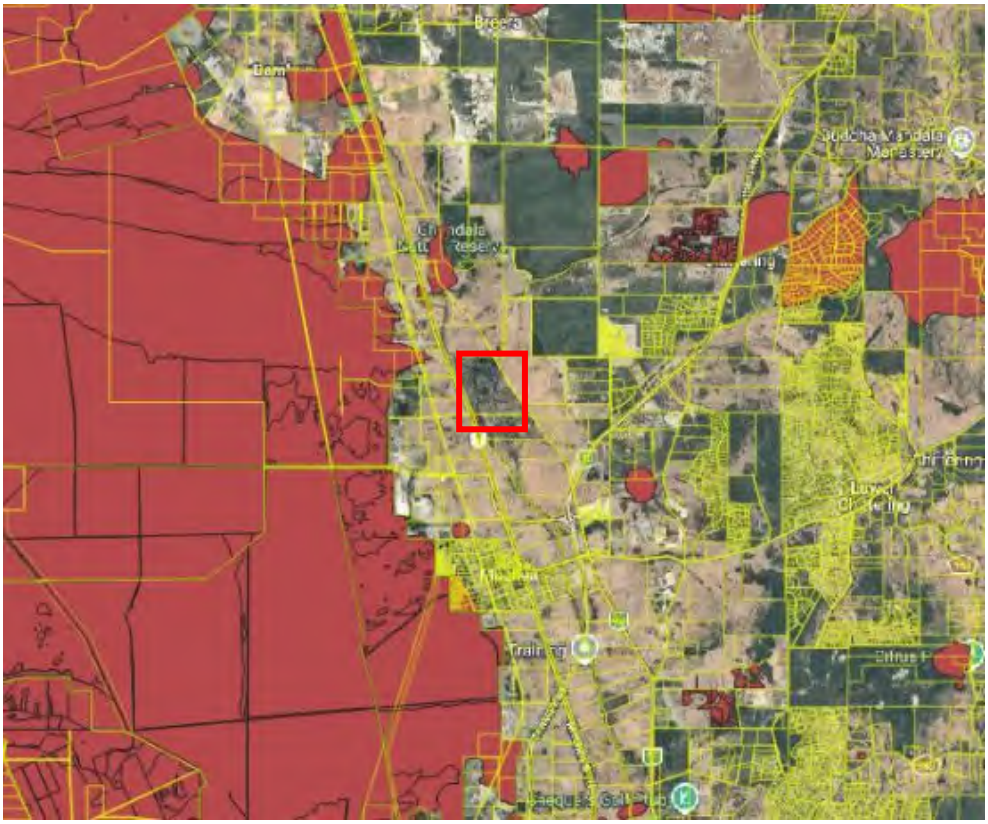


Figure 3-4. Bushfire History (DBCA 2026)

3.4 Bushfire Hazard Summary

The greatest bushfire threat to the proposed development is likely from bushfires spreading from the west and crossing Brand Highway to impact the site. While this hasn't historically occurred due to the agricultural land separating Chandala facility from the continuous forest vegetation to the west, fire spread across the grassland is possible at certain times of the summer.

Bushfires from the east could also occur within areas of continuous forest vegetation, and spread toward the site, and similar to the scenario above, the existing agricultural land has historically prevented spread toward the facility but could support steady-state grassfire during certain times during summer.

The other potential bushfire risk is from ignition events along Brand Highway and close to the facility, which could result in a fully-developed fire from a 500-800 m long fire run, primarily through the forest and scrub vegetation in the southern and western portions of the existing Chandala facility site.

Given the above, this BMP assumes that steady-state bushfire impact could occur in the future and addresses the risk accordingly.

4 Renewable Energy Infrastructure Hazard and Risk Analysis

The CFA Renewable Guidelines notes that fire hazards could be as follows for these renewable energy infrastructure types

- BESS facilities:
    - Electrical hazards, such as battery faults; overcharging; rapid discharge; loss of remote monitoring systems; internal short circuits; overheating; water ingress; lightning strike (leading to thermal events/runaway).
    - Chemical hazards, such as the inherent hazards of the stored dangerous goods; spills and leaks of transformer oil/diesel, refrigerant gas/coolant; chemical reactions.
    - Explosions, from ignition of venting gases. Potential fire spread due to proximity of batteries (and containers/enclosures) to each other, on-site infrastructure and vegetation (including screening vegetation).
    - Mechanical damage to battery containers/enclosures due to vehicular impact. Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers, radiant heat and flame contact.

From a bushfire risk assessment and management perspective, much of the above can be distilled into the potential impact of bushfire on the proposed renewable energy infrastructure (e.g. BESS containers), and the ability for significant fires from the renewable energy infrastructure to ignite a bushfire.

4.1 Battery Energy Storage System (BESS) hazard review

BESS units are typically comprised of Lithium-ion (Li-ion) battery cells that are wired together to form modules, which have a battery management system (BMS) that prevents electrical imbalances in the battery cells, including with voltage, current and temperature. The BMS' main function is to shut down operations of the module (or system) if any of the voltage, current, or temperature changes are out of limit.

4.1.1 Thermal runaway in Li-ion batteries

The significant hazard posed by BESS units is primarily associated with thermal runaway occurring in the Li-ion batteries, and the fire and explosion risk that can accompany the release of flammable gases. Thermal runaway describes a process that is accelerated by increasing internal temperature, in turn releasing more energy that further increases temperature.

In Li-ion batteries thermal runaway is a condition where voltage, current or temperature instability, causes the battery cell temperature to rise which in turn increases the current with a further rise in temperature. The battery can begin to emit gases due to thermal decomposition of the electrolyte solvents, which could potentially result in fire ignition or explosion (of the flammable gas release).

Battery cells can fail at different rates under different modes of off-gassing (flammable gas release), which can be with or without flaming. Because thermal runaway can occur without flame, gases may not be consumed by an ignition source immediately after they are emitted, this can create a scenario where high heat and combustible gases can coexist without igniting, and accumulation of these gases can result in an explosive event should an ignition source be subsequently introduced.

There are differences between thermal runaway and conventional fires that are important to understand. A conventional fire (e.g. campfire) is sustained by a combination of fuel, heat, and oxygen, where if any one of

them is removed, the fire may be extinguished (e.g. suffocating the fire to remove oxygen, applying water to cool it, or dispersing the wood to remove fuel).

Thermal runaway in a Li-ion battery differs from the conventional fire, as a Li-ion battery is consumed in thermal runaway is fuelled by an internal chemical reaction that releases heat and can continue without oxygen or a visible flame. As such, the management of thermal runaway differs from that of a conventional fire because starving a thermal runaway event of oxygen, may have little effect until the fuel is consumed. On this basis, stopping a thermal runaway event is more difficult and is generally addressed by either cooling to remove heat, or removing/dispersing the fuel.

While thermal runaway and fire are two different processes in a Li-ion battery failure, one can lead to the other including:

- An external fire can send a battery into thermal runaway, or
- Thermal runaway can create a secondary fire as it begins to the burn plastic and remaining battery materials.

4.1.2 Historical failure events (Li-ion battery and BESS)

The hazard of Li-ion battery thermal runaway and off-gassing has been identified in research and public literature since the early 2000s, including extensive safety testing. Additionally, a number of failure events have created further awareness to the dangers of thermal runaway in Li-ion batteries, including the following in larger scale BESS systems (DNV-GL, 2020; ESV, 2021):

- **2017-2018** - BESS fires in a large facility in South Korea, however there is limited reporting and there appears to be some conflict regarding the causes of the failures.
- **2019** – McMicken BESS Failure Event, Arizona
    - This involved thermal runaway of a BESS container, that resulted in off-gassing and subsequent explosion of the BESS when the container door was opened by attending firefighters.
    - It is noted that the BESS technology and standards has progressed significantly since this event, which represents an example of BESS failure prior to many of the recent improvements in fire and explosion safety measures.
- **2021** – Victorian Big Battery fire
    - A Tesla Megapack at a facility in Geelong caught fire and spread to a neighbouring Megapack during the initial installation and commissioning, which didn't spread any further and burned out over the course of approximately six hours.
- **2023** – Bouldercombe Battery Project, Queensland
    - A Tesla Megapack ignited at a facility in Bouldercombe, and was allowed to burn out buy attending firefighters, without firewater, as a low intensity fire. Firefighters monitored temperatures to ensure fire didn't spread to adjacent BESS units, and monitored gas levels and conducted air sampling to manage risk to nearby residents.

4.1.3 BESS Standards

The main standards for BESS testing, construction and installation, include:

- UL 9540 (2023): Energy Storage Systems (ESS) and Equipment
- UL 9540A (2019): Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

  - supplementary document to UL 9540 that defines test methods for thermal runaway.
- NFPA 855 (2023): Standard for the Installation of Stationary Energy Storage Systems
- International Fire Code (2021): Chapter 12 Energy Systems

4.1.4 Likelihood of BESS Facility Fire

As noted on Section 4.1.2, there appears to be a relatively low likelihood of BESS fires based on historical occurrences in Australia, however it is noted that these type of grid scale BESS facilities are relatively new with the opportunity for failure and fire also limited, and the statistics around fire losses are based on historical estimates and incomplete datasets. There is also varying levels of resultant damage associated with these fires, which can range from small ignition events that have minor damage, through to complete destruction of at least one BESS unit or potentially multiple units.

4.1.5 BESS hazard summary for bushfire

The overall hazard with the BESS units, is largely associated with the potential for thermal runaway in the Li-ion batteries to produce a fire or explosion failure event.

The rise of the BESS industry has been very quick, and the has resulted in rapid advances in the design, construction, commissioning, operation and maintenance of this technology. Notwithstanding, there hasn't seeming been a many reported historical BESS fires or explosions, and certainly not in Australia, however when they have occurred, it is clear that they result in significant firefighting challenges, primarily due to the inability to easily extinguish the fires and manage flammable gases.

The Arizona BESS failure in particular has highlighted historical issues with this for attending firefighters, as well as the potential for catastrophic failure to ignite vegetation some distance from the BESS (UL, 2020).

From a bushfire risk management perspective, the hazard related to the BESS units can be distilled to the following:

- Exacerbation of a bushfire from fire and/or explosion of the BESS's as follows:
  - A bushfire impressing significant radiant heat, or producing direct flame impingement, onto the BESS container, that could increase battery temperatures and send into thermal runaway. This could also include the damage or destruction of supporting systems (e.g. BMS, thermal management) which might affect the ability of the BESS to maintain temperatures at required levels.
  - Ember attack from a bushfire, igniting a fire within the BESS unit, that could send a battery into thermal runaway, or damage or destroy supporting systems.
  - Ember attack from a bushfire igniting flammable gases from BESS with thermal runaway condition, either within the BESS or flammable gases being ventilated.
- Ignition of a bushfire as a result of a fire or explosion within the BESS, likely to be associated with thermal runaway igniting an internal fire and/or emitting flammable gases, which could result in an explosion.

The bushfire risk management principles expected to address the hazards above are explored in further detail in Section 4.3.

4.2 Transformer Hazard

The causes of fire hazards relating to transformers are typically categorised as one of the following:

- Electrical equipment containing combustible insulating liquids may rupture due to internal failure, and there may be fire ignition or an explosion.
- Electrical equipment without combustible insulating liquids may rupture due to internal failure; there still be an explosion with a modest fire risk.
- Other plant and equipment such as cables, batteries, and drainage pipes may catch fire and spread the fire.

The risk associated with transformers, relates primarily to the oil used in transformers (where oil-filled) for insulation and cooling, which could potentially leak and be ignited. The ground mounted transformers are oil-filled and contains a hermetically sealed steel tank that contains the transformer core surrounded with windings and connecting leads which are separated, insulated and cooled by mineral oil (oil impregnated upgraded wood pulp insulation) or ester oils.

Potential failure of the transformer can occur if the ambient temperature is raised above the rating of the transformer (typically 105°C-140°C) for an extended time, with short-term heating able to be addressed through power supply reduction or shutdown. While overheating can result in degradation of the transformer, the main risk is the potential for cracking of the tank and resultant oil loss and potential pool fire of the flammable mineral or ester oil.

Previous correspondence from power supply providers has been there are historically very few transformer fires, with most associated with lightning strikes on pole-top transformers in non-built-up areas. They have assessed the likelihood of a transformer fire occurring as being approximately 0.1%, or with accumulated probability of 4% per transformer over its typical service life.

While there is not a high probability of transformer fires, it could result in transformer loss and/or damage to adjacent infrastructure or combustible items. As such, fire protection measures are considered a critical part of the design of transformers. which include the following recommendations:

- Transformers are designed in accordance with various standards, including AS 2067 (Substations and High Voltage Installations) to reduce risk of fire, with a variety of measures incorporated to minimise potential for fire ignition.
- Cable clamps and support to limit leaking bushings.
- Managing limits for transformers to prevent overloading.
- Providing sufficient clearances to transformers based on oil volume, incorporation of oil containment and/or flame trap, or consideration of a fire screening wall
    - The incorporation of an oil bund and/or flame trap enables a reduction in minimum separation distance as it contains the spread of any leaked oil and reduces the size of the oil pool exposed to oxygen, which is limits combustion.
    - A fire screen wall (2 hr FRL) also enables reduced minimum separation distances as it shields the transformer from adjacent buildings and combustible items and ignition risks.

4.3 Derived Bushfire Risk Management Principles

Based on the analysis of the bushfire hazards and risk associated with renewable energy infrastructure facilities, including review of historical fire events, the following are considered key bushfire risk management principles to be incorporated into the proposed development to manage bushfire risk, both to protect the renewable energy infrastructure from bushfire, and also to manage the risk of bushfire ignition from infrastructure fire.

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of renewable energy infrastructure is based on a number of factors.
- Ensure suitable separation from nearby unmanaged vegetation to ensure bushfire impact on the infrastructure is appropriately managed commensurate to anticipated bushfire behaviour, in addition to providing sufficient separation to limit fire escape from renewable energy infrastructure fires (or BESS explosion) to ignite a bushfire.
    - This also includes ensuring no trees are to be located close enough to renewable energy infrastructure such that any falling branches or trees could mechanically damage the infrastructure, or cause other ignition sources (e.g. thermal runaway in BESS).
- Provision of appropriate vehicular access to the renewable energy infrastructure facility for attending firefighters, including permitting fire appliance turnaround where required.
- Provision of secure firewater supply for attending firefighters, to enable a rapid suppression response without extended turnaround times for appliance refills.
    - It is noted that the preferred onsite response may include leaving a BESS unit to burn out rather than applying firefighting water, but this may depend on various factors.
- Appropriate renewable energy infrastructure design and construction including (but not limited to):
    - For BESS facility
        - Limit potential for thermal runaway and associated off-gassing.
        - Incorporates a combined strategy of fire detection (and gas monitoring) and suppression followed by ventilation (and gas ventilation) and cooling, including all required infrastructure to achieve this.
        - Incorporate remote monitoring and communications, so the status of BESS BMS and fire/gas detection systems can be monitored and any information conveyed to relevant parties including fire brigade.
- Ensure sufficient information regarding the facility, its hazards and emergency management procedures is available to assist any attending firefighters.
- Engage with local fire brigade during project development and commissioning process, to ensure they understand the system and be aware of its specific hazards.
- Develop an emergency management plan which comprehensively details:
    - The hazards associated with renewable energy infrastructure
    - Housekeeping and routine maintenance actions (including ongoing compliance with project obligations), including limiting any onsite ignition sources or fuel loads
    - Ensure communication protocols are established for contacting DFES, nearby landowners/neighbours (if applicable), and relevant agencies (e.g. Western Power, AEMO etc) to enable management of emergencies, access to land and management of facility.
    - Pre-emptive actions on days with forecast of elevated Fire Danger Rating or Total Fire Ban days
    - Response actions for in the event of bushfire in the local area
        - Evacuation of staff offsite
        - Ensuring all onsite access routes are unlocked and available for attending firefighters.
    - Response actions for onsite BESS fire including
        - Rapid notification of site personnel, DFES and nearby landowners/neighbours

- Shutdown and de-energisation of BESS
- If safe to do so, conduct suppression on spot fires until DFES arrival etc.

- Staff training and exercises of emergency management procedures
- Ongoing review of emergency management plans (and any information relied upon by emergency services) on regular basis, including following changes to the BESS or any fire events.

5 Bushfire Safety Strategy and Management Measures

5.1 Bushfire Risk Strategy

As detailed in Section 1.3, the CFA Renewable Guidelines are currently seen as the best guidance for renewable energy facilities available at this point in time. The CFA Renewable Guidelines provide a comprehensive suite of design, construction, operation and emergency planning measures recommended for renewable energy facilities, that address the risk of fire within the infrastructure, but also bushfire risk to the development.

The CFA Renewable Guidelines note that any planning applications for all renewable energy facilities proposed in bushfire prone areas, strengthened or additional risk mitigation measures will be required to address bushfire risk, and will also need to address the following:

- The impact of any ignition events arising from the renewable energy infrastructure on nearby communities, infrastructure and assets.
- The impact of bushfire on the renewable energy infrastructure (e.g. ember attack, radiant heat impact, flame contact).
- Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.

A summary of the CFA Renewable Guidelines sections (relevant to this project) is provided in the voluntary compliance assessment on Table 4 in Section 6, and include the following:

- Siting and vegetation management requirements to ensure the renewable energy infrastructure fully involved in fire does not create the potential for ignition of vegetation.
- Vehicular access provisions for emergency services vehicles
- Firewater provisions for attending firefighters
- Design, construction and commissioning requirements for renewable energy infrastructure (especially BESS and transformers) and any Dangerous Goods
- Ongoing operation, maintenance and housekeeping requirements for renewable energy infrastructure (especially BESS)
- Familiarisation visits and emergency information for attending firefighters and emergency services personnel
- Development and preparation of comprehensive Emergency Management Plan for the facility, with relevant prevention, preparedness and response information for bushfires and onsite infrastructure fires.

Based on the guidance from the review of the bushfire risk and renewable energy infrastructure hazard in Sections 3 and 4, and informed by the relevant Model Requirements of the CFA Renewable Guidelines, the following bushfire safety strategy and associated risk management measures are to be incorporated into the proposed facility to manage bushfire risk to the renewable energy infrastructure, while also managing the escape of fire within the infrastructure to ignite a bushfire.

It is noted that while most management measures relate to management of bushfire impact on the proposed renewable energy infrastructure, some also relate to internal hazards which is also critical to avoid ignition of bushfires.

The subsections below detail the proposed bushfire risk management measures for the project, with an assessment in Section 6 demonstrating how these measures map to the principles from the CFA Renewable Guidelines.

Where possible, the bushfire management measures for both the buildings and renewable energy infrastructure have been depicted on Figure 5-1.

5.2 Vegetation Management and Separation

The following Non-Vegetated Zone (NVZ) and Asset Protection Zones (APZ) are to be established around proposed renewable energy infrastructure, to protect infrastructure from approaching bushfire impact, while also reducing the potential for onsite infrastructure fires to ignite a bushfire.

- NVZ/APZ around the perimeter of all renewable energy infrastructure including
    - BESS modules (BESS compound)
    - Transformers 1 and 2
- Non-vegetated land within perimeter NVZ/APZ of the following:
    - BESS compound
    - Transformers 1 and 2

Where stipulated, the NVZ/APZ must be non-vegetated, however outside this they can be either non-vegetated or managed low threat landscaping established in accordance with the APZ standards from the WA PBG and AS 3959 Clause 2.2.3.2 (e) and (f), however would preferably be non-vegetated where possible.

All onsite vegetation modification and management (including NVZ/APZ) is to be conducted and maintained for the operational life of the project.

5.2.1 Vegetation Management and Separation - BESS

Given the potential for BESS modules to react to elevated temperatures, NVZ/APZ to achieve a target radiant heat flux of no less than 10 kW/m^2 is considered appropriate. Additionally, given there has been historical BESS explosion igniting vegetation 23 m from the container, the NVZ/APZ for the BESS is to be no less than 25 m wide, to manage risk of bushfire ignition from an explosion. It is noted that this historical explosion was in a BESS that didn't have explosion management system nor many of the fire and safety features currently required, and as such, is not likely to be replicated, so the 25 m minimum NVZ/APZ is considered conservative.

Based on the above, the BESS system requires a 52.8 m wide perimeter NVZ/APZ consisting of the following:

- A 10 m wide NVZ adjacent to the BESS units (Plot 8), that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.
- Outside the 10 m NVZ, the remaining 42.8 m (Plot 9) can be non-vegetated or otherwise comply with the APZ standards from the WA PBG, with the following clarifications:
    - Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS
- The NVZ/APZ width is based on the following Method 2 calculation:
    - Separation from Plot 1 (Class A forest with effective slope of 2°) to achieve 10 kW/m^2 at the BESS compound boundary (i.e. at BESS modules)
    - All other inputs are default as per AS 3959 (i.e. fuel loads, flame width etc)
    - The Method 2 calculation is provided in Appendix D.

All land within the BESS perimeter NVZ/APZ (i.e. Plot 8 within BESS compound), are to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.

5.2.2 Vegetation Management and Separation - Transformers

In order to ensure sufficient separation is maintained between proposed transformers, and surrounding unmanaged vegetation, the following NVZ/APZs will be required:

- A 15 m wide perimeter NVZ/APZ to achieve BAL-29 or lower on the envelope.
    - Ideally the perimeter NVZ/APZs around transformers should be non-combustible (constructed of concrete, mineral earth or non-combustible mulch) and free of vegetation as much as practical, or otherwise compliant with the APZ standards from the WA PBG, with no plant or equipment unless non-combustible.

Additionally, all land within the transformer perimeter APZs is to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible. At the time of inspection, this land was currently non-vegetated.

5.3 Vehicular Access

Vehicular access requirement to the proposed renewable energy facility is to comply with private driveway specifications of the WA PBG (see Appendix E), with additional guidance provided from CFA Renewables Guideline where required. This is largely to be provided by the existing internal road network at the Chandala facility, with some extension to the proposed BESS.

As depicted on Figure 5-1, vehicular access to the existing Chandala facility is via an 6 m wide internal road form Brand Highway, that extends to the administration carpark, or into the greater facility via a security-controlled access point. There are a number of existing internal roads within the industrial part of the facility that would be available for use by emergency services to access the BESS facility and transformers in a bushfire emergency, with several of these roads depicted on Figure 5-1.

To provide vehicular access to, and around, the BESS facility from the existing internal road network, a new internal road is to be constructed as depicted on Figure 5-1.

Where new internal roads are proposed (including any gates and signage), they are to be constructed and maintained for the operational life of the project.

5.3.1 Vehicular access – BESS

There shall be provision of at least two (2) vehicular access points to the BESS compound, to/from the existing internal road network, to ensure emergency services can be achieved during a bushfire or onsite BESS fire emergency. The existing internal road network (see Figure 5-1) enables attending emergency services vehicles to approach the BESS site from either the north or the east, and given the use by heavy vehicles, is considered appropriate for emergency service use.

A new internal road is to be extended from the existing internal road (see Figure 5-1) and shall comply with the following requirements:

- Comply with the technical specifications of private driveway from the WA PBG (see Appendix E), noting the following:
    - All roads within BESS compound are to be minimum of 6 m wide.

  - Provides a perimeter road access around the BESS compound.
- At least 2 entrance/exit gates are to be provided to the BESS compound
- Any new gates are to be as follows:
  - Provide at least 6m clear horizontal width
  - If locked, any keys are issued to DFES and any local fire brigade, unless Tronox can ensure onsite personnel can provide access at all times.

5.3.2 Vehicular access – Transformers

Given the location of Transformer 1, there is existing internal road access to the transformer envelope, that appears compliant with the private driveway specifications of the WA PBG.

Vehicular access to Transformer 2 will be provided by the access route to the BESS compound detailed in Section 5.3.1.

5.4 Firewater Supply

The following assumes that there is no reticulated town main water supply to the site as is currently the case.

Covey understand the following firewater system is onsite:

- 1 combined process/firewater tank (overall capacity of 1735 kL with minimum fire reserve of 415 kL)
- 2 fire pumpsets to two fire hydrant ring mains (one to MRP ring main, and the other to SRP ring main)
- Fire hydrants and fire hose reels off each ring main, providing coverage of the existing facility

Further information regarding firewater requirements is provided in the subsections below.

It is also acknowledged that the fixed firewater systems are supplemented by the existing mobile onsite appliances at the facility as follows, which is especially important for trained staff to undertake first response suppression of onsite fire or spot fire, where safe to do so:

- 1 Fire Truck with 3000 L tank, rear mount pump, fire branches and hoses, and various firefighting and communication equipment.
- 1 Light Fire Tanker (4WD) with 800 L tank, small pump, hose reel, extinguishers, and various firefighting and communication equipment.
- 1 Mobile Fire Trailer, with 500 L tank and small pump and hose reel; and
- 1 Emergency Response Vehicle with fire branches and hoses, and various firefighting and communication equipment.

5.4.1 Firewater - BESS

The CFA Renewable Guidelines for centralised BESS facilities in areas without reticulated water supply recommend:

- *The firewater supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater.*
- *The quantity of static firewater 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).*
- *Fire hydrants must be provided and located so that every part of the battery energy storage system is 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.*

- *The firewater supply must be located at vehicle entrances to the facility, at least 10m from any renewable energy infrastructure and buildings.*
- *The firewater supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (e.g. Fire water tanks are to be located closer to the site entrance that the battery energy storage system).*
- *The firewater supply must comply with relevant Australian Standards (including AS 2419.1)*

As the BESS modules are approximately 1,700 m^2 in area, the 415 kL firewater reserve stored in the existing combined tank at Chandala has the potential to provide sufficient onsite static firewater supply to meet the requirements of the CFA Renewable Guidelines, however this is to be confirmed by a suitably qualified Fire Protection Engineer. Additionally, fire hydrant coverage to the proposed BESS may need to be extended from the existing hydrant system/s, to achieve compliance coverage, which would also require review and design by a suitably qualified Fire Protection Engineer.

Should new firewater tank/s be required (including supplementing the existing firewater tank), they will need to consider the following:

- All firewater tanks will need to comply with the standards from the WA PBG (see Appendix F), and consider the following recommendation from the CFA Renewables Guideline:
    - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
    - The tank suction point must be within 4 m of a road or hardstand
- All firewater tanks are to be sited further than 10 m from the renewable energy infrastructure, as well as in an area of BAL-29 or lower
    - To ensure this is implemented, a suitably sized NVZ/APZ is required around the perimeter of the tank/s
- Vehicular access to the firewater tank/s is to be via proposed or existing internal roads.
    - Vehicular access (compliant through or loop road or with turning head) is to be provided to within 4 m of the tank suction point.

Given the substantial amount of firewater currently onsite, no additional capacity is proposed for bushfire fighting purposes.

The firewater tanks, pumps and hydrants (including any alterations) are to be:

- Designed by a suitably qualified Fire Protection Engineer to ensure compliance with the above codes or Australian Standards and recommendations from the CFA Renewables Guidelines,
- Constructed and maintained for the operational life of the project.
- Documented in the Emergency Information Book and Signage (see Section 5.9) is to be provided at the site entrance (or location agreed with DFES), to inform attending emergency services personnel.
    - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.

5.4.2 Firewater – Transformers

- There is no specific firewater provisions required for the transformers, however the existing firewater systems onsite, and for the BESS facility, will provide sufficient nearby firewater for bushfire fighting around both transformer options should it be required.

5.5 Renewable Energy Infrastructure Design

The following measures are required for the proposed renewable energy infrastructure to manage the risk of fires, with more specific guidance provided in subsections below:

- All electrical equipment, including electrical cabling, junction boxes, inverters and transformers, must comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Appropriate system monitoring for all renewable energy infrastructure must be provided, especially the BESS unit BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification.
    - Monitoring is to be configured to provide warning to relevant onsite and offsite personnel.

5.5.1 BESS System

- Ensure the following elements are considered in the BESS:
    - External module is to be non-combustible material (e.g. metal).
    - Use suitable Li-ion batteries (or appropriate alternative), with sufficient cell quality and barriers, to limit potential for thermal runaway generating from internal cell defects and cascading thermal runaway.
    - Battery management/monitoring systems for monitoring and managing the state of battery systems including shutdown if any of the voltage, current, or temperature changes are out of limit.
    - Systems to prevent heat/fire spread within battery containers (such as thermal barriers, shut-down separators, isolation systems, cooling systems).
    - Detection systems for smoke, heat (thermal), fire and toxic gas (off-gassing) within battery containers.
    - Appropriate suppression systems for fire within battery containers.
    - Systems to prevent explosion within battery containers by safely ventilating the system in a controlled manner to reduce the flammability of the atmosphere, such as ventilation, pressure relief and exhaust systems, including incorporation of adequate explosion prevention protection, where applicable.
    - Warning and alarm systems within the battery containers, and/or the facility, to enable early warning for faults, operation of the battery energy storage system above 'normal'/safe parameters, smoke, off-gassing, and fire.
    - Consideration of direct alarm monitoring to the fire brigade for BESS automatic detection systems
    - Provide suitable ember protection (e.g. BAL-12.5 construction) to prevent embers from penetrating battery containers/enclosures including, but not limited to:
        - Battery enclosures via any external walls/roofs (if not completely sealed) and gas ventilation inlets/outlets.
        - Thermal management system (chiller) inlets and outlets
        - Any unsealed penetrations are to be appropriately sealed (with non-combustible material) or gaps/openings (>2mm) are to be screened with non-combustible (aluminium, steel, bronze) screening with maximum aperture <2mm.
    - BESS installation is on a non-combustible surface (e.g. concrete)

5.5.2 Transformers

- Transformers are to be designed, constructed and maintained to relevant Australian Standards.
- Ensure transformer is designed to minimise fire risk, incorporates either oil bund or flame trap, and is provided with required separation from adjacent infrastructure and the combustible vegetation, in accordance with relevant Australian Standards and manufacturer specifications.

5.6 Bushfire resilient construction

- Bushfire construction provisions of the National Construction Code require that buildings comply with the AS 3959 construction requirements, in accordance with the assessed BAL under AS 3959, provided the building is a Class 1, 2, 3 or associated Class 10a building/deck, or a "certain Class 9" building.
    - The renewable energy infrastructure (BESS, transformers) will not be any of the classifications nominated above, therefore in accordance with the National Construction Code, and as such, there is no statutory requirement to meet the construction requirements of AS 3959.
- As detailed in Section 5.5.1, BESS construction is guided by the CFA Renewable Guidelines with the following recommendations:
    - Container construction is to be non-combustible material (e.g. metal).
    - Ember protection is to be provided to parts of the BESS container, in accordance with AS 3959 BAL-12.5 specifications

5.7 Construction and Commissioning

- Ensure an emergency communication system must be provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and transformers) complies with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for Dangerous Goods as per relevant Australian Standards.
- Ensure tight ignition source control measures, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the Construction Management Plan (or other relevant document) for the construction and commissioning phase of the facility, adopting similar concepts to those in Section 5.11, for the operational BESS facility, which includes:
    - Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days.
    - Regularly monitor for, and otherwise be aware of, bushfires in the local area, and evacuate offsite prior to bushfire impact onsite.

  - Emergency procedures for identified risks and hazards of the renewable energy infrastructure, including but not limited to:
    - Bushfires
    - Onsite fire in renewable energy infrastructure (e.g. electrical infrastructure faults and fire in renewable energy infrastructure)
  - Ensure the response for any onsite fire or bushfire is the immediate notification of DFES.
  - The priority response action for a bushfire is immediate evacuation of all onsite personnel to offsite safer location (away from bushfire) ahead of bushfire impact on the site, and before bushfire impact (including smoke) on the vehicular access network to the offsite location.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the BESS modules.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 5.10.

5.8 Operation, Maintenance and Housekeeping

- Ensure ongoing compliance with the endorsed BMP is achieved, especially prior to, and during, bushfire season. This includes all vegetation management, internal driveway access, fire system and firewater obligations.
- Ensure any Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and the requirements detailed in Section 5.12.
- Ensure the Emergency Information Book and/or signage is appropriately stored at all nominated site entrances, and reviewed on an annual basis (see Section 5.9).
- Develop, implement and review the Emergency Management Plan including all preparedness, pre-emptive and response actions, as required, and ensure ongoing liaison with DFES and regular staff training and exercises are conducted (see Section 5.11 below).
- Ensure inspection, maintenance and any required repair activities are conducted for all renewable energy infrastructure, associated equipment, fire systems, communication systems, and vehicles at the facility, in line with relevant Australian Standards and manufacturers requirements.
  - With respect to the BESS units, this should include the following:
    - A schedule, list of activities and accountabilities for the inspecting, testing, monitoring and servicing of the battery and its monitoring, safety and protective systems.
    - Monthly inspections of battery enclosures/ containers and related infrastructure for physical damage. Any damage must be immediately assessed and rectified by a suitably qualified person.
    - Regular inspection and removal of all combustible materials near the battery enclosures/containers and related infrastructure.

5.9 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at the nominated site entrance to the facility (or main administration building), with any plans or information books provided in a weatherproof container (unless otherwise agreed with DFES).

The Emergency Information Book and/or signage is intended to provide to emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure (including BESS),
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
- The following BESS details and plans
    - Schematics and technical data for BESS units, the number of units on-site, and the number of battery racks or modules within each unit.
    - Details of the hazards for the BESS, including thermal events/runaway, electrical safety hazards, explosion hazards, dangerous goods hazards (including off-gassing), and the effects of fire on the BESS (e.g., explosion, release of toxic gases).
    - Details of all provided battery failure/safety and protective systems, including a description, the activation process/automatic trigger, and any hazards associated with these systems.
    - Specifications for safe operating conditions for temperature.
    - Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available.
    - The shutdown and/or isolation procedures if the BESS are involved in fire or emergency incident, and appropriate personnel contact details for verifying that the battery enclosure/container system has been isolated/shutdown and de-energised during emergencies.
- Details of any emergency equipment, including the type and location of fire and gas detection and suppression systems.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.
- Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, bushfire).

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

5.10 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 5.9) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel, or that onsite personnel will be available at all times to brigade access.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade.

5.11 Emergency Management Plan

An Emergency Management Plan (EMP) is to be developed for the BESS facility, or make amendment to the existing site EMP if relevant, detailing the procedures for preparing and responding to off-site bushfire, and on-site fire emergencies impacting the BESS including:

- BESS facility details including key contacts and technical support during an emergency, site plan, details of renewable energy infrastructure, details of fire and emergency systems, and a manifest of dangerous goods.
- The identified risks and hazards associated with the renewable energy infrastructure, such as onsite fire and bushfires.
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for onsite BESS fires and bushfire:
    - Ongoing compliance with the approved BMP, including ensuring regular vegetation management requirements are achieved, vehicular access routes and firewater systems are maintained and available, and conducting regular bushfire housekeeping inspections.
    - Ensuring ongoing maintenance of all infrastructure, fire and communication systems.
    - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
    - Modifying Site Activities (based on Forecast FDR and TFB/HVMB) including limiting activities which may introduce bushfire ignition (hot works, unnecessary vehicle movement etc).
    - Monitoring DFES Bushfire Emergency Warnings for bushfire (and/or other signs of bushfire activity) within 50 km of the facility, and understanding the decision-making triggers.
- Detail emergency response procedures to address to all identified hazards (including for onsite BESS fires and bushfire).
- For a bushfire emergency, the response should include the following:
    - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
    - Conducting early offsite evacuation of all staff away from the bushfire if safe to do so (preferred response), ideally offsite to Ellenbrook or Gingin in a direction away from approaching bushfire.
        - Only if permitted by authorized DFES/local fire brigade personnel, only essential staff may remain onsite where perhaps required for operational management and/or shutdown procedures
    - Conduct BESS facility shutdown, if safe to do so prior to staff evacuation:

        - Reduce the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
        - Ensure all other plant is properly secured.
        - Ensure all vehicular access routes are unlocked (if possible) and available for use.
        - Ensure all fire and communications systems are ready for use.
    - If there is insufficient time to safely travel offsite without being impacted by bushfire, conduct onsite shelter in place as directed by Tronox personnel.
- Response to onsite fire is to include:
    - Immediately notify DFES to enable a rapid turnout, and relevant Tronox personnel
    - Strongly consider full emergency shutdown of the BESS and transformers unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible).
    - If fire is within the BESS unit/s, ensure staff relocate as far as possible from the fire, and no less than 50 m away.
    - If fire is not in BESS modules (e.g. existing facility), and only if safe to do so, trained personnel to conduct first attack response on any spot fires to prevent bushfire ignition, until DFES arrival. Onsite staff are not expected to fight onsite infrastructure fires (unless trained), but only limit any potential for bushfire ignition where safe to do so.
    - Notify neighbouring landowners (if relevant).

The emergency management plan is to be reviewed regularly, and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

The above is a high-level summary, with further specific detail on the requirements of the emergency management plan relating to bushfire and onsite BESS infrastructure fire is provided in Appendix H.

5.12 Dangerous Goods

Strict controls are required on these potential ignition sources, such as storage and handling controls in accordance with the Dangerous Goods legislation and code, relevant Australian Standards and restrictions on hot works and electrical equipment within any on-site hazardous areas.

Should the facility propose any additional significant quantities of dangerous goods onsite such that the storage and use of these could potentially increase the risk of fire ignition at the proposed development, the following is required as a minimum, with the final siting and bushfire risk management to be assessed by an accredited bushfire practitioner:

- Ensure they are sited in areas of BAL-29 or lower as a minimum, and suitably protected from bushfire impact.
- Ensure there are strict controls on these potential ignition sources, such as storage and handling controls in accordance with the Dangerous Goods legislation, codes, and relevant Australian Standards.
- Restrictions on hot works and electrical equipment within any on-site hazardous areas.

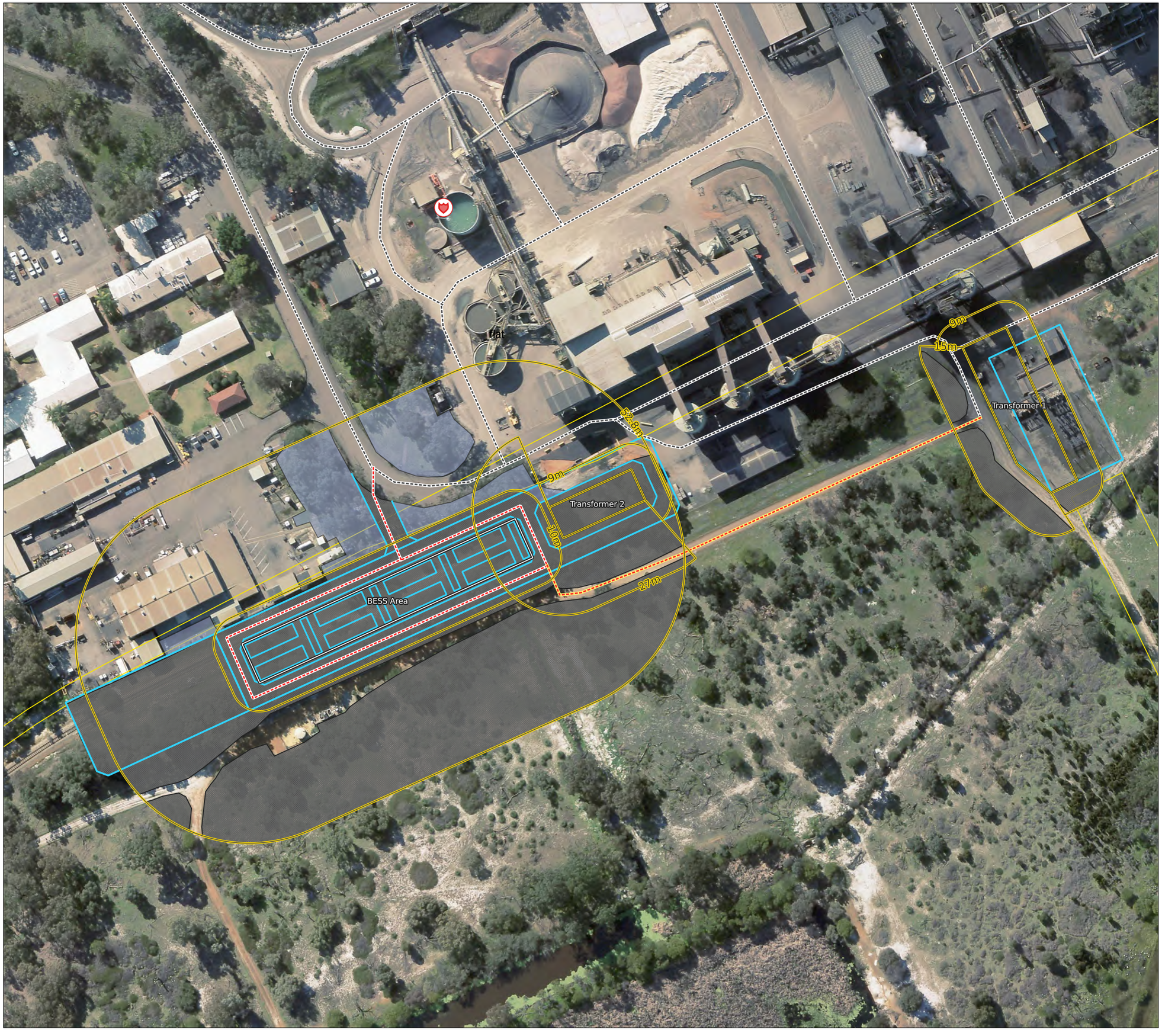
5.13 Compliance with annual firebreak notices

Compliance with the current Shire of Chittering annual firebreak notice is required, as amended (refer to Appendix F), however it is noted that the APZ and vehicular access requirements for this BESS development are addressed more specifically by this BMP.

The firebreak notice does provide the following relevant information which is to be complied with where relevant:

- Nominates bushfire season as being between 16 October and 31 May
- Nominates the following burning times and details actions permitted/prohibited during these times:
    - Prohibited – 1 December to 31 March
    - Restricted – 1 October to 30 November, and 1 April to 31 May
- Details on how to determine the Fire Danger Rating and actions for Total Fire Ban days

Additionally, the firebreak notice states that all properties wth approved Bushfire Management Plans and Emergency Management Plans, are to comply with the plan in its entirety.



Legend

Mitigation Measures

- Existing Fire Hydrant System Infrastructure
- Proposed Development

Internal Road

- Internal Road
- New Internal Road
- Upgraded Existing Internal Road
- Infrastructure Outline
- Cadastre
- Asset Protection Zone

Classified Vegetation

- Excluded Clause 2.2.3.2(f)
- Modified to non vegetated and low threat

0 20 40 60 Metres

covey

Tronox (Chandala) - BESS Facility

Bushfire Management Measures

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6 CFA Renewable Guidelines Assessment

As detailed in Section 1.3 of this BMP, the project voluntarily adopted the Model Requirements from the CFA Renewable Guidelines to develop the bushfire risk management strategy, albeit rationalised for a WA context where required (e.g. use of WA standards for APZs, driveways, firewater tanks etc).

The proposed bushfire management strategy and mitigation measures have been detailed above in Section 5, with an assessment of these measures against the Model Requirements of the CFA Renewable Guidelines provided below in Table 4.

The assessment demonstrates that alignment has been achieved with the Model Requirements, other than some rationalisations for the WA context. As previously noted, not all Model Requirements relate to bushfire impact on the proposed development, however the management of many of these internal hazards is also critical to avoid ignition of bushfires, so have been discussed as much as relevant.

Table 4: Summary of Renewable Energy Facility recommendations relating to bushfire and the development response (CFA, 2025)

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
Section 3: Fire Risk Management	***Risk Management Plan*** • A Risk Management Plan must be developed for all renewable energy facilities, before development starts. *Additional Recommendations from CFA Renewable Guidelines* • A Risk Management Plan (RMP) is critical in informing fire risk management in the design and operation of facilities, particularly where infrastructure or operations pose additional hazards to the landscape, occupants and emergency responders.	***All Facilities***	• This Bushfire Risk Management Plan assesses the bushfire hazards and risks for the proposed renewable energy infrastructure against the recommendations of the CFA Renewable Guidelines, and details how the risk has been appropriately managed. • The required mitigation measures for the renewable energy infrastructure, has been incorporated into the project Bushfire Management Plan, to ensure they are implemented and maintained for the operational life of the project. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 4: Facility Location	***Landscape Risk to Facility*** • An assessment that considers: o The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	***All Facilities***	• The proposed BESS is on the southern side of an existing industrial facility, with the bushfire risk primarily from forest and scrub vegetation to the south of the proposal. • As detailed in Section 3.3, while bushfires have historically been a regular occurrence in the local region especially in areas of retained vegetation to the west of Brand Highway, there have been few that have approached within 2 km of the Chandala facility likely due to the surrounding agricultural land. Notwithstanding, there is continuous forest vegetation within and surrounding the Chandala site, and there would be opportunity for steady-state bushfire to impact the proposed development. • The focus on addressing landscape risk of bushfire to the facility, is primarily through the provision of the following: o Onsite vegetation management, including NVZ/APZs around renewable energy infrastructure, to reduce bushfire impact to moderate levels, especially on the basis that the BESS modules are largely non-combustible materials and the anticipated bushfire behaviour ▪ The sizing of the NVZ and APZ is commensurate with the surrounding bushfire hazard (i.e. increasing in width to provide more separation from the hazard where it presents greater potential for significant bushfire behaviour). ▪ The BESS units are more susceptible to elevated heat which could potentially trigger thermal runaway, and on this basis, the NVZ/APZ has been sized to achieve a target of 10 kW/m^2, but with a minimum width of 25 m to address any explosion risk. ▪ The remainder of the renewable energy infrastructure (transformers) has greater resilience to bushfire and as such, the NVZ/APZ has been sized to achieve a target of BAL-29. o Vehicular access and firewater recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and provide significant resources for attending firefighters to fight bushfires at the BESS site: ▪ The internal road network enables attending firefighters to access all proposed BESS and the transformers, including the provision of multiple entrances to the site and the use of loop perimeter roads. ▪ The onsite firewater supplies, provide a significant quantity of firewater for attending firefighters to refill appliances, without extended travel time. o The BESS modules are designed to incorporate bushfire resilience through non-combustible construction and targeted ember protection. Additionally, the BESS units are designed with a number of fire and safety systems to limit the potential for thermal runaway, fire and explosion from the unit, including ▪ Battery management/monitoring systems ▪ Thermal management/monitoring systems ▪ Fire detection, alarm and suppression systems ▪ Explosion management systems o System monitoring for all electrical infrastructure must be provided, especially the BESS unit BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification. o Strong liaison with DFES and local fire brigade from facility commissioning and for the duration of operation

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
			o Emergency Management Plan that addresses bushfire preparedness, prevention and response activities, including notification of DFES, facility shutdown and offsite evacuation. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Facility Risk to Landscape • As assessment that considers the following and details how the proposal will reduce risks on site to an acceptable level: o The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets.	***All Facilities***	• As detailed in Section 4, based on historical occurrences in Australia, there appears to be a relatively low likelihood of BESS or transformer fires. It is noted that these types of grid scale BESS facilities are also relatively new, therefore the opportunity for fire damage and loss is limited. BESS fires in Australian appear to have generally been contained to 1 or 2 BESS units, with limited spread across adjacent BESS. • The focus on addressing risk to the landscape is primarily through prevention of uncontrolled BESS fire and explosion, in order to prevent fire spread to vegetation, through the provision of the following: o The BESS modules are designed to incorporate bushfire resilience through non-combustible construction and targeted ember protection. Additionally, the BESS units are designed with a number of fire and safety systems to limit the potential for thermal runaway, fire and explosion from the unit, including ▪ Battery management/monitoring systems ▪ Thermal management/monitoring systems ▪ Fire detection, alarm and suppression systems ▪ Explosion management systems o Appropriate separation of renewable energy infrastructure (in particular BESS units) to avoid spread of fire between infrastructure. o System monitoring for all electrical infrastructure must be provided, especially the BESS unit BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification. o Onsite vegetation management, including NVZ/APZs around renewable energy infrastructure, to limit the ability of onsite fire in the renewable energy infrastructure to escape to surrounding unmanaged vegetation. o Vehicular access and firewater recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and provide significant resources for attending firefighters to fight fire within the facility: ▪ The internal road network enables attending firefighters to access all proposed BESS infrastructure, and the transformers, including the provision of multiple entrances to the site and the use of loop perimeter roads. ▪ The onsite firewater supplies, provide a significant quantity of firewater for attending firefighters to control or suppress onsite fires. o Strong liaison with DFES and local fire brigade from facility commissioning and for the duration of operation o Emergency Management Plan that addresses bushfire preparedness, prevention and response activities, including notification of DFES, facility shutdown and offsite evacuation. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 4: Facility Design	***Non-Vegetated Zones (NVZ) and Asset Protection Zones (NVZ)*** • The provision of NVZ and/or APZ: o Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite. o Of a width of at least 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 NVZ must be: o Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.	***All Facilities BESS***	• Vegetation modification and management recommendations for the renewable energy infrastructure has been determined through application of the CFA Renewable Guidelines and detailed in Section 5.2: o The BESS units are to have a 52.8 m wide perimeter NVZ/APZ to achieve 10 kW/m^2 or lower and address any explosion risk for bushfire ignitions, consisting of the following: ▪ A 10 m wide NVZ adjacent to the BESS units, that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible. • All land within the BESS NVZ is to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation.

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	o Free of vegetation and obstructions at all times. o No plant or equipment of any kind is to be stored in fire breaks. *Additional Recommendations for BESS* • The provision of a NVZ and/or APZ around battery energy storage systems and related infrastructure.		▪ Outside the 10 m NVZ, the remaining 42.8 m can be non-vegetated or otherwise comply with the APZ standards from the WA PBG, with the following clarifications: • Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS o Transformer 1 is to have a 9 to 15 m wide perimeter NVZ/APZ to achieve no less than BAL-29, while Transformer 2 requires a 9 to 27 m wide NVZ/APZ to achieve BAL-29. ▪ In order to limit the chance of electrical faults in the transformers from igniting a bushfire, all within the transformer NVZ/APZs consisting entirely of non-vegetated elements. • These vegetation modification and management recommendations are to be maintained in for the operational life of the project. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Emergency Vehicle Access • Construction of a minimum four (4) metre perimeter road within the perimeter fire break. • Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g., no compacted earth). • Constructed roads should: o 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. o Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated. o Otherwise comply with the private driveway specifications of the WA PGB o Ensure any fencing along access routes allows for width of fire trucks. • Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure. • The provision of at least two (2) but preferably more access points to each part of the facility. *Additional Recommendations for BESS* • The provision of at least two access points into each section where battery energy storage systems are located.	***All Facilities*** ***BESS***	• Vehicular access recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and detailed in Section 5.3, and include use of the existing internal road network, supplemented by a section of new road to the BESS facility which includes the following: o Provide at least 2 entrance/exit gates are to be provided to the BESS compound, and the internal road to be configured as loop road, to avoid creation of any internal dead-end roads. o To align with local expectations, the internal road specifications are to comply with the private driveway specifications of the WA PBG, rather than the CFA Guidelines from Victoria. • ***Based on the above, the requirements of CFA Guidelines are in alignment, albeit adopting the internal road specifications from the WA PBG.***
	Firefighting Water Supply • Water access points must be clearly identifiable and unobstructed to ensure efficient access. • Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA PBG: o The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. o An external water level indicator must be provided to the tank and be visible from the hardstand area. o Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. o Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s). • The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours. • 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	***All Facilities*** ***BESS***	• The firewater recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and detailed in Section 5.4 and include: o The existing fire hydrant system (including existing 415 kL fire tank reserve) have the potential to be altered and extended (if required) to the BESS site to provide sufficient fire hydrant coverage, but this requires review and design by suitable qualified Fire Protection Engineer. o Should new firewater tank/s be required, they will need to consider the specifications detailed in Section 5.4, derived from CFA Renewable Guidelines and WA PBG. • Given the substantial amount of firewater required, no additional capacity is proposed for bushfire fighting purposes. • There is also a number of mobile fire appliances at the existing facility which will be able to undertake first response suppression of onsite fire or spot fire, where safe to do so. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	• The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection (or approved alternative), sized to comply with the required suction hydraulic performance. o The hard-suction point must be protected from mechanical damage where necessary. o The hard-suction point must be positioned within four (4) metres to a road or hardstand area and provide a clear access for emergency services personnel. • An all-weather road access and hardstand, compliant with the private driveway specifications of the WA PBG and at least 6 m wide and 8 m long, must be provided to the hard-suction point. o The road access and hardstand must be kept clear at all times. • Where the access road has one entrance, an 18 metre diameter turning circle must be provided at the tank. *Additional Recommendations for BESS (Centralised)* • Where reticulated water is available, the provision of a fire hydrant system that meets the requirements of AS 2419.1-2021 Clause 3.9: Open Yard Protection, and Table 2.2.5(D): Number of Fire Hydrants Required to Flow Simultaneously - Open Yards. OR o Except, that fire hydrants must be provided and located so that every part of the battery energy storage system is 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. • Where no reticulated water is available, provision of a fire water supply in static storage tanks, where: o The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater. o 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). o Fire hydrants must be provided and located so that every part of the battery energy storage system is 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. o The fire water supply must be located at vehicle entrances to the facility, at least 10m from any renewable energy infrastructure and buildings. o The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (e.g. Fire water tanks are to be located closer to the site entrance that the battery energy storage system). • The fire water supply must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA PBG		
	Fire Detection and Suppression Equipment • For on-site buildings and structures, according to the requirements of the National Construction Code. • For storages of Dangerous Goods, according to the requirements of any Australian Standards for the storage and handling of Dangerous Goods. • For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. • 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.	***All Facilities***	***National Construction Code (NCC) compliance*** • No buildings are proposed as part of this development ***Dangerous Goods compliance*** • Should significant quantities of dangerous goods be stored or handled onsite: o These will also need to comply with all relevant Dangerous Goods legislation, codes and standards o They should be reviewed by a BPAD Level 3 bushfire practitioner to ensure they are sited in areas of BAL-29 or lower, and appropriately protected from bushfire impact. ***Portable fire extinguishers*** • Portable fire extinguishers are to be provided in (or near) the following in accordance with Australian Standards: o Each BESS module

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
			• ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Design Specific to Facility Type *Additional Recommendations for BESS* • Facility design that incorporates: o A separation distance that prevents fire spread between battery containers/enclosures and other site elements. ▪ Separation must be at least the distance where the radiant heat flux (output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements. o A NVZ and/or APZ around the battery energy storage system and related infrastructure, of a width of no less than 10m (or greater where determined). ▪ NVZ must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. ▪ The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping. o A layout of site infrastructure that: ▪ Considers the safety of emergency responders. ▪ Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. ▪ Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure. • Battery energy storage systems must be: o Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles). o 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 fire at the battery energy storage system.) o Provided with in-built fire and gas detection systems. o Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels. o Provided with suitable ember protection. o Provided with suitable access roads for emergency services vehicles. o Installed on a non-combustible surface. o Provided with suitable ventilation. o Provided with suitable impact protection. o Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection. o Provided with spill containment that includes provision for management of fire water runoff.	***BESS***	***Separation Distance*** • The expectation is this will be addressed by complying with relevant codes and standards, including Australian Standards, and any manufacturers recommendations. ***NVZ/APZ around BESS and Related Infrastructure*** • Vegetation modification and management recommendations for the renewable energy infrastructure has been determined through application of the CFA Renewable Guidelines and detailed in Section 5.2, which are to be maintained for the operational life of the project. ***BESS Design Requirements*** • The BESS related design recommendations have been nominated as per the stated CFA Renewable Guidelines, and summarised in Section 5.5.1. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 5: Facility Construction and Commissioning	***Emergency Plan (Construction)*** • An Emergency Plan must be developed for the construction and commissioning phase of the facility. *Additional Guidance from CFA Renewable Guidelines* • An emergency communication system must be provided that is reliable and will operate in the event of power failure. • Install and commission fire detection and suppression systems for the facility at the earliest possible stage of construction.	***All Facilities***	• Emergency procedures for the construction phase are to be incorporated in the Construction Management Plan as mentioned in Section 5.7. • It is recommended that the bushfire emergency management concepts summarised in Section 5.11 for the operational BESS facility, are incorporated into the Construction Management Plan for bushfire preparedness and response, as much as applicable. • Additional bushfire related construction and commissioning recommendations for the renewable infrastructure, has been determined through application of the CFA Renewable Guidelines and documented in Section 5.7,

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	• 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. • Provide training for personnel in the use of on-site first-aid firefighting equipment, and responsibilities during emergencies. • Provide the required fire protection equipment for any storages of dangerous goods as per the relevant Australian Standards. • It is recommended the development of safe work procedures for the facility, encompassing but not limited to: o Electricity and chemical management. o Vegetation management. o Ignition source control, including hot works. o Infrastructure, equipment and vehicle maintenance. o Emergency management • Adhere to restrictions on Total Fire Ban or days of elevated fire danger • Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities. • Fire brigade must be notified at least seven (7) days prior to the commissioning of any high-risk infrastructure at the facility (e.g., battery energy storage systems).		including the specific requirement to notify DFES ahead of commissioning any renewable energy infrastructure. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 6: Facility Operation	***Fire Management Plan*** • A Fire Management Plan must be developed for the facility, before development starts. *Additional Guidance from CFA Renewable Guidelines* • A Fire Management Plan is based on the outcomes of the Risk Management Plan and outlines the activities, processes and accountabilities for the ongoing management of fire risk at the facility including: o A summary of fire hazards and risks to and from the site, specific to its location, infrastructure, activities and occupancy. o Description of control measures to prevent fire occurring and limit the consequences of fire at the facility. o Description of control measures to prevent and reduce the consequences of external fire impacting the facility. o Details of equipment and resources to manage fire at the facility o Policies and procedures that ensure all control measures are appropriate and effective, and remain so. o Procedures for review of the Plan *Additional Recommendations for BESS* • A Fire Management Plan for a facility that incorporates a battery energy storage system must also include: o A schedule, list of activities and accountabilities for the inspecting, testing, monitoring and servicing of the battery and its monitoring, safety and protective systems. o Monthly inspections of battery enclosures/ containers and related infrastructure for physical damage. Any damage must be immediately assessed and rectified by a suitably qualified person. o Seismic activity as a trigger for inspecting, testing and servicing of the battery energy storage system and its related infrastructure. Any damages or changes in operating parameters must be immediately assessed and rectified by a suitably qualified person. o Regular inspection and removal of all combustible materials near the battery enclosures/containers and related infrastructure.	***All Facilities*** ***BESS***	• The bushfire related siting, design, construction and maintenance recommendations for the renewable infrastructure, has been determined through application of the CFA Renewable Guidelines and summarised in Section 5, including the nomination of responsible entities for implementation and ongoing management. • The additional BESS recommendations are captured as ongoing operation, maintenance and housekeeping and are documented in Section 5.8, while the required information to include in the Emergency Information Book for attending firefighters has been addressed in Section 5.9. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Bushfire and Grassfire	***All Facilities***	• Bushfire preparedness and response actions for the renewable energy infrastructure has been determined

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	• If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan. *Additional Guidance from CFA Renewable Guidelines* • Your facility may be at-risk of bushfire if it is: o Located in an area close to or amongst dense or open bush, unmanaged grassland, near coastal scrub, or at an urban fringe. o Identified as being in a Designated Bushfire Prone Area. • Address bushfire prevention and preparedness activities		through application of the CFA Renewable Guidelines and documented in Section 5.11. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Vegetation Management • Facility operators must undertake the following measures during the nominated bushfire season (as per Local Government firebreak notice): o Grass must be maintained at or below 100mm in height during the nominated bushfire season. o Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. o Restrictions and guidance must be adhered to during the nominated bushfire season, days of High (and above) fire danger and declared Total Fire Ban days *Additional Recommendations for BESS* • Containers/enclosures and infrastructure for battery energy storage systems must be maintained to be clear of vegetation, including grass, for at least 10 m on all sides (or greater where determined).	***All Facilities*** ***BESS***	• Vegetation modification and management recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and detailed in Section 5.2, which are to be maintained for the operational life of the BESS facility. o The non-vegetated zone within, and surrounding, the BESS modules • Compliance with restrictions and guidance on days of elevated Fire Danger Rating, and Total Fire Ban days is summarised in Section 5.11. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Facility and System Monitoring • 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, and any fire is notified to 000 immediately. *Additional Recommendations for BESS* • For battery energy storage systems, appropriate monitoring and intervention measures must be provided to ensure that the following are rapidly identified and notified to 000 immediately: o Any shorts, faults, temperature increases above normal parameters (e.g., precursor to thermal events/runaway). o Equipment failures with the potential to ignite or propagate fire. o Off-gassing, smoke or fire. • The provision for direct alarm monitoring to the fire brigade for battery energy storage system automatic detection systems must be considered	***All Facilities*** ***BESS***	• The proposed facility is to be monitored, both onsite (during business hours) and offsite (at all times) as detailed in Section 5.5. • The following emergency response procedures for an onsite fire (in particular a BESS fire) are included in the bushfire emergency management arrangements summarised in Section 5.11 and expanded upon in Appendix H: o Immediately notify DFES to enable a rapid turnout o If possible, ensure relevant vehicular access routes are open and available, to enable attending firefighters to gain access to the location of the fire. o Ensure all fire and communications systems are ready for use. o Ensure attending firefighters have access to any relevant specialist technical personnel (onsite or offsite), to assist by providing technical advice. o If the fire in in the BESS, ensure no staff approach the BESS (if there are any onsite). Staff should move to safe distance from the subject site, no less than 50 m (or as advised). ▪ Strongly consider full emergency shutdown of the BESS and transformers unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible). o Notify neighbouring landowners. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Maintenance and Housekeeping • 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, the manufacturer's requirements. • Site-wide housekeeping inspections must be conducted regularly at facility. If your facility is at-risk of bushfire, site-wide bushfire preparedness housekeeping inspections must be conducted at least three months, and again one month, prior to the Fire Danger Period.	***All Facilities***	• The bushfire related siting, design, construction and maintenance recommendations for the renewable infrastructure, has been determined through application of the CFA Renewable Guidelines, with the specific recommendations during the operation phase relating to maintenance and housekeeping detailed in Section 5.8. • These bushfire risk management measures for the renewable energy infrastructure, including ongoing maintenance and management recommendations, have also been summarised in Section 5, including the nomination of responsible entities for ongoing management on Table 5. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	Safe Dangerous Goods Storage and Handling *Additional Guidance from CFA Renewable Guidelines* • Signage and labelling compliant with the Dangerous Goods (Storage and Handling) Regulations 2022 and the relevant Australian Standards must be provided at the site entrance, dangerous goods storage locations, and storage tanks where applicable. • Appropriate material for cleaning up dangerous goods spills and leaks (including absorbent, neutralisers, tools, disposal containers and personal protective equipment) must be provided and available on-site. • Training must be provided for site personnel on the hazards, safe use and emergency response for spills, leaks and fire involving dangerous goods. • All dangerous goods stored on-site must have a current Safety Data Sheet (SDS). Safety Data Sheets must be provided within the facility's Emergency Information Book(s), in the Emergency Information Container(s). • The requirements of the dangerous goods legislative framework, and all relevant Australian Standards must be complied with for all facilities, including facilities with battery energy storage systems.	***All Facilities***	• The proposed BESS units will contain Li-ion batteries (or similar) that will be classified as Dangerous Goods. o This BMP demonstrates the bushfire risk management measures align with the recommendations from CFA Renewable Guidelines, including reviewing and assessing the potential risk to and from the BESS units. o Notwithstanding, these Dangerous Goods will also need to comply with all relevant Dangerous Goods legislation, codes and standards. • Additionally, should significant quantities of dangerous goods (other than the BESS batteries) be stored or handled onsite: o These will also need to comply with all relevant Dangerous Goods legislation, codes and standards o They should be reviewed by a BPAD Level 3 bushfire practitioner to ensure they are sited in areas of BAL-29 or lower, and appropriately protected from bushfire impact as detailed in Section 5.12. • The Emergency Information Book is to contain a current manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for Dangerous Goods stored on-site. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Fire Risk Review *Additional Guidance from CFA Renewable Guidelines* • Fire risk must be effectively managed at operating facilities to meet obligations for providing a safe workplace under the OHS Act. • Fire brigade recommends that facility operators consider the design guidelines and model requirements contained in this document and develop procedures to ensure that: o The Fire Management Plan is reviewed and updated regularly, in line with any reviews and changes to hazards and risk management as per the Risk Management Plan, and where there is a near-miss or incident at the facility. o The Emergency Plan is reviewed and updated to reflect any changes in the Fire Management Plan, including where fire risks emerge or change, risk controls are added or modified, or where there is a near miss or incident at the facility. • Where substantive changes are made to these documents, fire brigade recommends considering peer-review by a suitably qualified, independent third party.	***All Facilities***	• Like any BMP, if there are significant changes to the development, they should be reviewed, and if required amended, to reflect those changes. • The Emergency Management Plan for the facility is to be reviewed and amended as summarised in Section 5.11. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 7: Emergency Planning	***Emergency Plan (Operational)*** • An Emergency Plan must be developed for the operational phase, specific to the facility, before development starts. *Additional Guidance from CFA Renewable Guidelines* • An Emergency Plan (EP) details the arrangements for managing emergencies, including the facility details, structures, procedures, resources and training. EP's must be specific to the infrastructure, operations and location of facilities, and informed by a sound risk management process. • The EP should address the following for each hazard: o Emergency Response Procedures (including evacuation or onsite shelter-in-place as required) o Personnel Training o Emergency Exercises • The EP is a 'living document' that must be regularly reviewed to ensure their currency and effectiveness. *Additional Recommendations for BESS* • Emergency Plans for facilities with battery energy storage systems must additionally include: o Contact information for 24/7/365 specialist technical support for the battery energy storage system. o Emergency response procedures based on identified risks and hazards of the battery energy storage system and related infrastructure, including but not limited to:	***All Facilities BESS***	• Bushfire emergency management preparedness and response concepts for the renewable energy infrastructure has been summarised in Section 5.11 (and Appendix H) are to be incorporated into the overall BESS facility Emergency Management Plan. • The additional recommendations for BESS facilities documented in the CFA Renewable Guidelines, have been included in the Emergency Information Book and signage for attending firefighters, and the site Emergency Management Plan • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	▪ Electrical infrastructure faults and fire. ▪ Battery energy storage system damage or faults, including battery monitoring faults, temperature increases above normal operating parameters, electrical faults, chemical spills or reactions, off-gassing, thermal events/runaway, smoke and fire. ▪ Bushfire and grassfire. ▪ The management of fire water runoff. o Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available (e.g., at the BESS containers, in an on-site control room, off-site monitoring facilities). o A plan for partial and full decommissioning of the battery energy storage system in the event of an emergency incident that renders the facility inoperable or unsafe, before its anticipated end-of-life. o Any information that supports the considerations in Appendix B: Emergency Response Considerations for Large-Scale Battery Energy Storage Systems. • This information must also be provided within the facility's Emergency Information Book.		
Section 8. Provision of Emergency Information	***Developing an Emergency Information Book*** • An Emergency Information Book must be developed and available to emergency responders, and include the following: o A description of the premises, its infrastructure and operations. o Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems, substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. o A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. o Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire) o Details of emergency equipment, including the type and location of gas detectors. o Up-to-date contact details for site personnel, regulatory authorities and site neighbours. o Safety Data Sheets (SDS) for dangerous goods stored on-site. • Emergency Information Books must be located weatherproof container, at each vehicle entrance the facility • Prior to commissioning of the facility, a familiarisation visit and explanation of emergency procedures is to be offered to local fire brigades and other emergency services. o A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade. o A review of the information contained within the facility's Emergency Information Book must be undertaken prior to commencement of bushfire season annually.	***All Facilities***	• The Emergency Information Book and signage, and emergency service familiarisation process for the renewable energy infrastructure, has been determined through application of the CFA Renewable Guidelines and detailed in Sections 5.9 and 5.10. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

7 Implementation and management of the bushfire measures

The BMP will be implemented to ensure bushfire management measures are adopted and implemented on an ongoing basis. Table 5 has been included to drive implementation of all bushfire management works associated with this project.

Table 5: Implementation and management of the bushfire measures

Implementation/management table	
No	***Implementation action***
Prior to commissioning and facility operation	
1	Establish NVZs and APZs around all nominated renewable energy infrastructure (BESS, transformers), in accordance with the dimensions and standards detailed in Section 5.2 of the BMP.
2	Construct the internal driveway network to the renewable energy infrastructure (BESS), in accordance with the dimensions and standards detailed in Section 5.3 of the BMP. Construct any required gates to the standards stated in the BMP, and ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to DFES and local fire brigade.
3	Ensure sufficient firewater is provided to the renewable energy infrastructure (BESS) in accordance with the recommendations detailed in Section 5.4 of the BMP and relevant Australian Standards.
4	Incorporate all the renewable energy infrastructure design, construction, installation and commissioning recommendations detailed in Sections 5.5, 5.6 and 5.7 of the BMP for the proposed facility.
5	Ensure any facility operation, maintenance and housekeeping recommendations are in place prior to operation, as detailed in Section 5.8 of the BMP.
6	Prepare and install the Emergency Information Book and signage in accordance with the recommendations of Section 5.9 of the BMP.
7	Conduct the emergency services familiarisation site visit, in accordance with the recommendations of Section 5.10 of the BMP.
8	Develop and implement the BESS facility emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.11 of the BMP
9	Comply with any relevant Dangerous Goods compliance requirements, as detailed in Section 5.12 of the BMP.
10	Comply with the Shire of Chittering firebreak notice as it applies to the BESS facility, as detailed in Section 5.13 of the BMP.
Ongoing (for the operational life of the project)	
1	Maintain the NVZs and APZs around all nominated renewable energy infrastructure (BESS, transformers) in accordance with the dimensions and standards detailed in Section 5.2 of the BMP.
2	Maintain the internal driveway network to the renewable energy infrastructure in accordance with the dimensions and standards detailed in Section 5.3 of the BMP.
3	Maintain the firewater system/s for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.4 of the BMP and relevant Australian Standards. Ensure the firewater tanks remains filled at all times, especially during bushfire season.

Implementation/management table	
No	***Implementation action***
4	Undertake the ongoing operation and maintenance recommendations for the renewable energy infrastructure are detailed in Section 5.8 of the BMP for the BESS facility.
5	Review, and if required update, the Emergency Information Book and signage in accordance with the recommendations of Section 5.9 of the BMP.
6	Continue the emergency services familiarisation visits, in accordance with the recommendations of Section 5.10 of the BMP.
7	Review, and if required updated, the BESS facility emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.11 of the BMP
8	Review onsite Dangerous Goods (associated with BESS facility) and ensure ongoing compliance with the requirements detailed in Section 5.12 of the BMP.
9	Comply with the Shire of Chittering firebreak notice as it applies to the BESS facility, as detailed in Section 5.13 of the BMP.

8 References

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Appendix A

Vegetation plot photos and description

Photo ID: 1a

Photo ID: 1b

Photo ID: 1c

Photo ID: 1d

Photo ID: 1e

Photo ID: 1f

Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 1g

Photo ID: 1h

Photo ID: 1i

Photo ID: 1j

Photo ID: 1k

Photo ID: 1l

Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 1m

Photo ID: 1n

Photo ID: 1o

Photo ID: 1p

Photo ID: 1q

Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 1r	Photo ID: 1s
Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 2a

Photo ID: 2b

Photo ID: 2c

Photo ID: 2d

Photo ID: 2e

Photo ID: 2f

Plot number	Plot 2
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 2g

Photo ID: 2h

Photo ID: 2i

Photo ID: 2j

Photo ID: 2k

Photo ID: 2l

Plot number	Plot 2
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 2m	Photo ID: 2n
Plot number	Plot 2
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 3a	Photo ID: 3b
Plot number	Plot 3
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity

Photo ID: 4a

Photo ID: 4c

Photo ID: 4b

Photo ID: 4d

Photo ID: 4e

Plot number	Plot 4
Vegetation classification	Class G Grassland
Description / justification	Grassland at maturity, greater than 100 mm in height

Photo ID: 4f

Photo ID: 4g

Photo ID: 4h

Plot number	Plot 4
Vegetation classification	Class G Grassland
Description / justification	Grassland at maturity, greater than 100 mm in height

Photo ID: 5a

Photo ID: 5b

Photo ID: 5c

Photo ID: 5d

Photo ID: 5e

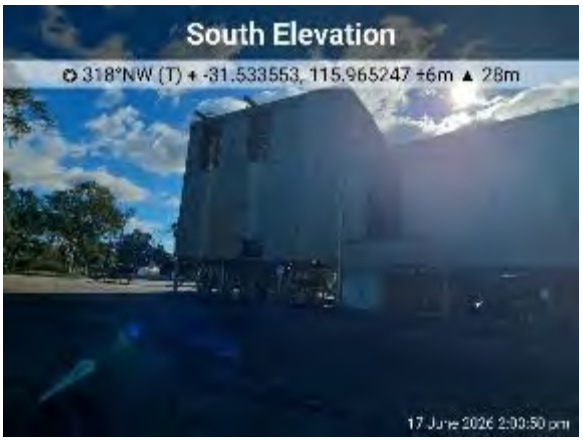


Photo ID: 5f

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated (Clause 2.2.3.2 [e])
Description / justification	Existing non-vegetated land, including buildings, roads and carparks.

Photo ID: 5g

Photo ID: 5h

Photo ID: 5i

Photo ID: 5j

Photo ID: 5k

Photo ID: 5l

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated (Clause 2.2.3.2 [e])
Description / justification	Existing non-vegetated land, including buildings, roads and carparks.

Photo ID: 5m

Photo ID: 5n

Photo ID: 5o

Photo ID: 5p

Photo ID: 5q

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated (Clause 2.2.3.2 [e])
Description / justification	Existing non-vegetated land, including buildings, roads and carparks.

Photo ID: 7a

Photo ID: 7b

Photo ID: 7c

Plot number	Plot 7
Vegetation classification	Excluded – Low threat (Clause 2.2.3.2 [f])
Description / justification	Existing low threat landscaping that is located within the proposed APZ, and will be subject to some modification and management to comply with APZ standards for the operational life of the project.

Photo ID: 8a

Photo ID: 8b

Photo ID: 8c

Photo ID: 8d

Photo ID: 8e

Photo ID: 8f

Plot number	Plot 8
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e])
Description / justification	Existing vegetation within the BESS compound, and the surrounding 10 m, that is to be established and maintained in a non-vegetated state for the operational life of the project.

Photo ID: 8g

Photo ID: 8h

Photo ID: 8i

Photo ID: 8j

Plot number	Plot 8
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e])
Description / justification	Existing vegetation within the BESS compound, and the surrounding 10 m, that is to be established and maintained in a non-vegetated state for the operational life of the project.

Photo ID: 9a

Photo ID: 9b

Photo ID: 9c

Photo ID: 9d

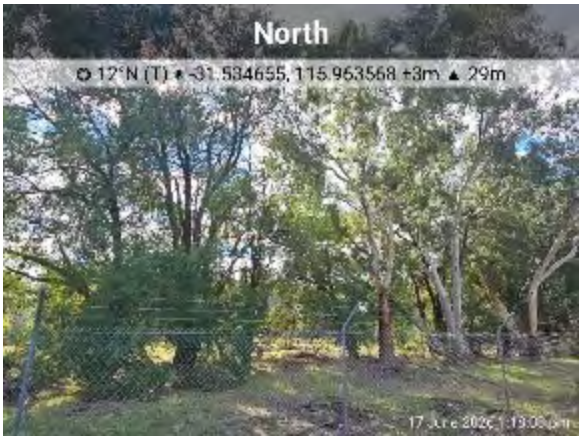


Photo ID: 9e

Photo ID: 9f

Plot number	Plot 9
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification	Existing vegetation within the BESS compound APZ, but further than 10 m the BESS compound, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

Photo ID: 9g

Photo ID: 9h

Photo ID: 9i

Photo ID: 9j

Photo ID: 9k

Photo ID: 9l

Plot number	Plot 9
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification	Existing vegetation within the BESS compound APZ, but further than 10 m the BESS compound, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

Photo ID: 9m

Photo ID: 9n

Photo ID: 9o

Photo ID: 9p

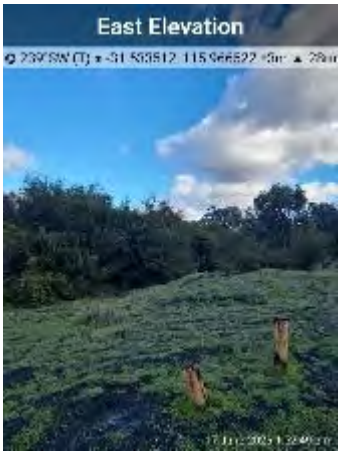


Photo ID: 9q

Photo ID: 9r

Plot number	Plot 9
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification	Existing vegetation within the BESS compound APZ, but further than 10 m the BESS compound, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

Appendix B

APZ Standards from WA PBG

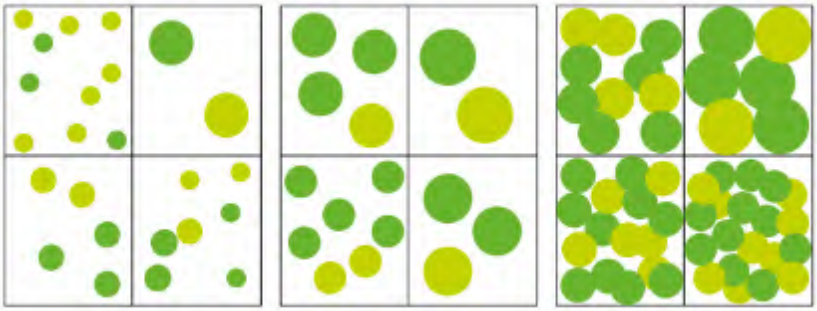
An APZ is a low fuel area maintained around a habitable building to increase the likelihood that it will survive a bushfire, by providing a defendable space and reducing the potential for direct flame contact, radiant heat exposure and ember attack. The APZ allows emergency services access and provides an area for firefighters and home-owners to defend their property.

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

Vegetation management within an APZ should provide defendable space and be maintained to a low threat state, for the operational life of the project, in accordance with the requirements outlined below.

Table 9: Asset Protection Zone Technical Requirements

- **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 overhang 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 5 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.



- **Shrub* and Scrub* (0.5 metres to 6 metres in height)**
  - 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.
  - Shrub and scrub >6 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height)**
  - Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load'.
  - Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
  - Ground covers >0.5 metres in height are to be treated as shrubs
- **Grass**

Table 9: Asset Protection Zone Technical Requirements

- 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.

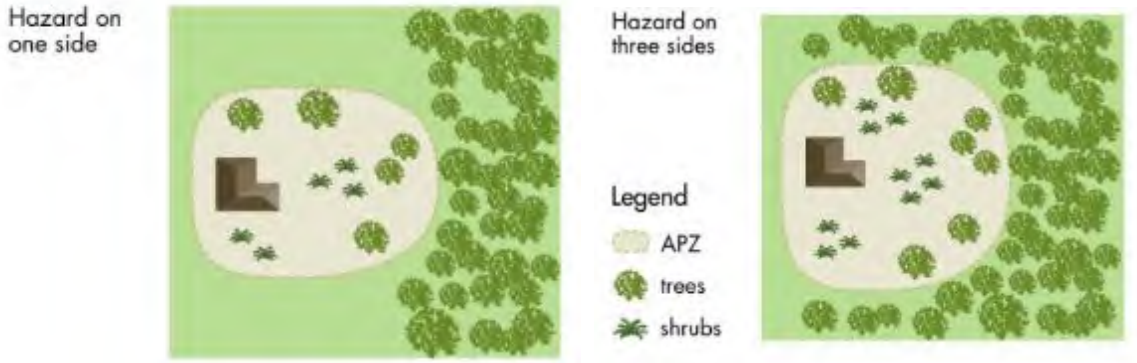
- **Fine Fuel load (combustible dead vegetation mater <6 mm in thickness)****
  - Should be managed and removed on a regular basis to be maintained as low threat vegetation.
  - Should be maintained at <2 tonnes per hectare (on average).
  - Mulches should be non-combustible such as stone, gravel, shells, rock or crushed mineral earth or wood mulch >5 millimetres in thickness.
- **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.
- **Fences within the APZ**
  - Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959)
- **LPG 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 sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

*** Fine fuel load:*

- *is the combustible, dead or dry vegetation matter on the ground, near ground, or elevated. Fine fuel includes grass, leaves, bark and twigs less than six millimetres in diameter that ignite readily and are burnt rapidly when dry.*
- *Fine fuel should be maintained at less than 2t/ha (100gm/m2 equates to 1t/ha).*
  - *To estimate a fuel load (in t/ha), collect the dry fine fuel from a representative one square meter and weigh (in grams using kitchen scales) and multiply the weight by 0.01.*

Figure 25: Design of an Asset Protection Zone



B.2.2 Designing an Asset Protection Zone

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

An APZ should provide the greatest level of vegetation management within at least three metres of a habitable building, to ensure adequate unobstructed defendable space for emergency services to operate. This area should contain minimal vegetation and be free of combustible materials and obstructions. Within the remainder of the APZ, planting of vegetation can increase as you move farther away from the building.

The placement of plants within an APZ is a key design technique. Separation of garden beds with areas of low fuel or non-combustible material will break up fuel continuity and reduce the likelihood of vegetation within an APZ supporting a bushfire. It is important to consider the plant density and final structure and form of plants in their mature state.

Strategic landscaping measures can be applied, such as replacing weeds with low flammability vegetation to create horizontal and vertical separations between the retained vegetation.

Mulches used within the APZ should be non-combustible. The use of stone, gravel, shells, rock and crushed mineral earth is encouraged. Very fine or light mulch (such as shredded pine bark, pine needles, or poplar woodchips) less than five millimeters in diameter should be avoided. It is recommended that wood mulch is used in garden beds or areas where the moisture level is higher by regular irrigation, and these areas are separated with non-combustible elements, such as pathways and open spaces.

Incorporation of landscaping features, such as masonry feature walls, can provide habitable buildings with barriers to wind, radiant heat and embers. These features can include noise walls or wind breaks. Use of Appendix F of AS 3959 for bushfire resistant timber selection or the use of non-combustible fencing materials such as iron, brick, limestone, metal post and wire is encouraged within an APZ

B2.3 Management of an Asset Protection Zone

Ongoing maintenance of an APZ is usually enforced through a condition of a development approval, which should refer to Table 9 APZ technical requirements within this Appendix.

In addition to regular maintenance of an APZ, further bushfire protection can be provided by:

- ensuring gutters are free from vegetation
- installing gutter guards or plugs
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps
- trimming and removing dead plants or leaf litter
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank
- following the requirements of the relevant local government firebreak notice, which may include additional provisions such as locating wood piles more than 10 metres from a building.

Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. Embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building.

Best practice recommends objects within the APZ are moved away from the building prior to any bushfire event.

Objects may include, but are not limited to:

- door mats
- outdoor furniture
- potted plants
- shade sails or umbrellas
- plastic garbage bins
- firewood stacks
- flammable sculptures
- playground equipment and children's toys.

B2.4 Plant Flammability

There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- **Fire resistant** – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- **Fire-retardant** – plants that can absorb more of the heat of the approaching bushfire without burning, compared to more flammable plants.
- **Fire wise** – plants that have been identified and selected based on their low flammability properties and linked to maintenance advice and planting location within a garden.

Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire-retardant plant species that suit the environmental characteristics of an area.

When developing a recommended plant species list, local governments should consult with ecologists, land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat.

When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics:

- grow in a predicted structure, shape and height;
- are open and loose branching with leaves that are thinly spread;
- have a coarse texture and low surface-area-to-volume ratio;
- will not drop large amounts of leaves or limbs, that require regular maintenance;
- have wide, flat, and thick or succulent leaves;
- trees that have bark attached tightly to their trunk or have smooth bark;

- have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed);
- do not produce or hold large amounts of fine dead material in their crowns; and/or
- will not become a weed in the area.

Appendix C

AS 3959 Clause 2.2.3.2 (e) and (f) – Low threat Vegetation and Non-Vegetated Areas

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

Appendix D

Method 2 Calculation – Plot 1

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 20/07/2026 **Assessment Date:** 20/07/2026

Site Street Address: Tronox Chandala - BESS, Chandala

Assessor: Linden Wears;

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

Vegetation Information

Vegetation Type:	Forest		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	2 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):**	52.8

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Calculation Parameters

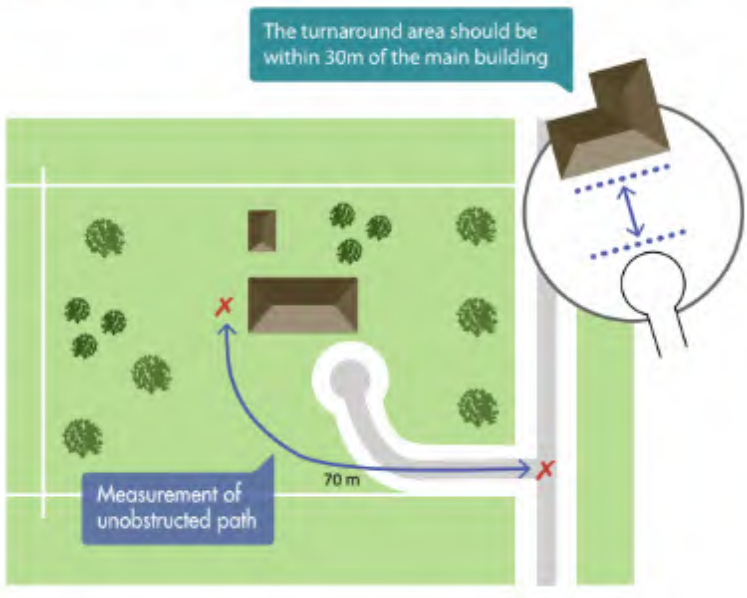
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	10.57
Radiant Heat(kW/m2):	9.98	**Flame Angle (degrees):**	73
Flame Length(m):	22.11	**Maximum View Factor:**	0.171
Rate Of Spread (km/h):	2.76	**Inner Protection Area(m):**	37
Transmissivity:	0.769	**Outer Protection Area(m):**	16
Fire Intensity(kW/m):	49822		

Appendix E

Vehicular Access Technical Standards of the WA PBG

Private driveways
Acceptable Solution A3.1
There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road. In circumstances where the above conditions are not met, the private driveway is to meet all of the following requirements: • requirements in Appendix B.3 Table 10, Column 5; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional carriageway width of 2 metres • (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 metres); and • turn-around area (Figure 30) and within 30 metres of the habitable building (Figure 38).
Explanatory note B3.8
Emergency services vehicles typically operate from the street frontage in areas serviced by reticulated water and where the distance from the public road to the farthest part of the habitable building is no greater than 70 metres. In the event the habitable building cannot be reached by hose reel from the public road, emergency services vehicles will need to gain access via the driveway to the property. Emergency services vehicles will also need to gain access to the property where access to water is provided by onsite water tanks. In these situations, the driveway and battle-axe access leg (if applicable) will need to be wide enough for access by an emergency services vehicle and a vehicle to evacuate. It is acceptable for a private driveway to have a carriageway width of four metres with a traversable verge of one metre on either side of the carriageway. Turn-around areas (**Figure 38**) should be available for conventional two-wheel drive vehicles and type 3.4 fire appliances and should be located within 30 metres of habitable buildings. Circular and loop driveway design may also be considered. Figure 38: Design requirements for a private driveway where required 

Private driveways

Figure 30: Design requirements for a turn-around area

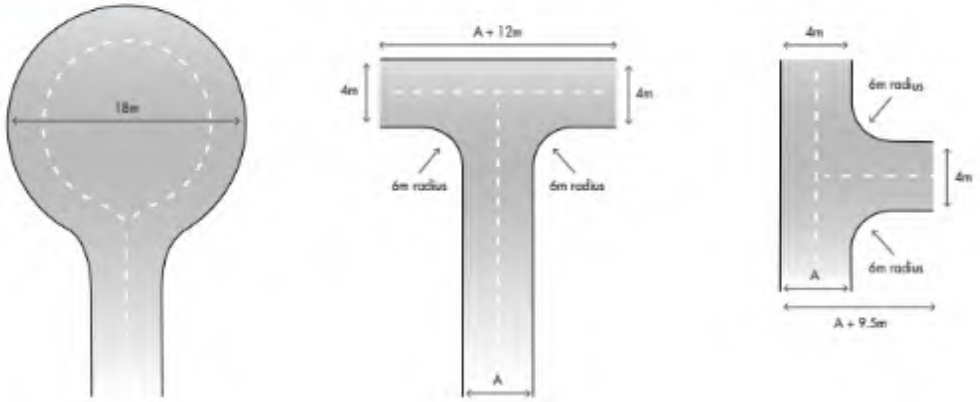


Table 10: Vehicular access technical requirements

	1		2		3		4		5	
TECHNICAL REQUIREMENTS	**PERIMETER ROADS**		**PUBLIC ROADS**		**EMERGENCY ACCESS WAY[3]**		**FIRE SERVICE ACCESS ROUTE[3]**		**BATTLE-AXE & PRIVATE DRIVEWAYS[1]**	
MAP OF BUSH FIRE PRONE AREAS DESIGNATION	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**
Minimum horizontal clearance (metres)	12	8	See note 5		10	6	10	6	6	
Minimum vertical clearance (metres)	4.5									
Minimum weight capacity (tonnes)	15									
Maximum grade unsealed road[2]	See note 5		See note 5		1:10 (10% or 6°)					
Maximum grade sealed road[2,4]					1:7 (14.3% or 8°)					
Maximum average grade sealed road					1:10 (10% or 6°)					
Minimum inner radius of road curves (metres)					8.5					

Notes:

[1] Driveways and battle-axe legs to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision where not required to comply with the widths in this Appendix or the Guidelines.

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

[3] To have crossfalls between 3 per cent and 6 per cent.

[4] For sealed roads only the maximum grade of no more than 1 in 5 (20 per cent) (11.3 degrees) for no more than 50 metres is permissible, except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed.

[5] As outlined in the Institute of **Public Works Engineering Australasia (IPWEA) subdivision guidelines, Liveable Neighbourhoods, Austroads Standards** Main Roads standard, supplement, policy or guideline and/or any applicable or relevant local government standard or policy.

Appendix F

Water Technical Standards of the WA PBG

Appendix B.4 – Water Supply

B4.1 Construction and Design Technical requirements

- An above-ground tank and associated stand should be constructed of non-combustible material.
- Below-ground tanks should have a 200 millimetres diameter access hole to allow tankers or emergency services vehicles to refill direct from the tank, with the outlet location clearly marked on the surface.
- Above and below ground tanks may need to comply with AS/NZS 3500.1:2018.
- An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018.
- Where an outlet for an emergency services vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply.

B4.1.1 Pipes and Fittings

- All above-ground, exposed water supply pipes and fittings should be metal.
- Fittings should be located away from the source of bushfire hazard and be in accordance with the applicable section below, unless otherwise specified by the local government.

B4.1.2 Fittings for above-ground water tanks

- Commercial land uses: 125mm Storz fitting; or
- Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or
- Standalone water tanks: 50mm male camlock coupling with full flow valve; or
- Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires.

B4.1.3 Remote outlets

- In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In instances in which a remote outlet is to be used, the applicant should consult the local government and DFES on their proposal.

B4.2 Use of Water Supply

- The combination of drinking water and water for firefighting purposes is not recommended, as stagnant water may alter the quality of the drinking water and the emergency services, by law, may not be able to take water from the water supply to suppress a bushfire.
- Combining drinking water and water for firefighting purposes is contrary to provisions within clause 4.2.3 of AS/ NZS 3500.1:2021

B4.3 Independent Water and Power Supply

- Water tank/s are to be provided in accordance with Table 11, Water supply dedicated for bushfire firefighting purposes.

B4.5 Location of Water Tanks and Hydrants

- Surrounding vegetation should be considered when locating a water tank.
- Avoid locations where the tank will be situated underneath existing vegetation or where vegetation will grow against or overhang the tank, (Figure 39). Where a tank is on the bushfire hazard side of a building, sufficient shielding for the protection of firefighters should be provided. In addition to the tank location, the fitting should be positioned and/or shielded from the bushfire hazard to allow access by emergency services.

Appendix B.4 – Water Supply

Figure 39: A good and bad example of landscaping around a water tank

Table 11: Water supply dedicated for bushfire firefighting purposes

SECTIONS FROM THE PLANNING FOR BUSHFIRE GUIDELINES					
SECTION 5[2] STRUCTURE PLANS AND SUBDIVISION APPLICATIONS		**SECTION 6[2] DEVELOPMENT – RESIDENTIAL**	**SECTION 7[2] DEVELOPMENT – COMMERCIAL & INDUSTRIAL**	**SECTION 8[2] – DEVELOPMENT – VULNERABLE LAND USES**	
One additional lot	10,000 litre water tank per lot	10,000 litre water tank per habitable building	For each habitable building - 10,000 litre per 1,500 m² of floor space up to 50,000 litre. Provided in a water tank	Camping ground	At the discretion of the local government
Three to 24 lots	10,000 litre water tank per lot[1] **or** 50,000 litre strategic water tank				
25 lots or more	50,000 litre per 25 lots or part thereof, provided as a strategic water tank(s) **and/or** 10,000 litre water tank per lot			Other vulnerable land uses	For each habitable building - 10,000 litre per 500 m² of floor space up to 50,000 litre. Provided in a water tank

Notes:

[1] Evidence that the identified water supply amounts in either column denoted is to be provided at the relevant planning stage.

[2] where more than one habitable building is proposed, strategic water tanks are to be provided in accordance with Section 5 requirements and at the discretion of the Local Government.

Appendix G

Shire of Chittering Firebreak Notice

Shire of Chittering

FIREBREAK & BUSHFIRE HAZARD REDUCTION NOTICE 2025/26

FIRST AND FINAL NOTICE TO ALL OWNERS AND OCCUPIERS OF LAND SITUATED IN THE SHIRE OF CHITTERING

COMPLIANCE DUE BY 16 OCTOBER 2025

SHIRE OF CHITTERING FIREBREAK & BUSHFIRE HAZARD REDUCTION NOTICE 2025/26

As a measure to assist in the control of bushfires and pursuant to Section 33 of the Bush Fires Act 1954, all owners and occupiers of land within the Shire of Chittering are required before the 16 October in each year or within 14 days of becoming the owner or occupier of land (if after that date) to clear firebreaks and/or take measures in accordance with this notice and to maintain those firebreaks and measures in accordance with this notice up to and including the 31st day of May in the following year.

ADDITIONAL WORKS

In addition to the requirements of this notice, regardless of land size and location, you may be required to carry out further bushfire preparedness works to reduce fire hazards considered necessary by an Authorised Officer. Any further requirements will be specified in a work order forwarded to the address of the owner(s) and/or occupier.

FAILURE TO COMPLY

Where the owner and/or occupier of the land fails or neglects to comply with the requisitions of this Notice within the specified time, the Shire of Chittering may, by its Authorised Officers and such servants, workmen and contractors enter upon the land and carry out the requisitions of this Notice which have not been complied with. The costs and expenses incurred may be recovered from the owner and/or occupier of the land by the Shire of Chittering. The Shire's Fire Control Officers are authorised under the Bush Fires Act 1954 (WA) and have powers to enter land pursuant to Section 14 of the Act. **Failure or neglect to comply with this notice is an offence and may result in a penalty of up to $5000.**

1. ALL PROPERTIES OF ANY SIZE

- Maintain grassed areas to a height of no more than 50 millimetres by slashing / mowing or grazing by livestock, as far as reasonably practicable.
- You must create an Asset Protection Zone (APZ) by installing and maintaining a 20 metre fuel reduced zone around all buildings or an asset of value. "Fuel reduced" is a reduction in the vegetation so as to reduce the impact of a bushfire on that asset.
- Trees over 5 metres in height within the APZ, must be under pruned to a clearance of 2 metres from the ground and should not overhang the asset..
- Trees and shrubs within 2 metres of the asset, must not exceed 2 metres in height.
- Ensure the roofs, gutters and walls of all buildings on the land are free of flammable matter.
- Properties that have haystacks or fuel storage areas must ensure there is a bare earth firebreak, not less than 5 metres wide, with a 4 metre vertical clearance completely surrounding haystacks and/or fuel storage areas. This requirement is in addition to firebreak requirements inside property boundaries.

Firebreaks may be constructed by one or more of the following methods: ploughing, cultivating, scarifying, raking, burning, chemical spraying or other approved method.

2. PROPERTIES 5000M² (½ HECTARE) AND LARGER

- Install and/or upgrade firebreaks.
- Clear a bare earth firebreak by removing all flammable material. The firebreak should be 3 metres wide, with a 4 metre vertical clearance (trafficable) along the inside of all the property boundaries.
- Properties with an area of 120 hectares or more must have a firebreak in such a position which divides the land into areas not exceeding 120 hectares. Firebreaks should be located as close as possible to all the property boundaries.

Firebreaks should be located as close as possible to the property boundaries. If for any reason it is not possible to comply with any of the requirements of the Firebreak and Bushfire Hazard Reduction Notice, you will need to apply for a 'variation'. All variation requests must be received and approved by the Shire of Chittering before 1 October in any given year. Applications must be in writing and provide details or a map of the proposed alternative measures. If approved, the firebreak variation will form an individual notice for the property and remain in place until revoked.

Follow the QR code to learn more about Property Preparation

3. BUSHFIRE AND EMERGENCY MANAGEMENT PLANS

All properties with a Bushfire Management Plan, Emergency Management Plan, or an approved Bushfire Attack Level assessment (BAL), approved as part of a Local Planning Scheme, subdivision approval, development approval or a building permit for an individual, or group of properties, shall comply with the plan in its entirety.

All bushfire management plan requirements are in addition to the requirements of this notice. Compliance is required throughout the year, each and every year.

4. PLANTATIONS

In accordance with the requirements of a Fire Management Plan approved in writing by the Shire; Install and maintain external perimeter and internal firebreaks that form compartment cells, and engage in hazard reduction measures that reduce fuel loads so as to protect neighbouring communities and essential infrastructure, Or;

Meet requirements and specifications set out within the *Department of Fire & Emergency Services Guidelines for Plantation Fire Protection 2011* publication.

If, for any reason, it is considered impractical to carry out the requirements as outlined above, plantation owners and managers may apply in writing to the Shire for permission to implement an alternative plan. A Fire Management Plan may be required to be developed and submitted.

Follow the QR Code for resources on:

- **Asset Protection Zones**
- **Firebreaks**
- **Contractor List**

FIREBREAK & VEHICLE ACCESS REQUIREMENTS

BEFORE

AFTER

ASSET PROTECTION ZONE

BURNING TIMES, BANS & OTHER RELATED INFORMATION

BURNING TIMES					
RESTRICTED		**PROHIBITED**		**RESTRICTED**	
Permits required for all burning activities		Burning strictly prohibited		Permits required for all burning activities	
From 1 Oct	**Until 30 Nov**	**From 1 Dec**	**Until 31 Mar**	**From 1 Apr**	**Until 31 May**

DATES MAY BE CHANGED ACCORDING TO SEASONAL CONDITIONS

If it is deemed that your property is not compliant, a Fire Control Officer may refuse to issue you a Permit to Burn. Permits are not valid on any Sunday or Public Holiday, or when the Fire Danger Rating is High, Extreme or Catastrophic.

For all hazard reduction burns please advise DFES Communications Centre on **9395 9209**

FIREBREAK & BUSHFIRE HAZARD REDUCTION DEADLINES	
INSTALL BEFORE 16 OCTOBER	**MAINTAIN UNTIL 31 MAY**

Follow the QR Code for more information on Burning Times on our website

Burning of Shire Verges

The burning of roadside verges is prohibited without written approval from the Shire of Chittering. Approvals are only available between June and September each year where no alternative method exists to reduce the hazard.

Follow the QR Code for a checklist on year-round property preparation

Fire Danger Rating (All Year Round)

No fire of any kind may be lit on a day when the forecast Fire Danger Rating for the district is High, Extreme or Catastrophic. The Chittering fire weather district is 'Swan Inland North'. The Fire Danger Rating is supplied daily by the Bureau of Meteorology (BoM). This information is also available from the Shire, DFES and Emergency WA websites, BoM Weather Service on Ph: 1300 183 341, The Bureau of Meteorology website (www.bom.gov.au) and is displayed on the information boards located at: Great Northern Highway, Muchea; John Glenn Park, Muchea; Muchea East Road, Lower Chittering; Great Northern Highway, Bindoon; Corner of Crest Hill and Mooliabeenee Roads, Bindoon.

Follow the QR Code to sign up for Fire Ban Notifications

Burning of Garden Refuse, Camping & Cooking Fires

Pursuant to Section 24G(2) and Section 25(1a) of the Bush Fires Act 1954 and applicable to all persons, the burning of garden refuse and lighting of camping or cooking fires is prohibited within the Shire of Chittering during the Prohibited Burning Time.

Furthermore, pursuant to Section 24G(2) of the Bush Fires Act 1954 and applicable to all persons, the burning of garden refuse is prohibited within the Shire of Chittering during the Restricted Burning Times unless a valid permit to burn has been obtained from a Fire Control Officer.

Other than during the RESTRICTED or PROHIBITED Burning Times, garden refuse may be burnt at any time, but care must be exercised. For all burning, please advise **DFES Communications Centre on 9395 9209**. Please note that excessive smoke from the burning of garden refuse may cause nuisance and annoyance to neighbours, other residents and danger to motorists.

It is an offence under the Health Local Law 2017 to burn damp, wet or green material causing excessive nuisance smoke. Please consider this and plan to minimise smoke. Please note it is also an offence to burn hazardous/toxic materials (e.g. tyres), household or commercial waste.

Wood Fired Ovens & Solid Fuel Barbecues in Restricted Burning Times

Wood fired pizza ovens and solid fuel barbecues in the open air do not require a Permit to Burn however, they may NOT be used in the restricted burning times unless the following conditions are met:

1. The Bureau of Meteorology Fire Danger Rating forecast is not High, Extreme or Catastrophic - at any time over the whole day.
2. The fire is only burning between 6pm and midnight, and completely extinguished when finished.
3. There is a minimum 5 metre firebreak, clear of flammable material surrounding the pizza oven or BBQ. (10 metre diameter).
4. At least 1 adult person is in attendance at all times.
5. The wood fired pizza oven or solid fuel BBQ is fitted with a spark arrester to the chimney and the door to the oven mouth (if specified and fitted by the manufacturer) is used to prevent the escape of embers and burning material.
6. There is a means of extinguishing a fire available at all times (e.g. garden hose, knapsack spray or fire unit).

Control of Operations Likely To Cause a Fire

Hot works including the operation of welding equipment and angle grinders, are activities likely to create a fire danger when used in the open air.

A person shall provide at least one fire extinguisher at the place where welding or cutting operations are carried out and surround this place with a firebreak which is at least 5 metres wide.

A ban on hot works, harvesting and movement of machinery and vehicles is likely to be imposed on days of adverse fire weather conditions. For updates on these bans please ring the information line on **9576 4666** (recorded message) or register with the SMS warning system with the Shire to receive a text when a ban is implemented.

Harvesting Operations (including Stubble Processing)

The Shire will permit harvesting operations, including stubble processing, during the Restricted and Prohibited Burning Times on the following conditions:

- That a fully operational firefighting unit (inclusive of associated pump, hose system and a minimum of 600 litres of water is present) at all times.
- Harvesting operations, and stubble processing, are not permitted when the Shire has declared a Harvest and Vehicle Movement Ban, including Hot Works Activities.

In addition to the conditions above, Harvesting Operations (including stubble processing) on Sundays and Public Holidays will be permitted on the following conditions,

- The local Fire Control Officer (FCO) is notified.
- Two able-bodied adult persons are present during the harvesting operations, only one of whom may be harvesting.

Hot Works, Harvest and Vehicle Movement Bans will be in place for Christmas Day, Boxing Day and New Year's Day.

LOCAL BUSH FIRE CONTROL OFFICERS

Fire Control Officers are not obliged to issue permits and may advise on alternatives to burning. Please remember Fire Control Officers are volunteers and their availability to issue permits may vary, assist them by planning in advance. Permits cannot be issued over the phone and should a Fire Control Officer refuse to issue a permit, it is a breach of the Act to request a permit from another Fire Control Officer.

MUCHEA	
James Marotta	0432 234 741
Tammy Foster	0422 150 479
LOWER CHITTERING	
Daniel Bates	0422 143 311
Graham Furlong	0476 881 796
UPPER CHITTERING	
Aaron Cover	0410 594 221
Will Lee	0415 154 715
BINDOON	
Paul Groves	0400 172 560
Dennis Badcock	0428 947 853
WANNAMAL	
Kim Haeusler	0428 559 043
Clayton Smith	0427 090 548
SHIRE FIRE CONTROL OFFICERS	
Rangers & Bush Fire Risk Officer	9576 4600
COMMUNITY EMERGENCY SERVICES MANAGER	
CHIEF BUSH FIRE CONTROL OFFICER	9576 4600

Applications for Permits during the Restricted Burning Time should be applied for through the Shire website:

www.chittering.wa.gov.au/permitstoburn

FOR ALL FIRES, CALL 000

HOT WORKS, HARVEST AND MOVEMENT OF MACHINERY BANS INFORMATION LINE 9576 4666

FOR FURTHER INFORMATION ON THIS NOTICE CONTACT THE SHIRE OF CHITTERING

Phone: 9576 4600

Email: chatter@chittering.wa.gov.au

Facebook: www.facebook.com/groups/chitteringbushfireready

Web Site: www.chittering.wa.gov.au

By order of the Shire of Chittering
Melinda Prinsloo
Chief Executive Officer

Shire of Chittering

Appendix H

Bushfire Emergency Management Plan Requirements

Develop an emergency management plan for the BESS facility, or make amendment to the existing site EMP if relevant, detailing the procedures for preparing and responding to off-site bushfire, and on-site fire emergencies impacting the BESS including:

- BESS facility details including:
  - Facility description, including infrastructure details, operations, number of personnel, and operating hours.
  - Up-to-date contact details for facility personnel, and any relevant off-site personnel that could provide technical support during an emergency including contact information for 24/7/365 specialist technical support for the renewable energy infrastructure.
  - Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
  - The following BESS details and plans
    - Schematics, technical data and overall configuration of the BESS units.
    - Details of the hazards for the BESS, including thermal events/runaway, electrical safety hazards, explosion hazards, dangerous goods hazards (including off-gassing), and the effects of fire on the BESS (e.g. explosion, release of toxic gases).
    - Details of all protection and safety systems, including a description and the activation process/automatic trigger for these systems.
    - Specifications for safe operating conditions for temperature.
    - Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available.
    - The shutdown and/or isolation procedures if the BESS are involved in fire or emergency incident, and appropriate personnel contact details for verifying that the battery enclosure/container system has been isolated/shutdown and de-energised during emergencies.
  - Details of any emergency resources, including fire detection and suppression systems and equipment; emergency eye-wash and shower facilities; spill containment systems and equipment; emergency warning systems; communication systems; personal protective equipment; first aid.
  - A manifest of dangerous goods (if required under the applicable Dangerous Goods legislation and codes, and relevant Australian Standards), including Safety Data Sheets (SDS).
- The identified risks and hazards associated with the renewable energy infrastructure, including but not limited to:

  - Electrical faults and renewable energy infrastructure fire
  - Bushfire
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for bushfire:
  - Ongoing compliance with the approved BMP, including ensuring regular vegetation management requirements are achieved, vehicular access routes and firewater systems are maintained and available, and conducting regular bushfire housekeeping inspections.
  - Ensuring ongoing maintenance of all relevant infrastructure.
  - Ensuring ongoing maintenance of all fire and communication systems.
  - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
    - A Harvest Vehicle Movement Ban is a notice issued by the local council or shire (Shire of Chittering) during days of elevated fire weather danger. Specific instructions must be adhered to when a HVMB is issued by the Shire (https://www.chittering.wa.gov.au/services/bushfire-emergency-services/fire-bans-fire-danger-rating.aspx)
    - A Total Fire Ban is a notice issued by the Department of Fire and Emergency Services during days of elevated fire weather danger. Specific instructions must be adhered to when a TFB is issued by DFES (Total fire ban - Department of Fire and Emergency Services)
  - Modifying Site Activities (based on Forecast FDR and TFB/HVMB)
  - Monitoring DFES Bushfire Emergency Warnings for bushfire (and/or other signs of bushfire activity) within 50 km of the facility, during bushfire season, and understanding the decision-making triggers.
- Detail emergency response procedures to address the nominated hazards, including for:
  - Bushfire and
  - Onsite fire in renewable energy infrastructure

Bushfire preparedness and pre-emptive activities

Year-round (with focus on the month prior to bushfire season)

- Ensure ongoing compliance with endorsed BMP including:
  - Vegetation management must be conducted as per the BMP including maintenance of NVZs and APZs.
  - Gutters, roof surfaces and valleys, kerbs, traps, sumps, bunds, drains, rooves or any other accumulation points for leaf litter, dry vegetation, or any other combustible materials must be cleared, and the debris removed from site.
  - Extraneous or unnecessary materials (fuel loads) must be removed from site (e.g. dilapidated/stored vehicles, plant or equipment; excess fuel/chemicals; any combustible waste materials).
- Bushfire preparedness housekeeping inspections:
  - Vegetation management as per BMP
  - Ensure all vehicle site access points, including emergency access points, are clear and accessible.
  - Ensure that all fire protection systems and equipment is unobstructed, in service and performing optimally.

- Fire detection, alarm and suppression systems, and any other communication and emergency equipment must be maintained in accordance with relevant codes and standards, and be in effective working order at all times
    - Any defects, faults or matters affecting the performance of systems must be identified through routine testing and servicing, with any maintenance activities and rectifications to be closed-out prior to bushfire season.
- Ensure Emergency Information Book and signage is up to date with the latest information, especially key contact names and phone numbers, as detailed in Section 5.9.
- Ensure local fire brigade is engaged with on an ongoing basis, to ensure they are familiar with the site layout, specific hazards and fire detection and suppression systems as detailed in Section 5.10.
- If possible, ensure the facility has registered with the Shire of Chittering for SMS notifications for Harvest Vehicle Movement Bans (HVMB).

During the bushfire season

Monitor Forecast Fire Danger Rating (FDR) and Total Fire Ban Days (TFB)

- A nominated person/role is to be responsible for identifying, responding to and communicating the Fire Danger Rating, ideally four days ahead:
    - http://www.bom.gov.au/wa/forecasts/fire-danger-ratings.shtml [4 day FDR forecast] or
    - https://www.emergency.wa.gov.au/index.html#firedangerratings [current/next day FDR]
    - https://www.emergency.wa.gov.au/#totalfirebans [Total Fire Ban]
- This information must be communicated to everyone likely to be present on-site, and relevant off-site personnel.
- Undertaken any modification of site activities based on forecast FDR or TFB (see below).

Modifying Site Activities (based on Forecast FDR and TFB)

- ***Moderate FDR or No Rating***
    - No specific daily monitoring or actions unless conditions change.
- ***High FDR***
    - Alert all site personnel and visitors of bushfire risk
    - No specific daily monitoring but remain vigilant to potential bushfires through visual checks, occasional check of online resources for emergency warnings and bushfires in the local area.
    - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- ***Extreme FDR***
    - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for site shutdown and offsite evacuation, if required.
    - Conduct regularly visual checks throughout the day

- Regularly check online resources for emergency warnings and bushfires in the local area.
- Consider minimisation of site personnel and visitation requiring travel to and from the facility, as well as non-essential activities and high-risk maintenance activities.
- Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
- Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.

- ***Catastrophic FDR and TFB declared days***
  - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for rapid site shutdown and offsite evacuation, if required
  - Conduct hourly visual checks throughout the day
  - Conduct hourly check online resources for emergency warnings and bushfires in the local area.
  - Postpone non-essential activities or high-risk maintenance activities at the facility.
  - Minimise site personnel and visitation to only essential personnel.
  - Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
  - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
  - Comply with all Total Fire Ban requirements including:
    - No fire or flames allowed in the open air
    - No open fires for the purpose of cooking or camping are not allowed
    - No ‘hot work’ such as metal work, grinding, welding, soldering, gas cutting or similar is allowed unless a formal exemption has been obtained
    - No use of chainsaws, plant or grass trimmers or lawn mowers in bushland areas
    - No other activities that may start a fire
    - Ensuring equipment or machinery is mechanically sound
    - Ensuring all reasonable precautions are taken to prevent a bushfire igniting, including postponing any activity that could result in a bushfire ignition.

Bushfire Monitoring, Triggers and Decision-Making

Bushfire Monitoring

Bushfire monitoring involves the identification of the DFES Bushfire Emergency Warnings (ADVICE, WATCH & ACT AND EMERGENCY) and/or bushfire activity within 50km of the facility, through the use of the Emergency WA website app (https://www.emergency.wa.gov.au/), or ABC local radio.

- ***If ADVICE warning or bushfire is within 25 km – 50 km of the site***
  - If possible, liaise with the DFES if fire travelling toward the site.

- If located at the BESS, consider reducing numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location (e.g. Ellenbrook or Gingin depending on direction of fire travel).
- Make preparations to shutdown facility and conduct offsite evacuation procedures, depending on bushfire location and direction of spread, including:
  - Ready the BESS facility to reduce to a low energy state (including discharging the BESS) if it is required
  - Ensure all other infrastructure and plant are properly secured.
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire and communications systems are ready for use.
- Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

- ***If WATCH & ACT warning or bushfire is within 10 km – 25 km of the site***
  - If possible, liaise with the DFES if fire travelling toward the site.
  - Prepare or commence shutdown facility, depending on bushfire location and direction of spread, including:
    - Reducing the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
    - Ensure all other infrastructure and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Prepare or commence offsite evacuation procedures depending on bushfire location and direction of spread, including:
    - Early reduction of numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location.
    - If possible, ensure relocation of all personnel to the offsite safer location ahead of any bushfire impact on road network (including smoke impact).
  - Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.
- ***If EMERGENCY warning or if bushfire is <10km or impact is imminent:***
  - If possible, liaise with the DFES.
  - If safe to do so, commence or conduct facility shutdown depending on bushfire location and direction of spread, including:
    - Reducing the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
    - Ensure all other infrastructure and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Urgently undertake offsite evacuation procedures (if safe to do so) depending on bushfire location and direction of spread, including:
    - Relocate all site personnel and visitors to nominated offsite safer location ahead of any bushfire impact on road network.
  - If there is insufficient time to safely travel offsite without being impacted by bushfire, conduct onsite shelter in place in building furthest from approaching fire, or as directed by Tronox personnel.

- Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

Offsite Evacuation and Onsite Shelter-in-Place Procedures

Ahead of deciding to evacuate offsite or remain onsite to shelter-in-place (which is the last resort response if unsafe to evacuate offsite), the following should be conducted:

- Assess the bushfire situation:
  - Review available information to determine bushfire location, direction and speed of travel
  - Determine if there are any DFES Bushfire Warnings issued
  - Contact and liaise with DFES for further information and guidance
  - Make a decision whether it is safe to evacuate to nominated offsite safer location (e.g. Ellenbrook or Gingin depending on direction of fire travel), or whether it is safer to shelter onsite (which should be a last resort action only).
  - Advise DFES of the decision, if possible.

Offsite Evacuation (and Facility Shutdown)

- Assemble all site personnel and visitors
  - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) and evacuate to nominated offsite safer location.
  - Ensure sufficient transport is available for all personnel to travel to nominated offsite safer location with sufficient fuel to travel 100 km, water, fire extinguishers (if possible)
- Conduct facility shutdown actions (if sufficient time) including
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire systems are ready for use.
  - Ensure all other infrastructure and plant are properly secured.
- Brief evacuees on offsite evacuation particulars including:
  - Confirm the offsite safer location (e.g. Ellenbrook or Gingin depending on direction of fire travel)
  - The evacuation route to travel to the off-site safer location
  - The need to travel in convoys in case of vehicle failure
  - Ensure final evacuating personnel are in no less than 2 vehicles.
- Monitor the leaving of site and arrival at nominated offsite safer location, and if anyone is missing, notify DFES immediately.

Onsite Shelter-in-place (and Facility Shutdown) – Last Resort Action Only

- Assemble all site personnel and visitors at the identified onsite building furthest from approach bushfire
  - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) but remain onsite to shelter in place.
- Prepare identified onsite building for shelter (NOTE: The existing onsite buildings are not bushfire refuge buildings and should only be used as a last resort if offsite evacuation is not possible)

  - Check the perimeter of building and put away all external combustible items and any loose items that could be projectiles
  - Close all doors and windows
  - Ensure all firefighting, emergency communication equipment and first aid supplies are available and ready for use, including hose reel coverage around the building from the mobile fire trailer.
  - Ensure all internal access routes within the building are open to enable people move to the available spaces
  - If installed, ensure any evaporative air-conditioning (HVAC) can be easily shutdown ahead of the fire impact. If possible, keep the water running and turn off the fan, otherwise shutdown completely.
  - Begin storing water for drinking (in containers) and review food stores
  - Consider collecting any blankets and fire extinguishers from other buildings
  - Soak towels and rugs in water and lay them along the inside of external doorways or block any other gaps for embers or smoke
- Conduct facility shutdown actions (if sufficient time and safe to do so) including
  - Reducing the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire systems are ready for use.
  - Ensure all other infrastructure and plant are properly secured.
- As bushfire impacts the facility:
  - All remaining occupants are to be within the identified onsite building
  - Immediately before the fire arrives, wet down building exterior, decks and landscaping close to the building. Turn off evaporative air-conditioning if not already done.
  - Ensure occupants to get down low to limit exposure to smoke and drink plenty of water to avoid becoming dehydrated.
  - Regularly inspect the condition of the building including:
    - Regular inspection of the inside of the building, including the roof space for sparks and embers, and extinguish where possible and safe to do so.
    - If safe to do so, organise for regular patrols of the outside of the building to check for any signs of bushfire ignition and extinguish where possible and safe to do so. Those conducting the patrols are to wear appropriate PPE.
- Stay inside while the fire front is passing and don't leave until advised by that the fire is no longer a threat or offsite evacuation can be conducted (or decided by Chief Fire Warden).
- If the building catches fire and/or conditions inside become unbearable:
  - Leave through the door furthest from the approaching fire
  - Relocate all occupants to the following locations furthest from the fire or previously burned land.
- Once the fire has passed, and approval is provided to leave the building:
  - Go outside and extinguish any fires on the building or in adjacent landscaping.
  - Regularly inspect the inside and outside of the building for several hours.
  - Do not approach the renewable energy infrastructure until advised by DFES.

Onsite Renewable Energy Infrastructure Fire Response

The emergency response to any onsite fire in renewable energy infrastructure (especially BESS), is to include the following:

- Immediately notify the following of onsite fire, including location:
  - DFES to enable rapid turnout to site
  - Relevant staff
  - Relevant neighbouring landowners
- Strongly consider full emergency shutdown of the BESS and transformers unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible).
- If fire is within the BESS unit/s, ensure staff relocate as far as possible from the fire, and no less than 50 m away.
- If possible, ensure relevant vehicular access routes are unlocked and available, to enable attending firefighters to gain access to the location of the fire.
- Ensure all fire and communications systems are ready for use.
- If safe to do so, conduct first attack response on any spot fires with mobile fire appliances, until DFES arrival.
- Ensure attending firefighters have access to any relevant specialist technical personnel (onsite or offsite), to assist by providing technical advice.

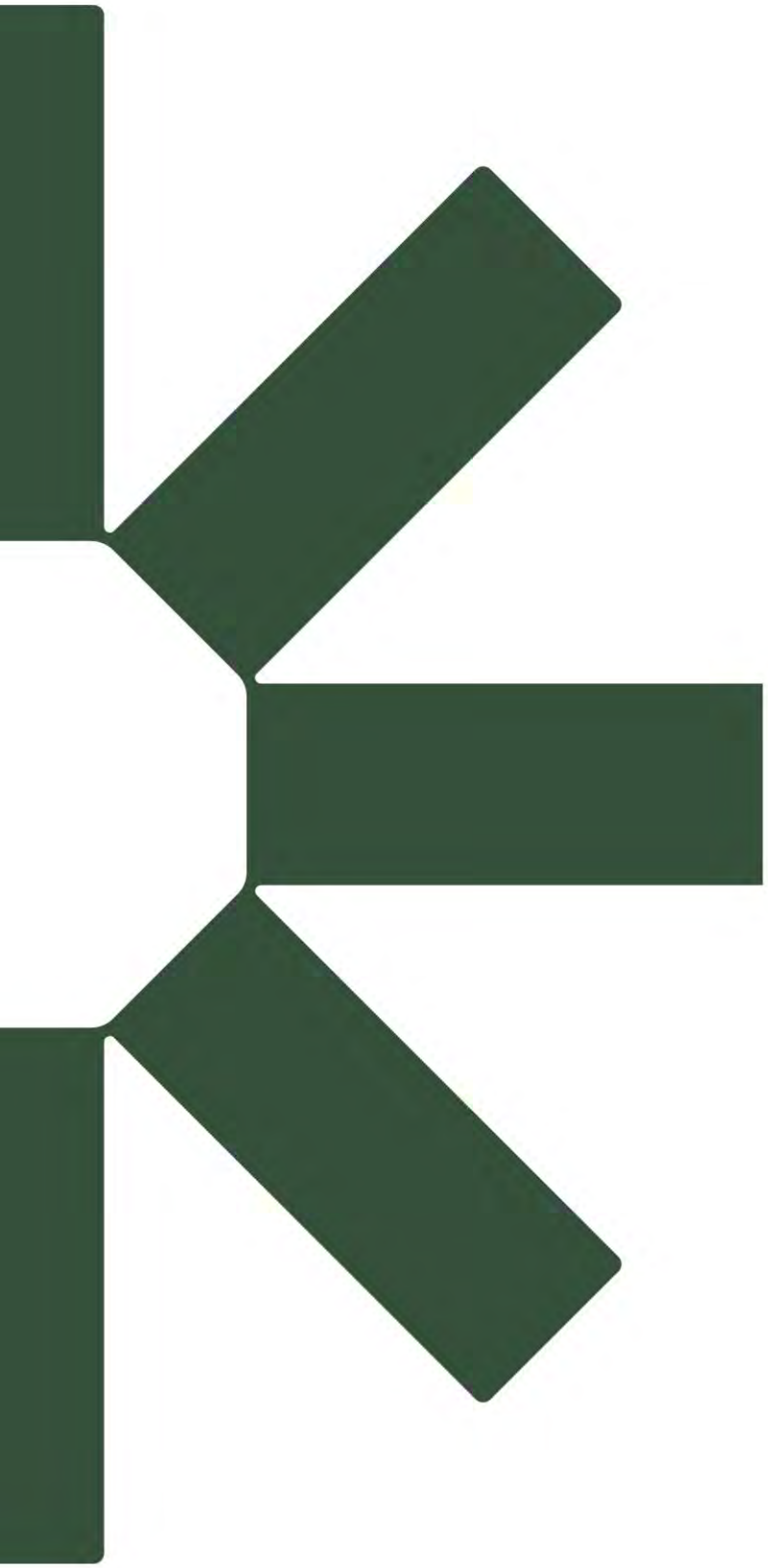
Emergency Management Plan Review, Training and Exercises

The emergency management plan is to be reviewed regularly as follows:

- At least annually to ensure currency and effectiveness
- Following any changes to the risk on-site pertaining to site infrastructure and operations
- After any activation of the plan or incident involving notification to the emergency services.
- After emergency exercises.

In addition to the review of the emergency management plan, it is critical to regularly train relevant staff and conduct exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. It also presents an opportunity to test the effectiveness of the plan and refine as required.

- Training should be conducted annually prior to bushfire season, as a minimum, and also at the commencement of employment.
- Exercises should be conducted annually prior to bushfire season, as a minimum, but ideally on a regular basis.



Making Sustainability Happen

ACCENTURE

CHANDALA TRONOX FACILITY
BESS PROJECT

PRELIMINARY ENVIRONMENTAL NOISE IMPACT ASSESSMENT

JULY 2026

OUR REFERENCE: 36611-4-26180-03

Rochdale Holdings Pty Ltd A.B.N. 85 009 049 067 trading as:
HERRING STORER ACOUSTICS
P.O. Box 219, Como, W.A. 6952
(08) 9367 6200
hsa@hsacoustics.com.au

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ENVIRONMENTAL NOISE IMPACT ASSESSMENT CHANDALA TRONOX FACILITY BESS PROJECT

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FOR

ACCENTURE

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This report has been prepared in accordance with the scope of services and on the basis of information and documents provided to Herring Storer Acoustics by the client. To the extent that this report relies on data and measurements taken at or under the times and conditions specified within the report and any findings, conclusions or recommendations only apply to those circumstances and no greater reliance should be assumed. The client acknowledges and agrees that the reports or presentations are provided by Herring Storer Acoustics to assist the client to conduct its own independent assessment.

EXECUTIVE SUMMARY

Herring Storer Acoustics were commissioned to carry out an acoustic study of noise emissions for the proposed BESS addition to the Tronox Chandala facility.

The proposed BESS addition includes 4 BESS modules, with each module consisting of 8 DC battery containers and 1 AC inverter skid, spread across 1 "BESS" site as shown in Appendix A.

This acoustic assessment provides a preliminary assessment of noise impacts to the surrounding area by the proposed project.

The nearest noise sensitive premises "R1" is situated approximately 1km to the north-west of the Tronox Chandala Facility.

Modelling was conducted with the noise level information provided.

For the most stringent time period (night) the Assigned Noise Level is 65 dB(A) at the nearest noise sensitive premise – due to its classification as an industrial caretaker premise. The highest predicted, assessable, noise emissions for the nearest noise sensitive premise is 37 dB(A) at "R1". This includes all proposed plant associated with the project operating at 90% battery operation and 100% inverters. An adjustment for tonal characteristics has been included in the noise level emissions.

It is noted that the above assessment excludes noise levels from all other sources – however – it is noted that at the calculated noise level of 32 dB(A) – which excludes the adjustment for tonality - the noise emissions associated with the proposed BESS facility would not contribute to any other noise emission in the area sufficiently to significantly contribute to an increase at R1 that would elevate noise levels above the most stringent Assigned Noise Level. A similar finding is applicable to other identified noise sensitive premises at distances further from the Tronox Chandala Facility that have a lower Assigned Noise Level.

Hence, it is considered that the proposed BESS facility addition to the Tronox Facility could be undertaken with negligible risk to impacting premises in the vicinity.

An update to the noise impact assessment is expected to be required to reflect the final design prior to development application approval – and likely to be the subject of a condition of approval.

CONTENTS

1.	INTRODUCTION	1
2.	ACOUSTIC CRITERIA	2
3.	METHODOLOGY	3
4.	RESULTS	4
5.	ASSESSMENT	5

APPENDICES

A	PRELIMINARY LAYOUT PLAN
B	NOISE CONTOUR PLOT

1. INTRODUCTION

Herring Storer Acoustics were commissioned to carry out an acoustic study of noise emissions for the proposed addition of a BESS facility to the Tronox facility at Chandala.

This is a preliminary assessment to ascertain the indicative noise impact of the proposed project and determine what further work in this regard, if any, is likely to be required as the development progresses.

The locality of the project relative to the Tronox Chandala facility is shown below in Figure 1.1.

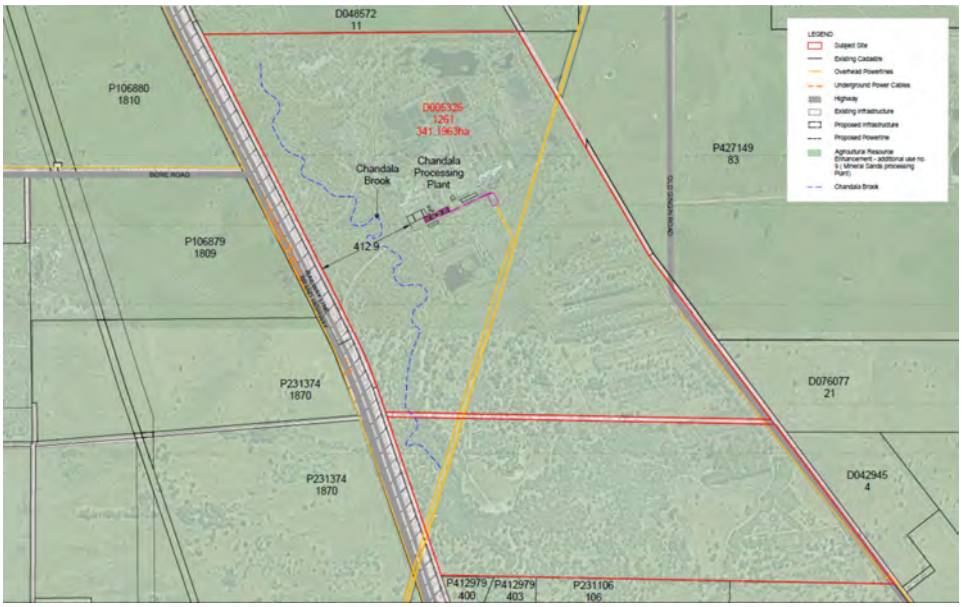


FIGURE 1.1 – PROPOSED BESS PROJECT LOCATIONS

The project consists of a BESS facility. The noise sources considered in our preliminary assessment consist of 4 modules with a total of

- 32 DC battery containers.
- 4 AC inverter skids.

The surroundings to the Tronox facility and the identified noise sensitive premises considered in this assessment, are shown below in Figure 1.2

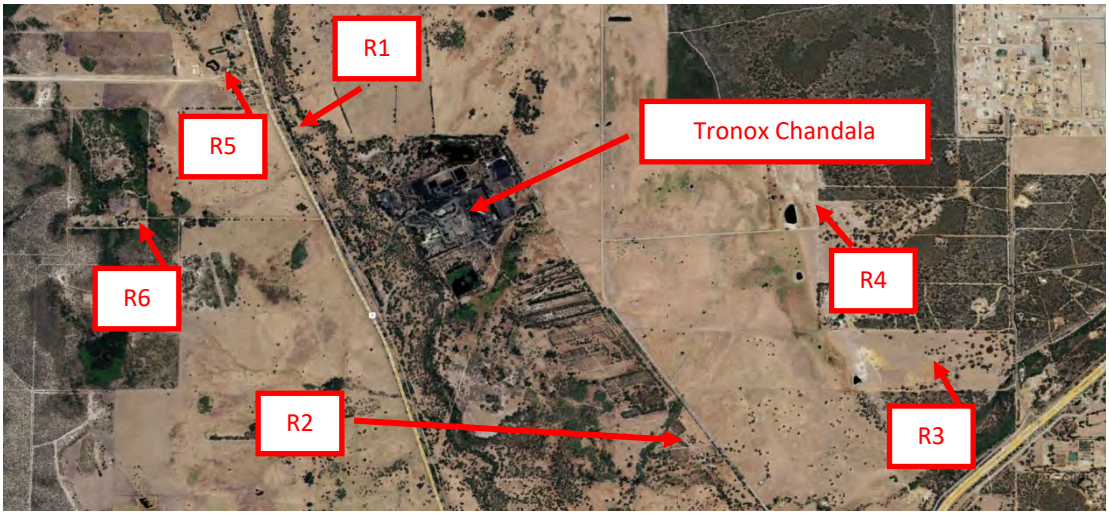


FIGURE 1.2 – SITE SURROUNDS

The nearest noise sensitive premises have been identified as shown above in Figure 1.2, with the nearest noise sensitive premises being approximately 1 km to the north-west of the Tronox Facility.

This report assesses night-time (worst case) noise emissions under maximum propagation conditions for the proposed development, based upon assumed noise levels for compliance with the requirements of the Western Australian *Environmental Protection (Noise) Regulations 1997* (WA) *(the Noise Regulations)*.

This work has been undertaken to accompany the development application for the project to ascertain if the project can comply with the Regulations. It is considered likely that a detailed assessment will need to be undertaken during the design development phase of the project in response to expected development approval conditions – at which time, equipment selections and the like would have been undertaken with finalised noise data able to be included in the modelled levels.

2. ACOUSTIC CRITERIA

The criteria used is in accordance with the *Environmental Protection (Noise) Regulations 1997.* These regulations stipulate maximum allowable external noise levels that can be received at one premises from another premises. For the highly sensitive area of a noise sensitive premises the allowable noise levels are determined by the calculation of an influencing factor. The influencing factor is calculated for the usage of land within the two circles, having radii of 100m and 450m from the premises of concern. For other premises (i.e. commercial and industrial premises), including other areas of a noise sensitive premises, the allowable noise levels are fixed. Table 2.1 lists the baseline Assigned Noise Levels for highly sensitive areas of a noise sensitive premises and the allowable noise levels for other premises.

TABLE 2.1 – ASSIGNED OUTDOOR NOISE LEVELS

Type of premises receiving noise	Time of day	Assigned level (dB)		
		$L_{A\,10}$	$L_{A\,1}$	$L_{A\,max}$
Noise sensitive premises: highly sensitive area (i.e. within 15m of a dwelling)	0700 to 1900 hours Monday to Saturday	45 + IF	55 + IF	65 + IF
	0900 to 1900 hours Sunday and public holidays	40 + IF	50 + IF	65 + IF
	1900 to 2200 hours all days	40 + IF	50 + IF	55 + IF
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35 + IF	45 + IF	55 + IF
Industrial Premises	All hours	65	80	90

Note: The L_{A10} noise level is the noise that is exceeded for 10% of the time.
The L_{A1} noise level is the noise that is exceeded for 1% of the time.
The L_{Amax} noise level is the maximum noise level recorded.
IF = Influencing Factor

It is a requirement that noise from the site be free of annoying characteristics (tonality, modulation and impulsiveness) at other premises, defined below as per Regulation 9.

Where the above characteristics are present and cannot be practicably removed, the following adjustments are made to the measured or predicted level at other premises.

TABLE 2.2 – ADJUSTMENTS FOR ANNOYING CHARACTERISTICS WHEN MUSIC IS NOT PRESENT

Where tonality is present	Where modulation is present	Where impulsiveness is present
+ 5 dB	+ 5 dB	+ 10 dB

The key receptors have been identified, as shown in Figure 2.2 above.

The Assigned Noise Levels for each noise sensitive premise identified is listed below in Table 2.3. It is understood that "R1" is classified as an industrial caretaker premises, as defined in Schedule 1 of the Environmental Protection (Noise) Regulations 1997 'Part A – Industrial and utility premises' which references "Caretakes and like residences attached to or forming part of premises referred to in this Part", hence, the Assigned Noise Level reflects this classification in the table below.

TABLE 2.3 – ASSIGNED NOISE LEVELS FOR SENSITIVE PREMISES

Type of premises receiving noise	Time of day	Assigned level (dB)		
		$L_{A\,10}$	$L_{A\,1}$	$L_{A\,max}$
R1	All Hours	65	80	90
R2 – R6	0700 to 1900 hours Monday to Saturday	45	55	65
	0900 to 1900 hours Sunday and public holidays	40	50	65
	1900 to 2200 hours all days	40	50	55
	2200 hours on any day to 0700 hours Monday to Saturday and 0900 hours Sunday and public holidays	35	45	55

This provides the closest in terms of distance to the project, with compliance at these locations indicative of compliance at all others.

3. METHODOLOGY

Noise immissions[1] at the nearest neighbouring residential premises, due to noise associated with the proposed operations, were modelled using the computer programme SoundPlan. Sound power levels used for the noise modelling were based on noise level data provided by Accenture.

This acoustic assessment is required for the approval process and is being undertaken prior to the final design of the project being known. In the event that equipment selections change, this modelling exercise may need to be repeated with updated selections.

The design configuration for the proposed project is contained in Appendix A.

The overall sound power levels for individual equipment as shown in Table 3.1.

TABLE 3.1 – SOUND POWER LEVEL - NOISE SOURCES dB(A)

Noise Sources	Sound Power Level dB(A)
Batteries (32 off)	96.7
Inverters (4 off)	86.2

The one-third octave band data listed below in Table 3.2 has been utilised in our assessment, with the batteries being the "90% working mode" data and the inverter being the overall sound power level provided for 100% operation in the noise simulation report.

The noise report(s) have not been included in this preliminary report as the information has been provided on a "commercial in confidence" basis.

1 Immissions – noise received at a source
2 Emissions – noise emanating from a source and / or location

TABLE 3.2 – BATTERY SWL, dB

Source	One-Third Octave Band Centre Frequency, Hz							
	100 125 160	200 250 315	400 500 630	800 1000 1250	1600 2000 2500	3150 4000 5000	6300 8000 10,000	dB(A)
Battery – "90% working mode"	89	90	88.4	86.5	81.1	74.4	56	96.7
	87.8	95.7	89.7	85.3	78.6	71.2	51.1	
	87.5	97.6	90.5	83.5	76.8	67.4	46.8	
	89	90	88.4	86.5	81.1	74.4	56	

It is noted that all equipment has been assumed to be operating at the same time, at maximum noise level conditions. It is understood that the noise emissions associated with batteries typically vary with temperature, hence, for the most stringent time period defined by the Regulations, this is likely to be conservative.

Weather conditions for modelling were as stipulated in the Environmental Protection Authority's "*Draft Guidance for Assessment of Environmental Factors No. 8 - Environmental Noise"* as listed in Table 3.3. The CONCAWE algorithm has been utilised for this assessment, with the weather conditions as listed below.

A ground factor of 0.6 has been in the modelling.

TABLE 3.3 – WEATHER CONDITIONS

Condition	Night	Day
Temperature	15°C	20°C
Relative humidity	50%	50%
Pasquill Stability Class	F	E
Wind speed	3 m/s*	4 m/s*

* From sources, towards receivers.

It is noted that 'worst case' wind conditions refer to conditions where there is a temperature inversion in conjunction with light winds in the direction from noise source to receiver, resulting in the highest sound propagation towards receiver locations.

4. RESULTS

A summary of the calculated noise levels for scenarios are shown in Table 4.1.

TABLE 4.1 – CALCULATED NOISE LEVELS, L_{A10} dB(A)

Receiver Name	Calculated Noise Level
R1	32
R2	26
R3	20
R4	23
R5	28
R6	28

A Noise contour plot for the above scenario is included in Appendix B.

5. ASSESSMENT

On the basis of the calculated noise levels, noise levels at the nearest noise sensitive premises have been calculated at up to 32 dB(A) – associated with only the proposed BESS facility addition.

Given the noise sources associated with the proposed development, noise level emissions may contain tonal characteristics – however – it is noted that this is considered a conservative assumption, as at the noise levels predicted, any tonal characteristics that may be present could be masked by background noise levels.

Hence, a + 5 dB adjustment to the calculated noise levels has been applied to the calculated noise levels in accordance with the Regulations.

Based on this, Table 5.1 contain the applicable adjustments, and assessable noise levels at each of the identified noise sensitive premises.

TABLE 5.1 – APPLICABLE ADJUSTMENTS AND ASSESSABLE LEVEL OF NOISE EMISSIONS, L_{A10} dB(A)

Noise Measurement Location	Calculated Noise Level L_{A10}	Applicable Adjustments to Measured Noise Levels, Characteristics			Assessable Noise Level
		Where Noise Emission is NOT music			
		Tonality	Modulation	Impulsiveness	
R1	32	+5	-	-	37
R2	26	+5	-	-	31
R3	20	+5	-	-	25
R4	23	+5	-	-	28
R5	28	+5	-	-	33
R6	28	+5	-	-	33

Hence, based on the most stringent time period – namely the night period - Table 5.2 assesses the noise impact of the proposed development.

TABLE 5.2 – ASSESSMENT OF NOISE LEVELS

Receiver	Assessable Noise Level, dB(A)	Applicable Times of Day	Applicable L_{A10} Assigned Noise Level (dB)	Exceedance to Assigned Noise Level L_{A10} (dB)
R1	37	All Hours	65	Complies
R2	31	Night (22:00 to 07:00)	35	Complies
R3	25		35	Complies
R4	28		35	Complies
R5	33		35	Complies
R3	33		35	Complies

For the most stringent time period (night) the Assigned Noise Level is 65 dB(A) at R1 and 35 dB(A) at the balance of the locations identified. The highest predicted, assessable, noise emissions for the nearest noise sensitive premise is 37 dB(A) at "R1". This includes all proposed plant associated with the project operating at 100%, and the adjustment for tonal characteristics included in the noise level emissions.

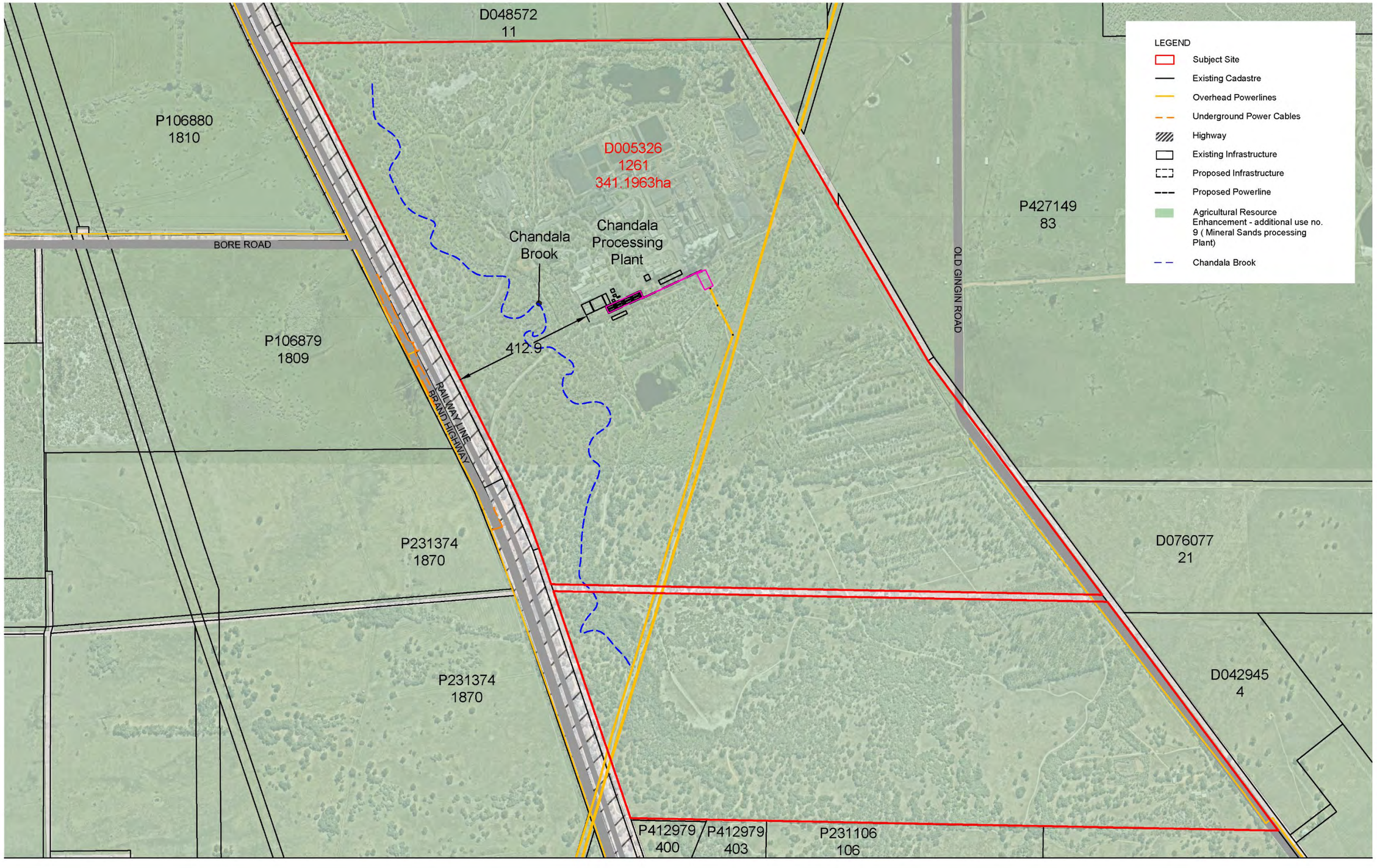
It is noted that the above assessment excludes noise levels from all other sources – however – it is noted that at the calculated noise level of 32 dB(A), the noise emissions associated with the proposed BESS facility would not contribute to any other noise emission in the area sufficiently to significantly contribute to an increase at R1 that would elevate noise levels above the most stringent Assigned Noise Level.

Similarly at the balance of the identified receivers, the margin of compliance from the proposed project only is such that the noise levels would contribute a negligible amount to current noise emissions – on the assumption that the current noise emissions may be as high as the applicable Assigned Noise Level at these locations.

Hence, it is considered that the proposed BESS facility addition to the Tronox Facility could be undertaken with negligible risk to impacting premises in the vicinity.

APPENDIX A

LAYOUT PLAN



Site 4 - Local Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

Date: 29 June 2026 Scale: 1:10000 @ A3 1:5000 @ A1 File: **675.07369 CP01A** Staff: JK GW Checked: CW

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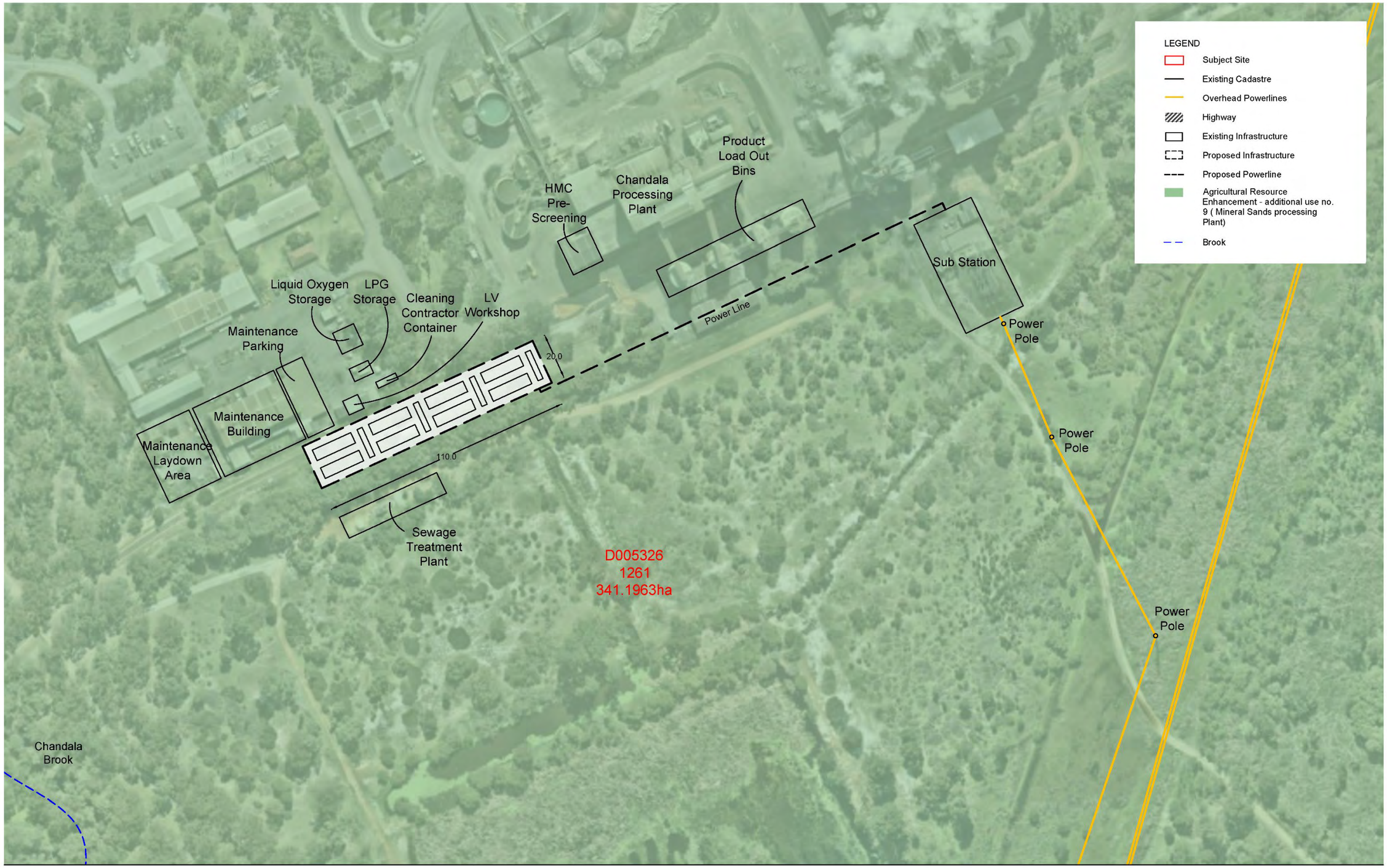

Site 4 - Site Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

Date: 24 June 2026 Scale: 1:1500 @ A3 1:750 @ A1 File: **675.07369 CP01A** Staff: JK GW Checked: CW

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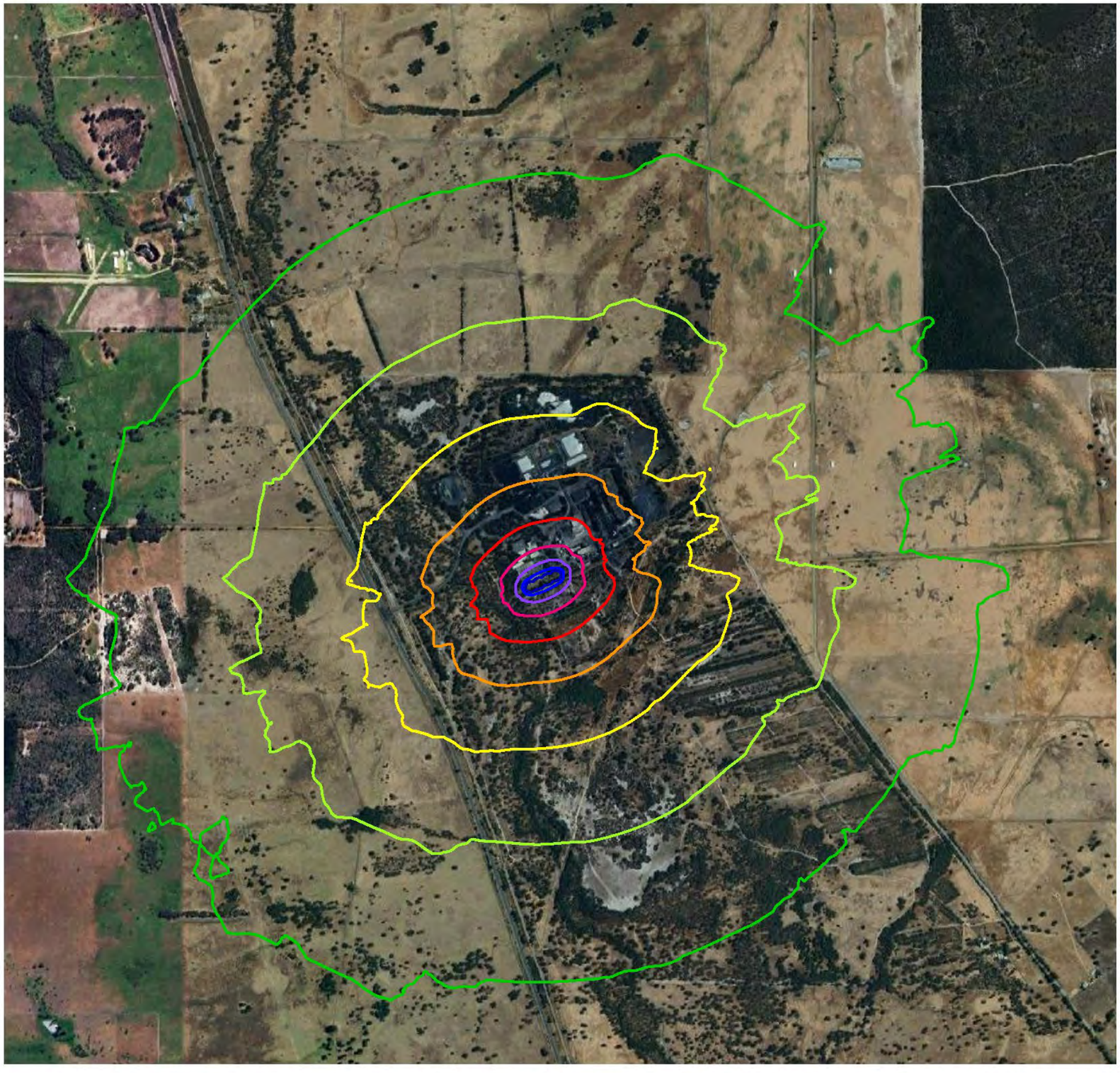
APPENDIX B

NOISE CONTOUR PLOT



Customer:
Tronox
Project: Tronox Chandala BESS
Project-No. 26180-033

TRONOX

Map
1

Chandala Tronox BESS Facility - GNM
Result number 3
Calculation in 1.5 m above ground

Project engineer: George Watts
Created:
Processed with SoundPLAN 9.1, Update 20/05/2026

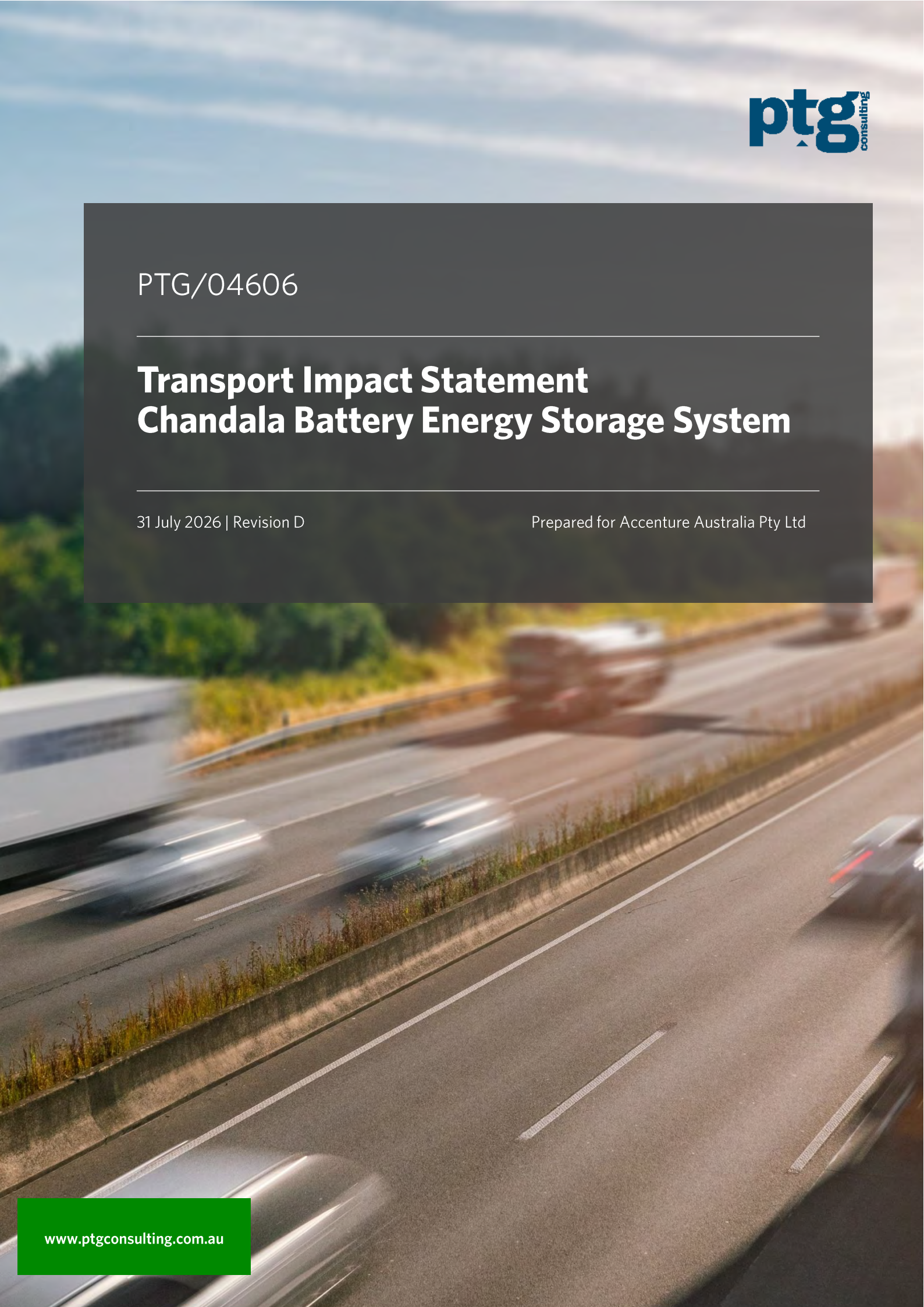
Levels LA10
in dB(A)

- = 30
- = 35
- = 40
- = 45
- = 50
- = 55
- = 60
- = 65
- = 70

N

Length scale 1:15000
0 100 200 400 600 800 m

HERRING STORER ACOUSTICS



PTG/04606

Transport Impact Statement
Chandala Battery Energy Storage System

31 July 2026 | Revision D

Prepared for Accenture Australia Pty Ltd

www.ptgconsulting.com.au

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REPORT DETAILS

Unique Document Identification

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PTG Consulting Office Details

Location	Perth, WA
Address	Level 4, 167 St Georges Terrace, Perth WA 6000
Telephone	+61 8 6188 4500
Email	ray.cook@ptgconsulting.com.au
Web	www.ptgconsulting.com.au

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C	03/7/2026	Minor Update	NA	RJC
D	31/7/2026	Minor Updates	NA	RJC

1 INTRODUCTION

1.1 Background

PTG Consulting Pty Ltd (PTG) has been commissioned by Accenture Australia Pty Ltd ('the Client') to prepare a Traffic Impact Statement (TIS) for the Battery Energy Storage System (BESS) proposed to be located at the Chandala Processing Plant, 722 Old Gingin Road, Muchea ('the Site') within the Shire of Chittering. The Chandala BESS facility is proposed to include a total of four (4) modules.

This report has been prepared in accordance with the *Western Australian Planning Commission (WAPC) Transport Assessment Guidelines for Developments: Volume 4 – Individual Developments (2016)* and the Transport Impact Statement (TIS) Checklist is included at Appendix A.

Specifically, this report aims to assess the operations of the proposed development internally and its connections to the adjacent road network, with a focus on traffic volumes, access and accessibility.

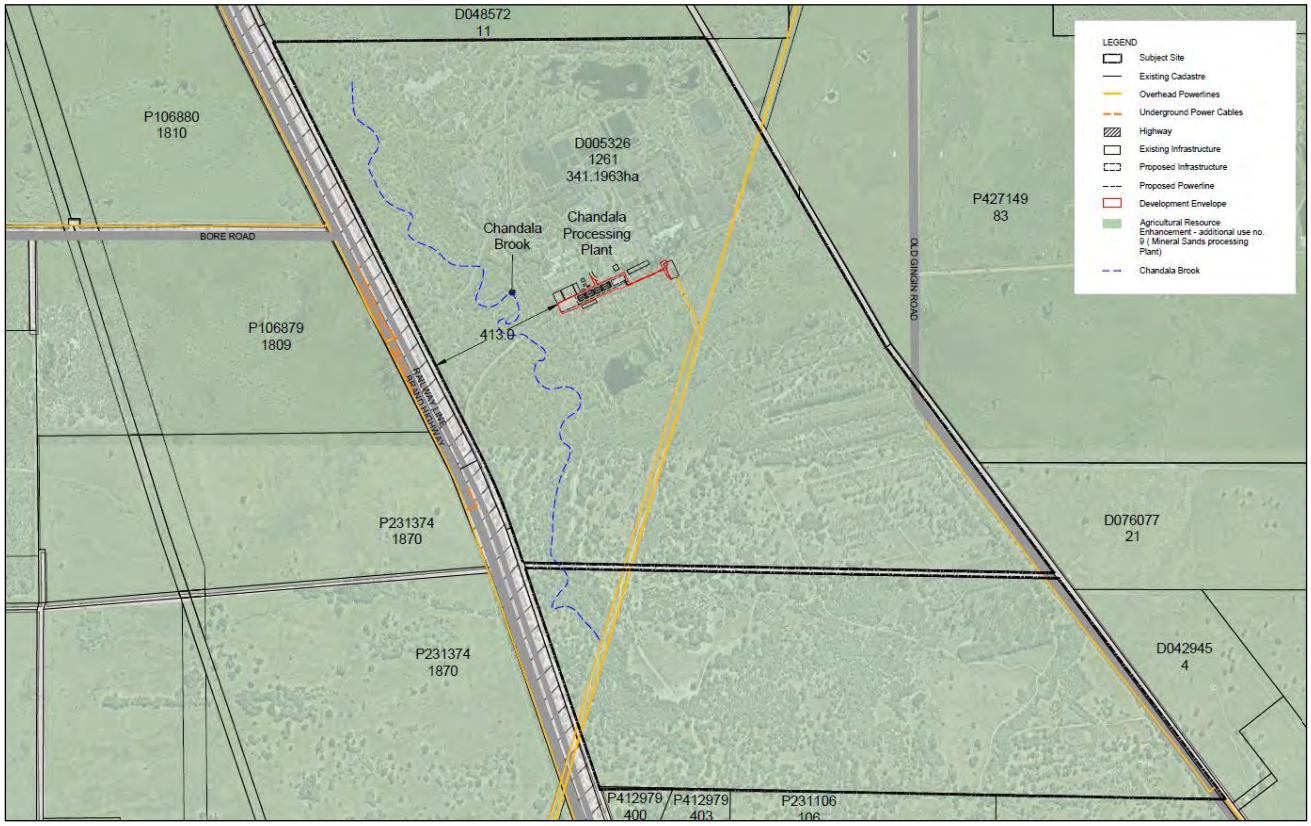
This report also outlines the requirements and opportunities associated with traffic and transport within the development, referencing relevant Council and WAPC policies and guidelines as well as best practice planning within Western Australia.

2 PROPOSED DEVELOPMENT

2.1 Site Location

The proposed Site of the Chandala BESS facility is within the Chandala Processing Plant, 722 Old Gingin Road, Muchea in the Shire of Chittering as shown in **Figure 1**. The Chandala Processing Plant is bounded by Brand Highway to the west and farmland to the east. A larger version of the site plan is included in **Appendix B**.

Figure 1 Proposed Chandala BESS Location



Source: SLR Consulting

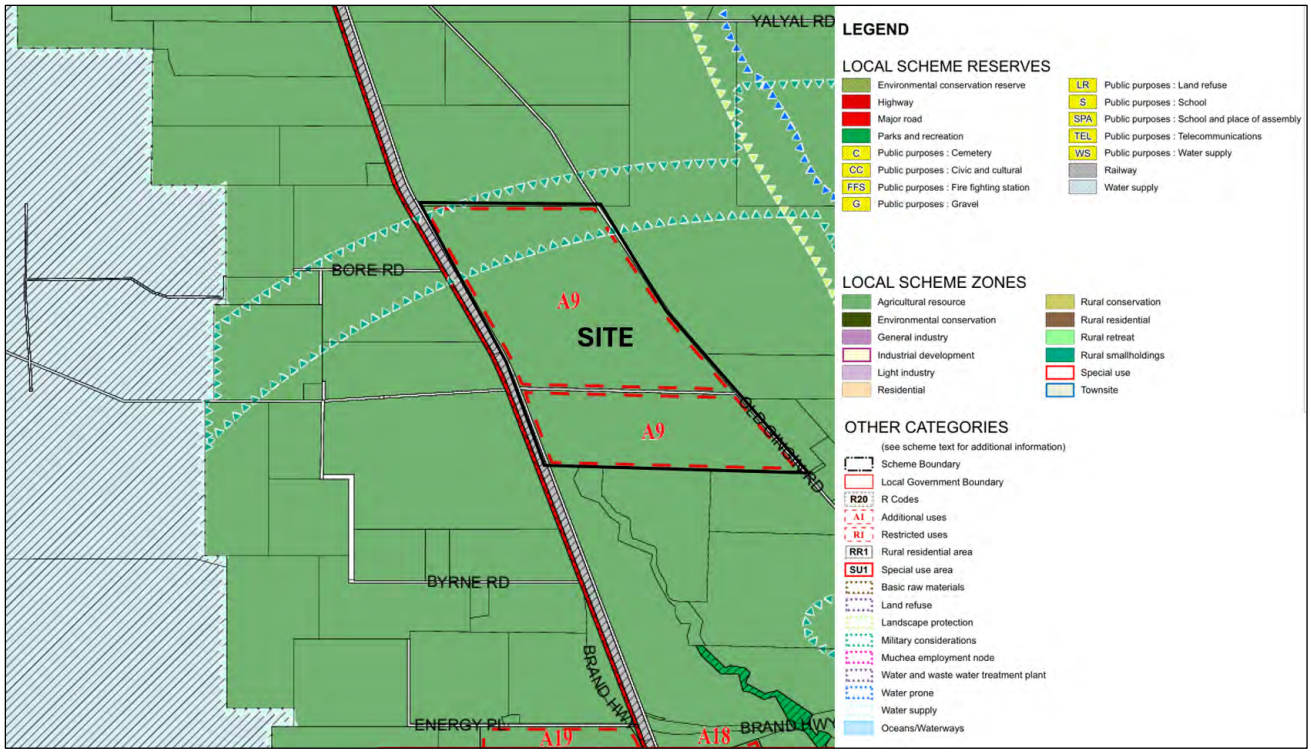
2.2 Existing Land Uses

The proposed Chandala BESS facility will be located in the old railway lines area in the south of the Site.

2.3 Context with Surrounds

Pursuant to the *Shire of Chittering Local Planning Scheme No. 6*, the lot where the Chandala BESS facility will be located is zoned '*Agricultural Resource*' with additional uses as shown in **Figure 2**. The Site is surrounded by other agricultural resource uses as well.

Figure 2 Context with Surroundings

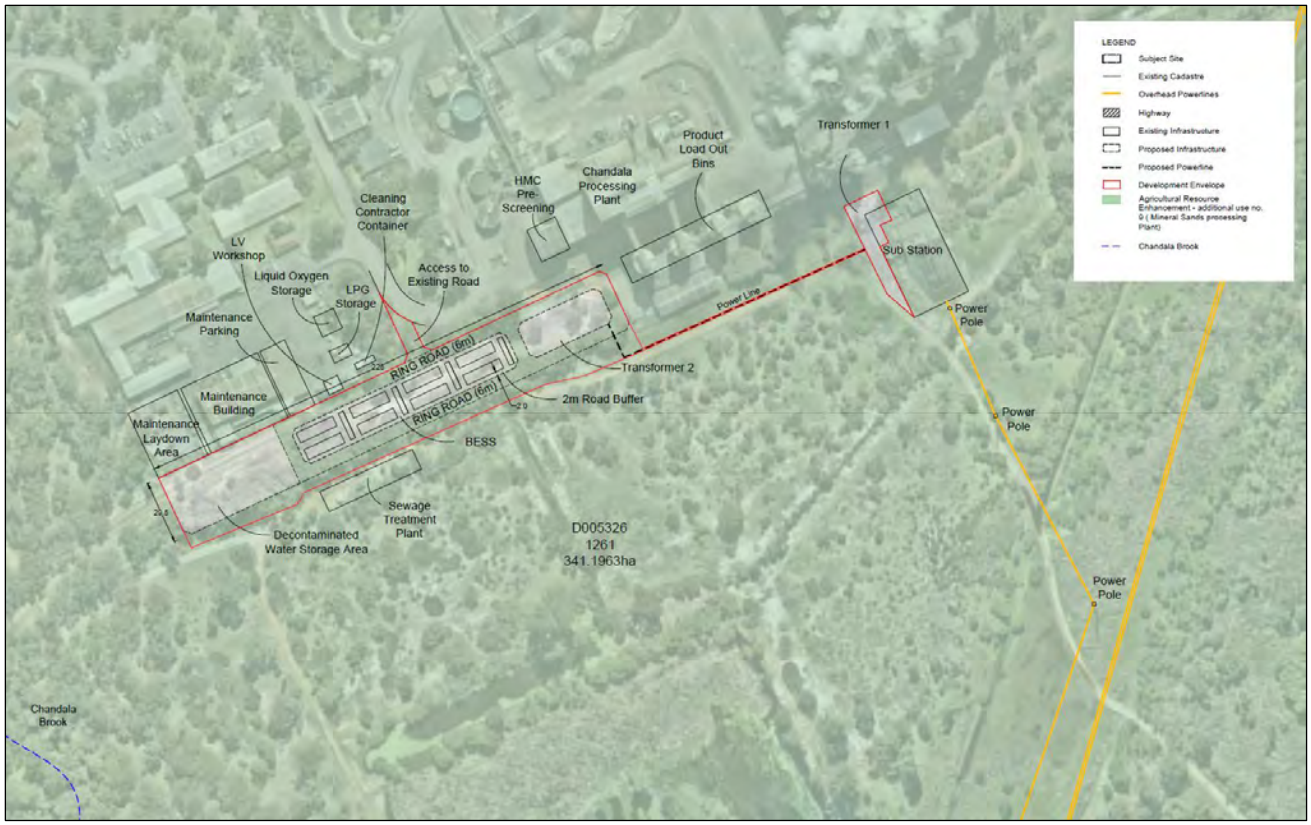


Source: Shire of Chittering Local Planning Scheme No. 6

2.4 Proposed Land Uses

The old railway lines area within the Chandala Processing Plant lot will be used as the location of the battery energy storage system (BESS). One (1) BESS location has been identified that will house four (4) modules. **Figure 3** shows the provisional location of the BESS, substation and the power line route.

Figure 3 Proposed Land Uses



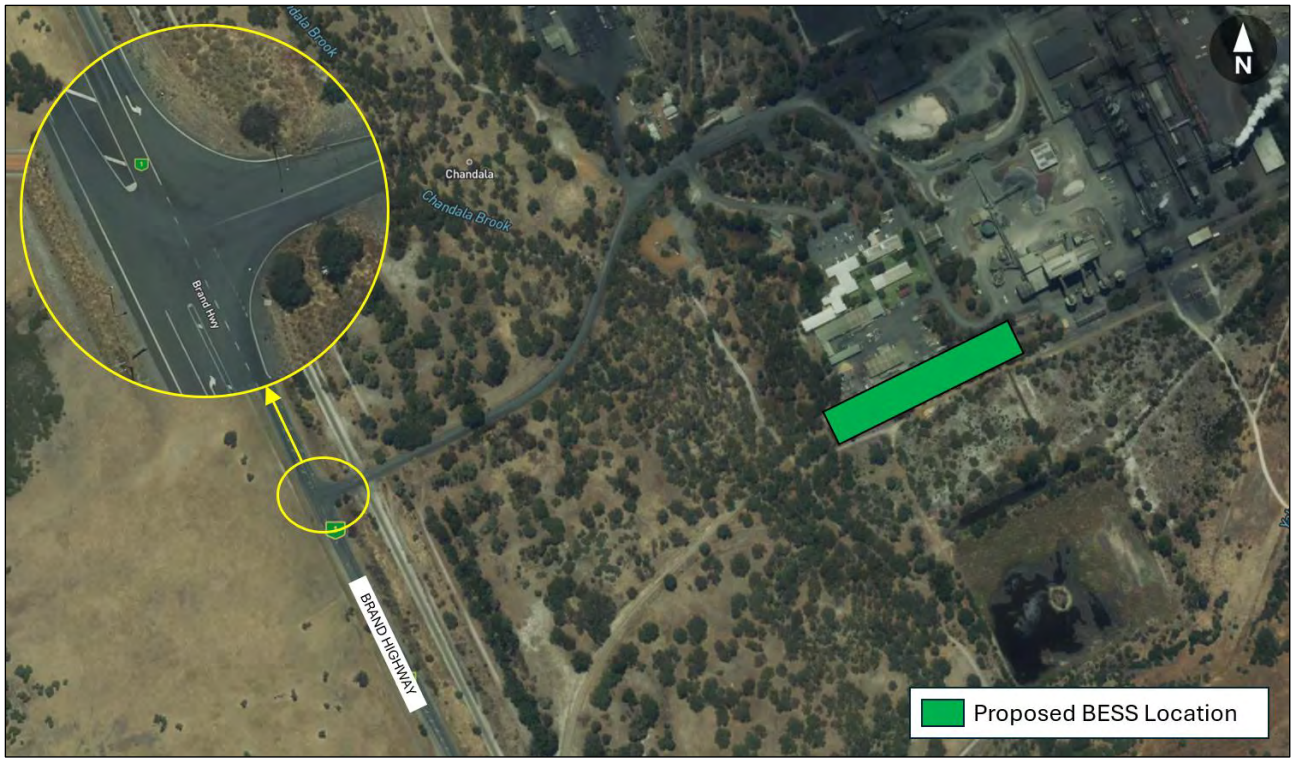
Source: SLR Consulting

3 VEHICULAR ACCESS AND PARKING

3.1 Access Arrangements

The proposed Chandala BESS facility can be accessed from the intersection of Brand Highway and the Site's access road as illustrated in **Figure 4**.

Figure 4 Access Arrangements



3.2 Public, Private, Disabled Parking Set Down/Pick Up

The statutory car parking requirements are outlined in the *Shire of Chittering Local Planning Policy No. 13 – Car Parking Requirements* and does not include a car parking requirement associated with a BESS facility. The scheme indicates:

"Where an application is made for planning consent and the purpose for which the land or building is to be used is not specified in Table 1, the Local Government shall determine the number of car parking bays to be provided, based on the number of employees and likely visitors to the site."

It is anticipated that 2-4 staff members would conduct scheduled maintenance once a month, and as such will produce an additional maximum traffic of two (2) light vehicles and one (1) truck during monthly visits. The existing car parking area within the Chandala Processing Plant will be utilised by the maintenance staff and is expected to accommodate the additional traffic.

4 SERVICE VEHICLES (NON-RESIDENTIAL)

4.1 Swept Path Analysis

A swept path analysis was undertaken for a 19m semi-trailer for the Chandala BESS facility. The 19m semi's will only access the site if there is any major maintenance with the BESS site which is likely to happen once a year. **Figure 5** illustrates the possible path of the service vehicle and no issues were observed regarding ingress, egress and circulation within the Site. It is anticipated that the existing trees will be removed once the BESS facility is operational to accommodate the vehicle's manoeuvre within the Site. A larger version of the swept path is included in **Appendix C**.

Figure 5 Swept Path – 19m semi-trailer

4.2 On/Off-Site Loading Facilities

On/off-site loading facilities will be located adjacent the BESS facility.

5 HOURS OF OPERATION

The Chandala BESS facility will operate 24 hours a day, seven (7) days a week.

6 TRAFFIC VOLUMES

6.1 Development Traffic Volumes

The anticipated traffic generation of the Chandala BESS facility has been determined based on information provided by the Client. During the operational stage, the maximum traffic generated by the facility is two (2) light vehicles and one (1) truck, associated with maintenance visits conducted by staff once a month. It is noted that BESS facilities are typically monitored remotely in real time and do not require on-site personnel at all times.

Table 1 shows the total number of vehicular trips the BESS facility will generate once a month.

Table 1 Trip Generation

Land Use	Source	Trips Generated Once a Month	
		IN	OUT
Battery Energy Storage System (BESS) facility	Client information	3 vehicle trips	3 vehicle trips
Total		6 vehicle trips	

The traffic generated during the construction phase and its impacts are excluded from the scope of this report and will be addressed in a separate report as necessary. Construction and Operational Traffic Management Plans will be prepared in consultation with Tronox Operations prior to the commencement of site operations.

6.2 Types of Vehicles

Based on the proposed land use, the main types of vehicles expected to access the facility will be private cars and trucks to conduct monthly maintenance. A 19m semi-trailer is anticipated to be used to deliver battery replacements from time to time.

7 TRAFFIC MANAGEMENT ON FRONTAGE STREETS

7.1 Existing Road Network and Traffic Management

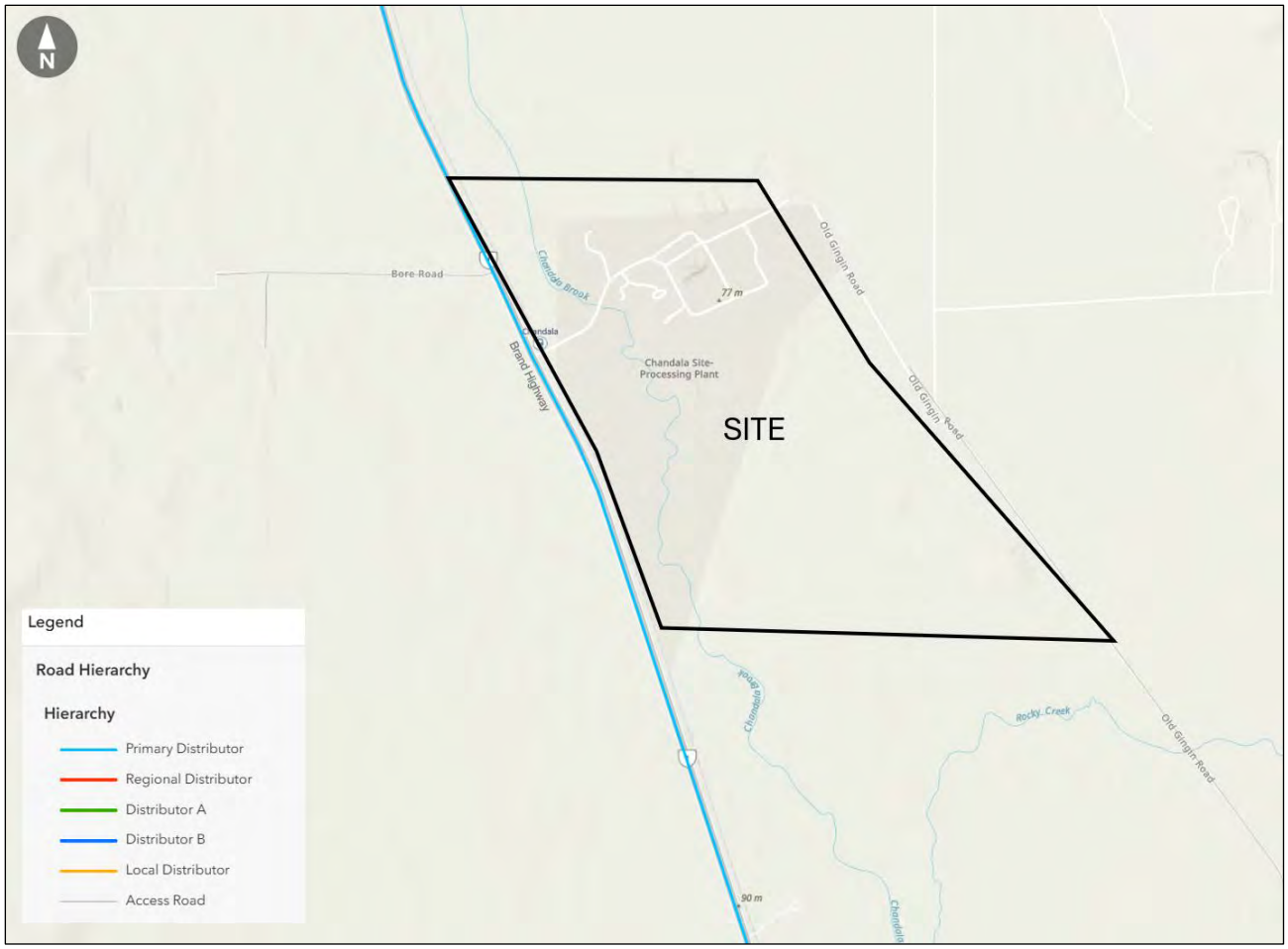
The road network within Western Australia is defined by Main Roads WA Road Hierarchy which describes the function, characteristic and management of each type of road. A description of each road type as per Main Roads WA Road Hierarchy criteria is summarised in **Table 2** below.

Table 2 Road Hierarchy Description

Road Type	Description
Primary Distributors	Provide for major regional and inter-regional traffic movement and carry large volumes of generally fast-moving traffic. Some are strategic freight routes, and all are State Roads. They are managed by Main Roads Western Australia (MRWA).
District Distributor A	Carry traffic between industrial, commercial and residential areas and generally connect to Primary Distributors. These are likely to be truck routes and provide only limited access to adjoining property. They are managed by local government.
District Distributor B	Perform a similar function to type A District Distributors but with reduced capacity due to flow restrictions from access to and roadside parking alongside adjoining property. These are often older roads with a traffic demand in excess of that originally intended. District Distributor A and B roads run between land-use cells and generally not through them, forming a grid which would ideally space them around 1.5 kilometres apart. They are managed by local government.
Regional Distributor	Roads that are not Primary Distributors, but which link significant destinations and are designed for efficient movement of people and goods within and beyond regional areas. They are managed by local government.
Local Distributor (Urban)	Roads that carry traffic within a cell and link District Distributors or Regional Distributors at the boundary, to access roads. The route of Local Distributors should discourage through traffic so that the cell formed by the grid of District Distributors only carries traffic belonging to or serving the area. These roads should accommodate buses but discourage trucks. Urban Local Distributor roads are managed by local government.
Local Distributor (Rural)	Connect to other Rural Distributors and to Rural Access Roads. Not Regional Distributors, but which are designed for efficient movement of people and goods within regional areas. Rural Local Distributor roads are managed by local government.
Access Roads	Provide access to abutting properties with amenity, safety and aesthetic aspects having priority over the vehicle movement function. These roads are bicycle and pedestrian friendly. They are managed by local government.

Figure 6 shows the road hierarchy network and Table 3 provides a summary of the road characteristics of the surrounding road network.

Figure 6 Road Hierarchy



Source: Main Roads WA Road Information Mapping System

Table 3 Surrounding Network Road Hierarchy

Road Name	Road Hierarchy	Jurisdiction	No. of Lanes	No. of Footpaths	Road Pavement Approximate Width (m)	Speed Limit (km/hr)
Brand Highway	Primary Distributor	MRWA	2-3	-	8.2-11.8	110

Source: Main Roads WA Road Information Mapping System & MetroMap

7.2 Traffic Flows on Surrounding Roads

Existing traffic volume data were obtained from Main Roads WA's Traffic Map at the location surrounding the Site shown in **Figure 7**. The daily traffic volumes are summarised in **Table 4**.

Figure 7 Traffic Data Location

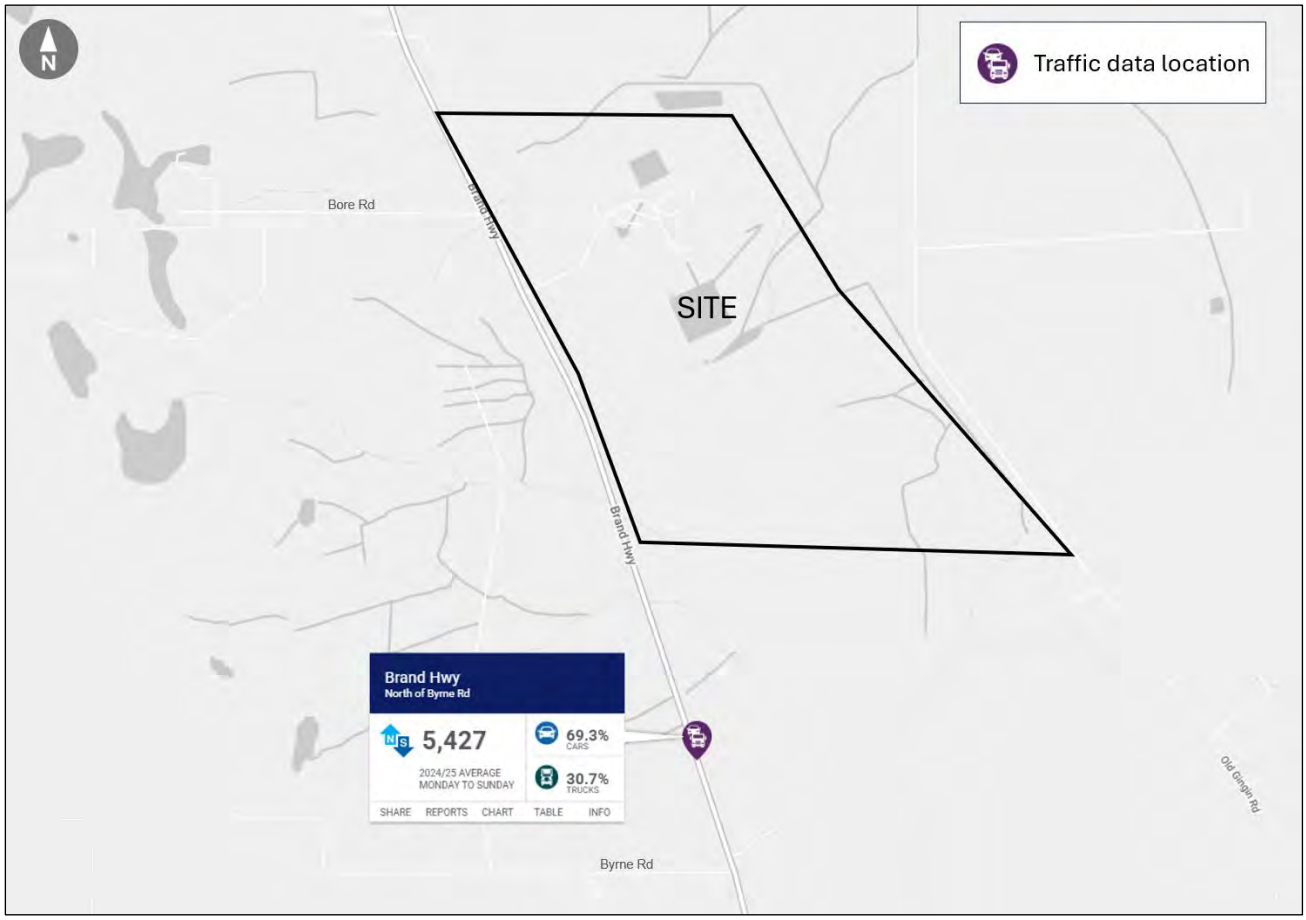


Table 4 Existing Traffic Volumes

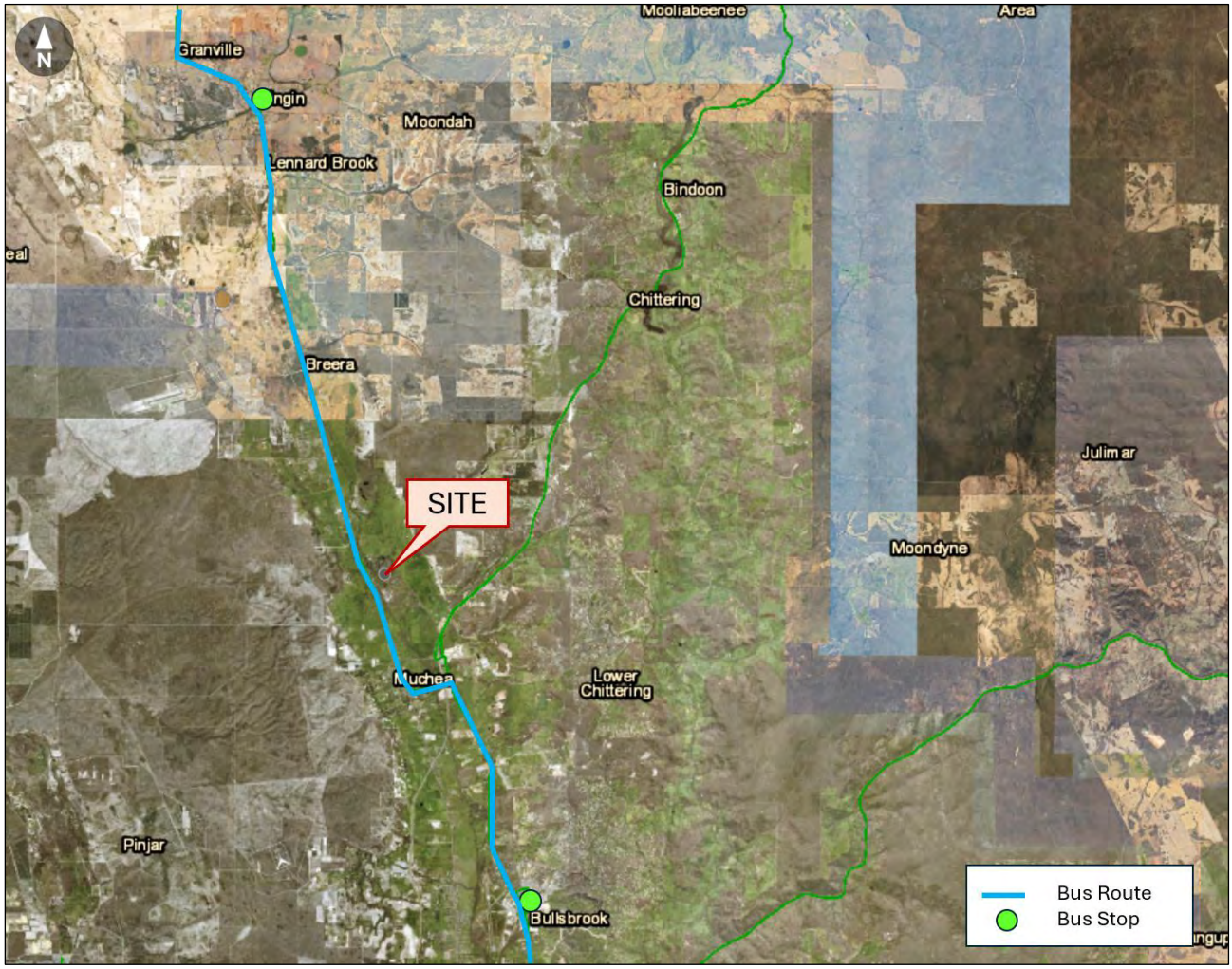
Road Name	Source	Date	AM Peak (vph)	PM Peak (vph)	Average Daily (vpd) (HV%)
Brand Highway (North of Byrne Road)	MRWA	2024/2025	390	427	5,427 (30.7%)

8 PUBLIC TRANSPORT ACCESS

8.1 Existing Public Transport Services

Figure 8 presents the route of the N1 coach line from East Perth to Kalbarri and Geraldton via Eneabba operated by TransWA which passes by the Site. **Figure 9** details the N1 coach line timetable as posted on the TransWA website.

Figure 8 Existing Bus Route



Source: Locate V5

Figure 9 N1 Timetable

Perth to Kalbarri via Eneabba
Perth to Geraldton via Eneabba

From Perth		879	GPE1
		Mon Wed Fri	Tue Thur Sat
		AM	AM
East Perth Terminal	Dep	8:30	8:30
Midland Station (Stand No. 10)	Dep	8:55	8:55
Bullsbrook (bus stop)	Dep	9:17	9:17
Gingin (Shire Office) ●	Dep	9:46	9:46
Cataby (Liberty Roadhouse)	Arr	10:43	10:43
	Dep	11:15	11:15
Badgingarra (information bay)	Dep	11:46	11:46
		PM	PM
Jurien Bay turnoff/Brand Highway (38km)*	Dep	12:00	12:00
Warradarge (Roadhouse)	Dep	12:14	12:14
Eneabba (Roadhouse) ●	Dep	12:37	12:37
Port Denison (Point Leander Drive)	Dep	1:34	1:34
Dongara (Visitor Centre)	Dep	1:39	1:39
Greenough (town site)	Dep	2:09	2:09
Cape Burney turnoff (1km)*	Dep	2.19	2.19
Geraldton (Railway Station)	Arr	2:30	2:30
	Dep	2:40	
Northampton (Lions bus shelter)	Dep	3:22	
Kalbarri (Motor Hotel)	Arr	4:55	

From Kalbarri/Geraldton		GPE2
		Mon to Sat
Kalbarri (Motor Hotel)	Dep	
Northampton (Lions bus shelter)	Dep	
Geraldton (Railway Station)	Arr	AM
	Dep	8:30
Cape Burney turnoff (1km)*	Dep	8.40
Greenough (town site)	Dep	8:50
Dongara (Visitor Centre) ●	Dep	9:20
Port Denison (Point Leander Drive)	Dep	9:25
Eneabba (Roadhouse) ●	Dep	10:22
Warradarge (Roadhouse)	Arr	10:45
	Dep	11:15
Jurien Bay turnoff/Brand Highway (38km)*	Dep	11:29
Badgingarra (information bay)	Dep	11:45
		PM
Cataby (Liberty Roadhouse)	Dep	12:15
Gingin (Shire Office)	Dep	1:11
Bullsbrook (bus stop)	Dep	1:40
Midland Station (Stand No. 10)	Dep	2:02
East Perth Terminal	Arr	2:30

Comfort stop

Wheelchair accessible toilet facilities available *(km) kilometres from townsite

● Road coach services will only divert to Dongara, Eneabba or Gingin if advance bookings are made

Amendments may apply on public holidays and during school holidays. Road coaches will only stop at other authorised stopping points if pre-booked.
Passengers are advised be ready to board 15 minutes prior to departure.

Source: TransWA

8.2 Nearest Bus Stops/Train Stations

No bus stops are found near the Site. However, the Site is located between the stops of the N1 coach line operated by TransWA as shown in **Figure 8.** The Gingin stop is situated 21.6km north of the Site and the Bullsbrook stop is located 16.5km south of the Site. However, it is very unlikely that maintenance staff will utilise public transport.

8.3 Pedestrian/Cycle Links to Bus Stops/Train Stations

No bus stops are observed near the Site, and no footpaths were identified along Brand Highway.

9 PEDESTRIAN AND CYCLE ACCESS/FACILITIES

9.1 Existing Pedestrian/Cycle Networks within the Development

No pedestrian/cycle Networks are present within the Chandala Processing Plant.

9.2 Proposed Pedestrian/Cycle Facilities within the Development

There are no proposed pedestrian and cycle facilities within the development.

9.3 Existing Pedestrian/Cycle Facilities on Surrounding Roads

No pedestrian footpaths and cycle facilities are provided along Brand Highway.

9.4 Proposals to Improve Pedestrian/Cycle Access

There are no known proposals to improve pedestrian/cycle access in the vicinity of the Site in the short to medium-term.

10 SITE SPECIFIC ISSUES

There are no Site-specific issues identified within this assessment.

11 SAFETY ISSUES

11.1 Crash Assessment

A crash assessment for the surrounding road network of the Site has been completed using Main Roads WA Reporting Centre. The assessment covers all the recorded crashes for the 5-year period between 1 January 2021 to 31 December 2025.

The crash locations and severity of these crashes are illustrated in **Figure 10**. A summary of all crashes that occurred within the vicinity of the Site is provided in **Table 5**.

Figure 10 Crash Locations

Source: Main Roads WA Reporting Centre

Table 5 Total Crashes

Crash Nature	Fatal	Hospital	Medical	PDO Major	PDO Minor	Total Crashes
Right Turn Thru	-	-	-	1	-	1
Sideswipe Same Direction	-	-	-	1	-	1
Unspecified	-	-	-	1	-	1
Total	-	-	-	3	-	3

Crash data is summarised as follows:

- A total of three (3) crashes were recorded along Brand Highway, with no fatal crashes recorded.
- The recorded crashes had different causes, but all resulted in major property damage.
- All crashes occurred at the midblock and none at the intersection.

Overall, given the low expected traffic generation, it is unlikely that the proposed development will have a significant impact on road safety in the area.

11.2 Stopping Sight Distance

According to *Austroads Guide to Road Design Part 4: Intersections and Crossings (AGRD Part 4)*, the sight distance requirements for railway level crossings depend on the type of crossing control. As the subject crossing is actively controlled by flashing lights, the sight distance requirements in AGRD Part 4 do not apply.

For actively controlled crossings, the key requirement is that drivers have adequate sight distance to see the signals. Therefore, the approach sight distance requirements in *Austroads Guide to Road Design Part 4A: Unsignalised and Signalised Intersections (AGRD Part 4A)* should be achieved.

The approach sight distance (ASD) for trucks to stop safely at a railway level crossing with active control (i.e. flashing lights) is determined in accordance with the provisions of AGRD Part 4A which says: "*Approach sight distances for trucks are numerically the same as the stopping sight distance (SSD) values for trucks provided in Austroads Guide to Road Design Part 3: Geometric Design (AGRD Part 3).*"

Figure 11, from AGRD Part 3, shows the corresponding SSD based on the truck's operating speed and driver reaction time. Considering that the truck will slow down at the slip lane along Brand Highway with an adopted operating speed of 60 km/h and using a reaction time of 2.5 seconds, the SSD is 91 metres. It is noted that the internal road has a posted speed limit of 40 km/h. Therefore, the stopping sight distance assessment is conservative.

As shown in **Figure 12**, the required stopping sight distance of 91m is accommodated within the slip lanes along Brand Highway and at the access road to the Site. This means that drivers are provided with sufficient visibility to detect the railway level crossing, perceive any warning devices and stop safely before reaching the tracks. Warning signage are also posted along Brand Highway to inform drivers of the upcoming railway crossing.

Figure 13 and **Figure 14** present the Street View images from the driver's position at the 91m stopping sight distance. **Figure 13** shows that the flashing light signals are clearly visible within the required sight triangle, confirming that the available sight distance is adequate. **Figure 14** shows that although some trees are located within the sight triangle, gaps in between the trees allow the flashing light signals to remain visible to the driver from this location.

Figure 11 Truck Stopping Sight Distances

Operating speed (km/h)	Single unit trucks, semi-trailers and B-doubles Based on $d = 0.29$[1]							
	R_T = 1.5 s[2]					R_T = 2.0 s		R_T = 2.5 s
40	38					44		49
50	55					62		69
60	74					82		91
70	96					105		115
80	120					131		142
90	147					160		172
100	–					191		205
110	–					225		241
Corrections due to grade [3] [4]	**–8%**	**–6%**	**–4%**	**–2%**	**2%**	**4%**	**6%**	**8%**
40	8	6	3	2	–1	–3	–4	–5
50	13	9	5	3	–2	–4	–6	–7
60	19	13	8	4	–3	–6	–8	–11
70	25	17	11	5	–4	–8	–11	–14
80	33	23	14	6	–6	–11	–15	–19
90	42	29	18	8	–7	–13	–19	–24
100	52	35	22	10	–9	–16	–23	–29
110	63	43	26	12	–11	–20	–28	–36

1 *On any horizontal curve with a side friction factor greater than the desirable maximum value for trucks, the stopping sight distance values given should be based on a coefficient of deceleration that is reduced by 0.05.*
2 *Reaction times of 1.5 s cannot be used in Western Australia. A 1.5 s reaction time is only to be used in constrained situations where drivers will be alert. Typical situations are given in Table 5.2. The general minimum reaction time is 2.0 s.*
3 *If the roadway is on a grade, designers shall adjust stopping sight distance values by applying these grade corrections derived with d = 0.29. Downhill grades are shown as negative, with uphill listed as positive. The grade adopted is determined using the average grade over the braking length.*
4 *Corrected stopping sight distances should be rounded conservatively to the nearest 5 m.*

Note: Combinations of design speed and reaction times not shown in this table are generally not used.

Source: Austroads Guide to Road Design Part 3: Geometric Design

Figure 12 Stopping Sight Distances and Warning Signage at Brand Highway and Railway Crossing

Figure 13 Driver's View of the Flashing Lights at 91m Stopping Sight Distance (at the north approach of Brand Highway)

Source: Metromap

Figure 14 Driver's View of the Flashing Lights at 91m Stopping Sight Distance (at the south approach of Brand Highway)

Source: Metromap

11.3 Remedial Measures

No remedial measures are proposed as no safety issues were identified.

12 SUMMARY AND CONCLUSIONS

This report has been prepared in accordance with the Western Australian Planning Commission (WAPC) Transport Assessment Guidelines for Developments: Volume 4 – Individual Developments (2016); the checklist is included in Appendix A.

The following conclusions can be drawn from this TIS:

- The Site is proposed to be located at the Chandala Processing Plant, 722 Old Gingin Road, Muchea within the Shire of Chittering.
- The proposed Chandala BESS facility will store a total of four (4) modules.
- The anticipated traffic generation during the operational phase of the BESS facility is three (3) inbound vehicle trips and three (3) outbound vehicle trips, occurring only once a month for scheduled maintenance visits by staff. The traffic generated during the construction phase and its impacts are excluded from the scope of this report and will be addressed in a separate report as necessary.
- Construction and Operational Traffic Management Plans will be prepared in consultation with Tronox Operations prior to the commencement of site operations.
- The *Shire of Chittering Local Planning Policy No. 13* does not include a car parking requirement associated with a BESS facility. Based on the anticipated traffic generation of two (2) light vehicles and one (1) truck during the BESS operations, the existing car parking area within the Chandala Processing Plant is considered sufficient to accommodate the additional traffic.
- TransWA's N1 coach line passes by the Site. However, no bus stops are found near the Site. The Gingin stop is situated 21.6km north of the Site and the Bullsbrook stop is located 16.5km south of the Site. However, it is very unlikely that maintenance staff will utilise public transport.
- A swept path analysis was conducted using a 19m semi-trailer. It was demonstrated that the service vehicle will have no issues regarding ingress, egress and circulation of the service vehicle within the Site.
- A total of three (3) crashes were recorded within the vicinity of the Site over the past five years, with all crashes resulting in major property damage.

Overall, it is not expected that the proposed development will have an adverse impact on road safety or traffic operations in the surrounding area.

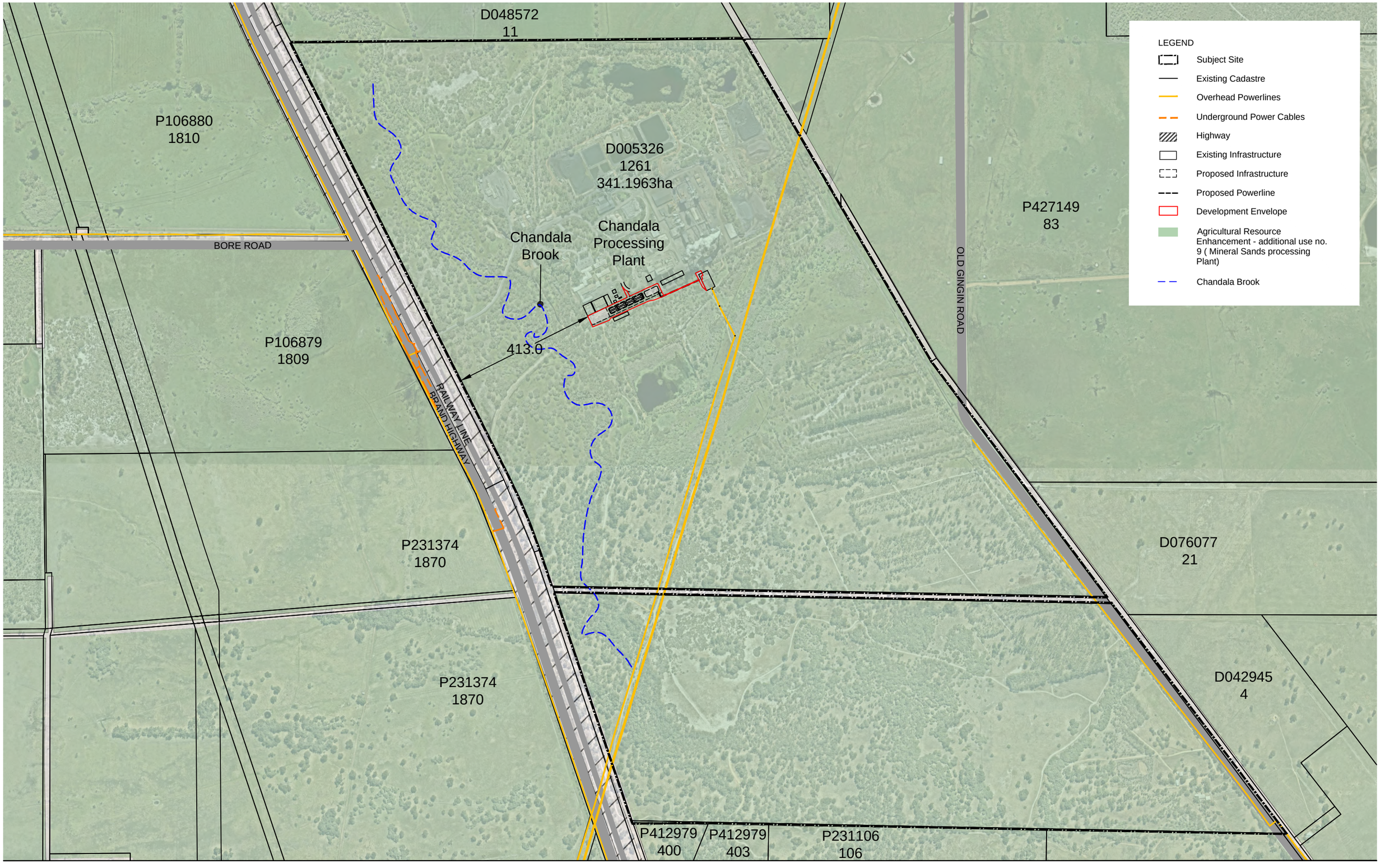
Appendix A

WAPC CHECKLIST

Item	Status	Comments/Proposal
Proposed Development	**Section 2**	
existing land uses	Section 2	
proposed land uses	Section 2	
context with surrounds	Section 2	
Vehicular access and parking	**Section 3**	
access arrangements	Section 3	
public, private, disabled parking set down/pick up	Section 3	
Service vehicles (non-residential)	**Section 4**	
access arrangements	Section 4	
on/off-site loading facilities	Section 4	
Hours of Operation (non-residential only)	**Section 5**	
Traffic Volumes	**Section 6**	
daily or peak traffic volumes	Section 6	
type of vehicles (e.g. cars, trucks)	Section 6	
Traffic management on frontage streets	**Section 7**	
Public transport access	**Section 8**	
nearest bus/train routes	Section 8	
nearest bus stops/train stations	Section 8	
pedestrian/cycle links to bus stops/train station	Section 8	
Pedestrian and Cycle access/facilities	**Section 9**	
existing pedestrian and cycle facilities within the development (if any)	Section 9	
proposed pedestrian and cycle facilities within the development	Section 9	
existing pedestrian and cycle facilities on surrounding roads	Section 9	
proposals to improve pedestrian and cycle access	Section 9	
Site specific issues	**Section 10**	
Safety issues	**Section 11**	
identify issues	Section 11	
remedial measures	Section 11	
Summary	**Section 12**	

Appendix B

SITE PLAN



Site 4 - Local Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

0 200m

Date: 20 Jul 2026 Scale: 1:10000 @ A3 1:5000 @ A1 File: **675.07369 CP01A** Staff: JK GW Checked: CW

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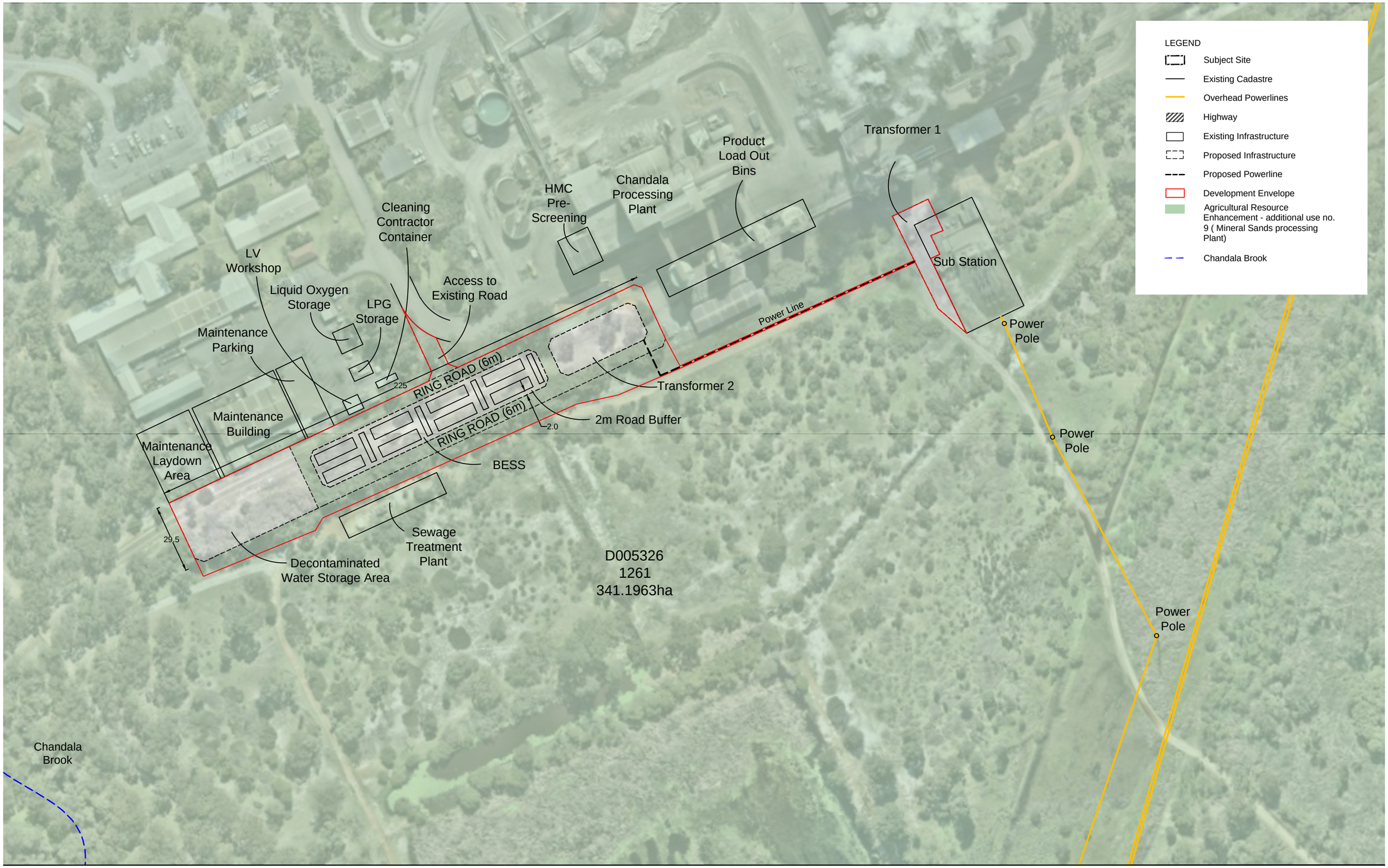

Site 4 - Site Context

Lot 1261 (No. 722) Old Gingin Road, Muchea

0 100m

Date: 20 Jul 2026 Scale: 1:1500 @ A3 1:750 @ A1 File: **675.07369 CP01A** Staff: JK GW Checked: CW

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Appendix C

SWEPT PATH

4.20
13.70
1.40
9.50
0.20
1.60
5.30
PM S 19M
meters
Tractor Width : 2.50
Trailer Width : 2.50
Tractor Track : 2.50
Trailer Track : 2.50
Lock to Lock Time : 6.0
Steering Angle : 27.8
Articulating Angle : 70.0

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Report

Bushfire Management Plan (Renewables)

LOCATION: TRONOX (CHANDALA) BESS FACILITY

ADDRESS: 722 (LOT M1261) OLD GINGIN ROAD, MUCHEA WA

Project Ref 264527/ N26-0211 Issue C

3 August 2026

DOCUMENT ISSUE APPROVAL

Project Title:	Bushfire Management Plan (Renewables)
Project Location:	Tronox (Chandala) BESS Facility
Project Address:	722 (Lot M1261) Old Gingin Road, Muchea WA
Project No:	264527
Report No:	N26-0211
Issue:	C
Date:	3 August 2026
Distribution:	Client
	Covey Associates

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Author:

Linden Wears
Senior Bushfire Engineer

BSc, GradDip (Fire Safety Eng.), GradDip (Bushfire Protection)
BPAD Level 3 Accredited Bushfire Practitioner

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1 Introduction

1.1 Proposed Development

A Battery Energy Storage System (BESS) facility and associated infrastructure at Lot 1261 (No.722) Old Gingin Road, Muchea is lodging a development application (DA) for development within the existing Tronox Chandala Processing Plant (the subject site).

This project constitutes part of the Tronox Decarbonisation Project, which seeks to develop an environmentally friendly and cost-effective power system for the synthetic rutile process.

The proposed BESS development is expected to include the following infrastructure (see Figure 1-1):

- ***Battery Energy Storage System (BESS)***
    - 4 BESS modules expected to store up to 38 MW/322MWh each
        - Each BESS module contains 8 DC containers and 1 AC skid
    - The BESS modules will be a centralised BESS arrangement occupying approximately 15 m x 105 m area within the nominated BESS compound (29.5 m x 225 m) is located on the southern side of the existing Chandala facility.
- ***Transformers***
    - Addition of up to two transformers as follows:
        - A new transformer co-located with the proposed BESS (Transformer 2)
        - A new transformer (Transformer 1) located next to the existing switchyard, located 180 m east of the BESS compound.
    - Both transformers are expected to be designed and constructed in accordance with relevant Australian Standards.
- ***Internal roads***
- ***Fencing***
- ***Firewater infrastructure***
    - Likely to be extended to BESS compound from existing onsite hydrant system

There are no buildings proposed as part of the proposed BESS development, and there will be no staff required for the operation BESS. Any attendance to the BESS is to be for routine maintenance and any troubleshooting or repairs, and would be conducted by specialist contractors or existing Tronox staff.

The existing facility is manned 24 hours a day, 7 days a week, and there is expected to be Tronox staff at the plant at all times.

1.2 Site description

The proposed BESS is to be sited in the southern portion of existing Chandala facility, which forms a part of the processing sequence that Tronox implements to turn raw mineral sands into finish products (zircon, rutile, leucoxene and activated carbon). The Chandala facility includes three major plants: a dry mill, which separates the minerals; a synthetic rutile plant, which upgrades ilmenite into high-quality synthetic rutile; and a residue management plant. Additionally, there is also a number of administration, maintenance and support buildings and areas that form the existing facility.

The existing facility predominantly occupies the north-eastern portion of Lot M1261, with the following infrastructure also noted onsite:

- Existing switchyard along the southern part of the existing facility
- Existing Western Power owned transmission lines extend from the switchyard, to the north-east and south-west within a 20-25 m easement
- Existing railway extending from silos on the southern part of the existing facility, west and then south-west to the existing railway running parallel with the Brand Highway (but doesn't appear to connect to this railway line)
    - This onsite railway has not been used for over 20 years and has been disconnected from the main railway in excess of 10 years
    - The onsite railway is associated with an existing easement, however is not fully sited within the easement, especially at the subject site.

The proposed BESS compound and Transformer 2 is located immediately south of the existing maintenance buildings, partially over the existing railway line, in an area that isn't cleared of vegetation other than the old railway line. Most land within the subject site, and surrounding it to the south-west, south and east, is forest or scrub vegetation. Land to the north is primarily existing non-vegetated buildings, infrastructure and roads, or managed landscaping.

Transformer 1 is proposed within the existing switchyard, and this site is currently cleared of vegetation, and surrounded by grassland, scrub and forest vegetation.

Slopes across the site appear to be shallow (less than 5 degrees) and descending from the slightly higher existing facility, to lower lying areas to the south and west.

Public road access to the existing site is largely via the main entrance to the facility from Brand Highway to the west. This entrance road provides access to the main administration area, but also extends into the existing facility through security-controlled entrances.

Additionally, there is an alternative vehicular access from Old Gingin Road to the east, however this is connected to the existing facility by narrower unsealed track, and is generally rarely used (see Figure 1-2).

Internal vehicular access within the Chandala facility is currently via existing sealed and unsealed roads, which are used by a variety of light and heavy vehicles.

There is no known reticulated town main water supply currently provided to the existing site, nor is there any existing street hydrants. The site has an existing fire hydrant system that serves the majority of the plant and administration areas, that includes:

- 1 combined process/firewater tank
    - Overall capacity of up to 1735 kL, but currently kept to 60% of this (approximately 1041 kL)
    - 415 kL of overall capacity is kept as firewater reserve at the bottom of tank
- 2 fire pumpsets to two fire hydrant ring mains as follows:
    - Mineral Separation Plant (MRP) ring main
    - Synthetic Rutile Plant (SRP) ring main
- Fire hydrants and fire hose reels off each ring main, providing coverage of the existing facility

In addition to the fixed firewater systems, the existing facility has the following onsite fire appliances:

- 1 Fire Truck with 3000 L tank, rear mount pump, fire branches and hoses, and various firefighting and communication equipment.

- 1 Light Fire Tanker (4WD) with 800 L tank, small pump, hose reel, extinguishers, and various firefighting and communication equipment.
- 1 Mobile Fire Trailer, with 500 L tank and small pump and hose reel; and
- 1 Emergency Response Vehicle with fire branches and hoses, and various firefighting and communication equipment.

1.3 Purpose

1.3.1 Current Bushfire Regulatory Requirements

The entire subject site is currently designated as bushfire prone (Area 2) as per the *Map of Bush Fire Prone Areas* (DFES 2026; see Figure 1-3), however as no habitable buildings are proposed as part of this DA, there is no trigger to assess the proposal against '*State Planning Policy 3.7: Bushfire*' (SPP 3.7; Western Australian Planning Commission (WAPC) 2024) and the WA '*Planning for Bushfire Guidelines For the implementation of State Planning Policy 3.7 Bushfire*' (the WA PBG; WAPC 2024).

Application of SPP3.7 and the WA PBG is only required for "habitable buildings" as defined in WA Planning Regulations, in addition to hazardous, flammable and/or combustible materials associated with the development, however the proposed renewable energy infrastructure (e.g. BESS and transformers) is not considered "habitable building", therefore assessment is not triggered.

The following is also noted for renewable energy facilities:

- As compliance with SPP 3.7 and the WA PBG isn't triggered for proposed renewable energy infrastructure, there is no statutory requirement for this infrastructure to comply with any specific requirements.
- The Department of Planning, Lands and Heritage (DPLH) are currently in the process of drafting a WA Renewable Code and Guidelines, which is expected to address wind, solar, BESS and transmission infrastructure, however at this time, they have only produced a draft of these documents for wind farms which is not applicable to this project. The timing of the preparation and release of these documents is currently unconfirmed.
- The Western Australian Planning Commission (WAPC) have previously released a Position Statement on Renewable Energy Facilities (principally for wind turbine and solar array systems), and while not specifically applicable to this project, it does provide the following high-level guidance:
    - The objectives of the position statement include facilitate appropriate development of renewable energy facilities while minimising any potential impact upon the environment, natural landscape, and urban areas
    - Wind turbines and solar arrays in bushfire prone areas should be designed and maintained so they are not a bushfire risk to surrounding bushland, and where possible should not be in bushfire prone areas with an 'extreme' bushfire hazard level or bushfire attack level (BAL) - 40 or BAL- Flame Zone.
    - A minimum 10 metres clearance to combustible vegetation in the form of an Asset Protection Zone (APZ) is recommended, which should be managed in a low threat state, in accordance with the WA PBG.
- Current referral advice typically provided by DFES is that strict compliance is unlikely to be required or achieved with SPP 3.7 and the WA PBG, however application of the Country Fire Authority (CFA) *Design Guidelines for Renewable Energy Facilities v4.4* (the CFA Renewable Guidelines; CFA 2025) from Victorian fire brigade, currently provides the best design guidance for renewable energy facilities at this stage.

  - It is noted that the CFA Renewable Guidelines currently has no formal status in WA through SPP 3.7 and the WA PBG.
- The Shire of Chittering (the Shire) currently doesn't have any Local Planning Policies applicable to BESS development.

1.3.2 Project Bushfire Compliance and Reporting Approach

Based on the regulatory requirements detailed in Section 1.3.1, the following bushfire assessment and reporting approach is proposed:

- As there are no buildings proposed as part of the DA, nor are Covey aware of any Local Planning Policies or other planning instruments that trigger assessment of bushfire risk to the proposed BESS development, there is no requirement to produce bushfire reporting to accompany the DA.
- Voluntary assessment and mitigation of the bushfire risk to the development given the importance of bushfire risk in the proposed location;
- To address the above, Covey proposes voluntary adoption of the CFA Design Guidelines, documented in this Bushfire Management Plan, to:
  - Guide the development of the proposed bushfire risk management strategy and mitigation measures for the renewable energy infrastructure, and
  - Provide a technical benchmark with which to establish that bushfire risk has been managed to appropriate level for renewable energy infrastructure, noting the following:
    - The CFA Design Guidelines are a Victorian publication, and where relevant, Western Australian standards and specifications will be adopted
    - Aspects of the CFA Design Guidelines are aimed at both onsite infrastructure fires and bushfire risk management, and while Covey is primarily addressing the bushfire-relevant requirements of the CFA Design Guidelines, managing the potential for onsite renewable energy infrastructure fire to limit the opportunity for bushfire ignition and escape is also considered important part of bushfire risk management.

The focus of this BMP is to apply and demonstrate voluntary compliance of the proposed renewable energy infrastructure with the Model Requirements of the CFA Renewable Guidelines.

- *Covey notes that this BMP doesn't seek to achieve strict compliance with the Model Requirements of CFA Design Guidelines, but in lieu of any other detailed design guidance, use of it to provide a framework for bushfire assessment with some technical benchmarks to inform the bushfire risk management strategy for renewable energy infrastructure. Notwithstanding, where deviations have been made from the concepts of the CFA Design Guidelines, this has been justified in this BMP.*

1.4 Other plans/reports

There are no known bushfire reports or assessments that have been prepared previously for the subject site.

Covey note that the following reports accompany this DA submission:

- Environmental assessment reports
- Noise assessment reports

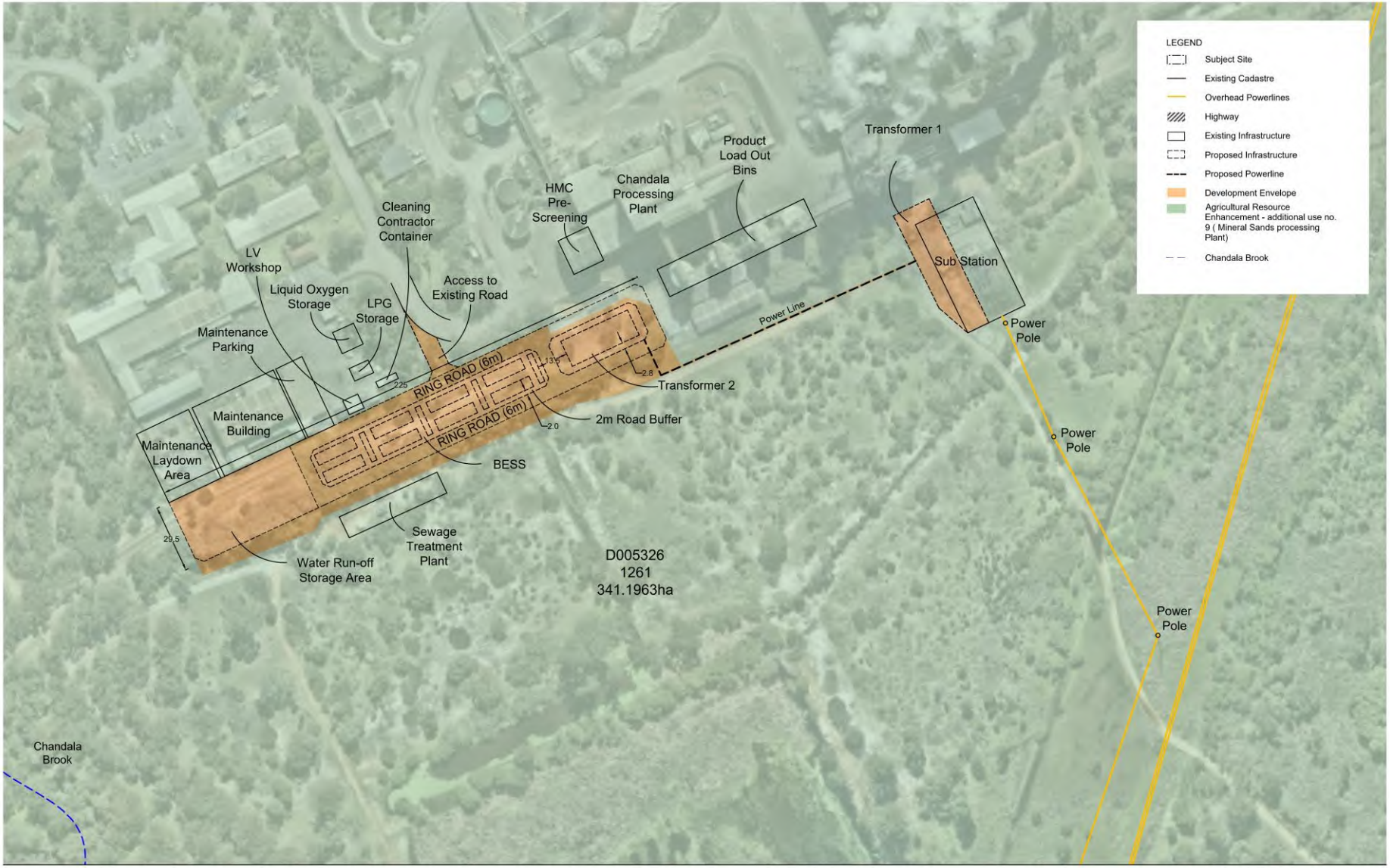

Figure 1-1. Development Layout

Legend

Mitigation Measures

- Existing Fire Hydrant System Infrastructure
- Proposed Development

Internal Road

- Internal Road
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre

0 90 180 270 Metres

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Tronox (Chandala) - BESS Facility

Site Overview

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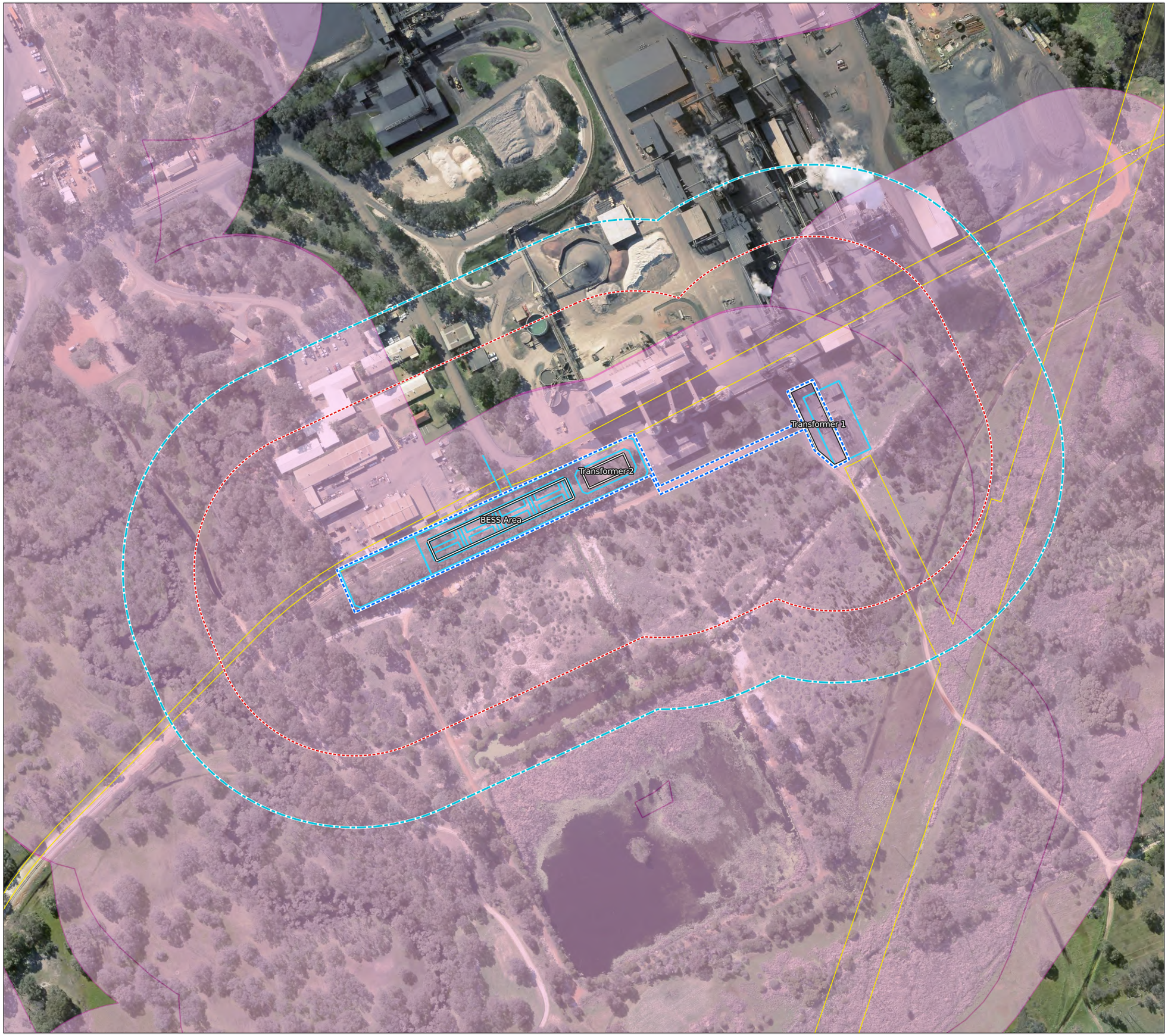

Legend

- Proposed Development
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Bushfire Prone Area 2

0 40 80 120 Metres

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Tronox (Chandala) - BESS Facility

Designated Bushfire Prone Areas

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2 Environmental Considerations

2.1 Native vegetation - modification and clearing

The proposed development is expected to require clearing of vegetation to enable construction of BESS infrastructure and implementation of the nominated Asset Protection Zones.

Covey understands that an Environmental Consultant to review the impacts of the proposal on environmental values and address under relevant legislation.

Notwithstanding, Covey assumes that all relevant environmental and heritage studies will be conducted, and that all required environmental and heritage approvals will be obtained prior to commencing any on-site vegetation modification or clearing required to construct the development or implement the onsite Asset Protection Zones.

2.2 Revegetation / Landscape Plans

No revegetation is proposed within the bushfire assessment areas, however some revegetation is proposed in the southern portion of the property as part of environmental obligations associated with the project.

All vegetation modification and management are to be conducted in accordance with the requirements detailed in Section 5.2 of this BMP, including compliance with the APZ standards from the WA PBG (see Appendix B) and requirements for low threat vegetation and managed landscaping in accordance with AS 3959 Clause 2.2.3.2 (f) (see Appendix C).

3 Bushfire assessment

Although no buildings are proposed as part of this DA, the suitability of the proposed renewable energy infrastructure siting from a bushfire risk perspective, is best assessed through use of a BAL assessment to achieve target BAL ratings (or target radiant heat flux).

On this basis, this section details the post-development vegetation and BAL contour mapping for the proposed renewable energy infrastructure.

3.1 Assessment inputs

3.1.1 Vegetation classification

Covey assessed classified vegetation and exclusions within 150 m of the subject site through on-ground verification, conducted on 17 June 2026 in accordance with *AS 3959—2018 Construction of Buildings in Bushfire-Prone Areas* (AS 3959; SA 2018) and the *Visual Guide for Bushfire Risk Assessment in Western Australia* (DoP 2016).

Georeferenced site photos and a description of the vegetation classifications and exclusions are contained in Appendix A and Table 1 and depicted on Figure 3-1.

3.1.2 Effective Slope

Covey assessed effective slope under classified vegetation through on-ground verification on 17 June 2026 in accordance with AS 3959. Results were cross-referenced with 2 m contour data depicted on Figure 3-1, and are summarised in Table 1.

Site observations near the BESS and new transformer areas were that land is elevated to the north and north-west was relatively flat, and descends to the west, south and south-east, resulting in classified vegetation having an assessed effective slope of downslope 0° – 5°.

3.1.3 Summary of Inputs

Table 1 summarises the anticipated post-development vegetation classifications and exclusions within 150 m of the proposed BESS compound and transformers, following completion of development works and implementation of Asset Protection Zones. The post-development vegetation classifications/exclusions and effective slope are illustrated on Figure 3-1.

Table 1: Post-development vegetation classifications/exclusions and effective slope (within 150 m of BESS compound & Transformers)

Vegetation plot	Vegetation classification	Effective slope	Comments
1	Class A Forest	Downslope >0–5°	Trees greater than 6 m high at maturity (and often 10-30 m), dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey.
2	Class D Scrub	Downslope >0–5°	Scrub vegetation, generally between 2 m and <6m high, generally associated with banksia woodland south of the subject site.

Vegetation plot	Vegetation classification	Effective slope	Comments
3	Class C Shrubland	Downslope >0–5°	Shrubland vegetation <2 m high, typically associated with reeds in low-lying drainage areas south of the subject site.
4	Class G Grassland	Downslope >0–5°	Unmanaged grassland >100mm in height
5	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	Existing non-vegetated land, including buildings, infrastructure, roads and carparks.
6	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing managed low threat landscaping within the facility, and including non-vegetated elements such as paths.
7	Excluded – Low threat (Clause 2.2.3.2 [f])	N/A	Existing low threat landscaping that is located within the proposed APZ, and will be subject to some modification and management to comply with APZ standards for the operational life of the project.
8	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	Existing vegetation within the BESS compound and the surrounding 10 m in addition to Transformer 2 pad and proposed new internal road, that is to be established and maintained in a non-vegetated state for the operational life of the project.
9	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	Existing vegetation within the BESS compound, Transformer 1 and 2 APZs, but further than 10 m the BESS compound and not within Transformer pads, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

3.2 Assessment outputs

3.2.1 Bushfire Attack Level (BAL) contour assessment

The BAL rating gives an indication of the level of bushfire attack (i.e. the radiant heat flux) that may be received by proposed future development and subsequently informs the standard of construction and/or setbacks required for the proposed development to potentially withstand such impacts.

Covey has undertaken a BAL contour assessment in accordance with Method 1 of AS 3959 for the BESSand transformer envelopes (see Figure 3-2).

The Method 1 procedure was conducted for all plots, with the methodology incorporating the following factors:

- state-adopted FDI 80 rating;
- vegetation classification;
- effective slope; and,
- distance maintained between proposed development areas and the classified vegetation.

The BAL contours are based on:

- the vegetation classifications and effective slope observed at the time of inspection; and,
- the anticipated post-development vegetation based on proposed on-site clearing extent, and resultant vegetation exclusions and separation distances, achieved to implement the proposed development and nominated Non-Vegetated Zones and Asset Protection Zones.

The results of the BAL contour assessment are detailed in Table 2 and illustrated in Figure 3-2.

Table 2: BAL contour assessment results (to proposed BESS compound & Transformers)

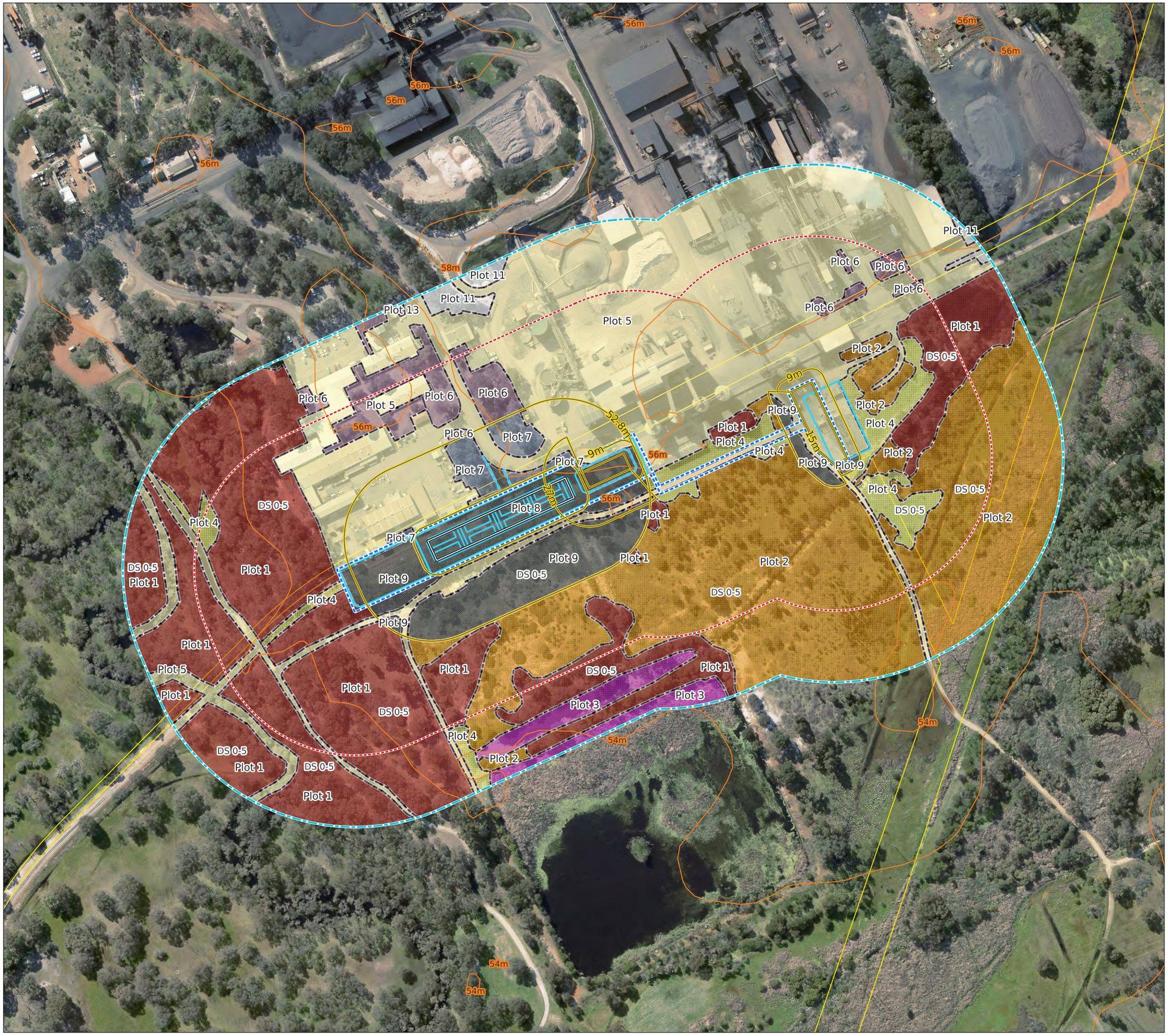
Plot	Vegetation classification	Effective slope	Calculation method	Separation (m)	BAL
1	Class A Forest	Downslope >0–5°	Method 1	33.5 m	BAL–29
2	Class D Scrub	Downslope >0–5°	Method 1	15 m	BAL–29
3	Class C Shrubland	Downslope >0–5°	Method 1	>100 m	BAL–Low
4	Class G Grassland	Downslope >0–5°	Method 1	15 m	BAL–19
5	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	N/A	N/A	N/A
6	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A
7	Excluded – Low threat (Clause 2.2.3.2 [f])	N/A	N/A	N/A	N/A
8	Excluded – Non-vegetated (Clause 2.2.3.2 [e])	N/A	N/A	N/A	N/A
9	Excluded – Non-vegetated and Low threat (Clause 2.2.3.2 [e] and [f])	N/A	N/A	N/A	N/A

Table 3 lists the BAL applicable to infrastructure within the proposed development.

Table 3: BAL applicable to proposed infrastructure

Infrastructure	Initial BAL	APZ	Revised BAL
BESS Compound	BAL–FZ	• 52.8 m wide NVZ/APZ extending from the external perimeter of the BESS Compound. • All land within the BESS Compound, and the 10 m surrounding the compound, is to be non-vegetated.	BAL-12.5 (10 kW/m^2)
Transformer 1	BAL–FZ	• 9 m to 15 m wide NVZ/APZ extending from the external perimeter of the Transformer 1. • All land within the Transformer 1 pad (and the existing switchyard) is to be non-vegetated land.	BAL-29
Transformer 2	BAL–FZ	• 9 m to 27 m wide NVZ/APZ extending from the external perimeter of the Transformer 2. • All land within the Transformer 2 pad is to be non-vegetated land.	BAL-29

Should there be any changes in development design or classified vegetation extent that results in a modified BAL outcome, then the BAL contours will need to be reassessed.



Legend

- Proposed Development
- Contours
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- A. Forest
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(a)
- Excluded Clause 2.2.3.2(e)
- Excluded Clause 2.2.3.2(f)
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

0 40 80 120 Metres

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Tronox (Chandala) - BESS Facility

Post-Development Vegetation and Effective Slope

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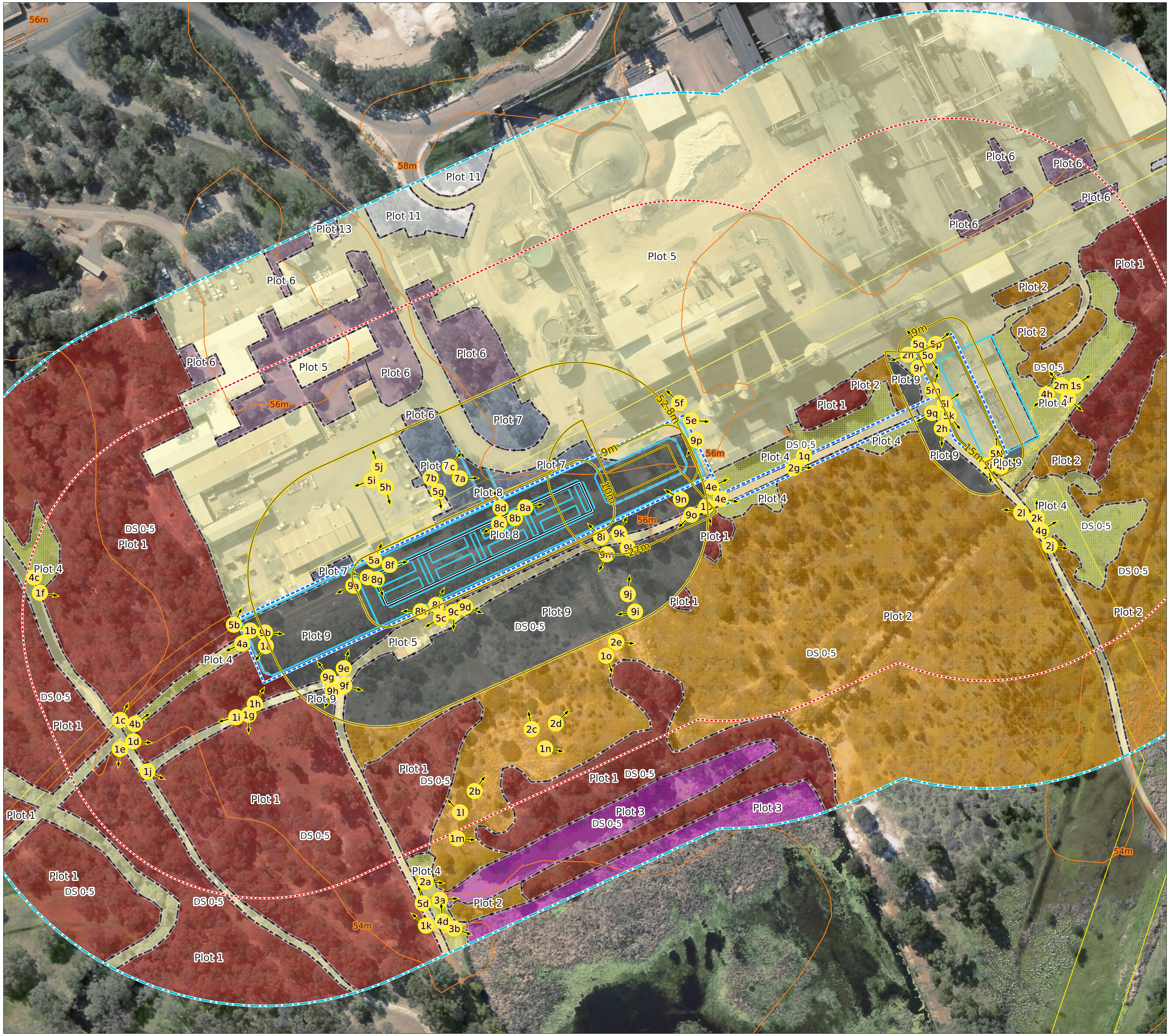

Legend

- Photo Location
- Proposed Development
- Contours
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

Classified Vegetation

- A. Forest
- C. Shrubland
- D. Scrub
- G. Grassland
- Excluded Clause 2.2.3.2(a)
- Excluded Clause 2.2.3.2(e)
- Excluded Clause 2.2.3.2(f)
- Excluded Clause 2.2.3.2(e&f)
- Modified to non vegetated and low threat

0 20 40 60 Metres

Tronox (Chandala) - BESS Facility

Post-Development Vegetation and Effective Slope (zoomed)

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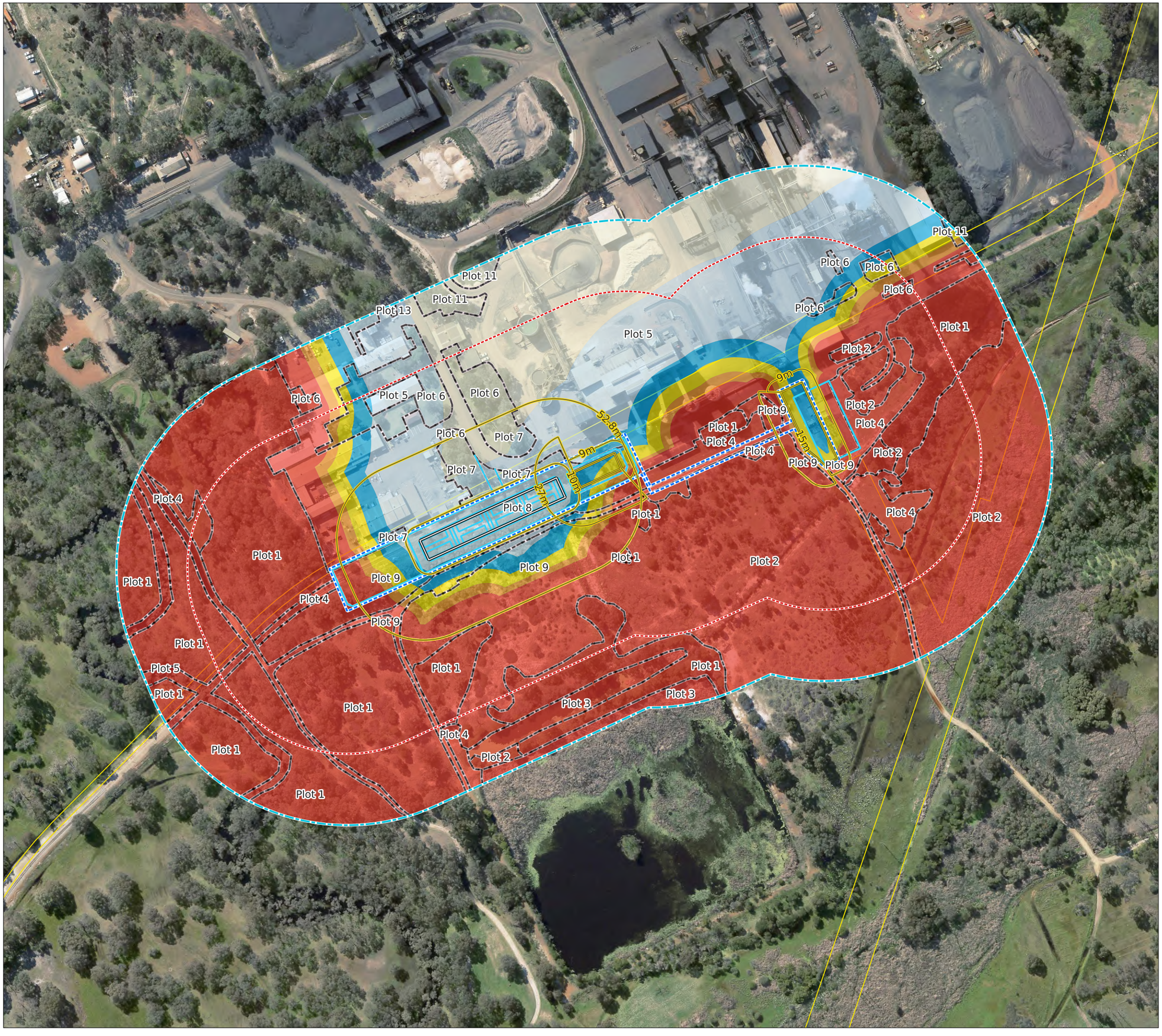

Legend

- Proposed Development
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

0 40 80 120 Metres

covey

Tronox (Chandala) - BESS Facility

Post-Development BAL Contour Plan

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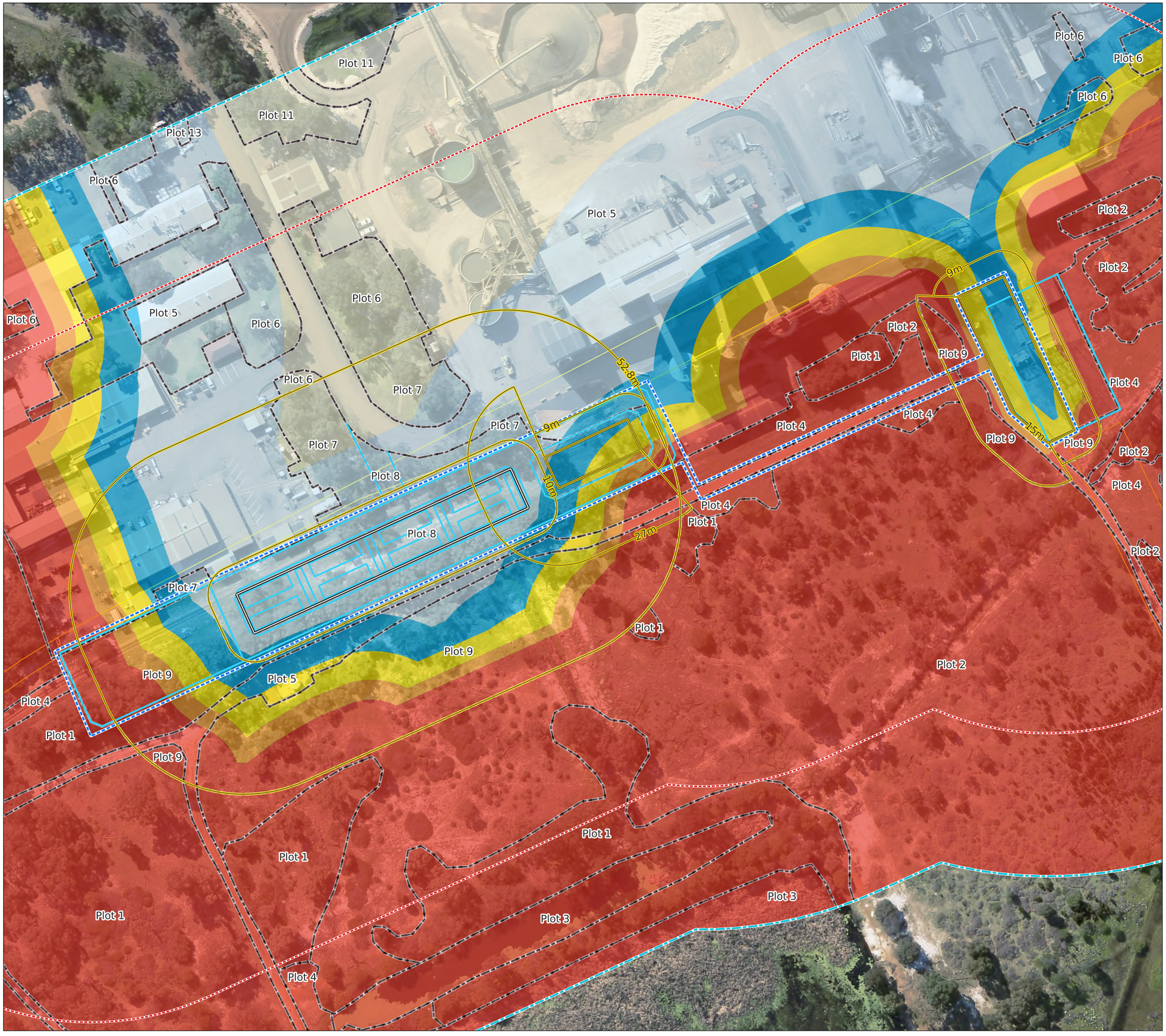

Legend

- Proposed Development
- Infrastructure Outline
- Subject Land
- Assessment Area (100m)
- Assessment Buffer (150m)
- Cadastre
- Vegetation Plot
- Asset Protection Zone

BAL Contours

- BAL FZ
- BAL 40
- BAL 29
- BAL 19
- BAL 12.5
- BAL Low

0 20 40 60 Metres

covey

Tronox (Chandala) - BESS Facility

Post-Development BAL Contour Plan (zoomed)

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3.3 Likelihood of Bushfire Impact

The likelihood of bushfire impact on renewable energy facilities is tied to the potential for bushfires to impact the site. To provide some guidance on this, historical bushfires have been depicted on Plates 1 and 2, using the following publicly available datasets:

- Firewatch which is a Landgate service that uses satellite remote sensing imagery to detect fire hotspots and burnt areas, to track live bushfires but also to review the broad extent of past fire events from 1989 to present day.
    - There have been numerous large bushfires west of Brand Highway, within the continuous forest vegetation within Gnangara-Moore River State Forest and adjacent conservation reserves
        - Only one appears to have crossed Brand Highway approximately 5 km to the north
        - The closest these bushfires have come to the Chandala facility is about 2.5 km away.
    - There have been a number of larger fires to the east of Brand Highway, but these have been over 10 km from the site, typically east and north of Chittering ,and south-east of Bullsbrook.
    - Two fires on the eastern side of Brand Highway have ignited closer than 10 km to the site, but both have been smaller fires that appear to have been contained:
        - In 2024 there was a 310 ha fire to the east of Muchea, about 3.5 km from Chandala facility
        - In 2023, there was a 385 ha fire near Lower Chittering, that was about 9 km from the facility.
- DBCA Fire History dataset which contains a collection of records of fire events (prescribed burns and bushfire) which were captured on departmental-managed land, and where available non-department managed land in Western Australia. The earliest records available are from 1937.
    - This dataset depicts a similar fire history of that from Firewatch, with numerous large bushfires west of Brand Highway, although the closest that they spread toward the Chandala is about 1.25 km.
    - Fires to the east of Brand Highway are also similar to Firewatch, with larger bushfires over 8 to 10 km from the site, other than the following:
        - In 2020 and 2021, two small ignitions occurred south of the facility along Brand Highway, approximately 900 m to 1.5 km from the site.
        - In 2019, a small fire occurred along Brand Highway, about 2 km to the north
        - In 2017 a 95 ha fire occurred near Chandala Nature Reserve, about 2.5 km to the north

In addition to the above, Tronox personnel have noted that a bushfire approached the facility directly from the west side of Brand Highway in 2025, which the onsite Emergency Response Team responded to.

The historical data depicts that while bushfires have regularly occurred in the local area, a significant number occur in the existing reserves containing remnant vegetation. Where the fire ignite in agricultural land, or spread from the reserves, these fires appear to generally be contained to relatively small-scale fires, likely due to lack of fuel (if harvesting has occurred) or due to being predominantly grassfires with reduced fire behaviour, that are more easily suppressed by local fire brigades and pastoralists, who are generally adept at managing these types of fires.

While there appear to be few historical bushfires within the site, the presence of such large bushfires to the west of Brand Highway, highlights that a combination of unfavourable conditions can support significant

destructive bushfire behaviour. Additionally, the potential for ignition events along Brand Highway, also presents another potential risk for smaller fires to ignite closer to the site.

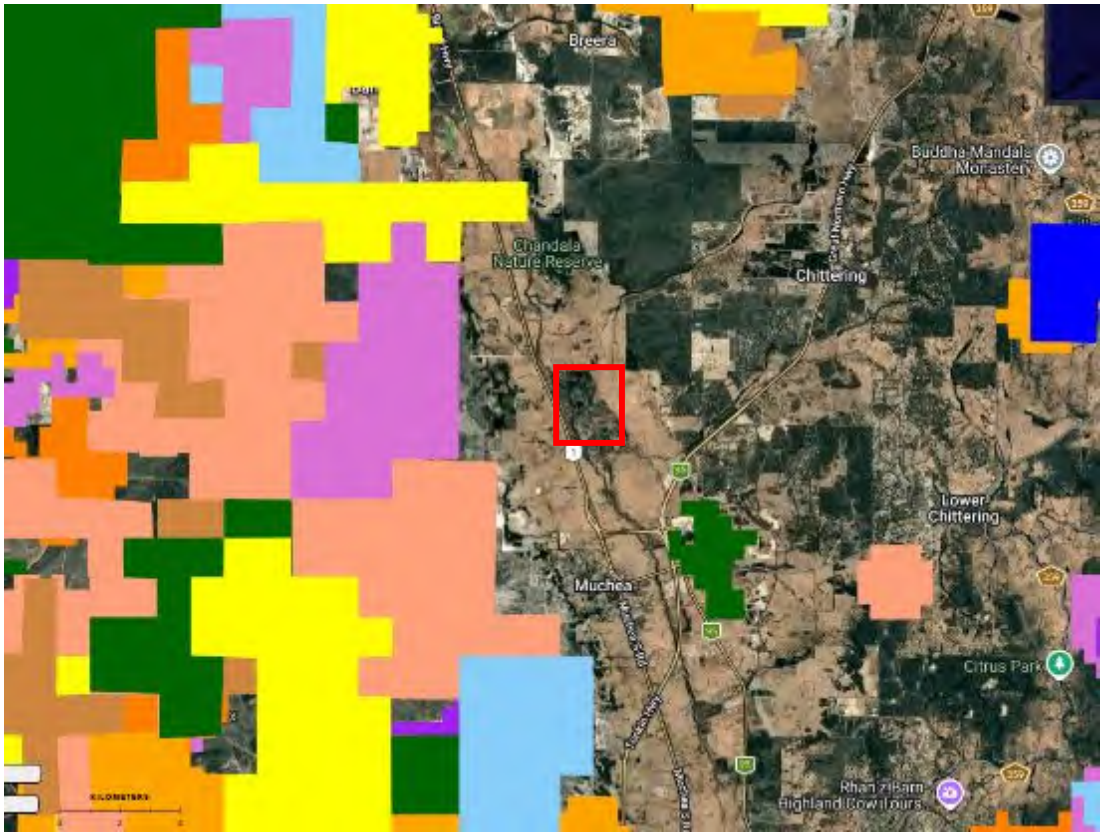


Figure 3-3. Bushfire History (Firewatch 2026)

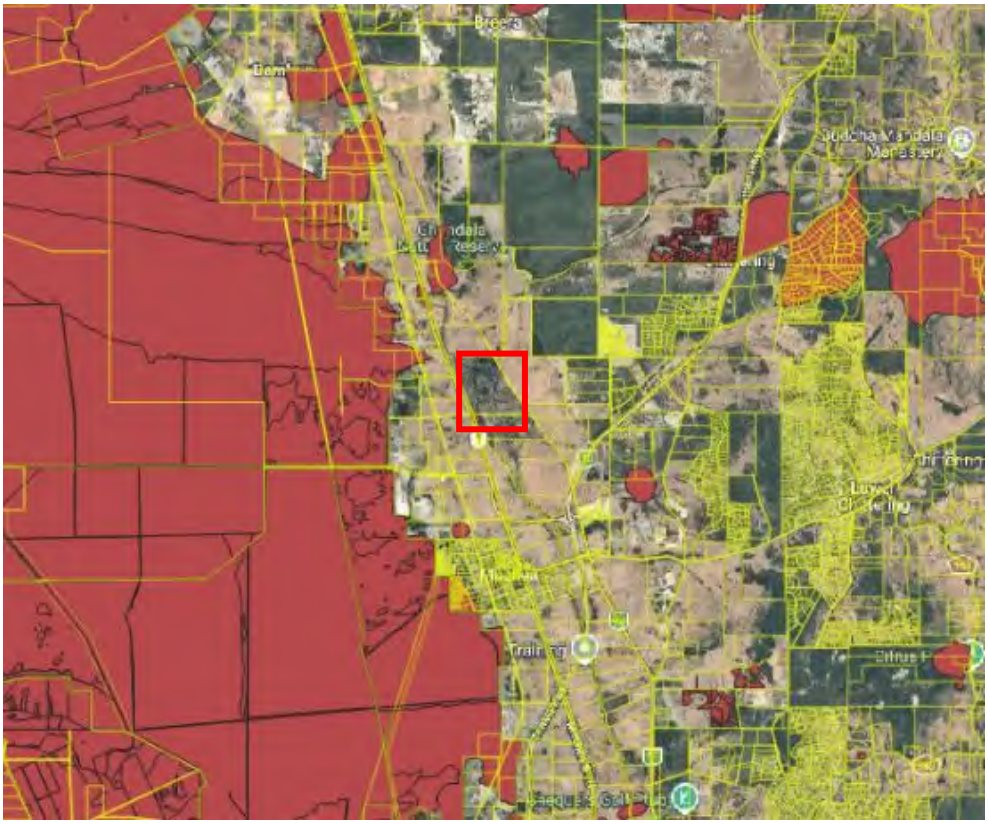


Figure 3-4. Bushfire History (DBCA 2026)

3.4 Bushfire Hazard Summary

The greatest bushfire threat to the proposed development is likely from bushfires spreading from the west and crossing Brand Highway to impact the site. While this hasn't historically occurred due to the agricultural land separating Chandala facility from the continuous forest vegetation to the west, fire spread across the grassland is possible at certain times of the summer.

Bushfires from the east could also occur within areas of continuous forest vegetation, and spread toward the site, and similar to the scenario above, the existing agricultural land has historically prevented spread toward the facility but could support steady-state grassfire during certain times during summer.

The other potential bushfire risk is from ignition events along Brand Highway and close to the facility, which could result in a fully-developed fire from a 500-800 m long fire run, primarily through the forest and scrub vegetation in the southern and western portions of the existing Chandala facility site.

Given the above, this BMP assumes that steady-state bushfire impact could occur in the future and addresses the risk accordingly.

4 Renewable Energy Infrastructure Hazard and Risk Analysis

The CFA Renewable Guidelines notes that fire hazards could be as follows for these renewable energy infrastructure types

- BESS facilities:
    - Electrical hazards, such as battery faults; overcharging; rapid discharge; loss of remote monitoring systems; internal short circuits; overheating; water ingress; lightning strike (leading to thermal events/runaway).
    - Chemical hazards, such as the inherent hazards of the stored dangerous goods; spills and leaks of transformer oil/diesel, refrigerant gas/coolant; chemical reactions.
    - Explosions, from ignition of venting gases. Potential fire spread due to proximity of batteries (and containers/enclosures) to each other, on-site infrastructure and vegetation (including screening vegetation).
    - Mechanical damage to battery containers/enclosures due to vehicular impact. Landscape hazards, such as bushfire/grassfire ignition from fire within the facility, or external ignition of site infrastructure from embers, radiant heat and flame contact.

From a bushfire risk assessment and management perspective, much of the above can be distilled into the potential impact of bushfire on the proposed renewable energy infrastructure (e.g. BESS containers), and the ability for significant fires from the renewable energy infrastructure to ignite a bushfire.

4.1 Battery Energy Storage System (BESS) hazard review

BESS units are typically comprised of Lithium-ion (Li-ion) battery cells that are wired together to form modules, which have a battery management system (BMS) that prevents electrical imbalances in the battery cells, including with voltage, current and temperature. The BMS' main function is to shut down operations of the module (or system) if any of the voltage, current, or temperature changes are out of limit.

4.1.1 Thermal runaway in Li-ion batteries

The significant hazard posed by BESS units is primarily associated with thermal runaway occurring in the Li-ion batteries, and the fire and explosion risk that can accompany the release of flammable gases. Thermal runaway describes a process that is accelerated by increasing internal temperature, in turn releasing more energy that further increases temperature.

In Li-ion batteries thermal runaway is a condition where voltage, current or temperature instability, causes the battery cell temperature to rise which in turn increases the current with a further rise in temperature. The battery can begin to emit gases due to thermal decomposition of the electrolyte solvents, which could potentially result in fire ignition or explosion (of the flammable gas release).

Battery cells can fail at different rates under different modes of off-gassing (flammable gas release), which can be with or without flaming. Because thermal runaway can occur without flame, gases may not be consumed by an ignition source immediately after they are emitted, this can create a scenario where high heat and combustible gases can coexist without igniting, and accumulation of these gases can result in an explosive event should an ignition source be subsequently introduced.

There are differences between thermal runaway and conventional fires that are important to understand. A conventional fire (e.g. campfire) is sustained by a combination of fuel, heat, and oxygen, where if any one of

them is removed, the fire may be extinguished (e.g. suffocating the fire to remove oxygen, applying water to cool it, or dispersing the wood to remove fuel).

Thermal runaway in a Li-ion battery differs from the conventional fire, as a Li-ion battery is consumed in thermal runaway is fuelled by an internal chemical reaction that releases heat and can continue without oxygen or a visible flame. As such, the management of thermal runaway differs from that of a conventional fire because starving a thermal runaway event of oxygen, may have little effect until the fuel is consumed. On this basis, stopping a thermal runaway event is more difficult and is generally addressed by either cooling to remove heat, or removing/dispersing the fuel.

While thermal runaway and fire are two different processes in a Li-ion battery failure, one can lead to the other including:

- An external fire can send a battery into thermal runaway, or
- Thermal runaway can create a secondary fire as it begins to the burn plastic and remaining battery materials.

4.1.2 Historical failure events (Li-ion battery and BESS)

The hazard of Li-ion battery thermal runaway and off-gassing has been identified in research and public literature since the early 2000s, including extensive safety testing. Additionally, a number of failure events have created further awareness to the dangers of thermal runaway in Li-ion batteries, including the following in larger scale BESS systems (DNV-GL, 2020; ESV, 2021):

- **2017-2018** - BESS fires in a large facility in South Korea, however there is limited reporting and there appears to be some conflict regarding the causes of the failures.
- **2019** – McMicken BESS Failure Event, Arizona
    - This involved thermal runaway of a BESS container, that resulted in off-gassing and subsequent explosion of the BESS when the container door was opened by attending firefighters.
    - It is noted that the BESS technology and standards has progressed significantly since this event, which represents an example of BESS failure prior to many of the recent improvements in fire and explosion safety measures.
- **2021** – Victorian Big Battery fire
    - A Tesla Megapack at a facility in Geelong caught fire and spread to a neighbouring Megapack during the initial installation and commissioning, which didn't spread any further and burned out over the course of approximately six hours.
- **2023** – Bouldercombe Battery Project, Queensland
    - A Tesla Megapack ignited at a facility in Bouldercombe, and was allowed to burn out buy attending firefighters, without firewater, as a low intensity fire. Firefighters monitored temperatures to ensure fire didn't spread to adjacent BESS units, and monitored gas levels and conducted air sampling to manage risk to nearby residents.

4.1.3 BESS Standards

The main standards for BESS testing, construction and installation, include:

- UL 9540 (2023): Energy Storage Systems (ESS) and Equipment
- UL 9540A (2019): Standard for Test Method for Evaluating Thermal Runaway Fire Propagation in Battery Energy Storage Systems

  - supplementary document to UL 9540 that defines test methods for thermal runaway.
- NFPA 855 (2023): Standard for the Installation of Stationary Energy Storage Systems
- International Fire Code (2021): Chapter 12 Energy Systems

4.1.4 Likelihood of BESS Facility Fire

As noted on Section 4.1.2, there appears to be a relatively low likelihood of BESS fires based on historical occurrences in Australia, however it is noted that these type of grid scale BESS facilities are relatively new with the opportunity for failure and fire also limited, and the statistics around fire losses are based on historical estimates and incomplete datasets. There is also varying levels of resultant damage associated with these fires, which can range from small ignition events that have minor damage, through to complete destruction of at least one BESS unit or potentially multiple units.

4.1.5 BESS hazard summary for bushfire

The overall hazard with the BESS units, is largely associated with the potential for thermal runaway in the Li-ion batteries to produce a fire or explosion failure event.

The rise of the BESS industry has been very quick, and the has resulted in rapid advances in the design, construction, commissioning, operation and maintenance of this technology. Notwithstanding, there hasn't seeming been a many reported historical BESS fires or explosions, and certainly not in Australia, however when they have occurred, it is clear that they result in significant firefighting challenges, primarily due to the inability to easily extinguish the fires and manage flammable gases.

The Arizona BESS failure in particular has highlighted historical issues with this for attending firefighters, as well as the potential for catastrophic failure to ignite vegetation some distance from the BESS (UL, 2020).

From a bushfire risk management perspective, the hazard related to the BESS units can be distilled to the following:

- Exacerbation of a bushfire from fire and/or explosion of the BESS's as follows:
  - A bushfire impressing significant radiant heat, or producing direct flame impingement, onto the BESS container, that could increase battery temperatures and send into thermal runaway. This could also include the damage or destruction of supporting systems (e.g. BMS, thermal management) which might affect the ability of the BESS to maintain temperatures at required levels.
  - Ember attack from a bushfire, igniting a fire within the BESS unit, that could send a battery into thermal runaway, or damage or destroy supporting systems.
  - Ember attack from a bushfire igniting flammable gases from BESS with thermal runaway condition, either within the BESS or flammable gases being ventilated.
- Ignition of a bushfire as a result of a fire or explosion within the BESS, likely to be associated with thermal runaway igniting an internal fire and/or emitting flammable gases, which could result in an explosion.

The bushfire risk management principles expected to address the hazards above are explored in further detail in Section 4.3.

4.2 Transformer Hazard

The causes of fire hazards relating to transformers are typically categorised as one of the following:

- Electrical equipment containing combustible insulating liquids may rupture due to internal failure, and there may be fire ignition or an explosion.
- Electrical equipment without combustible insulating liquids may rupture due to internal failure; there still be an explosion with a modest fire risk.
- Other plant and equipment such as cables, batteries, and drainage pipes may catch fire and spread the fire.

The risk associated with transformers, relates primarily to the oil used in transformers (where oil-filled) for insulation and cooling, which could potentially leak and be ignited. The ground mounted transformers are oil-filled and contains a hermetically sealed steel tank that contains the transformer core surrounded with windings and connecting leads which are separated, insulated and cooled by mineral oil (oil impregnated upgraded wood pulp insulation) or ester oils.

Potential failure of the transformer can occur if the ambient temperature is raised above the rating of the transformer (typically 105°C-140°C) for an extended time, with short-term heating able to be addressed through power supply reduction or shutdown. While overheating can result in degradation of the transformer, the main risk is the potential for cracking of the tank and resultant oil loss and potential pool fire of the flammable mineral or ester oil.

Previous correspondence from power supply providers has been there are historically very few transformer fires, with most associated with lightning strikes on pole-top transformers in non-built-up areas. They have assessed the likelihood of a transformer fire occurring as being approximately 0.1%, or with accumulated probability of 4% per transformer over its typical service life.

While there is not a high probability of transformer fires, it could result in transformer loss and/or damage to adjacent infrastructure or combustible items. As such, fire protection measures are considered a critical part of the design of transformers. which include the following recommendations:

- Transformers are designed in accordance with various standards, including AS 2067 (Substations and High Voltage Installations) to reduce risk of fire, with a variety of measures incorporated to minimise potential for fire ignition.
- Cable clamps and support to limit leaking bushings.
- Managing limits for transformers to prevent overloading.
- Providing sufficient clearances to transformers based on oil volume, incorporation of oil containment and/or flame trap, or consideration of a fire screening wall
    - The incorporation of an oil bund and/or flame trap enables a reduction in minimum separation distance as it contains the spread of any leaked oil and reduces the size of the oil pool exposed to oxygen, which is limits combustion.
    - A fire screen wall (2 hr FRL) also enables reduced minimum separation distances as it shields the transformer from adjacent buildings and combustible items and ignition risks.

4.3 Derived Bushfire Risk Management Principles

Based on the analysis of the bushfire hazards and risk associated with renewable energy infrastructure facilities, including review of historical fire events, the following are considered key bushfire risk management principles to be incorporated into the proposed development to manage bushfire risk, both to protect the renewable energy infrastructure from bushfire, and also to manage the risk of bushfire ignition from infrastructure fire.

- Considered siting of renewable energy infrastructure to minimise bushfire risk as much as practical, noting the siting of renewable energy infrastructure is based on a number of factors.
- Ensure suitable separation from nearby unmanaged vegetation to ensure bushfire impact on the infrastructure is appropriately managed commensurate to anticipated bushfire behaviour, in addition to providing sufficient separation to limit fire escape from renewable energy infrastructure fires (or BESS explosion) to ignite a bushfire.
    - This also includes ensuring no trees are to be located close enough to renewable energy infrastructure such that any falling branches or trees could mechanically damage the infrastructure, or cause other ignition sources (e.g. thermal runaway in BESS).
- Provision of appropriate vehicular access to the renewable energy infrastructure facility for attending firefighters, including permitting fire appliance turnaround where required.
- Provision of secure firewater supply for attending firefighters, to enable a rapid suppression response without extended turnaround times for appliance refills.
    - It is noted that the preferred onsite response may include leaving a BESS unit to burn out rather than applying firefighting water, but this may depend on various factors.
- Appropriate renewable energy infrastructure design and construction including (but not limited to):
    - For BESS facility
        - Limit potential for thermal runaway and associated off-gassing.
        - Incorporates a combined strategy of fire detection (and gas monitoring) and suppression followed by ventilation (and gas ventilation) and cooling, including all required infrastructure to achieve this.
        - Incorporate remote monitoring and communications, so the status of BESS BMS and fire/gas detection systems can be monitored and any information conveyed to relevant parties including fire brigade.
- Ensure sufficient information regarding the facility, its hazards and emergency management procedures is available to assist any attending firefighters.
- Engage with local fire brigade during project development and commissioning process, to ensure they understand the system and be aware of its specific hazards.
- Develop an emergency management plan which comprehensively details:
    - The hazards associated with renewable energy infrastructure
    - Housekeeping and routine maintenance actions (including ongoing compliance with project obligations), including limiting any onsite ignition sources or fuel loads
    - Ensure communication protocols are established for contacting DFES, nearby landowners/neighbours (if applicable), and relevant agencies (e.g. Western Power, AEMO etc) to enable management of emergencies, access to land and management of facility.
    - Pre-emptive actions on days with forecast of elevated Fire Danger Rating or Total Fire Ban days
    - Response actions for in the event of bushfire in the local area
        - Evacuation of staff offsite
        - Ensuring all onsite access routes are unlocked and available for attending firefighters.
    - Response actions for onsite BESS fire including
        - Rapid notification of site personnel, DFES and nearby landowners/neighbours

- Shutdown and de-energisation of BESS
- If safe to do so, conduct suppression on spot fires until DFES arrival etc.

- Staff training and exercises of emergency management procedures
- Ongoing review of emergency management plans (and any information relied upon by emergency services) on regular basis, including following changes to the BESS or any fire events.

5 Bushfire Safety Strategy and Management Measures

5.1 Bushfire Risk Strategy

As detailed in Section 1.3, the CFA Renewable Guidelines are currently seen as the best guidance for renewable energy facilities available at this point in time. The CFA Renewable Guidelines provide a comprehensive suite of design, construction, operation and emergency planning measures recommended for renewable energy facilities, that address the risk of fire within the infrastructure, but also bushfire risk to the development.

The CFA Renewable Guidelines note that any planning applications for all renewable energy facilities proposed in bushfire prone areas, strengthened or additional risk mitigation measures will be required to address bushfire risk, and will also need to address the following:

- The impact of any ignition events arising from the renewable energy infrastructure on nearby communities, infrastructure and assets.
- The impact of bushfire on the renewable energy infrastructure (e.g. ember attack, radiant heat impact, flame contact).
- Assessment of whether the proposal will lead to an increase in risk to adjacent land and how the proposal will reduce risks at the site to an acceptable level.

A summary of the CFA Renewable Guidelines sections (relevant to this project) is provided in the voluntary compliance assessment on Table 4 in Section 6, and include the following:

- Siting and vegetation management requirements to ensure the renewable energy infrastructure fully involved in fire does not create the potential for ignition of vegetation.
- Vehicular access provisions for emergency services vehicles
- Firewater provisions for attending firefighters
- Design, construction and commissioning requirements for renewable energy infrastructure (especially BESS and transformers) and any Dangerous Goods
- Ongoing operation, maintenance and housekeeping requirements for renewable energy infrastructure (especially BESS)
- Familiarisation visits and emergency information for attending firefighters and emergency services personnel
- Development and preparation of comprehensive Emergency Management Plan for the facility, with relevant prevention, preparedness and response information for bushfires and onsite infrastructure fires.

Based on the guidance from the review of the bushfire risk and renewable energy infrastructure hazard in Sections 3 and 4, and informed by the relevant Model Requirements of the CFA Renewable Guidelines, the following bushfire safety strategy and associated risk management measures are to be incorporated into the proposed facility to manage bushfire risk to the renewable energy infrastructure, while also managing the escape of fire within the infrastructure to ignite a bushfire.

It is noted that while most management measures relate to management of bushfire impact on the proposed renewable energy infrastructure, some also relate to internal hazards which is also critical to avoid ignition of bushfires.

The subsections below detail the proposed bushfire risk management measures for the project, with an assessment in Section 6 demonstrating how these measures map to the principles from the CFA Renewable Guidelines.

Where possible, the bushfire management measures for both the buildings and renewable energy infrastructure have been depicted on Figure 5-1.

5.2 Vegetation Management and Separation

The following Non-Vegetated Zone (NVZ) and Asset Protection Zones (APZ) are to be established around proposed renewable energy infrastructure, to protect infrastructure from approaching bushfire impact, while also reducing the potential for onsite infrastructure fires to ignite a bushfire.

- NVZ/APZ around the perimeter of all renewable energy infrastructure including
    - BESS modules (BESS compound)
    - Transformers 1 and 2
- Non-vegetated land within perimeter NVZ/APZ of the following:
    - BESS compound
    - Transformers 1 and 2

Where stipulated, the NVZ/APZ must be non-vegetated, however outside this they can be either non-vegetated or managed low threat landscaping established in accordance with the APZ standards from the WA PBG and AS 3959 Clause 2.2.3.2 (e) and (f), however would preferably be non-vegetated where possible.

All onsite vegetation modification and management (including NVZ/APZ) is to be conducted and maintained for the operational life of the project.

5.2.1 Vegetation Management and Separation - BESS

Given the potential for BESS modules to react to elevated temperatures, NVZ/APZ to achieve a target radiant heat flux of no less than 10 kW/m^2 is considered appropriate. Additionally, given there has been historical BESS explosion igniting vegetation 23 m from the container, the NVZ/APZ for the BESS is to be no less than 25 m wide, to manage risk of bushfire ignition from an explosion. It is noted that this historical explosion was in a BESS that didn't have explosion management system nor many of the fire and safety features currently required, and as such, is not likely to be replicated, so the 25 m minimum NVZ/APZ is considered conservative.

Based on the above, the BESS system requires a 52.8 m wide perimeter NVZ/APZ consisting of the following:

- A 10 m wide NVZ adjacent to the BESS units (Plot 8), that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.
- Outside the 10 m NVZ, the remaining 42.8 m (Plot 9) can be non-vegetated or otherwise comply with the APZ standards from the WA PBG, with the following clarifications:
    - Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS
- The NVZ/APZ width is based on the following Method 2 calculation:
    - Separation from Plot 1 (Class A forest with effective slope of 2°) to achieve 10 kW/m^2 at the BESS compound boundary (i.e. at BESS modules)
    - All other inputs are default as per AS 3959 (i.e. fuel loads, flame width etc)
    - The Method 2 calculation is provided in Appendix D.

All land within the BESS perimeter NVZ/APZ (i.e. Plot 8 within BESS compound), are to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible.

5.2.2 Vegetation Management and Separation - Transformers

In order to ensure sufficient separation is maintained between proposed transformers, and surrounding unmanaged vegetation, the following NVZ/APZs will be required:

- A 15 m wide perimeter NVZ/APZ to achieve BAL-29 or lower on the envelope.
    - Ideally the perimeter NVZ/APZs around transformers should be non-combustible (constructed of concrete, mineral earth or non-combustible mulch) and free of vegetation as much as practical, or otherwise compliant with the APZ standards from the WA PBG, with no plant or equipment unless non-combustible.

Additionally, all land within the transformer perimeter APZs is to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible. At the time of inspection, this land was currently non-vegetated.

5.3 Vehicular Access

Vehicular access requirement to the proposed renewable energy facility is to comply with private driveway specifications of the WA PBG (see Appendix E), with additional guidance provided from CFA Renewables Guideline where required. This is largely to be provided by the existing internal road network at the Chandala facility, with some extension to the proposed BESS.

As depicted on Figure 5-1, vehicular access to the existing Chandala facility is via an 6 m wide internal road form Brand Highway, that extends to the administration carpark, or into the greater facility via a security-controlled access point. There are a number of existing internal roads within the industrial part of the facility that would be available for use by emergency services to access the BESS facility and transformers in a bushfire emergency, with several of these roads depicted on Figure 5-1.

To provide vehicular access to, and around, the BESS facility from the existing internal road network, a new internal road is to be constructed as depicted on Figure 5-1.

Where new internal roads are proposed (including any gates and signage), they are to be constructed and maintained for the operational life of the project.

5.3.1 Vehicular access – BESS

There shall be provision of at least two (2) vehicular access points to the BESS compound, to/from the existing internal road network, to ensure emergency services can be achieved during a bushfire or onsite BESS fire emergency. The existing internal road network (see Figure 5-1) enables attending emergency services vehicles to approach the BESS site from either the north or the east, and given the use by heavy vehicles, is considered appropriate for emergency service use.

A new internal road is to be extended from the existing internal road (see Figure 5-1) and shall comply with the following requirements:

- Comply with the technical specifications of private driveway from the WA PBG (see Appendix E), noting the following:
    - All roads within BESS compound are to be minimum of 6 m wide.

  - Provides a perimeter road access around the BESS compound.
- At least 2 entrance/exit gates are to be provided to the BESS compound
- Any new gates are to be as follows:
  - Provide at least 6m clear horizontal width
  - If locked, any keys are issued to DFES and any local fire brigade, unless Tronox can ensure onsite personnel can provide access at all times.

5.3.2 Vehicular access – Transformers

Given the location of Transformer 1, there is existing internal road access to the transformer envelope, that appears compliant with the private driveway specifications of the WA PBG.

Vehicular access to Transformer 2 will be provided by the access route to the BESS compound detailed in Section 5.3.1.

5.4 Firewater Supply

The following assumes that there is no reticulated town main water supply to the site as is currently the case.

Covey understand the following firewater system is onsite:

- 1 combined process/firewater tank (overall capacity of 1735 kL with minimum fire reserve of 415 kL)
- 2 fire pumpsets to two fire hydrant ring mains (one to MRP ring main, and the other to SRP ring main)
- Fire hydrants and fire hose reels off each ring main, providing coverage of the existing facility

Further information regarding firewater requirements is provided in the subsections below.

It is also acknowledged that the fixed firewater systems are supplemented by the existing mobile onsite appliances at the facility as follows, which is especially important for trained staff to undertake first response suppression of onsite fire or spot fire, where safe to do so:

- 1 Fire Truck with 3000 L tank, rear mount pump, fire branches and hoses, and various firefighting and communication equipment.
- 1 Light Fire Tanker (4WD) with 800 L tank, small pump, hose reel, extinguishers, and various firefighting and communication equipment.
- 1 Mobile Fire Trailer, with 500 L tank and small pump and hose reel; and
- 1 Emergency Response Vehicle with fire branches and hoses, and various firefighting and communication equipment.

5.4.1 Firewater - BESS

The CFA Renewable Guidelines for centralised BESS facilities in areas without reticulated water supply recommend:

- *The firewater supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater.*
- *The quantity of static firewater 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).*
- *Fire hydrants must be provided and located so that every part of the battery energy storage system is 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.*

- *The firewater supply must be located at vehicle entrances to the facility, at least 10m from any renewable energy infrastructure and buildings.*
- *The firewater supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (e.g. Fire water tanks are to be located closer to the site entrance that the battery energy storage system).*
- *The firewater supply must comply with relevant Australian Standards (including AS 2419.1)*

As the BESS modules are approximately 1,700 m^2 in area, the 415 kL firewater reserve stored in the existing combined tank at Chandala has the potential to provide sufficient onsite static firewater supply to meet the requirements of the CFA Renewable Guidelines, however this is to be confirmed by a suitably qualified Fire Protection Engineer. Additionally, fire hydrant coverage to the proposed BESS may need to be extended from the existing hydrant system/s, to achieve compliance coverage, which would also require review and design by a suitably qualified Fire Protection Engineer.

Should new firewater tank/s be required (including supplementing the existing firewater tank), they will need to consider the following:

- All firewater tanks will need to comply with the standards from the WA PBG (see Appendix F), and consider the following recommendation from the CFA Renewables Guideline:
    - Must be an above-ground water tank constructed of concrete or steel and must comply with AS 2419.1 and signage indicating 'FIRE WATER' (or similar approved) and the tank capacity must be fixed to each tank.
    - The tank suction point must be within 4 m of a road or hardstand
- All firewater tanks are to be sited further than 10 m from the renewable energy infrastructure, as well as in an area of BAL-29 or lower
    - To ensure this is implemented, a suitably sized NVZ/APZ is required around the perimeter of the tank/s
- Vehicular access to the firewater tank/s is to be via proposed or existing internal roads.
    - Vehicular access (compliant through or loop road or with turning head) is to be provided to within 4 m of the tank suction point.

Given the substantial amount of firewater currently onsite, no additional capacity is proposed for bushfire fighting purposes.

The firewater tanks, pumps and hydrants (including any alterations) are to be:

- Designed by a suitably qualified Fire Protection Engineer to ensure compliance with the above codes or Australian Standards and recommendations from the CFA Renewables Guidelines,
- Constructed and maintained for the operational life of the project.
- Documented in the Emergency Information Book and Signage (see Section 5.9) is to be provided at the site entrance (or location agreed with DFES), to inform attending emergency services personnel.
    - This is to include the location of all onsite firewater tanks and the internal access routes to these tanks.

5.4.2 Firewater – Transformers

- There is no specific firewater provisions required for the transformers, however the existing firewater systems onsite, and for the BESS facility, will provide sufficient nearby firewater for bushfire fighting around both transformer options should it be required.

5.5 Renewable Energy Infrastructure Design

The following measures are required for the proposed renewable energy infrastructure to manage the risk of fires, with more specific guidance provided in subsections below:

- All electrical equipment, including electrical cabling, junction boxes, inverters and transformers, must comply with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Appropriate system monitoring for all renewable energy infrastructure must be provided, especially the BESS unit BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification.
    - Monitoring is to be configured to provide warning to relevant onsite and offsite personnel.

5.5.1 BESS System

- Ensure the following elements are considered in the BESS:
    - External module is to be non-combustible material (e.g. metal).
    - Use suitable Li-ion batteries (or appropriate alternative), with sufficient cell quality and barriers, to limit potential for thermal runaway generating from internal cell defects and cascading thermal runaway.
    - Battery management/monitoring systems for monitoring and managing the state of battery systems including shutdown if any of the voltage, current, or temperature changes are out of limit.
    - Systems to prevent heat/fire spread within battery containers (such as thermal barriers, shut-down separators, isolation systems, cooling systems).
    - Detection systems for smoke, heat (thermal), fire and toxic gas (off-gassing) within battery containers.
    - Appropriate suppression systems for fire within battery containers.
    - Systems to prevent explosion within battery containers by safely ventilating the system in a controlled manner to reduce the flammability of the atmosphere, such as ventilation, pressure relief and exhaust systems, including incorporation of adequate explosion prevention protection, where applicable.
    - Warning and alarm systems within the battery containers, and/or the facility, to enable early warning for faults, operation of the battery energy storage system above 'normal'/safe parameters, smoke, off-gassing, and fire.
    - Consideration of direct alarm monitoring to the fire brigade for BESS automatic detection systems
    - Provide suitable ember protection (e.g. BAL-12.5 construction) to prevent embers from penetrating battery containers/enclosures including, but not limited to:
        - Battery enclosures via any external walls/roofs (if not completely sealed) and gas ventilation inlets/outlets.
        - Thermal management system (chiller) inlets and outlets
        - Any unsealed penetrations are to be appropriately sealed (with non-combustible material) or gaps/openings (>2mm) are to be screened with non-combustible (aluminium, steel, bronze) screening with maximum aperture <2mm.
    - BESS installation is on a non-combustible surface (e.g. concrete)

5.5.2 Transformers

- Transformers are to be designed, constructed and maintained to relevant Australian Standards.
- Ensure transformer is designed to minimise fire risk, incorporates either oil bund or flame trap, and is provided with required separation from adjacent infrastructure and the combustible vegetation, in accordance with relevant Australian Standards and manufacturer specifications.

5.6 Bushfire resilient construction

- Bushfire construction provisions of the National Construction Code require that buildings comply with the AS 3959 construction requirements, in accordance with the assessed BAL under AS 3959, provided the building is a Class 1, 2, 3 or associated Class 10a building/deck, or a "certain Class 9" building.
    - The renewable energy infrastructure (BESS, transformers) will not be any of the classifications nominated above, therefore in accordance with the National Construction Code, and as such, there is no statutory requirement to meet the construction requirements of AS 3959.
- As detailed in Section 5.5.1, BESS construction is guided by the CFA Renewable Guidelines with the following recommendations:
    - Container construction is to be non-combustible material (e.g. metal).
    - Ember protection is to be provided to parts of the BESS container, in accordance with AS 3959 BAL-12.5 specifications

5.7 Construction and Commissioning

- Ensure an emergency communication system must be provided that is reliable and will operate in the event of power failure
- Ensure all electrical equipment (e.g. electrical cabling, junction boxes, inverters and transformers) complies with relevant design, construction and installation standards of electrical equipment including relevant Australian Standards, and manufacturers recommendations.
- Install and commission fire detection, alarm and suppression systems as early as practical during construction, and prior to commissioning.
- Provide first response firefighting equipment (e.g. extinguishers) at all construction portables/buildings onsite, in the vicinity of all construction activities, and in site-based vehicles.
- Ensure sufficient training provided to relevant personnel on the use of on-site firefighting equipment and first-aid, and responsibilities during emergencies
- Provide required fire protection equipment for Dangerous Goods as per relevant Australian Standards.
- Ensure tight ignition source control measures, including hot works and restriction of smoking to prescribed areas.
- Conduct any required vegetation management.
- Undertake all required infrastructure, equipment and vehicle maintenance.
- Incorporate emergency management procedures into the Construction Management Plan (or other relevant document) for the construction and commissioning phase of the facility, adopting similar concepts to those in Section 5.11, for the operational BESS facility, which includes:
    - Adhere to restrictions and guidance during days of Fire Danger Rating of High to Catastrophic, and Total Fire Ban days and Harvest Movement Ban days.
    - Regularly monitor for, and otherwise be aware of, bushfires in the local area, and evacuate offsite prior to bushfire impact onsite.

  - Emergency procedures for identified risks and hazards of the renewable energy infrastructure, including but not limited to:
    - Bushfires
    - Onsite fire in renewable energy infrastructure (e.g. electrical infrastructure faults and fire in renewable energy infrastructure)
  - Ensure the response for any onsite fire or bushfire is the immediate notification of DFES.
  - The priority response action for a bushfire is immediate evacuation of all onsite personnel to offsite safer location (away from bushfire) ahead of bushfire impact on the site, and before bushfire impact (including smoke) on the vehicular access network to the offsite location.
- Notification of fire brigade at least seven days prior to the commissioning of any renewable energy infrastructure at the facility, especially the BESS modules.
- Engage with fire brigade to offer a familiarisation visit prior to commissioning, as detailed in Section 5.10.

5.8 Operation, Maintenance and Housekeeping

- Ensure ongoing compliance with the endorsed BMP is achieved, especially prior to, and during, bushfire season. This includes all vegetation management, internal driveway access, fire system and firewater obligations.
- Ensure any Dangerous Goods (if any) comply with all relevant legislation, Australian Standards and the requirements detailed in Section 5.12.
- Ensure the Emergency Information Book and/or signage is appropriately stored at all nominated site entrances, and reviewed on an annual basis (see Section 5.9).
- Develop, implement and review the Emergency Management Plan including all preparedness, pre-emptive and response actions, as required, and ensure ongoing liaison with DFES and regular staff training and exercises are conducted (see Section 5.11 below).
- Ensure inspection, maintenance and any required repair activities are conducted for all renewable energy infrastructure, associated equipment, fire systems, communication systems, and vehicles at the facility, in line with relevant Australian Standards and manufacturers requirements.
  - With respect to the BESS units, this should include the following:
    - A schedule, list of activities and accountabilities for the inspecting, testing, monitoring and servicing of the battery and its monitoring, safety and protective systems.
    - Monthly inspections of battery enclosures/ containers and related infrastructure for physical damage. Any damage must be immediately assessed and rectified by a suitably qualified person.
    - Regular inspection and removal of all combustible materials near the battery enclosures/containers and related infrastructure.

5.9 Emergency Information Book and Signage

An Emergency Information Book and/or signage must be located at the nominated site entrance to the facility (or main administration building), with any plans or information books provided in a weatherproof container (unless otherwise agreed with DFES).

The Emergency Information Book and/or signage is intended to provide to emergency responders with an overview of the facility. This information should be developed in liaison with relevant emergency services representatives (if possible) and should seek to include the following:

- A description of the premises, its infrastructure and operations.
- Up-to-date contact details for site personnel and regulatory authorities.
- Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure (including BESS),
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
- The following BESS details and plans
    - Schematics and technical data for BESS units, the number of units on-site, and the number of battery racks or modules within each unit.
    - Details of the hazards for the BESS, including thermal events/runaway, electrical safety hazards, explosion hazards, dangerous goods hazards (including off-gassing), and the effects of fire on the BESS (e.g., explosion, release of toxic gases).
    - Details of all provided battery failure/safety and protective systems, including a description, the activation process/automatic trigger, and any hazards associated with these systems.
    - Specifications for safe operating conditions for temperature.
    - Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available.
    - The shutdown and/or isolation procedures if the BESS are involved in fire or emergency incident, and appropriate personnel contact details for verifying that the battery enclosure/container system has been isolated/shutdown and de-energised during emergencies.
- Details of any emergency equipment, including the type and location of fire and gas detection and suppression systems.
- A manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for dangerous goods stored on-site.
- Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, bushfire).

A review of the information contained within the facility's Emergency Information Book and signage must be undertaken prior to commencement of bushfire season annually.

5.10 Emergency Services Familiarisation

Prior to commissioning of the facility, a familiarisation visit and explanation of the proposed facility, the specific hazards, the proposed fire safety systems and management measures, and the emergency procedures, is to be offered to local fire brigades and other emergency services.

The opportunity should be taken to ensure that the information in the proposed Emergency Information Book/Signage (see Section 5.9) is appropriate for their needs, and that they are familiar with where this will be located.

Additionally, it should be confirmed that any required keys or access codes to any secured parts of the site have been (or will be) supplied to the relevant fire brigade personnel, or that onsite personnel will be available at all times to brigade access.

A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade.

5.11 Emergency Management Plan

An Emergency Management Plan (EMP) is to be developed for the BESS facility, or make amendment to the existing site EMP if relevant, detailing the procedures for preparing and responding to off-site bushfire, and on-site fire emergencies impacting the BESS including:

- BESS facility details including key contacts and technical support during an emergency, site plan, details of renewable energy infrastructure, details of fire and emergency systems, and a manifest of dangerous goods.
- The identified risks and hazards associated with the renewable energy infrastructure, such as onsite fire and bushfires.
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for onsite BESS fires and bushfire:
    - Ongoing compliance with the approved BMP, including ensuring regular vegetation management requirements are achieved, vehicular access routes and firewater systems are maintained and available, and conducting regular bushfire housekeeping inspections.
    - Ensuring ongoing maintenance of all infrastructure, fire and communication systems.
    - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
    - Modifying Site Activities (based on Forecast FDR and TFB/HVMB) including limiting activities which may introduce bushfire ignition (hot works, unnecessary vehicle movement etc).
    - Monitoring DFES Bushfire Emergency Warnings for bushfire (and/or other signs of bushfire activity) within 50 km of the facility, and understanding the decision-making triggers.
- Detail emergency response procedures to address to all identified hazards (including for onsite BESS fires and bushfire).
- For a bushfire emergency, the response should include the following:
    - The immediate response to any onsite bushfire, or bushfire observed in the local area, is to notify DFES and local fire brigade immediately.
    - Conducting early offsite evacuation of all staff away from the bushfire if safe to do so (preferred response), ideally offsite to Ellenbrook or Gingin in a direction away from approaching bushfire.
        - Only if permitted by authorized DFES/local fire brigade personnel, only essential staff may remain onsite where perhaps required for operational management and/or shutdown procedures
    - Conduct BESS facility shutdown, if safe to do so prior to staff evacuation:

        - Reduce the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
        - Ensure all other plant is properly secured.
        - Ensure all vehicular access routes are unlocked (if possible) and available for use.
        - Ensure all fire and communications systems are ready for use.
    - If there is insufficient time to safely travel offsite without being impacted by bushfire, conduct onsite shelter in place as directed by Tronox personnel.
- Response to onsite fire is to include:
    - Immediately notify DFES to enable a rapid turnout, and relevant Tronox personnel
    - Strongly consider full emergency shutdown of the BESS and transformers unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible).
    - If fire is within the BESS unit/s, ensure staff relocate as far as possible from the fire, and no less than 50 m away.
    - If fire is not in BESS modules (e.g. existing facility), and only if safe to do so, trained personnel to conduct first attack response on any spot fires to prevent bushfire ignition, until DFES arrival. Onsite staff are not expected to fight onsite infrastructure fires (unless trained), but only limit any potential for bushfire ignition where safe to do so.
    - Notify neighbouring landowners (if relevant).

The emergency management plan is to be reviewed regularly, and the relevant staff will need appropriate training and to conduct regular exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. Training should be conducted annually prior to bushfire season, and regular exercises conducted throughout the year.

The above is a high-level summary, with further specific detail on the requirements of the emergency management plan relating to bushfire and onsite BESS infrastructure fire is provided in Appendix H.

5.12 Dangerous Goods

Strict controls are required on these potential ignition sources, such as storage and handling controls in accordance with the Dangerous Goods legislation and code, relevant Australian Standards and restrictions on hot works and electrical equipment within any on-site hazardous areas.

Should the facility propose any additional significant quantities of dangerous goods onsite such that the storage and use of these could potentially increase the risk of fire ignition at the proposed development, the following is required as a minimum, with the final siting and bushfire risk management to be assessed by an accredited bushfire practitioner:

- Ensure they are sited in areas of BAL-29 or lower as a minimum, and suitably protected from bushfire impact.
- Ensure there are strict controls on these potential ignition sources, such as storage and handling controls in accordance with the Dangerous Goods legislation, codes, and relevant Australian Standards.
- Restrictions on hot works and electrical equipment within any on-site hazardous areas.

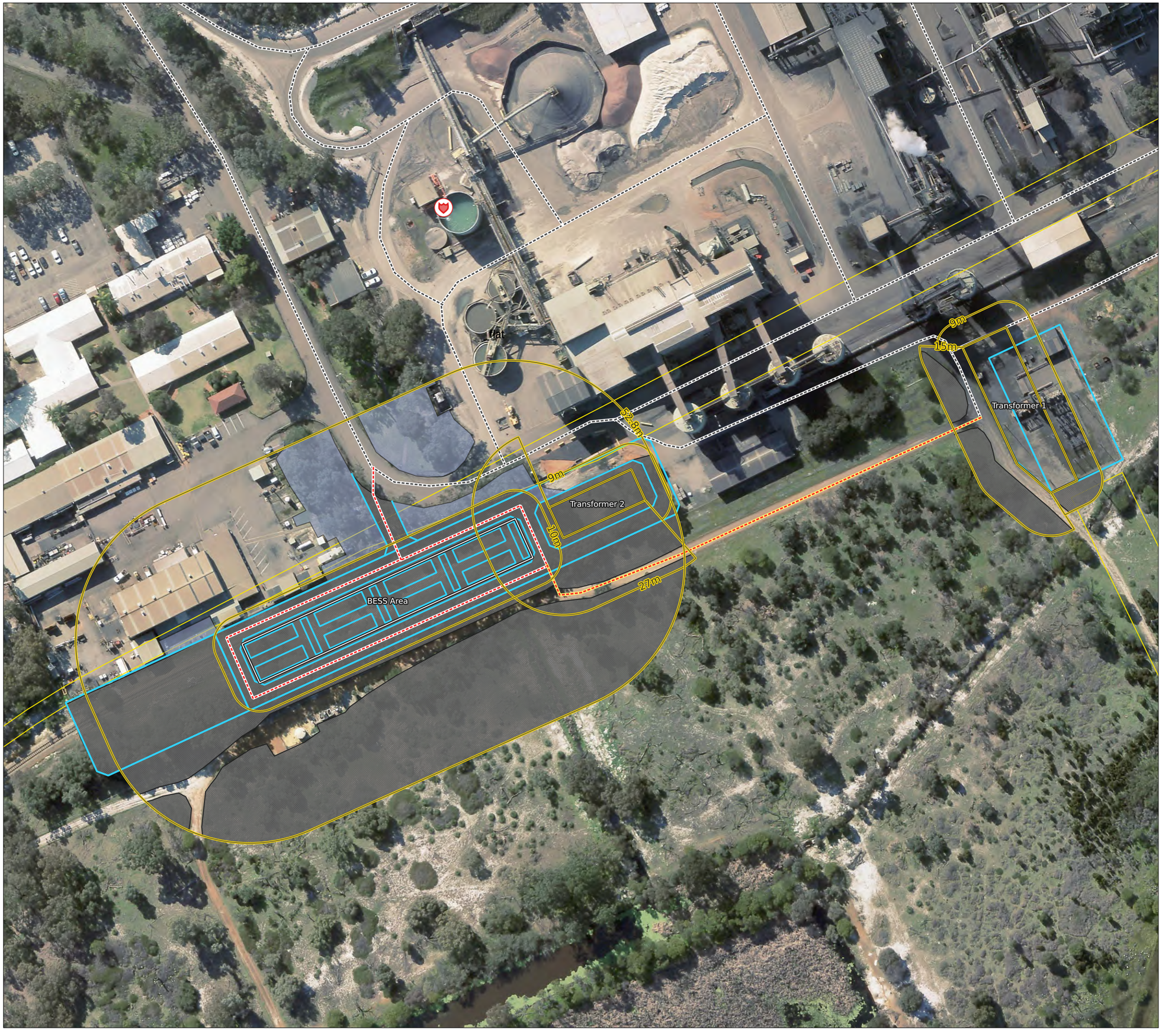
5.13 Compliance with annual firebreak notices

Compliance with the current Shire of Chittering annual firebreak notice is required, as amended (refer to Appendix F), however it is noted that the APZ and vehicular access requirements for this BESS development are addressed more specifically by this BMP.

The firebreak notice does provide the following relevant information which is to be complied with where relevant:

- Nominates bushfire season as being between 16 October and 31 May
- Nominates the following burning times and details actions permitted/prohibited during these times:
    - Prohibited – 1 December to 31 March
    - Restricted – 1 October to 30 November, and 1 April to 31 May
- Details on how to determine the Fire Danger Rating and actions for Total Fire Ban days

Additionally, the firebreak notice states that all properties wth approved Bushfire Management Plans and Emergency Management Plans, are to comply with the plan in its entirety.



Legend

Mitigation Measures

- Existing Fire Hydrant System Infrastructure
- Proposed Development

Internal Road

- Internal Road
- New Internal Road
- Upgraded Existing Internal Road
- Infrastructure Outline
- Cadastre
- Asset Protection Zone

Classified Vegetation

- Excluded Clause 2.2.3.2(f)
- Modified to non vegetated and low threat

0 20 40 60 Metres

covey

Tronox (Chandala) - BESS Facility

Bushfire Management Measures

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6 CFA Renewable Guidelines Assessment

As detailed in Section 1.3 of this BMP, the project voluntarily adopted the Model Requirements from the CFA Renewable Guidelines to develop the bushfire risk management strategy, albeit rationalised for a WA context where required (e.g. use of WA standards for APZs, driveways, firewater tanks etc).

The proposed bushfire management strategy and mitigation measures have been detailed above in Section 5, with an assessment of these measures against the Model Requirements of the CFA Renewable Guidelines provided below in Table 4.

The assessment demonstrates that alignment has been achieved with the Model Requirements, other than some rationalisations for the WA context. As previously noted, not all Model Requirements relate to bushfire impact on the proposed development, however the management of many of these internal hazards is also critical to avoid ignition of bushfires, so have been discussed as much as relevant.

Table 4: Summary of Renewable Energy Facility recommendations relating to bushfire and the development response (CFA, 2025)

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
Section 3: Fire Risk Management	***Risk Management Plan*** • A Risk Management Plan must be developed for all renewable energy facilities, before development starts. *Additional Recommendations from CFA Renewable Guidelines* • A Risk Management Plan (RMP) is critical in informing fire risk management in the design and operation of facilities, particularly where infrastructure or operations pose additional hazards to the landscape, occupants and emergency responders.	***All Facilities***	• This Bushfire Risk Management Plan assesses the bushfire hazards and risks for the proposed renewable energy infrastructure against the recommendations of the CFA Renewable Guidelines, and details how the risk has been appropriately managed. • The required mitigation measures for the renewable energy infrastructure, has been incorporated into the project Bushfire Management Plan, to ensure they are implemented and maintained for the operational life of the project. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 4: Facility Location	***Landscape Risk to Facility*** • An assessment that considers: o The impact of bushfire on the infrastructure (e.g. ember attack, radiant heat impact, flame contact).	***All Facilities***	• The proposed BESS is on the southern side of an existing industrial facility, with the bushfire risk primarily from forest and scrub vegetation to the south of the proposal. • As detailed in Section 3.3, while bushfires have historically been a regular occurrence in the local region especially in areas of retained vegetation to the west of Brand Highway, there have been few that have approached within 2 km of the Chandala facility likely due to the surrounding agricultural land. Notwithstanding, there is continuous forest vegetation within and surrounding the Chandala site, and there would be opportunity for steady-state bushfire to impact the proposed development. • The focus on addressing landscape risk of bushfire to the facility, is primarily through the provision of the following: o Onsite vegetation management, including NVZ/APZs around renewable energy infrastructure, to reduce bushfire impact to moderate levels, especially on the basis that the BESS modules are largely non-combustible materials and the anticipated bushfire behaviour ▪ The sizing of the NVZ and APZ is commensurate with the surrounding bushfire hazard (i.e. increasing in width to provide more separation from the hazard where it presents greater potential for significant bushfire behaviour). ▪ The BESS units are more susceptible to elevated heat which could potentially trigger thermal runaway, and on this basis, the NVZ/APZ has been sized to achieve a target of 10 kW/m^2, but with a minimum width of 25 m to address any explosion risk. ▪ The remainder of the renewable energy infrastructure (transformers) has greater resilience to bushfire and as such, the NVZ/APZ has been sized to achieve a target of BAL-29. o Vehicular access and firewater recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and provide significant resources for attending firefighters to fight bushfires at the BESS site: ▪ The internal road network enables attending firefighters to access all proposed BESS and the transformers, including the provision of multiple entrances to the site and the use of loop perimeter roads. ▪ The onsite firewater supplies, provide a significant quantity of firewater for attending firefighters to refill appliances, without extended travel time. o The BESS modules are designed to incorporate bushfire resilience through non-combustible construction and targeted ember protection. Additionally, the BESS units are designed with a number of fire and safety systems to limit the potential for thermal runaway, fire and explosion from the unit, including ▪ Battery management/monitoring systems ▪ Thermal management/monitoring systems ▪ Fire detection, alarm and suppression systems ▪ Explosion management systems o System monitoring for all electrical infrastructure must be provided, especially the BESS unit BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification. o Strong liaison with DFES and local fire brigade from facility commissioning and for the duration of operation

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
			o Emergency Management Plan that addresses bushfire preparedness, prevention and response activities, including notification of DFES, facility shutdown and offsite evacuation. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Facility Risk to Landscape • As assessment that considers the following and details how the proposal will reduce risks on site to an acceptable level: o The impact of any ignitions arising from the infrastructure on nearby communities, infrastructure and assets.	***All Facilities***	• As detailed in Section 4, based on historical occurrences in Australia, there appears to be a relatively low likelihood of BESS or transformer fires. It is noted that these types of grid scale BESS facilities are also relatively new, therefore the opportunity for fire damage and loss is limited. BESS fires in Australian appear to have generally been contained to 1 or 2 BESS units, with limited spread across adjacent BESS. • The focus on addressing risk to the landscape is primarily through prevention of uncontrolled BESS fire and explosion, in order to prevent fire spread to vegetation, through the provision of the following: o The BESS modules are designed to incorporate bushfire resilience through non-combustible construction and targeted ember protection. Additionally, the BESS units are designed with a number of fire and safety systems to limit the potential for thermal runaway, fire and explosion from the unit, including ▪ Battery management/monitoring systems ▪ Thermal management/monitoring systems ▪ Fire detection, alarm and suppression systems ▪ Explosion management systems o Appropriate separation of renewable energy infrastructure (in particular BESS units) to avoid spread of fire between infrastructure. o System monitoring for all electrical infrastructure must be provided, especially the BESS unit BMS and fire/gas detection, to ensure that any electrical or equipment failures with the potential to ignite or propagate fire are rapidly identified and relevant site personnel notified to enable early fire brigade notification. o Onsite vegetation management, including NVZ/APZs around renewable energy infrastructure, to limit the ability of onsite fire in the renewable energy infrastructure to escape to surrounding unmanaged vegetation. o Vehicular access and firewater recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and provide significant resources for attending firefighters to fight fire within the facility: ▪ The internal road network enables attending firefighters to access all proposed BESS infrastructure, and the transformers, including the provision of multiple entrances to the site and the use of loop perimeter roads. ▪ The onsite firewater supplies, provide a significant quantity of firewater for attending firefighters to control or suppress onsite fires. o Strong liaison with DFES and local fire brigade from facility commissioning and for the duration of operation o Emergency Management Plan that addresses bushfire preparedness, prevention and response activities, including notification of DFES, facility shutdown and offsite evacuation. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 4: Facility Design	***Non-Vegetated Zones (NVZ) and Asset Protection Zones (NVZ)*** • The provision of NVZ and/or APZ: o Around the perimeter of control rooms, electricity compounds, substations and all other buildings onsite. o Of a width of at least 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 NVZ must be: o Non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock.	***All Facilities BESS***	• Vegetation modification and management recommendations for the renewable energy infrastructure has been determined through application of the CFA Renewable Guidelines and detailed in Section 5.2: o The BESS units are to have a 52.8 m wide perimeter NVZ/APZ to achieve 10 kW/m^2 or lower and address any explosion risk for bushfire ignitions, consisting of the following: ▪ A 10 m wide NVZ adjacent to the BESS units, that is non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation and obstructions at all times, with no plant or equipment unless totally non-combustible. • All land within the BESS NVZ is to be non-combustible (constructed of concrete, mineral earth or non-combustible mulch etc) and free of vegetation.

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	o Free of vegetation and obstructions at all times. o No plant or equipment of any kind is to be stored in fire breaks. *Additional Recommendations for BESS* • The provision of a NVZ and/or APZ around battery energy storage systems and related infrastructure.		▪ Outside the 10 m NVZ, the remaining 42.8 m can be non-vegetated or otherwise comply with the APZ standards from the WA PBG, with the following clarifications: • Have no trees located close enough to BESS's such that any falling branches or trees could mechanically damage the BESS o Transformer 1 is to have a 9 to 15 m wide perimeter NVZ/APZ to achieve no less than BAL-29, while Transformer 2 requires a 9 to 27 m wide NVZ/APZ to achieve BAL-29. ▪ In order to limit the chance of electrical faults in the transformers from igniting a bushfire, all within the transformer NVZ/APZs consisting entirely of non-vegetated elements. • These vegetation modification and management recommendations are to be maintained in for the operational life of the project. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Emergency Vehicle Access • Construction of a minimum four (4) metre perimeter road within the perimeter fire break. • Roads must be of all-weather construction and capable of accommodating a vehicle of fifteen (15) tonnes (e.g., no compacted earth). • Constructed roads should: o 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. o Incorporate passing bays at least every 600 metres, which must be at least twenty (20) metres long and have a minimum trafficable width of six (6) metres. Where roads are less than 600 metres long, at least one passing bay must be incorporated. o Otherwise comply with the private driveway specifications of the WA PGB o Ensure any fencing along access routes allows for width of fire trucks. • Road networks must enable responding emergency services to access all areas of the facility, including fire service infrastructure, buildings, and related renewable energy infrastructure. • The provision of at least two (2) but preferably more access points to each part of the facility. *Additional Recommendations for BESS* • The provision of at least two access points into each section where battery energy storage systems are located.	***All Facilities*** ***BESS***	• Vehicular access recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and detailed in Section 5.3, and include use of the existing internal road network, supplemented by a section of new road to the BESS facility which includes the following: o Provide at least 2 entrance/exit gates are to be provided to the BESS compound, and the internal road to be configured as loop road, to avoid creation of any internal dead-end roads. o To align with local expectations, the internal road specifications are to comply with the private driveway specifications of the WA PBG, rather than the CFA Guidelines from Victoria. • ***Based on the above, the requirements of CFA Guidelines are in alignment, albeit adopting the internal road specifications from the WA PBG.***
	Firefighting Water Supply • Water access points must be clearly identifiable and unobstructed to ensure efficient access. • Static water storage tank installations must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA PBG: o The static water storage tank(s) must be an aboveground water tank constructed of concrete or steel. o An external water level indicator must be provided to the tank and be visible from the hardstand area. o Signage indicating 'FIRE WATER' and the tank capacity must be fixed to each tank. o Signage must be provided at each vehicle entrance to the facility, indicating the direction to the nearest static water tank(s). • The static water storage tank(s) must be capable of being completely refilled automatically or manually within 24 hours. • 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	***All Facilities*** ***BESS***	• The firewater recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and detailed in Section 5.4 and include: o The existing fire hydrant system (including existing 415 kL fire tank reserve) have the potential to be altered and extended (if required) to the BESS site to provide sufficient fire hydrant coverage, but this requires review and design by suitable qualified Fire Protection Engineer. o Should new firewater tank/s be required, they will need to consider the specifications detailed in Section 5.4, derived from CFA Renewable Guidelines and WA PBG. • Given the substantial amount of firewater required, no additional capacity is proposed for bushfire fighting purposes. • There is also a number of mobile fire appliances at the existing facility which will be able to undertake first response suppression of onsite fire or spot fire, where safe to do so. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	• The hard-suction point must be provided with a 150mm full bore isolation valve equipped with a Storz connection (or approved alternative), sized to comply with the required suction hydraulic performance. o The hard-suction point must be protected from mechanical damage where necessary. o The hard-suction point must be positioned within four (4) metres to a road or hardstand area and provide a clear access for emergency services personnel. • An all-weather road access and hardstand, compliant with the private driveway specifications of the WA PBG and at least 6 m wide and 8 m long, must be provided to the hard-suction point. o The road access and hardstand must be kept clear at all times. • Where the access road has one entrance, an 18 metre diameter turning circle must be provided at the tank. *Additional Recommendations for BESS (Centralised)* • Where reticulated water is available, the provision of a fire hydrant system that meets the requirements of AS 2419.1-2021 Clause 3.9: Open Yard Protection, and Table 2.2.5(D): Number of Fire Hydrants Required to Flow Simultaneously - Open Yards. OR o Except, that fire hydrants must be provided and located so that every part of the battery energy storage system is 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. • Where no reticulated water is available, provision of a fire water supply in static storage tanks, where: o The fire water supply must be of a quantity no less than 288,000L or as per the provisions for Open Yard Protection of AS 2419.1-2021, flowing for a period of no less than four hours at 20L/s, whichever is the greater. o 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). o Fire hydrants must be provided and located so that every part of the battery energy storage system is 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. o The fire water supply must be located at vehicle entrances to the facility, at least 10m from any renewable energy infrastructure and buildings. o The fire water supply must be reasonably adjacent to the battery energy storage system and shall be accessible without undue danger in an emergency. (e.g. Fire water tanks are to be located closer to the site entrance that the battery energy storage system). • The fire water supply must comply with relevant Australian Standards (including AS 2419.1) and the technical requirements of the WA PBG		
	Fire Detection and Suppression Equipment • For on-site buildings and structures, according to the requirements of the National Construction Code. • For storages of Dangerous Goods, according to the requirements of any Australian Standards for the storage and handling of Dangerous Goods. • For electrical installations, a minimum of two suitable fire extinguishers must be provided within 3m-20m of each PCU. • 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.	***All Facilities***	***National Construction Code (NCC) compliance*** • No buildings are proposed as part of this development ***Dangerous Goods compliance*** • Should significant quantities of dangerous goods be stored or handled onsite: o These will also need to comply with all relevant Dangerous Goods legislation, codes and standards o They should be reviewed by a BPAD Level 3 bushfire practitioner to ensure they are sited in areas of BAL-29 or lower, and appropriately protected from bushfire impact. ***Portable fire extinguishers*** • Portable fire extinguishers are to be provided in (or near) the following in accordance with Australian Standards: o Each BESS module

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
			• ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Design Specific to Facility Type *Additional Recommendations for BESS* • Facility design that incorporates: o A separation distance that prevents fire spread between battery containers/enclosures and other site elements. ▪ Separation must be at least the distance where the radiant heat flux (output) from a battery energy storage system container/enclosure fully involved in fire does not create the potential for ignition of these site elements. o A NVZ and/or APZ around the battery energy storage system and related infrastructure, of a width of no less than 10m (or greater where determined). ▪ NVZ must be non-combustible, constructed of concrete, mineral earth or non-combustible mulch such as crushed rock. ▪ The width must be calculated based on the ignition source being radiant heat of surrounding vegetation, including landscaping. o A layout of site infrastructure that: ▪ Considers the safety of emergency responders. ▪ Minimises the potential for grassfire and/or bushfire to impact the battery energy storage system. ▪ Minimises the potential for fires in battery containers/enclosures to impact on-site and offsite infrastructure. • Battery energy storage systems must be: o Located so as to be reasonably adjacent to a site vehicle entrance (suitable for emergency vehicles). o 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 fire at the battery energy storage system.) o Provided with in-built fire and gas detection systems. o Provided with explosion prevention via sensing and venting, or explosion mitigation through deflagration panels. o Provided with suitable ember protection. o Provided with suitable access roads for emergency services vehicles. o Installed on a non-combustible surface. o Provided with suitable ventilation. o Provided with suitable impact protection. o Provided with enclosed wiring and buried cabling, except where required to be above-ground for grid connection. o Provided with spill containment that includes provision for management of fire water runoff.	***BESS***	***Separation Distance*** • The expectation is this will be addressed by complying with relevant codes and standards, including Australian Standards, and any manufacturers recommendations. ***NVZ/APZ around BESS and Related Infrastructure*** • Vegetation modification and management recommendations for the renewable energy infrastructure has been determined through application of the CFA Renewable Guidelines and detailed in Section 5.2, which are to be maintained for the operational life of the project. ***BESS Design Requirements*** • The BESS related design recommendations have been nominated as per the stated CFA Renewable Guidelines, and summarised in Section 5.5.1. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 5: Facility Construction and Commissioning	***Emergency Plan (Construction)*** • An Emergency Plan must be developed for the construction and commissioning phase of the facility. *Additional Guidance from CFA Renewable Guidelines* • An emergency communication system must be provided that is reliable and will operate in the event of power failure. • Install and commission fire detection and suppression systems for the facility at the earliest possible stage of construction.	***All Facilities***	• Emergency procedures for the construction phase are to be incorporated in the Construction Management Plan as mentioned in Section 5.7. • It is recommended that the bushfire emergency management concepts summarised in Section 5.11 for the operational BESS facility, are incorporated into the Construction Management Plan for bushfire preparedness and response, as much as applicable. • Additional bushfire related construction and commissioning recommendations for the renewable infrastructure, has been determined through application of the CFA Renewable Guidelines and documented in Section 5.7,

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	• 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. • Provide training for personnel in the use of on-site first-aid firefighting equipment, and responsibilities during emergencies. • Provide the required fire protection equipment for any storages of dangerous goods as per the relevant Australian Standards. • It is recommended the development of safe work procedures for the facility, encompassing but not limited to: o Electricity and chemical management. o Vegetation management. o Ignition source control, including hot works. o Infrastructure, equipment and vehicle maintenance. o Emergency management • Adhere to restrictions on Total Fire Ban or days of elevated fire danger • Restrict smoking to prescribed areas and provide suitable ash and butt disposal facilities. • Fire brigade must be notified at least seven (7) days prior to the commissioning of any high-risk infrastructure at the facility (e.g., battery energy storage systems).		including the specific requirement to notify DFES ahead of commissioning any renewable energy infrastructure. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 6: Facility Operation	***Fire Management Plan*** • A Fire Management Plan must be developed for the facility, before development starts. *Additional Guidance from CFA Renewable Guidelines* • A Fire Management Plan is based on the outcomes of the Risk Management Plan and outlines the activities, processes and accountabilities for the ongoing management of fire risk at the facility including: o A summary of fire hazards and risks to and from the site, specific to its location, infrastructure, activities and occupancy. o Description of control measures to prevent fire occurring and limit the consequences of fire at the facility. o Description of control measures to prevent and reduce the consequences of external fire impacting the facility. o Details of equipment and resources to manage fire at the facility o Policies and procedures that ensure all control measures are appropriate and effective, and remain so. o Procedures for review of the Plan *Additional Recommendations for BESS* • A Fire Management Plan for a facility that incorporates a battery energy storage system must also include: o A schedule, list of activities and accountabilities for the inspecting, testing, monitoring and servicing of the battery and its monitoring, safety and protective systems. o Monthly inspections of battery enclosures/ containers and related infrastructure for physical damage. Any damage must be immediately assessed and rectified by a suitably qualified person. o Seismic activity as a trigger for inspecting, testing and servicing of the battery energy storage system and its related infrastructure. Any damages or changes in operating parameters must be immediately assessed and rectified by a suitably qualified person. o Regular inspection and removal of all combustible materials near the battery enclosures/containers and related infrastructure.	***All Facilities*** ***BESS***	• The bushfire related siting, design, construction and maintenance recommendations for the renewable infrastructure, has been determined through application of the CFA Renewable Guidelines and summarised in Section 5, including the nomination of responsible entities for implementation and ongoing management. • The additional BESS recommendations are captured as ongoing operation, maintenance and housekeeping and are documented in Section 5.8, while the required information to include in the Emergency Information Book for attending firefighters has been addressed in Section 5.9. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Bushfire and Grassfire	***All Facilities***	• Bushfire preparedness and response actions for the renewable energy infrastructure has been determined

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	• If your facility is at-risk of bushfire, prevention and preparedness activities must be detailed in the Fire Management Plan. *Additional Guidance from CFA Renewable Guidelines* • Your facility may be at-risk of bushfire if it is: o Located in an area close to or amongst dense or open bush, unmanaged grassland, near coastal scrub, or at an urban fringe. o Identified as being in a Designated Bushfire Prone Area. • Address bushfire prevention and preparedness activities		through application of the CFA Renewable Guidelines and documented in Section 5.11. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Vegetation Management • Facility operators must undertake the following measures during the nominated bushfire season (as per Local Government firebreak notice): o Grass must be maintained at or below 100mm in height during the nominated bushfire season. o Long grass and/or deep leaf litter must not be present in areas where heavy equipment will be working, during construction or operation. o Restrictions and guidance must be adhered to during the nominated bushfire season, days of High (and above) fire danger and declared Total Fire Ban days *Additional Recommendations for BESS* • Containers/enclosures and infrastructure for battery energy storage systems must be maintained to be clear of vegetation, including grass, for at least 10 m on all sides (or greater where determined).	***All Facilities*** ***BESS***	• Vegetation modification and management recommendations for the renewable energy infrastructure have been determined through application of the CFA Renewable Guidelines and detailed in Section 5.2, which are to be maintained for the operational life of the BESS facility. o The non-vegetated zone within, and surrounding, the BESS modules • Compliance with restrictions and guidance on days of elevated Fire Danger Rating, and Total Fire Ban days is summarised in Section 5.11. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Facility and System Monitoring • 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, and any fire is notified to 000 immediately. *Additional Recommendations for BESS* • For battery energy storage systems, appropriate monitoring and intervention measures must be provided to ensure that the following are rapidly identified and notified to 000 immediately: o Any shorts, faults, temperature increases above normal parameters (e.g., precursor to thermal events/runaway). o Equipment failures with the potential to ignite or propagate fire. o Off-gassing, smoke or fire. • The provision for direct alarm monitoring to the fire brigade for battery energy storage system automatic detection systems must be considered	***All Facilities*** ***BESS***	• The proposed facility is to be monitored, both onsite (during business hours) and offsite (at all times) as detailed in Section 5.5. • The following emergency response procedures for an onsite fire (in particular a BESS fire) are included in the bushfire emergency management arrangements summarised in Section 5.11 and expanded upon in Appendix H: o Immediately notify DFES to enable a rapid turnout o If possible, ensure relevant vehicular access routes are open and available, to enable attending firefighters to gain access to the location of the fire. o Ensure all fire and communications systems are ready for use. o Ensure attending firefighters have access to any relevant specialist technical personnel (onsite or offsite), to assist by providing technical advice. o If the fire in in the BESS, ensure no staff approach the BESS (if there are any onsite). Staff should move to safe distance from the subject site, no less than 50 m (or as advised). ▪ Strongly consider full emergency shutdown of the BESS and transformers unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible). o Notify neighbouring landowners. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Maintenance and Housekeeping • 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, the manufacturer's requirements. • Site-wide housekeeping inspections must be conducted regularly at facility. If your facility is at-risk of bushfire, site-wide bushfire preparedness housekeeping inspections must be conducted at least three months, and again one month, prior to the Fire Danger Period.	***All Facilities***	• The bushfire related siting, design, construction and maintenance recommendations for the renewable infrastructure, has been determined through application of the CFA Renewable Guidelines, with the specific recommendations during the operation phase relating to maintenance and housekeeping detailed in Section 5.8. • These bushfire risk management measures for the renewable energy infrastructure, including ongoing maintenance and management recommendations, have also been summarised in Section 5, including the nomination of responsible entities for ongoing management on Table 5. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	Safe Dangerous Goods Storage and Handling *Additional Guidance from CFA Renewable Guidelines* • Signage and labelling compliant with the Dangerous Goods (Storage and Handling) Regulations 2022 and the relevant Australian Standards must be provided at the site entrance, dangerous goods storage locations, and storage tanks where applicable. • Appropriate material for cleaning up dangerous goods spills and leaks (including absorbent, neutralisers, tools, disposal containers and personal protective equipment) must be provided and available on-site. • Training must be provided for site personnel on the hazards, safe use and emergency response for spills, leaks and fire involving dangerous goods. • All dangerous goods stored on-site must have a current Safety Data Sheet (SDS). Safety Data Sheets must be provided within the facility's Emergency Information Book(s), in the Emergency Information Container(s). • The requirements of the dangerous goods legislative framework, and all relevant Australian Standards must be complied with for all facilities, including facilities with battery energy storage systems.	***All Facilities***	• The proposed BESS units will contain Li-ion batteries (or similar) that will be classified as Dangerous Goods. o This BMP demonstrates the bushfire risk management measures align with the recommendations from CFA Renewable Guidelines, including reviewing and assessing the potential risk to and from the BESS units. o Notwithstanding, these Dangerous Goods will also need to comply with all relevant Dangerous Goods legislation, codes and standards. • Additionally, should significant quantities of dangerous goods (other than the BESS batteries) be stored or handled onsite: o These will also need to comply with all relevant Dangerous Goods legislation, codes and standards o They should be reviewed by a BPAD Level 3 bushfire practitioner to ensure they are sited in areas of BAL-29 or lower, and appropriately protected from bushfire impact as detailed in Section 5.12. • The Emergency Information Book is to contain a current manifest of dangerous goods (if required) and Safety Data Sheets (SDS) for Dangerous Goods stored on-site. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
	Fire Risk Review *Additional Guidance from CFA Renewable Guidelines* • Fire risk must be effectively managed at operating facilities to meet obligations for providing a safe workplace under the OHS Act. • Fire brigade recommends that facility operators consider the design guidelines and model requirements contained in this document and develop procedures to ensure that: o The Fire Management Plan is reviewed and updated regularly, in line with any reviews and changes to hazards and risk management as per the Risk Management Plan, and where there is a near-miss or incident at the facility. o The Emergency Plan is reviewed and updated to reflect any changes in the Fire Management Plan, including where fire risks emerge or change, risk controls are added or modified, or where there is a near miss or incident at the facility. • Where substantive changes are made to these documents, fire brigade recommends considering peer-review by a suitably qualified, independent third party.	***All Facilities***	• Like any BMP, if there are significant changes to the development, they should be reviewed, and if required amended, to reflect those changes. • The Emergency Management Plan for the facility is to be reviewed and amended as summarised in Section 5.11. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***
Section 7: Emergency Planning	***Emergency Plan (Operational)*** • An Emergency Plan must be developed for the operational phase, specific to the facility, before development starts. *Additional Guidance from CFA Renewable Guidelines* • An Emergency Plan (EP) details the arrangements for managing emergencies, including the facility details, structures, procedures, resources and training. EP's must be specific to the infrastructure, operations and location of facilities, and informed by a sound risk management process. • The EP should address the following for each hazard: o Emergency Response Procedures (including evacuation or onsite shelter-in-place as required) o Personnel Training o Emergency Exercises • The EP is a 'living document' that must be regularly reviewed to ensure their currency and effectiveness. *Additional Recommendations for BESS* • Emergency Plans for facilities with battery energy storage systems must additionally include: o Contact information for 24/7/365 specialist technical support for the battery energy storage system. o Emergency response procedures based on identified risks and hazards of the battery energy storage system and related infrastructure, including but not limited to:	***All Facilities BESS***	• Bushfire emergency management preparedness and response concepts for the renewable energy infrastructure has been summarised in Section 5.11 (and Appendix H) are to be incorporated into the overall BESS facility Emergency Management Plan. • The additional recommendations for BESS facilities documented in the CFA Renewable Guidelines, have been included in the Emergency Information Book and signage for attending firefighters, and the site Emergency Management Plan • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

CFA Guideline Section	Recommendation	Type	Assessment of Mitigating Measures
	▪ Electrical infrastructure faults and fire. ▪ Battery energy storage system damage or faults, including battery monitoring faults, temperature increases above normal operating parameters, electrical faults, chemical spills or reactions, off-gassing, thermal events/runaway, smoke and fire. ▪ Bushfire and grassfire. ▪ The management of fire water runoff. o Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available (e.g., at the BESS containers, in an on-site control room, off-site monitoring facilities). o A plan for partial and full decommissioning of the battery energy storage system in the event of an emergency incident that renders the facility inoperable or unsafe, before its anticipated end-of-life. o Any information that supports the considerations in Appendix B: Emergency Response Considerations for Large-Scale Battery Energy Storage Systems. • This information must also be provided within the facility's Emergency Information Book.		
Section 8. Provision of Emergency Information	***Developing an Emergency Information Book*** • An Emergency Information Book must be developed and available to emergency responders, and include the following: o A description of the premises, its infrastructure and operations. o Site plans that include the layout of the entire site, including buildings, internal roads, infrastructure, fire protection systems and equipment, dangerous goods storage areas, gas detectors, battery energy storage systems, substations/terminals, grid connections, drains and isolation valves, neighbours and the direction of north. o A manifest of dangerous goods (if required) as per Schedule 3 of the Dangerous Goods (Storage and Handling) Regulations 2022. o Procedures for the management of emergencies, including evacuation, shelter-in-place (for facilities at risk of bushfire/grassfire), containment of spills and leaks, and fire procedures (including infrastructure/plant fires, vehicle fires, grassfire/bushfire) o Details of emergency equipment, including the type and location of gas detectors. o Up-to-date contact details for site personnel, regulatory authorities and site neighbours. o Safety Data Sheets (SDS) for dangerous goods stored on-site. • Emergency Information Books must be located weatherproof container, at each vehicle entrance the facility • Prior to commissioning of the facility, a familiarisation visit and explanation of emergency procedures is to be offered to local fire brigades and other emergency services. o A schedule for ongoing site familiarisation to account for changing personnel, facility infrastructure and hazards, and emergency exercises should be developed in conjunction with the local fire brigade. o A review of the information contained within the facility's Emergency Information Book must be undertaken prior to commencement of bushfire season annually.	***All Facilities***	• The Emergency Information Book and signage, and emergency service familiarisation process for the renewable energy infrastructure, has been determined through application of the CFA Renewable Guidelines and detailed in Sections 5.9 and 5.10. • ***Based on the above, all recommendations from the CFA Renewable Guidelines are in alignment.***

7 Implementation and management of the bushfire measures

The BMP will be implemented to ensure bushfire management measures are adopted and implemented on an ongoing basis. Table 5 has been included to drive implementation of all bushfire management works associated with this project.

Table 5: Implementation and management of the bushfire measures

Implementation/management table	
No	***Implementation action***
Prior to commissioning and facility operation	
1	Establish NVZs and APZs around all nominated renewable energy infrastructure (BESS, transformers), in accordance with the dimensions and standards detailed in Section 5.2 of the BMP.
2	Construct the internal driveway network to the renewable energy infrastructure (BESS), in accordance with the dimensions and standards detailed in Section 5.3 of the BMP. Construct any required gates to the standards stated in the BMP, and ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to DFES and local fire brigade.
3	Ensure sufficient firewater is provided to the renewable energy infrastructure (BESS) in accordance with the recommendations detailed in Section 5.4 of the BMP and relevant Australian Standards.
4	Incorporate all the renewable energy infrastructure design, construction, installation and commissioning recommendations detailed in Sections 5.5, 5.6 and 5.7 of the BMP for the proposed facility.
5	Ensure any facility operation, maintenance and housekeeping recommendations are in place prior to operation, as detailed in Section 5.8 of the BMP.
6	Prepare and install the Emergency Information Book and signage in accordance with the recommendations of Section 5.9 of the BMP.
7	Conduct the emergency services familiarisation site visit, in accordance with the recommendations of Section 5.10 of the BMP.
8	Develop and implement the BESS facility emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.11 of the BMP
9	Comply with any relevant Dangerous Goods compliance requirements, as detailed in Section 5.12 of the BMP.
10	Comply with the Shire of Chittering firebreak notice as it applies to the BESS facility, as detailed in Section 5.13 of the BMP.
Ongoing (for the operational life of the project)	
1	Maintain the NVZs and APZs around all nominated renewable energy infrastructure (BESS, transformers) in accordance with the dimensions and standards detailed in Section 5.2 of the BMP.
2	Maintain the internal driveway network to the renewable energy infrastructure in accordance with the dimensions and standards detailed in Section 5.3 of the BMP.
3	Maintain the firewater system/s for the renewable energy infrastructure in accordance with the requirements detailed in Section 5.4 of the BMP and relevant Australian Standards. Ensure the firewater tanks remains filled at all times, especially during bushfire season.

Implementation/management table	
No	***Implementation action***
4	Undertake the ongoing operation and maintenance recommendations for the renewable energy infrastructure are detailed in Section 5.8 of the BMP for the BESS facility.
5	Review, and if required update, the Emergency Information Book and signage in accordance with the recommendations of Section 5.9 of the BMP.
6	Continue the emergency services familiarisation visits, in accordance with the recommendations of Section 5.10 of the BMP.
7	Review, and if required updated, the BESS facility emergency management plan, incorporating the recommended procedures for bushfire and onsite fire, detailed in Section 5.11 of the BMP
8	Review onsite Dangerous Goods (associated with BESS facility) and ensure ongoing compliance with the requirements detailed in Section 5.12 of the BMP.
9	Comply with the Shire of Chittering firebreak notice as it applies to the BESS facility, as detailed in Section 5.13 of the BMP.

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Appendix A

Vegetation plot photos and description

Photo ID: 1a

Photo ID: 1b

Photo ID: 1c

Photo ID: 1d

Photo ID: 1e

Photo ID: 1f

Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 1g

Photo ID: 1h

Photo ID: 1i

Photo ID: 1j

Photo ID: 1k

Photo ID: 1l

Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 1m

Photo ID: 1n

Photo ID: 1o

Photo ID: 1p

Photo ID: 1q

Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 1r	Photo ID: 1s
Plot number	Plot 1
Vegetation classification	Class A Forest
Description / justification	Trees 10-30 m high at maturity, dominated by Eucalypts, multi-tiered structure comprising tall canopy layer, shrubby middle layer and grass/herb/sedge understorey

Photo ID: 2a

Photo ID: 2b

Photo ID: 2c

Photo ID: 2d

Photo ID: 2e

Photo ID: 2f

Plot number	Plot 2
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 2g

Photo ID: 2h

Photo ID: 2i

Photo ID: 2j

Photo ID: 2k

Photo ID: 2l

Plot number	Plot 2
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 2m	Photo ID: 2n
Plot number	Plot 2
Vegetation classification	Class D Scrub
Description / justification	Vegetation with a continuous horizontal and vertical structure, greater than 2 m high at maturity

Photo ID: 3a	Photo ID: 3b
Plot number	Plot 3
Vegetation classification	Class C Shrubland
Description / justification	Shrub vegetation less than 2 m high at maturity

Photo ID: 4a

Photo ID: 4c

Photo ID: 4b

Photo ID: 4d

Photo ID: 4e

Plot number	Plot 4
Vegetation classification	Class G Grassland
Description / justification	Grassland at maturity, greater than 100 mm in height

Photo ID: 4f

Photo ID: 4g

Photo ID: 4h

Plot number	Plot 4
Vegetation classification	Class G Grassland
Description / justification	Grassland at maturity, greater than 100 mm in height

Photo ID: 5a

Photo ID: 5b

Photo ID: 5c

Photo ID: 5d

Photo ID: 5e

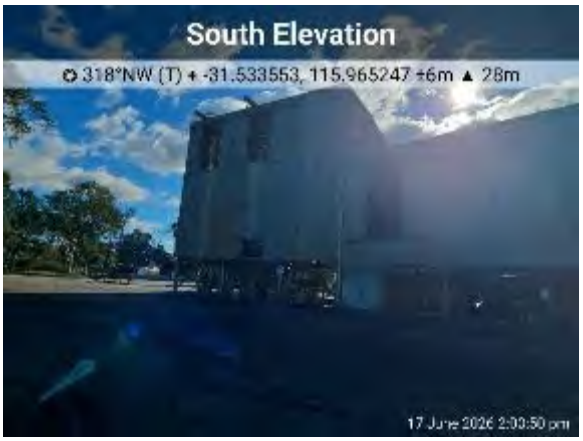


Photo ID: 5f

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated (Clause 2.2.3.2 [e])
Description / justification	Existing non-vegetated land, including buildings, roads and carparks.

Photo ID: 5g

Photo ID: 5h

Photo ID: 5i

Photo ID: 5j

Photo ID: 5k

Photo ID: 5l

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated (Clause 2.2.3.2 [e])
Description / justification	Existing non-vegetated land, including buildings, roads and carparks.

Photo ID: 5m

Photo ID: 5n

Photo ID: 5o

Photo ID: 5p

Photo ID: 5q

Plot number	Plot 5
Vegetation classification	Excluded – Non-vegetated (Clause 2.2.3.2 [e])
Description / justification	Existing non-vegetated land, including buildings, roads and carparks.

Photo ID: 7a

Photo ID: 7b

Photo ID: 7c

Plot number	Plot 7
Vegetation classification	Excluded – Low threat (Clause 2.2.3.2 [f])
Description / justification	Existing low threat landscaping that is located within the proposed APZ, and will be subject to some modification and management to comply with APZ standards for the operational life of the project.

Photo ID: 8a

Photo ID: 8b

Photo ID: 8c

Photo ID: 8d

Photo ID: 8e

Photo ID: 8f

Plot number	Plot 8
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e])
Description / justification	Existing vegetation within the BESS compound, and the surrounding 10 m, that is to be established and maintained in a non-vegetated state for the operational life of the project.

Photo ID: 8g

Photo ID: 8h

Photo ID: 8i

Photo ID: 8j

Plot number	Plot 8
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e])
Description / justification	Existing vegetation within the BESS compound, and the surrounding 10 m, that is to be established and maintained in a non-vegetated state for the operational life of the project.

Photo ID: 9a

Photo ID: 9b

Photo ID: 9c

Photo ID: 9d

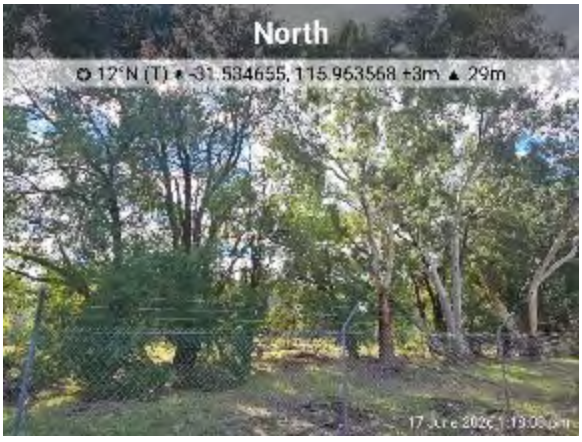


Photo ID: 9e

Photo ID: 9f

Plot number	Plot 9
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification	Existing vegetation within the BESS compound APZ, but further than 10 m the BESS compound, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

Photo ID: 9g

Photo ID: 9h

Photo ID: 9i

Photo ID: 9j

Photo ID: 9k

Photo ID: 9l

Plot number	Plot 9
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification	Existing vegetation within the BESS compound APZ, but further than 10 m the BESS compound, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

Photo ID: 9m

Photo ID: 9n

Photo ID: 9o

Photo ID: 9p

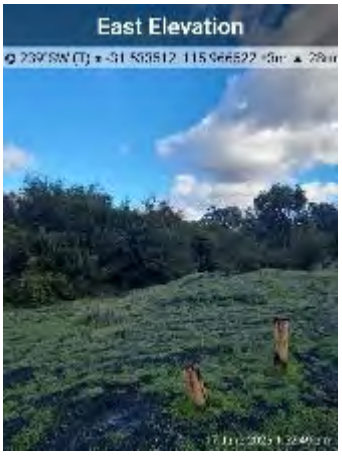


Photo ID: 9q

Photo ID: 9r

Plot number	Plot 9
Vegetation classification	Modified to non-vegetated (exclusion 2.2.3.2 [e]) and/or low threat (exclusion 2.2.3.2 [f]) state
Description / justification	Existing vegetation within the BESS compound APZ, but further than 10 m the BESS compound, to be modified to non-vegetated elements or low threat landscaping compliant with the APZ standards, for the operational life of the project.

Appendix B

APZ Standards from WA PBG

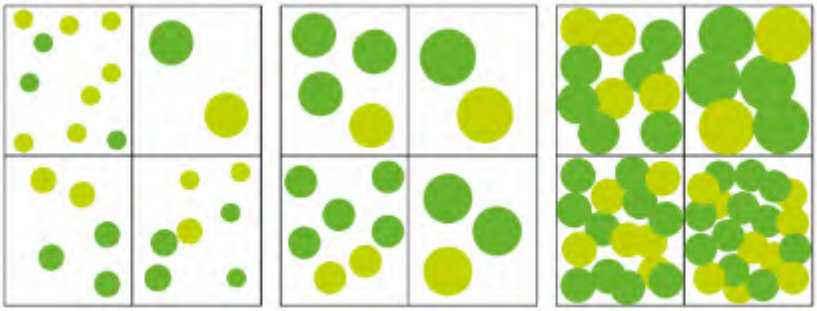
An APZ is a low fuel area maintained around a habitable building to increase the likelihood that it will survive a bushfire, by providing a defendable space and reducing the potential for direct flame contact, radiant heat exposure and ember attack. The APZ allows emergency services access and provides an area for firefighters and home-owners to defend their property.

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

Vegetation management within an APZ should provide defendable space and be maintained to a low threat state, for the operational life of the project, in accordance with the requirements outlined below.

Table 9: Asset Protection Zone Technical Requirements

- **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 overhang 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 5 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.



- **Shrub* and Scrub* (0.5 metres to 6 metres in height)**
  - 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.
  - Shrub and scrub >6 metres in height are to be treated as trees.
- **Ground covers (<0.5 metres in height)**
  - Can be planted under trees but must be maintained to remove dead plant material, as prescribed in 'Fine fuel load'.
  - Can be located within two metres of a structure, but three metres from windows or doors if >100 millimetres in height.
  - Ground covers >0.5 metres in height are to be treated as shrubs
- **Grass**

Table 9: Asset Protection Zone Technical Requirements

- 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.

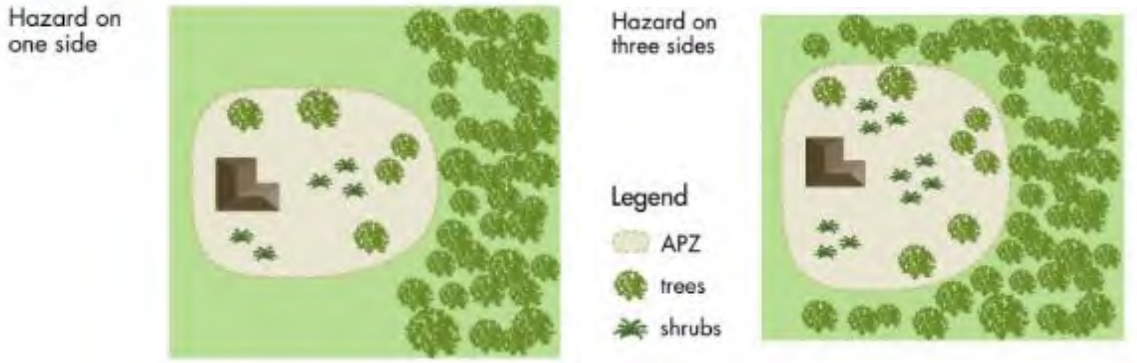
- **Fine Fuel load (combustible dead vegetation mater <6 mm in thickness)****
  - Should be managed and removed on a regular basis to be maintained as low threat vegetation.
  - Should be maintained at <2 tonnes per hectare (on average).
  - Mulches should be non-combustible such as stone, gravel, shells, rock or crushed mineral earth or wood mulch >5 millimetres in thickness.
- **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.
- **Fences within the APZ**
  - Should be constructed from non-combustible materials (for example, iron, brick, limestone, metal post and wire, or bushfire-resisting timber referenced in Appendix F of AS 3959)
- **LPG 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 sit on a firm, level and non-combustible base and be secured to a solid structure.

** Plant flammability, landscaping design and maintenance should be considered – refer to explanatory notes*

*** Fine fuel load:*

- *is the combustible, dead or dry vegetation matter on the ground, near ground, or elevated. Fine fuel includes grass, leaves, bark and twigs less than six millimetres in diameter that ignite readily and are burnt rapidly when dry.*
- *Fine fuel should be maintained at less than 2t/ha (100gm/m2 equates to 1t/ha).*
  - *To estimate a fuel load (in t/ha), collect the dry fine fuel from a representative one square meter and weigh (in grams using kitchen scales) and multiply the weight by 0.01.*

Figure 25: Design of an Asset Protection Zone



B.2.2 Designing an Asset Protection Zone

An APZ should not be seen as an area entirely cleared of vegetation, but as a strategically designed space that considers how existing and future mature vegetation, and combustible and non-combustible features interact with and affect the building's resilience to bushfire.

An APZ should provide the greatest level of vegetation management within at least three metres of a habitable building, to ensure adequate unobstructed defendable space for emergency services to operate. This area should contain minimal vegetation and be free of combustible materials and obstructions. Within the remainder of the APZ, planting of vegetation can increase as you move farther away from the building.

The placement of plants within an APZ is a key design technique. Separation of garden beds with areas of low fuel or non-combustible material will break up fuel continuity and reduce the likelihood of vegetation within an APZ supporting a bushfire. It is important to consider the plant density and final structure and form of plants in their mature state.

Strategic landscaping measures can be applied, such as replacing weeds with low flammability vegetation to create horizontal and vertical separations between the retained vegetation.

Mulches used within the APZ should be non-combustible. The use of stone, gravel, shells, rock and crushed mineral earth is encouraged. Very fine or light mulch (such as shredded pine bark, pine needles, or poplar woodchips) less than five millimeters in diameter should be avoided. It is recommended that wood mulch is used in garden beds or areas where the moisture level is higher by regular irrigation, and these areas are separated with non-combustible elements, such as pathways and open spaces.

Incorporation of landscaping features, such as masonry feature walls, can provide habitable buildings with barriers to wind, radiant heat and embers. These features can include noise walls or wind breaks. Use of Appendix F of AS 3959 for bushfire resistant timber selection or the use of non-combustible fencing materials such as iron, brick, limestone, metal post and wire is encouraged within an APZ

B2.3 Management of an Asset Protection Zone

Ongoing maintenance of an APZ is usually enforced through a condition of a development approval, which should refer to Table 9 APZ technical requirements within this Appendix.

In addition to regular maintenance of an APZ, further bushfire protection can be provided by:

- ensuring gutters are free from vegetation
- installing gutter guards or plugs
- regular cleaning of underfloor spaces, or enclosing them to prevent gaps
- trimming and removing dead plants or leaf litter
- pruning climbing vegetation (such as vines) on a trellis, to ensure it does not connect to a building, particularly near windows and doors
- removing vegetation in close proximity to a water tank to ensure it is not touching the sides of a tank
- following the requirements of the relevant local government firebreak notice, which may include additional provisions such as locating wood piles more than 10 metres from a building.

Preparation of a property prior to the bushfire season and/or in anticipation of a bushfire is beneficial even if your plan is to evacuate. Embers can travel up to several kilometres from a bushfire and fall into small spaces and crevices or land against the external walls of a building.

Best practice recommends objects within the APZ are moved away from the building prior to any bushfire event.

Objects may include, but are not limited to:

- door mats
- outdoor furniture
- potted plants
- shade sails or umbrellas
- plastic garbage bins
- firewood stacks
- flammable sculptures
- playground equipment and children's toys.

B2.4 Plant Flammability

There are certain plant characteristics that are known to influence flammability, such as moisture or oil content and the presence and type of bark. Plants with lower flammability properties may still burn during a bushfire event, but may be more resistant to burning and some may regenerate faster post-bushfire.

There are many terms for plant flammability that should not be confused, including:

- **Fire resistant** – plant species that survive being burnt and will regrow after a bushfire and therefore may be highly flammable and inappropriate for a garden in areas of high bushfire risk.
- **Fire-retardant** – plants that can absorb more of the heat of the approaching bushfire without burning, compared to more flammable plants.
- **Fire wise** – plants that have been identified and selected based on their low flammability properties and linked to maintenance advice and planting location within a garden.

Although not a requirement of these Guidelines, local governments may develop their own list of fire wise or fire-retardant plant species that suit the environmental characteristics of an area.

When developing a recommended plant species list, local governments should consult with ecologists, land care officers or environmental authorities to ensure the plants do not present a risk to endangered ecological communities, threatened, or endangered species or their habitat.

When selecting plants, private landholders and developers should aim for plants within the APZ that have the following characteristics:

- grow in a predicted structure, shape and height;
- are open and loose branching with leaves that are thinly spread;
- have a coarse texture and low surface-area-to-volume ratio;
- will not drop large amounts of leaves or limbs, that require regular maintenance;
- have wide, flat, and thick or succulent leaves;
- trees that have bark attached tightly to their trunk or have smooth bark;

- have low amounts of oils, waxes, and resins (which will often have a strong scent when crushed);
- do not produce or hold large amounts of fine dead material in their crowns; and/or
- will not become a weed in the area.

Appendix C

AS 3959 Clause 2.2.3.2 (e) and (f) – Low threat Vegetation and Non-Vegetated Areas

2.2.3.2 *Exclusions—Low threat vegetation and non-vegetated areas*

The following vegetation shall be excluded from a BAL assessment:

(a) Vegetation of any type that is more than 100 m from the site.

(b) Single areas of vegetation less than 1 ha in area and not within 100 m of other areas of vegetation being classified vegetation.

(c) Multiple areas of vegetation less than 0.25 ha in area and not within 20 m of the site, or each other or of other areas of vegetation being classified vegetation.

(d) Strips of vegetation less than 20 m in width (measured perpendicular to the elevation exposed to the strip of vegetation) regardless of length and not within 20 m of the site or each other, or other areas of vegetation being classified vegetation.

(e) Non-vegetated areas, that is, areas permanently cleared of vegetation, including waterways, exposed beaches, roads, footpaths, buildings and rocky outcrops.

(f) Vegetation regarded as low threat due to factors such as flammability, moisture content or fuel load. This includes grassland managed in a minimal fuel condition, mangroves and other saline wetlands, maintained lawns, golf courses (such as playing areas and fairways), maintained public reserves and parklands, sporting fields, vineyards, orchards, banana plantations, market gardens (and other non-curing crops), cultivated gardens, commercial nurseries, nature strips and windbreaks.

NOTES:

1 Minimal fuel condition means there is insufficient fuel available to significantly increase the severity of the bushfire attack (recognizable as short-cropped grass for example, to a nominal height of 100 mm).

2 A windbreak is considered a single row of trees used as a screen or to reduce the effect of wind on the leeward side of the trees.

Appendix D

Method 2 Calculation – Plot 1

NBC Bushfire Attack Assessment Report V4.1

AS3959 (2018) Appendix B - Detailed Method 2

Print Date: 20/07/2026 **Assessment Date:** 20/07/2026

Site Street Address: Tronox Chandala - BESS, Chandala

Assessor: Linden Wears;

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

Vegetation Information

Vegetation Type:	Forest		
Vegetation Group:	Forest and Woodland		
Vegetation Slope:	2 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):**	52.8

Fire Inputs

Veg./Flame Width(m):	100	**Flame Temp(K):**	1090

Calculation Parameters

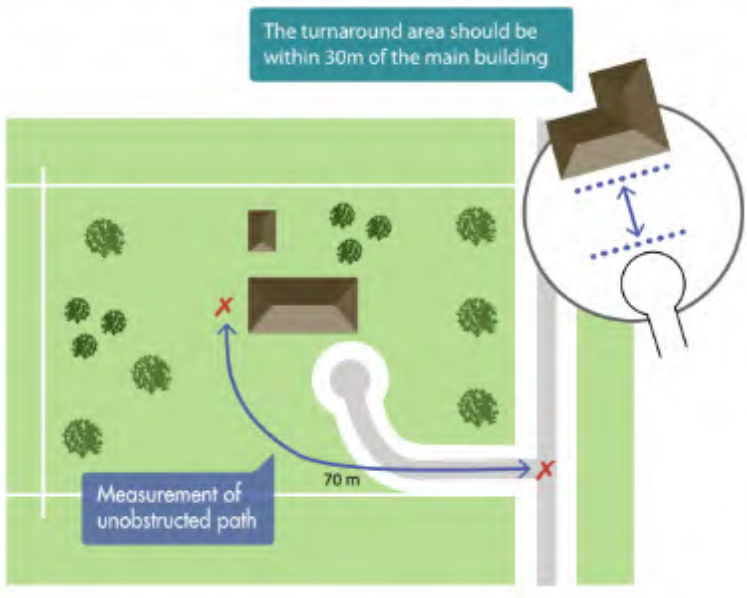
Flame Emissivity:	95	**Relative Humidity(%):**	25
Heat of Combustion(kJ/kg	18600	**Ambient Temp(K):**	308
Moisture Factor:	5	**FDI:**	80

Program Outputs

Level of Construction:	BAL 12.5	**Peak Elevation of Receiver(m):**	10.57
Radiant Heat(kW/m2):	9.98	**Flame Angle (degrees):**	73
Flame Length(m):	22.11	**Maximum View Factor:**	0.171
Rate Of Spread (km/h):	2.76	**Inner Protection Area(m):**	37
Transmissivity:	0.769	**Outer Protection Area(m):**	16
Fire Intensity(kW/m):	49822		

Appendix E

Vehicular Access Technical Standards of the WA PBG

Private driveways
Acceptable Solution A3.1
There are no private driveway technical requirements (prescribed by these Guidelines) where the private driveway is within a lot serviced by reticulated water and is no greater than 70 metres in length between the most distant external part of the habitable building and the public road. In circumstances where the above conditions are not met, the private driveway is to meet all of the following requirements: • requirements in Appendix B.3 Table 10, Column 5; and • passing bays every 200 metres with a minimum length of 20 metres and a minimum additional carriageway width of 2 metres • (i.e. the combined carriageway width of the passing bay and constructed private driveway to be a minimum 6 metres); and • turn-around area (Figure 30) and within 30 metres of the habitable building (Figure 38).
Explanatory note B3.8
Emergency services vehicles typically operate from the street frontage in areas serviced by reticulated water and where the distance from the public road to the farthest part of the habitable building is no greater than 70 metres. In the event the habitable building cannot be reached by hose reel from the public road, emergency services vehicles will need to gain access via the driveway to the property. Emergency services vehicles will also need to gain access to the property where access to water is provided by onsite water tanks. In these situations, the driveway and battle-axe access leg (if applicable) will need to be wide enough for access by an emergency services vehicle and a vehicle to evacuate. It is acceptable for a private driveway to have a carriageway width of four metres with a traversable verge of one metre on either side of the carriageway. Turn-around areas (**Figure 38**) should be available for conventional two-wheel drive vehicles and type 3.4 fire appliances and should be located within 30 metres of habitable buildings. Circular and loop driveway design may also be considered. Figure 38: Design requirements for a private driveway where required 

Private driveways

Figure 30: Design requirements for a turn-around area

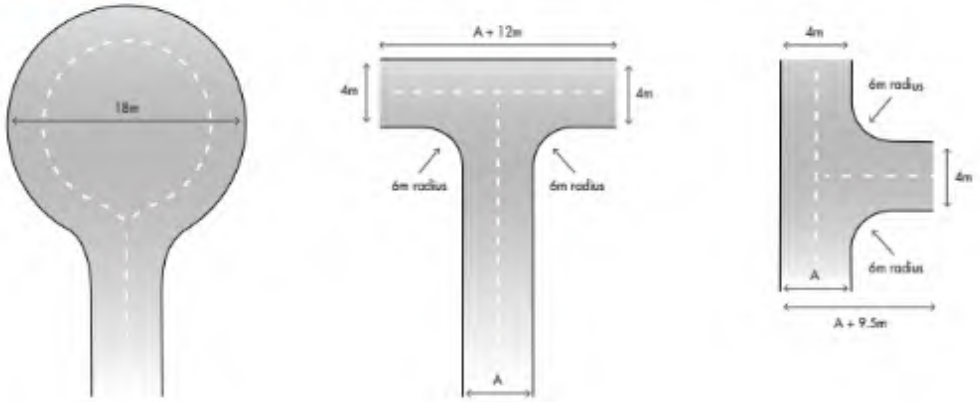


Table 10: Vehicular access technical requirements

	1		2		3		4		5	
TECHNICAL REQUIREMENTS	**PERIMETER ROADS**		**PUBLIC ROADS**		**EMERGENCY ACCESS WAY[3]**		**FIRE SERVICE ACCESS ROUTE[3]**		**BATTLE-AXE & PRIVATE DRIVEWAYS[1]**	
MAP OF BUSH FIRE PRONE AREAS DESIGNATION	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**	**Area 2**	**Area 1**
Minimum horizontal clearance (metres)	12	8	See note 5		10	6	10	6	6	
Minimum vertical clearance (metres)	4.5									
Minimum weight capacity (tonnes)	15									
Maximum grade unsealed road[2]	See note 5		See note 5		1:10 (10% or 6°)					
Maximum grade sealed road[2,4]					1:7 (14.3% or 8°)					
Maximum average grade sealed road					1:10 (10% or 6°)					
Minimum inner radius of road curves (metres)					8.5					

Notes:

[1] Driveways and battle-axe legs to comply with the Residential Design Codes and Development Control Policy 2.2 Residential Subdivision where not required to comply with the widths in this Appendix or the Guidelines.

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

[3] To have crossfalls between 3 per cent and 6 per cent.

[4] For sealed roads only the maximum grade of no more than 1 in 5 (20 per cent) (11.3 degrees) for no more than 50 metres is permissible, except for short constrictions to 3.5 metres for no more than 30 metres in length where an obstruction cannot be reasonably avoided or removed.

[5] As outlined in the Institute of **Public Works Engineering Australasia (IPWEA) subdivision guidelines, Liveable Neighbourhoods, Austroads Standards** Main Roads standard, supplement, policy or guideline and/or any applicable or relevant local government standard or policy.

Appendix F

Water Technical Standards of the WA PBG

Appendix B.4 – Water Supply

B4.1 Construction and Design Technical requirements

- An above-ground tank and associated stand should be constructed of non-combustible material.
- Below-ground tanks should have a 200 millimetres diameter access hole to allow tankers or emergency services vehicles to refill direct from the tank, with the outlet location clearly marked on the surface.
- Above and below ground tanks may need to comply with AS/NZS 3500.1:2018.
- An inspection opening may double as the access hole provided that the inspection opening meets the requirements of AS/NZS 3500.1:2018.
- Where an outlet for an emergency services vehicle is provided, then an unobstructed, hardened ground surface is to be supplied within four metres of any water supply.

B4.1.1 Pipes and Fittings

- All above-ground, exposed water supply pipes and fittings should be metal.
- Fittings should be located away from the source of bushfire hazard and be in accordance with the applicable section below, unless otherwise specified by the local government.

B4.1.2 Fittings for above-ground water tanks

- Commercial land uses: 125mm Storz fitting; or
- Strategic water tanks: 50mm or 100mm (where applicable and adapters are available) male camlock coupling with full flow valve; or
- Standalone water tanks: 50mm male camlock coupling with full flow valve; or
- Combined water tanks: 50mm male camlock coupling with full flow valve or a domestic fitting, being a standard household tap that enables an occupant to access the water supply with domestic hoses or buckets for extinguishing minor fires.

B4.1.3 Remote outlets

- In certain circumstances, it may be beneficial to have the outlet located away from the water supply. In instances in which a remote outlet is to be used, the applicant should consult the local government and DFES on their proposal.

B4.2 Use of Water Supply

- The combination of drinking water and water for firefighting purposes is not recommended, as stagnant water may alter the quality of the drinking water and the emergency services, by law, may not be able to take water from the water supply to suppress a bushfire.
- Combining drinking water and water for firefighting purposes is contrary to provisions within clause 4.2.3 of AS/ NZS 3500.1:2021

B4.3 Independent Water and Power Supply

- Water tank/s are to be provided in accordance with Table 11, Water supply dedicated for bushfire firefighting purposes.

B4.5 Location of Water Tanks and Hydrants

- Surrounding vegetation should be considered when locating a water tank.
- Avoid locations where the tank will be situated underneath existing vegetation or where vegetation will grow against or overhang the tank, (Figure 39). Where a tank is on the bushfire hazard side of a building, sufficient shielding for the protection of firefighters should be provided. In addition to the tank location, the fitting should be positioned and/or shielded from the bushfire hazard to allow access by emergency services.

Appendix B.4 – Water Supply

Figure 39: A good and bad example of landscaping around a water tank

Table 11: Water supply dedicated for bushfire firefighting purposes

SECTIONS FROM THE PLANNING FOR BUSHFIRE GUIDELINES					
SECTION 5[2] STRUCTURE PLANS AND SUBDIVISION APPLICATIONS		**SECTION 6[2] DEVELOPMENT – RESIDENTIAL**	**SECTION 7[2] DEVELOPMENT – COMMERCIAL & INDUSTRIAL**	**SECTION 8[2] – DEVELOPMENT – VULNERABLE LAND USES**	
One additional lot	10,000 litre water tank per lot	10,000 litre water tank per habitable building	For each habitable building - 10,000 litre per 1,500 m² of floor space up to 50,000 litre. Provided in a water tank	Camping ground	At the discretion of the local government
Three to 24 lots	10,000 litre water tank per lot[1] **or** 50,000 litre strategic water tank				
25 lots or more	50,000 litre per 25 lots or part thereof, provided as a strategic water tank(s) **and/or** 10,000 litre water tank per lot			Other vulnerable land uses	For each habitable building - 10,000 litre per 500 m² of floor space up to 50,000 litre. Provided in a water tank

Notes:

[1] Evidence that the identified water supply amounts in either column denoted is to be provided at the relevant planning stage.

[2] where more than one habitable building is proposed, strategic water tanks are to be provided in accordance with Section 5 requirements and at the discretion of the Local Government.

Appendix G

Shire of Chittering Firebreak Notice

Shire of Chittering

FIREBREAK & BUSHFIRE HAZARD REDUCTION NOTICE 2025/26

FIRST AND FINAL NOTICE TO ALL OWNERS AND OCCUPIERS OF LAND SITUATED IN THE SHIRE OF CHITTERING

COMPLIANCE DUE BY 16 OCTOBER 2025

SHIRE OF CHITTERING FIREBREAK & BUSHFIRE HAZARD REDUCTION NOTICE 2025/26

As a measure to assist in the control of bushfires and pursuant to Section 33 of the Bush Fires Act 1954, all owners and occupiers of land within the Shire of Chittering are required before the 16 October in each year or within 14 days of becoming the owner or occupier of land (if after that date) to clear firebreaks and/or take measures in accordance with this notice and to maintain those firebreaks and measures in accordance with this notice up to and including the 31st day of May in the following year.

ADDITIONAL WORKS

In addition to the requirements of this notice, regardless of land size and location, you may be required to carry out further bushfire preparedness works to reduce fire hazards considered necessary by an Authorised Officer. Any further requirements will be specified in a work order forwarded to the address of the owner(s) and/or occupier.

FAILURE TO COMPLY

Where the owner and/or occupier of the land fails or neglects to comply with the requisitions of this Notice within the specified time, the Shire of Chittering may, by its Authorised Officers and such servants, workmen and contractors enter upon the land and carry out the requisitions of this Notice which have not been complied with. The costs and expenses incurred may be recovered from the owner and/or occupier of the land by the Shire of Chittering. The Shire's Fire Control Officers are authorised under the Bush Fires Act 1954 (WA) and have powers to enter land pursuant to Section 14 of the Act. **Failure or neglect to comply with this notice is an offence and may result in a penalty of up to $5000.**

1. ALL PROPERTIES OF ANY SIZE

- Maintain grassed areas to a height of no more than 50 millimetres by slashing / mowing or grazing by livestock, as far as reasonably practicable.
- You must create an Asset Protection Zone (APZ) by installing and maintaining a 20 metre fuel reduced zone around all buildings or an asset of value. "Fuel reduced" is a reduction in the vegetation so as to reduce the impact of a bushfire on that asset.
- Trees over 5 metres in height within the APZ, must be under pruned to a clearance of 2 metres from the ground and should not overhang the asset..
- Trees and shrubs within 2 metres of the asset, must not exceed 2 metres in height.
- Ensure the roofs, gutters and walls of all buildings on the land are free of flammable matter.
- Properties that have haystacks or fuel storage areas must ensure there is a bare earth firebreak, not less than 5 metres wide, with a 4 metre vertical clearance completely surrounding haystacks and/or fuel storage areas. This requirement is in addition to firebreak requirements inside property boundaries.

Firebreaks may be constructed by one or more of the following methods: ploughing, cultivating, scarifying, raking, burning, chemical spraying or other approved method.

2. PROPERTIES 5000M² (½ HECTARE) AND LARGER

- Install and/or upgrade firebreaks.
- Clear a bare earth firebreak by removing all flammable material. The firebreak should be 3 metres wide, with a 4 metre vertical clearance (trafficable) along the inside of all the property boundaries.
- Properties with an area of 120 hectares or more must have a firebreak in such a position which divides the land into areas not exceeding 120 hectares. Firebreaks should be located as close as possible to all the property boundaries.

Firebreaks should be located as close as possible to the property boundaries. If for any reason it is not possible to comply with any of the requirements of the Firebreak and Bushfire Hazard Reduction Notice, you will need to apply for a 'variation'. All variation requests must be received and approved by the Shire of Chittering before 1 October in any given year. Applications must be in writing and provide details or a map of the proposed alternative measures. If approved, the firebreak variation will form an individual notice for the property and remain in place until revoked.

Follow the QR code to learn more about Property Preparation

3. BUSHFIRE AND EMERGENCY MANAGEMENT PLANS

All properties with a Bushfire Management Plan, Emergency Management Plan, or an approved Bushfire Attack Level assessment (BAL), approved as part of a Local Planning Scheme, subdivision approval, development approval or a building permit for an individual, or group of properties, shall comply with the plan in its entirety.

All bushfire management plan requirements are in addition to the requirements of this notice. Compliance is required throughout the year, each and every year.

4. PLANTATIONS

In accordance with the requirements of a Fire Management Plan approved in writing by the Shire; Install and maintain external perimeter and internal firebreaks that form compartment cells, and engage in hazard reduction measures that reduce fuel loads so as to protect neighbouring communities and essential infrastructure, Or;

Meet requirements and specifications set out within the *Department of Fire & Emergency Services Guidelines for Plantation Fire Protection 2011* publication.

If, for any reason, it is considered impractical to carry out the requirements as outlined above, plantation owners and managers may apply in writing to the Shire for permission to implement an alternative plan. A Fire Management Plan may be required to be developed and submitted.

Follow the QR Code for resources on:

- **Asset Protection Zones**
- **Firebreaks**
- **Contractor List**

FIREBREAK & VEHICLE ACCESS REQUIREMENTS

BEFORE

AFTER

ASSET PROTECTION ZONE

BURNING TIMES, BANS & OTHER RELATED INFORMATION

BURNING TIMES					
RESTRICTED		**PROHIBITED**		**RESTRICTED**	
Permits required for all burning activities		Burning strictly prohibited		Permits required for all burning activities	
From 1 Oct	**Until 30 Nov**	**From 1 Dec**	**Until 31 Mar**	**From 1 Apr**	**Until 31 May**

DATES MAY BE CHANGED ACCORDING TO SEASONAL CONDITIONS

If it is deemed that your property is not compliant, a Fire Control Officer may refuse to issue you a Permit to Burn. Permits are not valid on any Sunday or Public Holiday, or when the Fire Danger Rating is High, Extreme or Catastrophic.

For all hazard reduction burns please advise DFES Communications Centre on **9395 9209**

FIREBREAK & BUSHFIRE HAZARD REDUCTION DEADLINES	
INSTALL BEFORE 16 OCTOBER	**MAINTAIN UNTIL 31 MAY**

Follow the QR Code for more information on Burning Times on our website

Burning of Shire Verges

The burning of roadside verges is prohibited without written approval from the Shire of Chittering. Approvals are only available between June and September each year where no alternative method exists to reduce the hazard.

Follow the QR Code for a checklist on year-round property preparation

Fire Danger Rating (All Year Round)

No fire of any kind may be lit on a day when the forecast Fire Danger Rating for the district is High, Extreme or Catastrophic. The Chittering fire weather district is 'Swan Inland North'. The Fire Danger Rating is supplied daily by the Bureau of Meteorology (BoM). This information is also available from the Shire, DFES and Emergency WA websites, BoM Weather Service on Ph: 1300 183 341, The Bureau of Meteorology website (www.bom.gov.au) and is displayed on the information boards located at: Great Northern Highway, Muchea; John Glenn Park, Muchea; Muchea East Road, Lower Chittering; Great Northern Highway, Bindoon; Corner of Crest Hill and Mooliabeenee Roads, Bindoon.

Follow the QR Code to sign up for Fire Ban Notifications

Burning of Garden Refuse, Camping & Cooking Fires

Pursuant to Section 24G(2) and Section 25(1a) of the Bush Fires Act 1954 and applicable to all persons, the burning of garden refuse and lighting of camping or cooking fires is prohibited within the Shire of Chittering during the Prohibited Burning Time.

Furthermore, pursuant to Section 24G(2) of the Bush Fires Act 1954 and applicable to all persons, the burning of garden refuse is prohibited within the Shire of Chittering during the Restricted Burning Times unless a valid permit to burn has been obtained from a Fire Control Officer.

Other than during the RESTRICTED or PROHIBITED Burning Times, garden refuse may be burnt at any time, but care must be exercised. For all burning, please advise **DFES Communications Centre on 9395 9209**. Please note that excessive smoke from the burning of garden refuse may cause nuisance and annoyance to neighbours, other residents and danger to motorists.

It is an offence under the Health Local Law 2017 to burn damp, wet or green material causing excessive nuisance smoke. Please consider this and plan to minimise smoke. Please note it is also an offence to burn hazardous/toxic materials (e.g. tyres), household or commercial waste.

Wood Fired Ovens & Solid Fuel Barbecues in Restricted Burning Times

Wood fired pizza ovens and solid fuel barbecues in the open air do not require a Permit to Burn however, they may NOT be used in the restricted burning times unless the following conditions are met:

1. The Bureau of Meteorology Fire Danger Rating forecast is not High, Extreme or Catastrophic - at any time over the whole day.
2. The fire is only burning between 6pm and midnight, and completely extinguished when finished.
3. There is a minimum 5 metre firebreak, clear of flammable material surrounding the pizza oven or BBQ. (10 metre diameter).
4. At least 1 adult person is in attendance at all times.
5. The wood fired pizza oven or solid fuel BBQ is fitted with a spark arrester to the chimney and the door to the oven mouth (if specified and fitted by the manufacturer) is used to prevent the escape of embers and burning material.
6. There is a means of extinguishing a fire available at all times (e.g. garden hose, knapsack spray or fire unit).

Control of Operations Likely To Cause a Fire

Hot works including the operation of welding equipment and angle grinders, are activities likely to create a fire danger when used in the open air.

A person shall provide at least one fire extinguisher at the place where welding or cutting operations are carried out and surround this place with a firebreak which is at least 5 metres wide.

A ban on hot works, harvesting and movement of machinery and vehicles is likely to be imposed on days of adverse fire weather conditions. For updates on these bans please ring the information line on **9576 4666** (recorded message) or register with the SMS warning system with the Shire to receive a text when a ban is implemented.

Harvesting Operations (including Stubble Processing)

The Shire will permit harvesting operations, including stubble processing, during the Restricted and Prohibited Burning Times on the following conditions:

- That a fully operational firefighting unit (inclusive of associated pump, hose system and a minimum of 600 litres of water is present) at all times.
- Harvesting operations, and stubble processing, are not permitted when the Shire has declared a Harvest and Vehicle Movement Ban, including Hot Works Activities.

In addition to the conditions above, Harvesting Operations (including stubble processing) on Sundays and Public Holidays will be permitted on the following conditions,

- The local Fire Control Officer (FCO) is notified.
- Two able-bodied adult persons are present during the harvesting operations, only one of whom may be harvesting.

Hot Works, Harvest and Vehicle Movement Bans will be in place for Christmas Day, Boxing Day and New Year's Day.

LOCAL BUSH FIRE CONTROL OFFICERS

Fire Control Officers are not obliged to issue permits and may advise on alternatives to burning. Please remember Fire Control Officers are volunteers and their availability to issue permits may vary, assist them by planning in advance. Permits cannot be issued over the phone and should a Fire Control Officer refuse to issue a permit, it is a breach of the Act to request a permit from another Fire Control Officer.

MUCHEA	
James Marotta	0432 234 741
Tammy Foster	0422 150 479
LOWER CHITTERING	
Daniel Bates	0422 143 311
Graham Furlong	0476 881 796
UPPER CHITTERING	
Aaron Cover	0410 594 221
Will Lee	0415 154 715
BINDOON	
Paul Groves	0400 172 560
Dennis Badcock	0428 947 853
WANNAMAL	
Kim Haeusler	0428 559 043
Clayton Smith	0427 090 548
SHIRE FIRE CONTROL OFFICERS	
Rangers & Bush Fire Risk Officer	9576 4600
COMMUNITY EMERGENCY SERVICES MANAGER	
CHIEF BUSH FIRE CONTROL OFFICER	9576 4600

Applications for Permits during the Restricted Burning Time should be applied for through the Shire website:

www.chittering.wa.gov.au/permitstoburn

FOR ALL FIRES, CALL 000

HOT WORKS, HARVEST AND MOVEMENT OF MACHINERY BANS INFORMATION LINE 9576 4666

FOR FURTHER INFORMATION ON THIS NOTICE CONTACT THE SHIRE OF CHITTERING

Phone: 9576 4600

Email: chatter@chittering.wa.gov.au

Facebook: www.facebook.com/groups/chitteringbushfireready

Web Site: www.chittering.wa.gov.au

By order of the Shire of Chittering
Melinda Prinsloo
Chief Executive Officer

Shire of Chittering

Appendix H

Bushfire Emergency Management Plan Requirements

Develop an emergency management plan for the BESS facility, or make amendment to the existing site EMP if relevant, detailing the procedures for preparing and responding to off-site bushfire, and on-site fire emergencies impacting the BESS including:

- BESS facility details including:
  - Facility description, including infrastructure details, operations, number of personnel, and operating hours.
  - Up-to-date contact details for facility personnel, and any relevant off-site personnel that could provide technical support during an emergency including contact information for 24/7/365 specialist technical support for the renewable energy infrastructure.
  - Site plans that depict the entire site layout, including:
    - Buildings, substations and renewable energy infrastructure,
    - Internal driveways and surrounding public roads
    - Fire protection systems and equipment, including firewater tanks
    - Grid connections, drains and isolation valves,
    - Dangerous goods storage areas
    - Neighbouring landowners, and any relevant infrastructure (e.g. dwellings), and
    - North direction and scale
  - The following BESS details and plans
    - Schematics, technical data and overall configuration of the BESS units.
    - Details of the hazards for the BESS, including thermal events/runaway, electrical safety hazards, explosion hazards, dangerous goods hazards (including off-gassing), and the effects of fire on the BESS (e.g. explosion, release of toxic gases).
    - Details of all protection and safety systems, including a description and the activation process/automatic trigger for these systems.
    - Specifications for safe operating conditions for temperature.
    - Details of the elements monitored/controlled by the Battery Management System (BMS), including internal temperature, state of charge, voltage, etc. and the locations this information is available.
    - The shutdown and/or isolation procedures if the BESS are involved in fire or emergency incident, and appropriate personnel contact details for verifying that the battery enclosure/container system has been isolated/shutdown and de-energised during emergencies.
  - Details of any emergency resources, including fire detection and suppression systems and equipment; emergency eye-wash and shower facilities; spill containment systems and equipment; emergency warning systems; communication systems; personal protective equipment; first aid.
  - A manifest of dangerous goods (if required under the applicable Dangerous Goods legislation and codes, and relevant Australian Standards), including Safety Data Sheets (SDS).
- The identified risks and hazards associated with the renewable energy infrastructure, including but not limited to:

  - Electrical faults and renewable energy infrastructure fire
  - Bushfire
- Detail preparedness and pre-emptive actions to address the above hazards, including the following for bushfire:
  - Ongoing compliance with the approved BMP, including ensuring regular vegetation management requirements are achieved, vehicular access routes and firewater systems are maintained and available, and conducting regular bushfire housekeeping inspections.
  - Ensuring ongoing maintenance of all relevant infrastructure.
  - Ensuring ongoing maintenance of all fire and communication systems.
  - Determining forecast Fire Danger Rating (FDR), Total Fire Bans (TFB) and Harvest Vehicle Movement Bans (HVMB), during bushfire season
    - A Harvest Vehicle Movement Ban is a notice issued by the local council or shire (Shire of Chittering) during days of elevated fire weather danger. Specific instructions must be adhered to when a HVMB is issued by the Shire (https://www.chittering.wa.gov.au/services/bushfire-emergency-services/fire-bans-fire-danger-rating.aspx)
    - A Total Fire Ban is a notice issued by the Department of Fire and Emergency Services during days of elevated fire weather danger. Specific instructions must be adhered to when a TFB is issued by DFES (Total fire ban - Department of Fire and Emergency Services)
  - Modifying Site Activities (based on Forecast FDR and TFB/HVMB)
  - Monitoring DFES Bushfire Emergency Warnings for bushfire (and/or other signs of bushfire activity) within 50 km of the facility, during bushfire season, and understanding the decision-making triggers.
- Detail emergency response procedures to address the nominated hazards, including for:
  - Bushfire and
  - Onsite fire in renewable energy infrastructure

Bushfire preparedness and pre-emptive activities

Year-round (with focus on the month prior to bushfire season)

- Ensure ongoing compliance with endorsed BMP including:
  - Vegetation management must be conducted as per the BMP including maintenance of NVZs and APZs.
  - Gutters, roof surfaces and valleys, kerbs, traps, sumps, bunds, drains, rooves or any other accumulation points for leaf litter, dry vegetation, or any other combustible materials must be cleared, and the debris removed from site.
  - Extraneous or unnecessary materials (fuel loads) must be removed from site (e.g. dilapidated/stored vehicles, plant or equipment; excess fuel/chemicals; any combustible waste materials).
- Bushfire preparedness housekeeping inspections:
  - Vegetation management as per BMP
  - Ensure all vehicle site access points, including emergency access points, are clear and accessible.
  - Ensure that all fire protection systems and equipment is unobstructed, in service and performing optimally.

- Fire detection, alarm and suppression systems, and any other communication and emergency equipment must be maintained in accordance with relevant codes and standards, and be in effective working order at all times
    - Any defects, faults or matters affecting the performance of systems must be identified through routine testing and servicing, with any maintenance activities and rectifications to be closed-out prior to bushfire season.
- Ensure Emergency Information Book and signage is up to date with the latest information, especially key contact names and phone numbers, as detailed in Section 5.9.
- Ensure local fire brigade is engaged with on an ongoing basis, to ensure they are familiar with the site layout, specific hazards and fire detection and suppression systems as detailed in Section 5.10.
- If possible, ensure the facility has registered with the Shire of Chittering for SMS notifications for Harvest Vehicle Movement Bans (HVMB).

During the bushfire season

Monitor Forecast Fire Danger Rating (FDR) and Total Fire Ban Days (TFB)

- A nominated person/role is to be responsible for identifying, responding to and communicating the Fire Danger Rating, ideally four days ahead:
    - http://www.bom.gov.au/wa/forecasts/fire-danger-ratings.shtml [4 day FDR forecast] or
    - https://www.emergency.wa.gov.au/index.html#firedangerratings [current/next day FDR]
    - https://www.emergency.wa.gov.au/#totalfirebans [Total Fire Ban]
- This information must be communicated to everyone likely to be present on-site, and relevant off-site personnel.
- Undertaken any modification of site activities based on forecast FDR or TFB (see below).

Modifying Site Activities (based on Forecast FDR and TFB)

- ***Moderate FDR or No Rating***
    - No specific daily monitoring or actions unless conditions change.
- ***High FDR***
    - Alert all site personnel and visitors of bushfire risk
    - No specific daily monitoring but remain vigilant to potential bushfires through visual checks, occasional check of online resources for emergency warnings and bushfires in the local area.
    - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
- ***Extreme FDR***
    - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for site shutdown and offsite evacuation, if required.
    - Conduct regularly visual checks throughout the day

- Regularly check online resources for emergency warnings and bushfires in the local area.
- Consider minimisation of site personnel and visitation requiring travel to and from the facility, as well as non-essential activities and high-risk maintenance activities.
- Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
- Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.

- ***Catastrophic FDR and TFB declared days***
  - Alert all site personnel and visitors of elevated bushfire risk and communicate modified activities including requirement to be prepared for rapid site shutdown and offsite evacuation, if required
  - Conduct hourly visual checks throughout the day
  - Conduct hourly check online resources for emergency warnings and bushfires in the local area.
  - Postpone non-essential activities or high-risk maintenance activities at the facility.
  - Minimise site personnel and visitation to only essential personnel.
  - Include bushfire ignition hazards in any Job Hazard Analysis or similar activity-based risk management process for site activities.
  - Conduct daily checks of vegetation, rubbish and extraneous storage accumulation, vehicular access routes and fire systems to ensure they are fit-for-purpose in a bushfire emergency.
  - Comply with all Total Fire Ban requirements including:
    - No fire or flames allowed in the open air
    - No open fires for the purpose of cooking or camping are not allowed
    - No ‘hot work’ such as metal work, grinding, welding, soldering, gas cutting or similar is allowed unless a formal exemption has been obtained
    - No use of chainsaws, plant or grass trimmers or lawn mowers in bushland areas
    - No other activities that may start a fire
    - Ensuring equipment or machinery is mechanically sound
    - Ensuring all reasonable precautions are taken to prevent a bushfire igniting, including postponing any activity that could result in a bushfire ignition.

Bushfire Monitoring, Triggers and Decision-Making

Bushfire Monitoring

Bushfire monitoring involves the identification of the DFES Bushfire Emergency Warnings (ADVICE, WATCH & ACT AND EMERGENCY) and/or bushfire activity within 50km of the facility, through the use of the Emergency WA website app (https://www.emergency.wa.gov.au/), or ABC local radio.

- ***If ADVICE warning or bushfire is within 25 km – 50 km of the site***
  - If possible, liaise with the DFES if fire travelling toward the site.

- If located at the BESS, consider reducing numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location (e.g. Ellenbrook or Gingin depending on direction of fire travel).
- Make preparations to shutdown facility and conduct offsite evacuation procedures, depending on bushfire location and direction of spread, including:
  - Ready the BESS facility to reduce to a low energy state (including discharging the BESS) if it is required
  - Ensure all other infrastructure and plant are properly secured.
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire and communications systems are ready for use.
- Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

- ***If WATCH & ACT warning or bushfire is within 10 km – 25 km of the site***
  - If possible, liaise with the DFES if fire travelling toward the site.
  - Prepare or commence shutdown facility, depending on bushfire location and direction of spread, including:
    - Reducing the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
    - Ensure all other infrastructure and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Prepare or commence offsite evacuation procedures depending on bushfire location and direction of spread, including:
    - Early reduction of numbers of onsite personnel to essential staff only, and relocate all other staff and visitors to nominated offsite safer location.
    - If possible, ensure relocation of all personnel to the offsite safer location ahead of any bushfire impact on road network (including smoke impact).
  - Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.
- ***If EMERGENCY warning or if bushfire is <10km or impact is imminent:***
  - If possible, liaise with the DFES.
  - If safe to do so, commence or conduct facility shutdown depending on bushfire location and direction of spread, including:
    - Reducing the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
    - Ensure all other infrastructure and plant are properly secured.
    - Ensure all vehicular access routes are unlocked and available for use.
    - Ensure all fire and communications systems are ready for use.
  - Urgently undertake offsite evacuation procedures (if safe to do so) depending on bushfire location and direction of spread, including:
    - Relocate all site personnel and visitors to nominated offsite safer location ahead of any bushfire impact on road network.
  - If there is insufficient time to safely travel offsite without being impacted by bushfire, conduct onsite shelter in place in building furthest from approaching fire, or as directed by Tronox personnel.

- Continue monitoring and re-evaluating situation depending on bushfire behaviour, and liaising with DFES as required.

Offsite Evacuation and Onsite Shelter-in-Place Procedures

Ahead of deciding to evacuate offsite or remain onsite to shelter-in-place (which is the last resort response if unsafe to evacuate offsite), the following should be conducted:

- Assess the bushfire situation:
  - Review available information to determine bushfire location, direction and speed of travel
  - Determine if there are any DFES Bushfire Warnings issued
  - Contact and liaise with DFES for further information and guidance
  - Make a decision whether it is safe to evacuate to nominated offsite safer location (e.g. Ellenbrook or Gingin depending on direction of fire travel), or whether it is safer to shelter onsite (which should be a last resort action only).
  - Advise DFES of the decision, if possible.

Offsite Evacuation (and Facility Shutdown)

- Assemble all site personnel and visitors
  - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) and evacuate to nominated offsite safer location.
  - Ensure sufficient transport is available for all personnel to travel to nominated offsite safer location with sufficient fuel to travel 100 km, water, fire extinguishers (if possible)
- Conduct facility shutdown actions (if sufficient time) including
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire systems are ready for use.
  - Ensure all other infrastructure and plant are properly secured.
- Brief evacuees on offsite evacuation particulars including:
  - Confirm the offsite safer location (e.g. Ellenbrook or Gingin depending on direction of fire travel)
  - The evacuation route to travel to the off-site safer location
  - The need to travel in convoys in case of vehicle failure
  - Ensure final evacuating personnel are in no less than 2 vehicles.
- Monitor the leaving of site and arrival at nominated offsite safer location, and if anyone is missing, notify DFES immediately.

Onsite Shelter-in-place (and Facility Shutdown) – Last Resort Action Only

- Assemble all site personnel and visitors at the identified onsite building furthest from approach bushfire
  - Brief them of the bushfire situation and the plan to shutdown facility (if sufficient time) but remain onsite to shelter in place.
- Prepare identified onsite building for shelter (NOTE: The existing onsite buildings are not bushfire refuge buildings and should only be used as a last resort if offsite evacuation is not possible)

  - Check the perimeter of building and put away all external combustible items and any loose items that could be projectiles
  - Close all doors and windows
  - Ensure all firefighting, emergency communication equipment and first aid supplies are available and ready for use, including hose reel coverage around the building from the mobile fire trailer.
  - Ensure all internal access routes within the building are open to enable people move to the available spaces
  - If installed, ensure any evaporative air-conditioning (HVAC) can be easily shutdown ahead of the fire impact. If possible, keep the water running and turn off the fan, otherwise shutdown completely.
  - Begin storing water for drinking (in containers) and review food stores
  - Consider collecting any blankets and fire extinguishers from other buildings
  - Soak towels and rugs in water and lay them along the inside of external doorways or block any other gaps for embers or smoke
- Conduct facility shutdown actions (if sufficient time and safe to do so) including
  - Reducing the facility to a low energy state (including discharging the BESS), in consultation with authorised DFES personnel (where possible)
  - Ensure all vehicular access routes are unlocked and available for use.
  - Ensure all fire systems are ready for use.
  - Ensure all other infrastructure and plant are properly secured.
- As bushfire impacts the facility:
  - All remaining occupants are to be within the identified onsite building
  - Immediately before the fire arrives, wet down building exterior, decks and landscaping close to the building. Turn off evaporative air-conditioning if not already done.
  - Ensure occupants to get down low to limit exposure to smoke and drink plenty of water to avoid becoming dehydrated.
  - Regularly inspect the condition of the building including:
    - Regular inspection of the inside of the building, including the roof space for sparks and embers, and extinguish where possible and safe to do so.
    - If safe to do so, organise for regular patrols of the outside of the building to check for any signs of bushfire ignition and extinguish where possible and safe to do so. Those conducting the patrols are to wear appropriate PPE.
- Stay inside while the fire front is passing and don't leave until advised by that the fire is no longer a threat or offsite evacuation can be conducted (or decided by Chief Fire Warden).
- If the building catches fire and/or conditions inside become unbearable:
  - Leave through the door furthest from the approaching fire
  - Relocate all occupants to the following locations furthest from the fire or previously burned land.
- Once the fire has passed, and approval is provided to leave the building:
  - Go outside and extinguish any fires on the building or in adjacent landscaping.
  - Regularly inspect the inside and outside of the building for several hours.
  - Do not approach the renewable energy infrastructure until advised by DFES.

Onsite Renewable Energy Infrastructure Fire Response

The emergency response to any onsite fire in renewable energy infrastructure (especially BESS), is to include the following:

- Immediately notify the following of onsite fire, including location:
  - DFES to enable rapid turnout to site
  - Relevant staff
  - Relevant neighbouring landowners
- Strongly consider full emergency shutdown of the BESS and transformers unless there are mitigating circumstances. This should be conducted in consultation with authorised DFES personnel (where possible).
- If fire is within the BESS unit/s, ensure staff relocate as far as possible from the fire, and no less than 50 m away.
- If possible, ensure relevant vehicular access routes are unlocked and available, to enable attending firefighters to gain access to the location of the fire.
- Ensure all fire and communications systems are ready for use.
- If safe to do so, conduct first attack response on any spot fires with mobile fire appliances, until DFES arrival.
- Ensure attending firefighters have access to any relevant specialist technical personnel (onsite or offsite), to assist by providing technical advice.

Emergency Management Plan Review, Training and Exercises

The emergency management plan is to be reviewed regularly as follows:

- At least annually to ensure currency and effectiveness
- Following any changes to the risk on-site pertaining to site infrastructure and operations
- After any activation of the plan or incident involving notification to the emergency services.
- After emergency exercises.

In addition to the review of the emergency management plan, it is critical to regularly train relevant staff and conduct exercises to ensure everyone is fully conversant with the requirements of the plan and able to respond as required during all emergencies. It also presents an opportunity to test the effectiveness of the plan and refine as required.

- Training should be conducted annually prior to bushfire season, as a minimum, and also at the commencement of employment.
- Exercises should be conducted annually prior to bushfire season, as a minimum, but ideally on a regular basis.

Department of **Planning, Lands and Heritage**

GOVERNMENT OF WESTERN AUSTRALIA

Addressee's ref:	CAS-114672-C2P2L8
Our ref:	ADV-10011501
Case file no:	
Enquiries:	Warren Greatorex 0499 986 830

Lola Sterrett
Element Advisory Pty Ltd

Email: lola.sterrett@elementadvisory.com.au

Dear Lola,

ABORIGINAL CULTURAL HERITAGE – CHANDALA PROCESSING PLANT - ACH SITE GINGIN BROOK WAGGYL (ID 20008).

Thank you for your inquiry dated 20/03/2026 seeking comment from the Department of Planning, Lands and Heritage (DPLH), regarding the proposed augment of the Cooljarloo Energy Park (CEP) in the locality of Muchea.

A review of the Register of Places and Objects, as well as the DPLH Aboriginal Heritage Database, concludes that the subject area **does not intersect** with any known Aboriginal heritage Places or Registered Sites.

Therefore, based on the current information held by DPLH, no approvals under the *Aboriginal Heritage Act* 1972 (AHA) are required in this instance.

Please note that limited Aboriginal heritage surveys have been completed over the subject land and, as such, it is unknown if there is Aboriginal cultural heritage present. Therefore, Element Advisory Pty Ltd needs to be made aware of their obligations under the AHA.

Should you have any queries regarding this advice please contact Warren Greatorex, Senior Heritage Officer, at warren.greatorex@dplh.wa.gov.au or on 0499 986 830.

Yours sincerely,

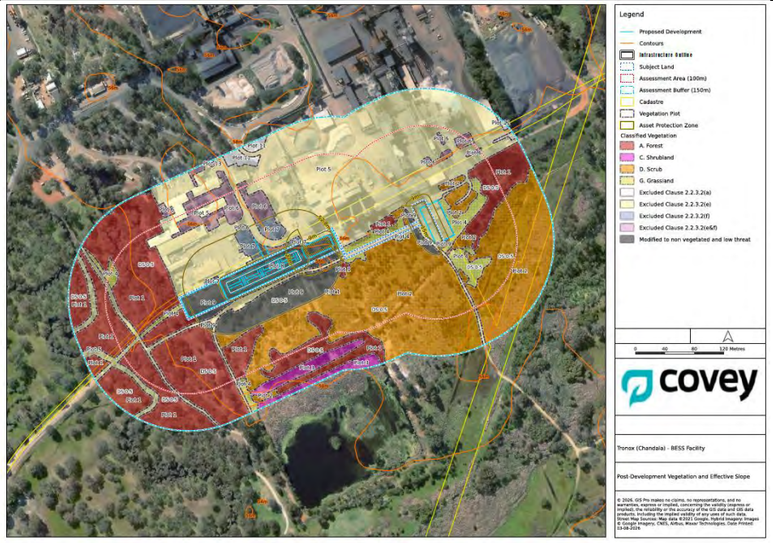
Warren Greatorex
Senior Heritage Officer
24/03/2026

SCHEDULE OF SUBMISSIONS – Lot 1261 (RN 722) Old Gingin Road, Muchea – Proposed Battery Energy Storage System (BESS)

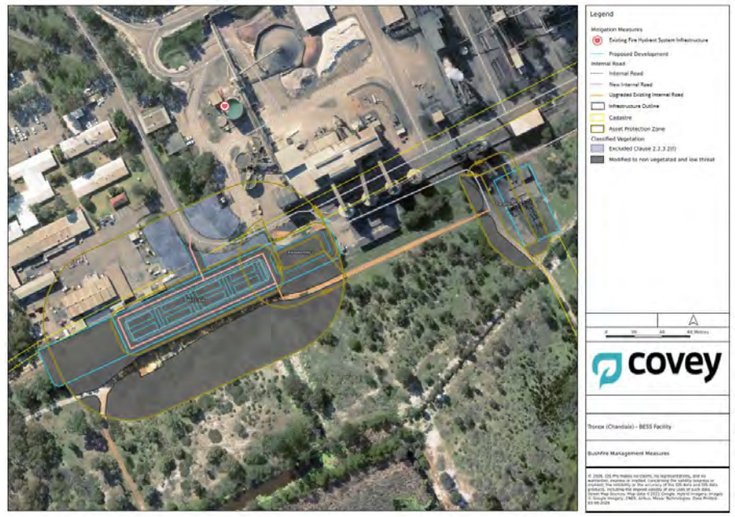
Submitter	Comment	Proponent Response	Shire Officer Response
Western Power	Western Power supports the development application for the proposed BESS facility at Lot 1261 Old Gingin Road, Muchea in the Shire of Chittering. The BESS development proposal is progressing the initiation of the project through the scoping, network connection and substation arrangement processes with the applicant/proponent, ensuring that the connection, location, design, access and ongoing maintenance and operations of assets are supported by Western Power. Where Western Power does not have easements on freehold land, it relies on safe clearances to ensure appropriate development occurs in the vicinity of its assets, which includes appropriate setbacks of buildings, vegetation and use of land in the vicinity of power lines and assets. Western Power recommends the following standard Advice Notes should development approval be granted, pursuant to Section 167 of the *Planning and Development Act 2005*: *Advice Notes* *(i) The development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.* *(ii) No development (including drainage, fill, fencing, storage or parking) will be permitted within Western Power line and cable easements or restriction zones without the prior written approval of Western Power.* *(iii) The applicant should formally progress the Western Power network connection and substation arrangements with Western Power.* *(iv) Arrangements being made to the specifications of Western Power for the provision of necessary electricity easements are maintained and/or provided as required.*	There is no objection to the inclusion of an advice note that reflect the need for the proponent to progress network connection and substation arrangements through a formal Western Power application submission. This will ensure the connection, location, design, access and ongoing maintenance and operations of assets are supported by Western Power. Section 167 of the P&D Act 2005 refers to easements and creation of easements on subdivision. This application is for development, not subdivision, approval hence reference to s167 is not likely relevant. It is recommended that the suggested condition be converted to the following advice note, as has been recently imposed by decision makers, including the RDAP, on recent wind farms: <u>Proposed Advice Note:</u> *The development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict. Arrangements should be made to the specifications of Western Power for the provision of necessary electricity easements as and where required. No development (including drainage, fill, fencing, storage or parking) will be permitted within Western Power line and cable easements or restriction zones without the prior written approval of Western Power.*	Noted, Shire officers agree with the Proponent's recommended advice note and have placed this on the recommended conditions and advice notes of this application.
Department of Water & Environmental Regulation (DWER)	Thank you for providing the above referral for the Department of Water and Environmental Regulation (Department) to consider. The Department has identified that the proposed development application has the potential to impact on environment values and management. Key issues and recommendations that should be addressed are provided below: **Native vegetation clearing** Under section 51C of the *Environmental Protection Act 1986* (EP Act), clearing of native vegetation is an offence unless: • it is undertaken under the authority of a clearing permit • it is done after the person has received notice under Section 51DA(5) that a clearing permit is not required • the clearing is subject to an exemption Exemptions for clearing that are a requirement of written law, or authorised under certain statutory processes, are contained in Schedule 6 of the EP Act. Exemptions for low impact routine land management practices outside of environmentally sensitive areas (ESAs) are contained in	DWER's submission is noted in conjunction with the following comments: **Native vegetation clearing** The proposed NVCP is required to establish a bushfire buffer which is needed for the operation of the BESS. **Industry regulation** It is noted that any changes to the licensed premises will require an amendment application to be submitted by the instrument holder under section 53 of the *EP Act* and can be authorised through a works approval or licence amendment. **Contaminated sites** DWER's comments noting that the proposed development does not involve a change to a more sensitive land use, and that the department has no objection to the proposal and that a contamination condition is not required are noted. No objection is raised in relation to the proposed advice note requiring the preparation of an appropriate health and safety plan to manage potential exposure risks associated with soil and groundwater contamination if intrusive works, including excavation or dewatering, are undertaken as part of the development.	Noted, an advice note has been placed on the recommended conditions and advice notes of this application which advises the applicant of their requirement to contact DWER to obtain the relevant clearing permits and/or any required works approvals.

	the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* (the Clearing Regulations). The Department received a clearing permit application CPS 11714/1 on 1 September 2026 from DC Project SPV-I Pty Ltd as trustee for the DC Project to clear 0.9 hectares of native vegetation at the proposal location for the purpose of establishing a bushfire buffer around a Battery Energy Storage System (BESS). This application is currently under assessment. The extent of the area in the development application appears to be within the area of clearing specified in the clearing permit application. However, the purpose of the clearing permit is to establish a bushfire buffer around the BESS and not clearing for the construction of the BESS. If further clarification is required, please contact the Department's Native Vegetation Regulation section at admin.nvp@dwer.wa.gov.au or on 6364 7098. **Industry regulation** The Department regulates emissions and discharges from the construction and operation of prescribed premises through a works approval and licensing process, under Part V, Division 3 of the *Environmental Protection Act 1986* (EP Act). The categories of prescribed premises are outlined in Schedule 1 of the *Environmental Protection Regulations 1987*. The EP Act requires a works approval to be obtained before constructing a prescribed premises and makes it an offence to cause an emission or discharge from an existing prescribed premises unless they are the holder of a works approval or licence (or registration) and the emission is in accordance with any conditions to which the licence or works approval is subject. This premises is licensed under Part V of the EP Act (licence number L5939/1988/11) as a Category 8: Mineral sands mining or processing prescribed premises. The Licence Holder is Tronox Management Pty Ltd. Any changes to the licensed premises will require an amendment application to be submitted by the instrument holder under section 53 of the EP Act and can be authorised through a works approval or licence amendment. Further guidance on changes to prescribed premises can be found in the Department's Industry Regulation Guide to Licensing which can be accessed at: https://www.wa.gov.au/service/building-utilities-and-essential-services/integrated-essential-services/guideline-industry-regulation-guide-licensing **Contaminated sites** Please refer to Attachment 1 for further advice provided by the Department's Contaminated Sites Branch.		

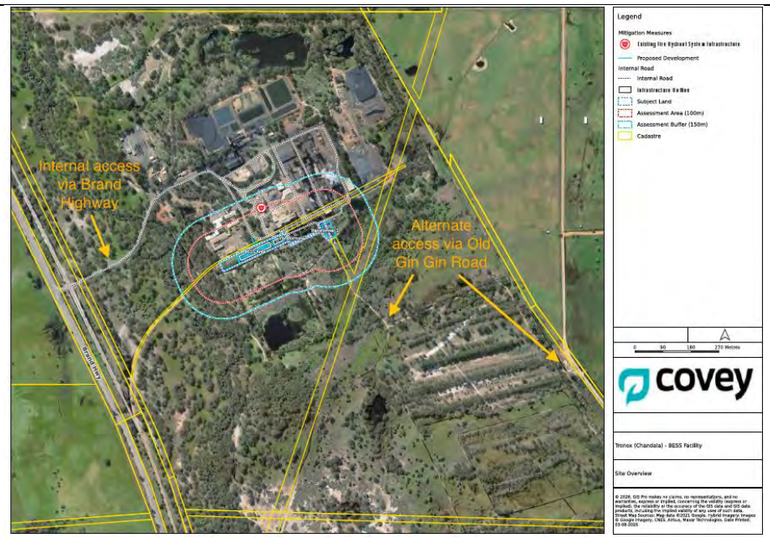
	In the event there are modifications to the proposal that may have implications on aspects of environment and/or water management, the Department should be notified to enable the implications to be assessed.		
Department of Water & Environmental Regulation (DWER) - Contaminated Sites Advice	I refer to your email dated 2 October 2026 sent to the Department of Water and Environmental Regulation (the department) regarding the proposed development at the above-mentioned site. As per the requirements under section 58(6)(b) of the *Contaminated Sites Act 2003* (CS Act), advice is required on the suitability of the classified land for the proposed development. The central portion of Lot 1261 is currently occupied by a mineral sands processing facility, with the surrounding land comprising a mix of rural, agricultural and industrial uses. The proposed development comprises construction of battery energy storage system within the perimeter of the existing mineral processing plant. Land at Lot 1261 on Diagram 5326 (the site) was classified under the CS Act as *contaminated – remediation required* on 24 August 2009, and memorial L90474 ML was placed on the certificate of title. The classification was based on soil and groundwater contamination resulting from historical activities of the site. However, the site was considered suitable for ongoing commercial/industrial land use. As the proposed development does not involve a change to a more sensitive land use, the department has no objection to the proposal and considers that a contamination condition is not required. However, to address potential contamination-related risks, the department recommends that the following advice note be included in any approval granted by the Shire. **Advice:** An appropriate health and safety plan should be prepared to manage potential exposure risks associated with soil and groundwater contamination if intrusive works, including excavation or dewatering, are undertaken as part of the development.	Refer above.	Noted, see above response.
Department of Fire and Emergency Services	I refer to your email dated 2 October 2026 regarding the submission of a Bushfire Management Plan (BMP) (Version C), prepared by Covey Associates and dated 3 August 2026, for the above proposed development. This advice relates to the *State Planning Policy 3.7 Bushfire* (SPP 3.7) and supporting *Planning for Bushfire Guidelines* (Guidelines), as well as DFES' role and responsibilities as Hazard Management Agency (HMA) for Fire in Western Australia. General Comment • DFES acknowledges that the proposed development includes a 38 megawatt Battery Energy Storage System (BESS) facility, two transformers,	**No change is proposed to the BMP mapping or recommended APZs.** The APZ for the BESS and Transformer 2 is based on the Method 2 calculation using Class A Forest, and not Class D Scrub. This approach was adopted due to the presence of forest vegetation immediately south of the proposed BESS which required management. It is however noted that spatial continuity with Plot 1 is not considered determinative in vegetation classification as many bushfire vegetation classifications can be mapped adjacent to each other.	Shire officers do believe that the BMP requires minor amendments, and any further discussions regarding vegetation classification and the possible requirement to alter the BMP in this regard can be dealt with after approval is granted via a condition of approval to update the BMP prior to implementation of the bushfire mitigation measures.

	a water run-off storage area, associated electrical infrastructure and an internal access network. • The BMP concludes that the application of SPP 3.7 does not apply to the proposal on the basis that no habitable buildings are proposed. The decision maker has referred this proposal to DFES as a discretionary referral. A BMP was prepared to demonstrate a 10kW/m2 area for the BESS facility. • DFES has provided a high-level review of the BMP to enable validation of the Method 2 calculation used to calculate the area of 10kW/m2 for the BESS envelope only. • DFES has reviewed the BMP, however cannot guarantee that the BMP is consistent with all other plans and information submitted as part of the proposal. The decision maker should be satisfied that all submitted documents have consistent details. • Given the temperature sensitive nature of the infrastructure, it is critical to ensure that the proposed design adequately responds to facility fire risks and bushfire risks in order to protect life, property and infrastructure. • Accordingly, DFES has also undertaken a high-level assessment of the proposal against the *CFA Design Guidelines and Model Requirements – Renewable Energy Facilities* as amended (REF Guidelines) from an HMA perspective on how the proposal has incorporated site risk mitigation measures to assist operational activities in the event of an emergency. The REF Guidelines is currently considered best practice for the development of renewable energy facilities. • Specific requirements of the REF Guidelines are to be further addressed in the BMP as outlined in the below assessment. **Recommendation: Insufficient information provided – further information and review required** • DFES recommends the BMP be modified to contain all the information to address the Method 2, emergency vehicular access and firefighting water supply requirements as per the Assessment advice provided in Table 1. Should the modified BMP affect the design of the proposal, the proposal should be amended to reflect these modifications. • Further information should also be provided to demonstrate compliance with the REF Guidelines. **<u>Vegetation Classification:</u>** **<u>Classified Plot 2 – not demonstrated</u>** Vegetation Plot 2 cannot be substantiated as Class D Scrub with the limited information and photographic evidence provided. Height indicators have not been used to validate the vegetation height. Furthermore, the majority of Plot 2 vegetation is contiguous with Plot 1 vegetation which is assessed as Class A Forest. In the absence of an enforceable and ongoing vegetation management mechanism, the potential for revegetation should be adequately considered in accordance with Clause 2.2.3.1 of AS 3959. The BMP should detail specifically how the Class D Scrub 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 AS 3959, or the resultant BAL ratings may be inaccurate.	 <u>The APZ for Transformer 1 is based on Class D Scrub, which is appropriate given that:</u> • The Class D Scrub classification was assessed during a site inspection by a BPAD Level 3 bushfire practitioner, and is described as the following in the BMP: o *generally between 2 m and <6m high, generally associated with banksia woodland south of the subject site.* • There are 14 photos of Plot 2 in the BMP Appendix A (several with people in them for height reference) that clearly depict the trees (typically banksia) which are generally 4m to 5m high - not the eucalypt species associated with Plot 1 (see Plot 1 photos) which were 8m to 10m or above. Photos 2h to 2n clearly show the vegetation is not Class A Forest. • The aerial mapping and some photos (e.g. 2a, 2d, 2l) also clearly show that portions of mapped Plot 2 are currently grassland or shrubland vegetation (vegetation <2m high) interspersed with scrub vegetation that is 2m – 6m high. • There was no observed evidence that the mapped scrub was likely to become forest vegetation. • Therefore, classifying the 'Scrub' is already appropriate based on vegetation height (if not conservative given the presence of grassland and shrubland vegetation in this plot) and reclassification to Plot 1 'Forest' is unwarranted given the lack of trees > 6m high. As a result of the above, there is no requirement to amend the BMP mapping nor adjust the APZ widths.	

	<u>Classified Plot 3 – not demonstrated</u> Vegetation Plot 3 cannot be substantiated as Class C Shrubland with the limited information and photographic evidence provided. Height indicators have not been used to validate the vegetation height. Furthermore, Plot 3 vegetation is contiguous with Plot 1 vegetation which is assessed as Class A Forest. In the absence of an enforceable and ongoing vegetation management mechanism, the potential for revegetation should be adequately considered in accordance with Clause 2.2.3.1 of AS 3959. The BMP should detail specifically how the Class C Shrubland classification was derived as opposed to Class A Forest. If unsubstantiated, the vegetation classification should be revised	**No changes are proposed to the BMP to this address comment given:** • Photos 3a and 3b in the BMP clearly depict the areas mapped as Plot 3 are within an existing waterway (Photo 3a which has little to no vegetation but conservatively assumed to be shrubland if water dries up) and reeds within an existing pond (Photo 3b depicts the reeds). • Given the Plot 3 vegetation is less than 2 m high, neither area is required to be classified as Class A Forest. • Both plots are more than 100 m from the proposed infrastructure, and therefore have no BAL impact on proposed development. • As detailed above, the APZs for all proposed infrastructure near the Class C Shrubland (i.e. BESS and Transformer 2), have been sized on the basis of Class A Forest.	See above.
	<u>Bushfire Assessment Methodology: Method 2</u> DFES notes that there is some lack of clarity around definitions for inputs to Method 2 calculations, of particular relevance to this application are those regarding effective slope. In the absence of clear instruction to the contrary, DFES considers that the Method 2 normative procedure should apply the 5-degree increments for effective slope, as per Method 1, rather than discrete figures. Deviation from this would require a comprehensive Performance Solution that complies with the relevant Bushfire Resistance Performance Requirements of the National Construction Code (NCC). The BMP applies a 2-degree downslope, which should instead use a 5-degree downslope to comply with the Method 2 normative procedure. Furthermore, the vegetation classification should adequately consider the potential of unmanaged vegetation to revegetate to Class A Forest, in the absence of an enforceable vegetation management mechanism. Accordingly, DFES considers that the Method 2 outputs cannot be validated.	**No change to be made to the BMP to this address comment given that:** • AS 3959 states Method 2 is *"…appropriate where a more specific result is sought or where the site conditions are outside of the scope of Method 1"* o The Method 2 calculation was primarily undertaken to determine the separation distances required to achieve 10 kW/m^2 to the BESS containers, which can't be achieved through use of the Method 1 simplified procedure (which can only provide separation distances down to BAL-12.5) • When employing Method 2 calculations, various inputs have been historically used to reflect site-specific conditions including effective slope, site slope, Fire Danger Index, flame width, and flame temperature. These inputs into Method 2 calculations have been regularly approved including via peer review by other BPAD consultants. • Several Method 2 calculators enable the use of discrete slopes for effective and site slope inputs, including the FPAA Flamesol calculator (FPAA oversee BPAD accreditation). • In our opinion, AS3959 Appendix B does not preclude the use of discrete slopes outside the 5 degree increments adopted for Method 1 (which is simplified for ease of use). • For this project, given a Method 2 calculation was required for the BESS anyway, the effective slope was reduced to 2 degrees to reflect the slope measured onsite. We see no specific reason to adjust this observation. • The APZ for the BESS primarily requires management of vegetation to the south of the BESS containers, which as depicted in the BMP (see Figure 3-1 on pages 11 and 12) is mostly Class D Scrub. On this basis, the BESS APZ width is conservative being based on Class A Forest, in lieu of Class D Scrub. Class A Forest is still appropriate given the small portions of post-development forest to the south of the BESS. If the BESS envelope is relocated, review of the Method 2 calculation and associated setbacks would need to be undertaken, but this would be the case anyway, regardless of the effective slope adopted.	Shire officers do believe that the BMP requires minor amendments, and any further discussions regarding assessment methodology and the possible requirement to alter the BMP in this regard can be dealt with after approval is granted via a condition of approval to update the BMP prior to implementation of the bushfire mitigation measures.
	<u>Bushfire Assessment Methodology: REF Guidelines – Vehicle Access</u> The REF Guidelines requires the provision of at least two but preferable more access points to each part of the facility. However, the submitted development site plan indicates only a single access point to the BESS facility. In addition, it is unclear how emergency services vehicles would access the substation, as no vehicular access to the substation is shown on	**No change to be made to the BMP to this address comment given:** • Figure 5-1 (page 35 of the BMP) depicts two access routes to the BESS • One is via existing Tronox internal roads the north of the proposed BESS • The other from the south, via an existing unsealed road which is to be upgraded as part of proposed works, and which also provides access to Transformer 1.	Shire officers do believe that the BMP requires minor amendments, and believe that the BMP will need to be updated to make it clearer as to how the site has sufficient two-way access/egress. This can be dealt with after approval is granted via a condition of approval

	the plan. Please also refer to further comments in the section titled 'DFES Regional Operations' below.	• Section 5.3 of the BMP provides further information on the required internal road network requirements, including that these roads are to comply with private driveway specifications of the WA Planning for Bushfire Guidelines.  • Overall access public road to the site from Brand Highway is shown on Figure 1-2 (page 6 of BMP). It is also noted in Section 1.2 of the BMP that there is an alternative vehicular access from Old Gingin Road to the east, which is connected to the facility by an existing, rarely used track (given the availability of the sealed main entrance from Brand Highway).	to update the BMP prior to implementation of the bushfire mitigation measures.

SCHEDULE OF SUBMISSIONS – Lot 1261 (RN 722) Old Gingin Road, Muchea – Proposed Battery Energy Storage System (BESS)

			
	Bushfire Assessment Methodology: REF Guidelines – Water Supply Section 5.4 of the BMP identifies that the BESS facility requires a firewater supply of not less than 288,000 litres that may be provided via the 415,000 litres firewater reserve stored in the existing combined tank at the Chandala Processing Plant. However, it is unclear whether the existing water reserve is dedicated for firefighting purposes and meets the relevant flow rate and pressure requirements. Please also refer to further comments in the section titled 'DFES Regional Operations' below.	**No change to be made to the BMP to this address comment given that:** • Section 5.4.1 of the BMP details the firewater to be provided for proposed BESS, which is to be compliant with the CFA Renewable Guidelines for a centralised BESS, with no additional supply required for bushfire fighting purposes. • Given the substantial amount of existing onsite firewater, the BMP has proposed that the existing firewater systems could be considered instead of a new hydrant system, provided this is confirmed by a suitably qualified Fire Protection Engineer. • Should the existing system be found to be deficient in any way (capacity, flow rate, pressure etc) then the system would either need to be upgraded or alternatively, a new system installed that is compliant with CFA Renewable Guidelines. • The BMP requires that a compliant firewater system is provided, however the assessment of the suitability of the existing firewater system to meet these requirements is expected to be conducted as part of the detailed design phase.	Shire officers do believe that the BMP requires minor amendments, and believe that the BMP will need to be updated to make it clearer as to how the site will have sufficient water reserved for firefighting purposes for both the existing Tronox site and for the new proposed BESS. This can be dealt with after approval is granted via a condition of approval to update the BMP prior to implementation of the bushfire mitigation measures.
	Emergency Management Plan Given the high-risk land use at this location, it is considered appropriate that an 'Emergency Management Plan' be prepared. Consideration should be given to the Bushfire Emergency Plan (BEP) Manual (as published by the Western Australian Planning Commission), Section 7 of the REF Guidelines and the comments from DFES Aviation Services below. These contain details of information that should be included in a EMP and will ensure the appropriate content is detailed when finalising the EMP to the satisfaction of the decision maker.	**No change to be made to the BMP to this address comment given:** • Section 5.11 of the BMP requires the preparation of an Emergency Management Plan (EMP) for the BESS facility (or amend existing site EMP if relevant). • Section 5.11 summarises the responses for bushfires and onsite fires, with additional detailed guidance provided in Appendix H of the BMP. • The intent is that a BESS facility EMP (or amend existing site EMP) would be prepared, and include the guidance in Section 5.11 and Appendix H into that document. • There were no comments from DFES Aviation Services below. • Recommended Condition 6 proposes the preparation of an Emergency Management Plan to be approved to the satisfaction of the Shire of Chittering.	Officers recommend that a condition of approval is required to prepare an Emergency Management Plan to address these concerns from DFES. The applicant has agreed to this condition.

Commented [LW1]: I replaced the existing comment. The preparation of an EMP for the facility is a requirement of the BMP, with inclusion of the response procedures from Section 5.11 and Appendix H. There is little point in amending the BMP given the need to produce the EMP anyway.

	Risk Management Plan As per the REF Guidelines, a Risk Management Plan (RMP) 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. A RMP is considered to be a critical requirement of planning and informing fire risk management in the design and operation of renewable energy facilities. While DFES accepts that Table 4: Summary of Renewable Energy Facility Recommendations relating to bushfire and the other development response (CFA, 2025) of the BMP can be considered as a draft RMP, a detailed RMP should be further developed to demonstrate compliance with the REF Guidelines, including addressing the following model requirements of the REF Guidelines: • Detailed site plans showing the location of site vehicle access points, internal roads, battery containers, substations, buildings and fire water supplies. • The exact specifications of the elements within the renewable energy facility, such as the battery chemistry, relevant specifications and technical data sheets on the BESS facility. • Details of the fire, smoke, heat, and toxic off-gassing detection system for the BESS facility. The system should specify what triggers an internal operator response and what triggers a 000 call. • Details of the explosion prevention and venting system for the BESS facility. • Details of the battery management and monitoring system. The system should enable the operator to intervene for the prevention of thermal runaway. • Details of the system to prevent water ingress to battery containers and appropriate ingress protection rating for containers. • Details of the warning and alarm system within battery containers and/or the facility. The system should specify what each alarm signal means. • Details of the spill containment provisions for the management of fire water runoff.	**No change to be made to the BMP to this address comment given:** • Recommended Condition 7 proposes the preparation of a Risk Management Plan to be approved to the satisfaction of the Shire of Chittering. The preparation and approval of an RMP can be conditioned as part of a development approval. An advice note can be included to guide the preparation of the RMP ensuring the following items are addressed: • Detailed site plans showing the location of site vehicle access points, internal roads, battery containers, substations, buildings and fire water supplies. • The exact specifications of the elements within the renewable energy facility, such as the battery chemistry, relevant specifications and technical data sheets on the BESS facility. • Details of the fire, smoke, heat, and toxic off-gassing detection system for the BESS facility. The system should specify what triggers an internal operator response and what triggers a 000 call. • Details of the explosion prevention and venting system for the BESS facility. • Details of the battery management and monitoring system. The system should enable the operator to intervene for the prevention of thermal runaway. • Details of the system to prevent water ingress to battery containers and appropriate ingress protection rating for containers. • Details of the warning and alarm system within battery containers and/or the facility. The system should specify what each alarm signal means. • Details of the spill containment provisions for the management of fire water runoff. It is noted that: • Section 5.5 of the BMP captures the additional design, construction and commissioning requirements for the BESS, and details most of the requirements noted by the DFES comment • Section 5.9 of the BMP details information to be provided for attending emergency services, and includes a list of information to be provided including site plans and technical specifications for the BESS.	Officers recommend that a condition of approval is required to prepare a Risk Management Plan to address these concerns from DFES. The applicant has agreed to this condition.
	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.	**No change to be made to the BMP to this address comment given:** • The BMP nominates the following DFES liaison being required, as a minimum, as derived from the CFA Renewable Guidelines: • Emergency Services familiarisation to be conducted prior to commissioning (see Section 5.7 of BMP), including notification seven days ahead of commissioning any renewable energy infrastructure, especially BESS units (see Section 5.7 of BMP). • Appropriate information is to be provided for attending firefighters and emergency services (see Section 5.9 of BMP) • Schedule of ongoing site familiarisation and liaison is to be determined with local fire brigade (see Section 5.10 of BMP).	Noted.
	DFES Bushfire Technical Services: The Method 2 calculations should use the slope band of 0-5 degrees downslope (5 degrees) rather than 2 degrees downslope. Unmanaged vegetation has the potential to revegetate to Class A Forest over time. Accordingly, the vegetation that is classified as Class D Scrub, Class C	**No change to be made to the BMP to this address comment given:** • The validity of the Method 2 calculation is addressed above (see Method 2 comments) • We disagree with the DFES comments regarding use of 5-degree increments for effective slope as per Method 1, especially given the ability to use discrete effective	Shire officers do believe that the BMP requires minor amendments, and any further discussions regarding assessment methodology and the possible requirement to alter the BMP in this regard can be dealt with after approval is

Commented [LW2]: I added these to the comment previously inputed by SLR

Commented [LW3]: Replaced previous with this response

	Shrubland and Class G Grassland must be supported by an enforceable vegetation management agreement and/or landscape management plan to substantiate the lower hazard classification than Class A Forest.	slope measurements (i.e. to the individual degree) is provided for in several Method 2 calculators (including that from the FPAA), has historically been calculated and approved on that basis (including with peer-reviews by BPAD practitioners).	granted via a condition of approval to update the BMP prior to implementation of the bushfire mitigation measures.

	Emergency vehicle access and egress
	The development plans identify an internal ring road arrangement around the proposed BESS facility, with a nominated road width of approximately 6 metres. Although this arrangement may provide vehicle circulation around the BESS facility, it does not demonstrate that responding fire appliances will have adequate access and egress under emergency conditions.
	
	The following matters require further consideration:
	• Single access point- The BESS facility appears to rely on one connection to the existing internal road network. An incident involving fire, smoke, hazardous gases or other infrastructure could compromise this access.
	• Alternative egress- A secondary independent access and egress arrangement should be considered to ensure responding appliances are not trapped or required to withdraw through an affected area.
	• Appliance manoeuvrability- The proposed road layout should demonstrate suitable turning radii, clearances, road load capacity and manoeuvring space for DFES heavy fire appliances.
	• Industrial site access- Emergency access through the existing Tronox facility is to consider security gates, site operating procedures, vehicle movements and access arrangements outside normal working hours.
	• The development plans also identify a 2-metre road buffer adjacent to the BESS facility. It is unclear whether this separation provides sufficient protection for firefighting personnel and appliances during a significant battery fire.
	
	<u>Operational recommendation:</u> The proponent should provide a detailed emergency vehicle access plan demonstrating suitable access, alternative egress, appliance turning and positioning arrangements, together with a risk-based assessment of the proposed separation distances.
	
	Firefighting water supply and infrastructure
	The referral documentation identifies an existing firefighting water reserve of approximately 415 kL within the Tronox processing plant, with the potential for the existing hydrant network to be extended to service the BESS facility.
	
	Although this may provide an opportunity to utilise existing infrastructure, the availability of sufficient water for the BESS facility has not been demonstrated. Of particular concern is whether the existing reserve is dedicated to the proposed development or forms part of the firefighting water supply required for the existing processing plant.
	
	The following information should be provided:
		No change to be made to the BMP to this address comment given:
		• Recommended Condition 6 proposes the preparation of an Emergency Management Plan to be approved to the satisfaction of the Shire of Chittering.
		• Section 5.11 of the BMP requires the preparation of an Emergency Management Plan (EMP) for the BESS facility (or amend existing site EMP if relevant).
		• The EMP (provided Appendix H) to account for a detailed emergency vehicle access plan that demonstrates:
		  • Additional access to the alternative road egress to the south
		  • Demonstrated manoeuvrability (suitable turning radii, clearances, road load capacity and manoeuvring space for DFES heavy fire appliances)
		  • Management measures that provide emergency access through the existing Tronox facility is to consider security gates, site operating procedures, vehicle movements and access arrangements outside normal working hours to be featured in the BMP
		  • Construction of any required gates to the standards stated in the BMP, and arrangements to ensure keys to any locked gates are provided to all relevant staff and onsite personnel, as well as being made available to DFES and local fire brigade.
		
		It is expected that any required setbacks to internal roads and accessways can be addressed in the Risk Management Plan, addressed as Condition 7.
		
		Firefighting water supply and infrastructure:
		As mentioned above in response above to "REF Guidelines – Water Supply"
		• Section 5.4.1 of the BMP details the firewater to be provided for proposed BESS, which is to be compliant with the CFA Renewable Guidelines for a centralised BESS, with no additional supply required for bushfire fighting purposes.
		• Given the substantial amount of existing onsite firewater, the BMP has proposed that the existing firewater systems could be considered instead of a new hydrant system, provided this is confirmed by a suitably qualified Fire Protection Engineer.
		• Should the existing system be found to be deficient in any way (capacity, flow rate, pressure etc) then the system would either need to be upgraded or alternatively, a new system installed that is compliant with CFA Renewable Guidelines.
		<u>Operational Recommendation</u>
		• The BMP requires that a compliant firewater system is provided (in accordance with CFA Renewable Guidelines), however the assessment of the suitability of the existing firewater system to meet these requirements is expected to be conducted as part of the detailed design phase.
		
		BESS fire behaviour and firefighter safety
		• Recommended Conditions 6 and 7 propose the preparation of an Emergency Management Plan and a Risk Management Plan to be approved to the satisfaction of the Shire of Chittering.
		• An advice note can be included to require the BESS Fire Risk Assessment and Emergency Management Plan to address:
			Shire officers do believe that the BMP requires minor amendments, and believe that the BMP will need to be updated to make it clearer as to how the site has sufficient two-way access/egress. This can be dealt with after approval is granted via a condition of approval to update the BMP prior to implementation of the bushfire mitigation measures.
			
			Shire officers do believe that the BMP requires minor amendments, and believe that the BMP will need to be updated to make it clearer as to how the site will have sufficient water reserved for firefighting purposes for both the existing Tronox site and for the new proposed BESS. This can be dealt with after approval is granted via a condition of approval to update the BMP prior to implementation of the bushfire mitigation measures.

Commented [LW4]: The BMP already requires a BESS facility EMP is prepared. There is little point in amending the BMP further, but rather just prepare the facility EMP.

	• Confirmation of the available firefighting water volume and whether it is dedicated or shared. • Hydraulic design information demonstrating the available flow and pressure at the proposed BESS facility. • Details of proposed hydrant locations, fire pumps, water tanks and any booster arrangements. • Confirmation that the proposed system can support the anticipated firefighting strategy, including prolonged cooling and exposure protection where required. • Demonstration that the water supply remains adequate when other firefighting demands within the processing plant are considered. • Confirmation that hydrants, booster connections and other firefighting fittings are compatible with DFES equipment. <u>Operational recommendation:</u> The proponent should demonstrate at the development approval stage that an adequate firefighting water supply can be provided. Detailed hydraulic design, infrastructure arrangements and commissioning tests should be completed before the facility becomes operational. **<u>BESS fire behaviour and firefighter safety</u>** Lithium-ion battery installations present operational hazards that differ significantly from conventional structural and bushfire incidents. A battery thermal runaway event may result in the release of flammable and toxic gases, intense heat, smoke, fire propagation and potentially explosive conditions. The following information is required: • Details of the battery monitoring, detection, alarm and suppression systems. • Battery enclosure ventilation and gas discharge arrangements, including the direction of any hazardous gas release. • Electrical isolation and emergency shutdown procedures. • Minimum safe approach distances and incident exclusion zones. • Firefighting strategies recommended by the battery manufacturer, including circumstances where defensive operations may be necessary. Operational recommendation: A site-specific BESS Fire Risk Assessment and Emergency Management Plan should be provided, addressing the anticipated fire behaviour, hazardous emissions, explosion potential and safe emergency response strategies. **<u>Proximity to existing industrial infrastructure</u>** An important distinction between the proposed Tronox development and the nearby Byrne Road BESS is that the location of the Tronox installation is within an existing industrial processing facility. The development plans identify several items of existing infrastructure in proximity to the proposed BESS facility, including: • Liquid oxygen storage and Liquefied Petroleum Gas (LPG) storage.	• The interaction between the proposed BESS and the existing Tronox processing plant, including potential escalation, hazardous materials, exposure protection, emergency access and the consequences of multiple simultaneous incidents • The expected roles and limitations of responding emergency services. Relevant career and volunteer brigades should receive site familiarisation and BESS-specific awareness before commissioning. • Site familiarisation, emergency response planning, commissioning information and verification of firefighting infrastructure should be completed before the BESS facility is brought into operation. **Local brigade response capability and Operational familiarisation and commissioning** • The BMP doesn't state nor require local brigades to intervene a BESS fire. • Sections 5.9, 5.10 and 5.11 of the BMP address preparation of emergency services information book, emergency services familiarisation, and development of an Emergency Management Plan for the proposed facility. • Additionally, Section 5.7 of the BMP details emergency services familiarisation to be conducted prior to commissioning including notification seven days ahead of commissioning any renewable energy infrastructure, especially BESS units. • There is sufficient opportunity for DFES and local brigades to outline their operational preferences, roles and responsibilities, and for that to be captured by in the Emergency Services Information Book and/or site (or BESS) Emergency Management Plan. • Recommended Condition 6 proposes the preparation of an Emergency Management Plan to be approved to the satisfaction of the Shire of Chittering.	

Commented [LW5]: Added this response

Commented [LW6]: Added this response

	• Maintenance buildings and workshop facilities. • Processing plant infrastructure. • A sewage treatment plant and water run-off storage area. • Existing and proposed transformers, electrical equipment and powerlines. The presence of these facilities creates additional operational considerations, particularly where a BESS fire could expose adjoining infrastructure to radiant heat, smoke or hazardous gases. Conversely, an incident involving existing industrial infrastructure could affect the BESS facility or restrict emergency access. The proximity of LPG and liquid oxygen storage is particularly relevant and should be considered as part of a broader assessment of credible fire and emergency scenarios. <u>Operational recommendation:</u> The risk assessment should consider the interaction between the proposed BESS and the existing Tronox processing plant, including potential escalation, hazardous materials, exposure protection, emergency access and the consequences of multiple simultaneous incidents. **<u>Local brigade response capability</u>** There are operational concerns regarding the capability of local Volunteer Bush Fire Brigades to respond to incidents involving lithium-ion battery installations. The local volunteer brigades may be among the first emergency services to arrive at an incident, particularly given the location of the development outside the metropolitan area. However, not all volunteer brigades have specialised personal protective clothing, respiratory protection, equipment or training necessary to safely undertake operations involving toxic battery emissions and thermal runaway. The site-specific emergency response plan should not assume that local volunteer brigades will undertake direct intervention in a battery fire. <u>Operational recommendation:</u> The Emergency Management Plan should clearly identify the expected roles and limitations of responding emergency services. Relevant career and volunteer brigades should receive site familiarisation and BESS-specific awareness before commissioning. **<u>Operational familiarisation and commissioning</u>** The transition from construction to commissioning is a critical period for emergency response preparedness. Before the facility becomes operational, DFES should be provided with final as-constructed documentation, including: • Emergency vehicle access and site layout plans. • Firefighting water and hydrant infrastructure plans. • Fire detection, monitoring and suppression system information. • Battery manufacturer emergency response procedures. • Electrical isolation and emergency shutdown information. • Emergency contacts and site security arrangements.		

	A site familiarisation visit should be arranged for relevant responding brigades, with consideration given to a practical emergency response exercise involving the site operator and DFES. Where practicable, the completed firefighting water infrastructure should also be subject to operational inspection and testing. Operational recommendation: Site familiarisation, emergency response planning, commissioning information and verification of firefighting infrastructure should be completed before the BESS facility is brought into operation.		
	DFES Land Use Planning: It is the responsibility of the proponent to ensure the proposal complies with relevant planning and building requirements. This advice does not exempt the applicant/proponent from obtaining approvals that apply to the proposal including planning, building, environmental health or any other approvals required by a relevant authority under written laws.	**No change to be made to the BMP to this address comment.** • DFES comment noted	Noted.
Public Transport Authority of WA (PTA)	The PTA has no objections to the proposed Battery Energy Storage System, and requests that the Shire includes the following advice note on its Responsible Authority Report recommendation: This development approval does not authorise the removal of railway infrastructure within area of Easement F290681. Removal of any such infrastructure would be subject to a separate approval by the Public Transport Authority. The above advice note is requested as the land subject to this application is affected by an Easement burden to the benefit of the Western Australian Government Railways Commission (now known as the Public Transport Authority). The PTA acknowledges that the proponents have engaged the PTA regarding the future of this easement, however until such time as these discussions conclude, it remains to the benefit of the PTA and should not be prejudiced	**Noted and no objection is raised in response to the recommended PTA advice note.**	Noted, advice note has been recommended for the approval of this application.

*Note: Comments are as per original submission received by the Shire.

/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/c

From: WAPCreferrals <WAPCreferrals@pta.wa.gov.au>
Sent: Monday, 16 November 2026 9:25 AM
To: Chatter
Cc: Isaac Parfrey
Subject: I26172214 - Response To: PTA COMMENTS - OSB2625490 - OPPORTUNITY TO COMMENT – DEVELOPMENT ASSESSMENT PANEL APPLICATION - PROPOSED BATTERY ENERGY STORAGE SYSTEM; LOT 1261 (RN 722) OLD GINGIN ROAD, MUCHEA

Importance: High

OFFICIAL

To whom it may concern

Apologies for the delayed response on this matter. The PTA was affected by Friday's Outlook outage and was unable to respond prior to the stated due date.

The PTA has no objections to the proposed Battery Energy Storage System, and requests that the Shire includes the following advice note on its Responsible Authority Report recommendation:

> This development approval does not authorise the removal of railway infrastructure within area of Easement F290681. Removal of any such infrastructure would be subject to a separate approval by the Public Transport Authority.

The above advice note is requested as the land subject to this application is affected by an Easement burden to the benefit of the Western Australian Government Railways Commission (now known as the Public Transport Authority). The PTA acknowledges that the proponents have engaged the PTA regarding the future of this easement, however until such time as these discussions conclude, it remains to the benefit of the PTA and should not be prejudiced.

Should you have any queries regarding the above, please don't hesitate to contact me at the phone number or email address below.

Kind regards,,

Jackson Ballardin
Planning Assistant | Infrastructure Planning & Land Services
Public Transport Authority of Western Australia
Tel: (08) 9326 5916
Email: WAPCreferrals@pta.wa.gov.au | Web: www.pta.wa.gov.au

Public Transport Authority

We acknowledge the Traditional Custodians of this land and pay respect to Elders past and present.

The Public Transport Authority of Western Australia cannot accept any liability for any loss or damage sustained as a result of software viruses. You must carry out such virus checking as is necessary before opening any attachment to this message. The information in this email and any files transmitted with it may

Isaac Parfrey

From: Strategic Planning Referrals <strategic.planning.referrals@westernpower.com.au>
Sent: Tuesday, 3 November 2026 10:42 AM
To: Isaac Parfrey
Subject: Western Power Response - Proposed Battery Energy Storage System (BESS) Facility - Lot 1261 (RN 722) Old Gingin Road, Muchea (PER-0002330 - SPR -133-2026)

You don't often get email from strategic.planning.referrals@westernpower.com.au. Learn why this is important

Good morning, Isaac,

Western Power has recently re-established the Strategic Planning Referrals (SPR) Program, with dedicated land use planning resources that support the review of referrals and integration of electricity network requirements into the strategic land use planning process and renewable energy facility related development applications. For future reference, please refer all related land use planning referrals directly to strategic.planning.referrals@westernpower.com.au

Western Power supports the development application for the proposed BESS facility at Lot 1261 Old Gingin Road, Muchea in the Shire of Chittering.

The BESS development proposal is progressing the initiation of the project through the scoping, network connection and substation arrangement processes with the applicant/proponent, ensuring that the connection, location, design, access and ongoing maintenance and operations of assets are supported by Western Power.

Where Western Power does not have easements on freehold land, it relies on safe clearances to ensure appropriate development occurs in the vicinity of its assets, which includes appropriate setbacks of buildings, vegetation and use of land in the vicinity of power lines and assets.

Western Power recommends the following standard Advice Notes should development approval be granted, pursuant to Section 167 of the *Planning and Development Act 2005*:

Advice Notes

(i) The development shall be designed and constructed to protect Western Power infrastructure and interests from potential land use conflict.
(ii) No development (including drainage, fill, fencing, storage or parking) will be permitted within Western Power line and cable easements or restriction zones without the prior written approval of Western Power.
(iii) The applicant should formally progress the Western Power network connection and substation arrangements with Western Power.
(iv) Arrangements being made to the specifications of Western Power for the provision of necessary electricity easements are maintained and/or provided as required.

Should you wish to discuss the above, please contact the undersigned.

Kind regards,

Doreen Rowley

Government of Western Australia
Department of Fire & Emergency Services

DFES
Department of Fire & Emergency Services

Our Ref: 2026/2165
Your Ref: P137/26

Isaac Parfrey
Shire of Chittering

chatter@chittering.wa.gov.au

Dear Mr Parfrey

LOT 2161 (722) OLD GINGIN ROAD, MUCHEA – PROPOSED BATTERY ENERGY STORAGE SYSTEM - DEVELOPMENT APPLICATION

I refer to your email dated 2 October 2026 regarding the submission of a Bushfire Management Plan (BMP) (Version C), prepared by Covey Associates and dated 3 August 2026, for the above proposed development.

This advice relates to the *State Planning Policy 3.7 Bushfire* (SPP 3.7) and supporting *Planning for Bushfire Guidelines* (Guidelines), as well as DFES' role and responsibilities as Hazard Management Agency (HMA) for Fire in Western Australia.

General Comment

- DFES acknowledges that the proposed development includes a 38 megawatt Battery Energy Storage System (BESS) facility, two transformers, a water run-off storage area, associated electrical infrastructure and an internal access network.
- The BMP concludes that the application of SPP 3.7 does not apply to the proposal on the basis that no habitable buildings are proposed. The decision maker has referred this proposal to DFES as a discretionary referral. A BMP was prepared to demonstrate a 10kW/m^2 area for the BESS facility.
- DFES has provided a high-level review of the BMP to enable validation of the Method 2 calculation used to calculate the area of 10kW/m^2 for the BESS envelope only.
- DFES has reviewed the BMP, however cannot guarantee that the BMP is consistent with all other plans and information submitted as part of the proposal. The decision maker should be satisfied that all submitted documents have consistent details.
- Given the temperature sensitive nature of the infrastructure, it is critical to ensure that the proposed design adequately responds to facility fire risks and bushfire risks in order to protect life, property and infrastructure.
- Accordingly, DFES has also undertaken a high-level assessment of the proposal against the *CFA Design Guidelines and Model Requirements – Renewable Energy Facilities* as amended (REF Guidelines) from an HMA perspective on how the proposal has incorporated site risk mitigation measures to assist operational activities in the event of an emergency. The REF Guidelines is currently considered best practice for the development of renewable energy facilities.

- Specific requirements of the REF Guidelines are to be further addressed in the BMP as outlined in the below assessment.

Recommendation: Insufficient information provided – further information and review required

DFES recommends the BMP be modified to contain all the information to address the Method 2, emergency vehicular access and firefighting water supply requirements as per the Assessment advice provided in Table 1. Should the modified BMP affect the design of the proposal, the proposal should be amended to reflect these modifications.

Further information should also be provided to demonstrate compliance with the REF Guidelines.

Could you please forward notification of the application determination to DFES for our records.

If you require any clarification or further information regarding the below assessment, please do not hesitate to contact Senior Land Use Planning Officer – Sean He on telephone number 9395 9702.

Yours sincerely

Desmond Abel
DIRECTOR LAND USE PLANNING

12 November 2026

cc: Isaac.Parfrey@chittering.wa.gov.au

Table 1: DFES Role as Hazard Management Agency (HMA)

DFES wishes to provide the below advice in its role and responsibilities of HMA for Fire in Western Australia.

Vegetation Classification or Exclusions	BMP Modification Required
Classified Plot 2 – not demonstrated Vegetation Plot 2 cannot be substantiated as Class D Scrub with the limited information and photographic evidence provided. Height indicators have not been used to validate the vegetation height. Furthermore, the majority of Plot 2 vegetation is contiguous with Plot 1 vegetation which is assessed as Class A Forest. In the absence of an enforceable and ongoing vegetation management mechanism, the potential for revegetation should be adequately considered in accordance with Clause 2.2.3.1 of AS 3959. The BMP should detail specifically how the Class D Scrub 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 AS 3959, or the resultant BAL ratings may be inaccurate.	**BAL Rating cannot be validated.** Further evidence to support the vegetation classification of 2 is required.
Classified Plot 3 – not demonstrated Vegetation Plot 3 cannot be substantiated as Class C Shrubland with the limited information and photographic evidence provided. Height indicators have not been used to validate the vegetation height. Furthermore, Plot 3 vegetation is contiguous with Plot 1 vegetation which is assessed as Class A Forest. In the absence of an enforceable and ongoing vegetation management mechanism, the potential for revegetation should be adequately considered in accordance with Clause 2.2.3.1 of AS 3959. The BMP should detail specifically how the Class C Shrubland 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 AS 3959, or the resultant BAL ratings may be inaccurate.	**BAL Rating cannot be validated.** Further evidence to support the vegetation classification of 3 is required.
Bushfire Assessment Methodologies	**BMP Modification Required**
Method 2 DFES notes that there is some lack of clarity around definitions for inputs to Method 2 calculations, of particular relevance to this application are those regarding effective slope. In the absence of clear instruction to the contrary, DFES considers that the Method 2 normative procedure should apply the 5-	**BAL Rating cannot be validated.**

degree increments for effective slope, as per Method 1, rather than discrete figures. Deviation from this would require a comprehensive Performance Solution that complies with the relevant Bushfire Resistance Performance Requirements of the National Construction Code (NCC). The BMP applies a 2-degree downslope, which should instead use a 5-degree downslope to comply with the Method 2 normative procedure. Furthermore, the vegetation classification should adequately consider the potential of unmanaged vegetation to revegetate to Class A Forest, in the absence of an enforceable vegetation management mechanism. Accordingly, DFES considers that the Method 2 outputs cannot be validated.	Method 2 outputs cannot be validated. Inputs to be modified as per Table B1 of AS 3959.
REF Guidelines – Vehicle Access The REF Guidelines requires the provision of at least two but preferable more access points to each part of the facility. However, the submitted development site plan indicates only a single access point to the BESS facility. In addition, it is unclear how emergency services vehicles would access the substation, as no vehicular access to the substation is shown on the plan. Please also refer to further comments in the section titled 'DFES Regional Operations' below.	**Comment only.**
REF Guidelines – Water Supply Section 5.4 of the BMP identifies that the BESS facility requires a firewater supply of not less than 288,000 litres that may be provided via the 415,000 litres firewater reserve stored in the existing combined tank at the Chandala Processing Plant. However, it is unclear whether the existing water reserve is dedicated for firefighting purposes and meets the relevant flow rate and pressure requirements. Please also refer to further comments in the section titled 'DFES Regional Operations' below.	**Comment only.**

Emergency Management Plan (EMP)		**Action**
Emergency Management Plan (EMP)	Given the high-risk land use at this location, it is considered appropriate that an 'Emergency Management Plan' be prepared. Consideration should be given to the Bushfire Emergency Plan (BEP) Manual (as published by the Western Australian Planning Commission), Section 7	**Comment only.**

	of the REF Guidelines and the comments from DFES Aviation Services below. These contain details of information that should be included in a EMP and will ensure the appropriate content is detailed when finalising the EMP to the satisfaction of the decision maker.	
Renewable Energy Facilities		**Action**
Risk Management Plan	As per the REF Guidelines, a Risk Management Plan (RMP) 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. A RMP is considered to be a critical requirement of planning and informing fire risk management in the design and operation of renewable energy facilities. While DFES accepts that *Table 4: Summary of Renewable Energy Facility Recommendations relating to bushfire and the other development response (CFA, 2025)* of the BMP can be considered as a draft RMP, a detailed RMP should be further developed to demonstrate compliance with the REF Guidelines, including addressing the following model requirements of the REF Guidelines: • Detailed site plans showing the location of site vehicle access points, internal roads, battery containers, substations, buildings and fire water supplies. • The exact specifications of the elements within the renewable energy facility, such as the battery chemistry, relevant specifications and technical data sheets on the BESS facility. • Details of the fire, smoke, heat, and toxic off-gassing detection system for the BESS facility. The system should specify what triggers an internal operator response and what triggers a 000 call. • Details of the explosion prevention and venting system for the BESS facility. • Details of the battery management and monitoring system. The system should enable the operator to intervene for the prevention of thermal runaway. • Details of the system to prevent water ingress to battery containers and appropriate ingress protection rating for containers. • Details of the warning and alarm system within battery containers and/or the facility. The system should specify what each alarm signal means. • Details of the spill containment provisions for the management of fire water runoff.	**A detailed Risk Management Plan is required to be provided.**
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.	**Comment only.**

	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.	
DFES Other Technical Advice		**Action**
DFES Bushfire Technical Services	The Method 2 calculations should use the slope band of 0-5 degrees downslope (5 degrees) rather than 2 degrees downslope. Unmanaged vegetation has the potential to revegetate to Class A Forest over time. Accordingly, the vegetation that is classified as Class D Scrub, Class C Shrubland and Class G Grassland must be supported by an enforceable vegetation management agreement and/or landscape management plan to substantiate the lower hazard classification than Class A Forest.	**Modification to the BMP is required to address the Assessment advice.**
DFES Regional Operations	**Emergency vehicle access and egress** The development plans identify an internal ring road arrangement around the proposed BESS facility, with a nominated road width of approximately 6 metres. Although this arrangement may provide vehicle circulation around the BESS facility, it does not demonstrate that responding fire appliances will have adequate access and egress under emergency conditions. The following matters require further consideration: • Single access point- The BESS facility appears to rely on one connection to the existing internal road network. An incident involving fire, smoke, hazardous gases or other infrastructure could compromise this access. • Alternative egress- A secondary independent access and egress arrangement should be considered to ensure responding appliances are not trapped or required to withdraw through an affected area. • Appliance maneuverability- The proposed road layout should demonstrate suitable turning radii, clearances, road load capacity and maneuvering space for DFES heavy fire appliances.	**Modification to the BMP is required to address the Assessment advice**

	• Industrial site access- Emergency access through the existing Tronox facility is to consider security gates, site operating procedures, vehicle movements and access arrangements outside normal working hours. • The development plans also identify a 2-metre road buffer adjacent to the BESS facility. It is unclear whether this separation provides sufficient protection for firefighting personnel and appliances during a significant battery fire. Operational recommendation: The proponent should provide a detailed emergency vehicle access plan demonstrating suitable access, alternative egress, appliance turning and positioning arrangements, together with a risk-based assessment of the proposed separation distances. **Firefighting water supply and infrastructure** The referral documentation identifies an existing firefighting water reserve of approximately 415 kL within the Tronox processing plant, with the potential for the existing hydrant network to be extended to service the BESS facility. Although this may provide an opportunity to utilise existing infrastructure, the availability of sufficient water for the BESS facility has not been demonstrated. Of particular concern is whether the existing reserve is dedicated to the proposed development or forms part of the firefighting water supply required for the existing processing plant. The following information should be provided: • Confirmation of the available firefighting water volume and whether it is dedicated or shared. • Hydraulic design information demonstrating the available flow and pressure at the proposed BESS facility. • Details of proposed hydrant locations, fire pumps, water tanks and any booster arrangements. • Confirmation that the proposed system can support the anticipated firefighting strategy, including prolonged cooling and exposure protection where required. • Demonstration that the water supply remains adequate when other firefighting demands within the processing plant are considered. • Confirmation that hydrants, booster connections and other firefighting fittings are compatible with DFES equipment.	

	Operational recommendation: The proponent should demonstrate at the development approval stage that an adequate firefighting water supply can be provided. Detailed hydraulic design, infrastructure arrangements and commissioning tests should be completed before the facility becomes operational. **BESS fire behaviour and firefighter safety** Lithium-ion battery installations present operational hazards that differ significantly from conventional structural and bushfire incidents. A battery thermal runaway event may result in the release of flammable and toxic gases, intense heat, smoke, fire propagation and potentially explosive conditions. The following information is required: • Details of the battery monitoring, detection, alarm and suppression systems. • Battery enclosure ventilation and gas discharge arrangements, including the direction of any hazardous gas release. • Electrical isolation and emergency shutdown procedures. • Minimum safe approach distances and incident exclusion zones. • Firefighting strategies recommended by the battery manufacturer, including circumstances where defensive operations may be necessary. Operational recommendation: A site-specific BESS Fire Risk Assessment and Emergency Management Plan should be provided, addressing the anticipated fire behaviour, hazardous emissions, explosion potential and safe emergency response strategies. **Proximity to existing industrial infrastructure** An important distinction between the proposed Tronox development and the nearby Byrne Road BESS is that the location of the Tronox installation is within an existing industrial processing facility. The development plans identify several items of existing infrastructure in proximity to the proposed BESS facility, including: • Liquid oxygen storage and Liquefied Petroleum Gas (LPG) storage. • Maintenance buildings and workshop facilities. • Processing plant infrastructure.	

	• A sewage treatment plant and water run-off storage area. • Existing and proposed transformers, electrical equipment and powerlines. The presence of these facilities creates additional operational considerations, particularly where a BESS fire could expose adjoining infrastructure to radiant heat, smoke or hazardous gases. Conversely, an incident involving existing industrial infrastructure could affect the BESS facility or restrict emergency access. The proximity of LPG and liquid oxygen storage is particularly relevant and should be considered as part of a broader assessment of credible fire and emergency scenarios. Operational recommendation: The risk assessment should consider the interaction between the proposed BESS and the existing Tronox processing plant, including potential escalation, hazardous materials, exposure protection, emergency access and the consequences of multiple simultaneous incidents. **Local brigade response capability** There are operational concerns regarding the capability of local Volunteer Bush Fire Brigades to respond to incidents involving lithium-ion battery installations. The local volunteer brigades may be among the first emergency services to arrive at an incident, particularly given the location of the development outside the metropolitan area. However, not all volunteer brigades have specialised personal protective clothing, respiratory protection, equipment or training necessary to safely undertake operations involving toxic battery emissions and thermal runaway. The site-specific emergency response plan should not assume that local volunteer brigades will undertake direct intervention in a battery fire. Operational recommendation: The Emergency Management Plan should clearly identify the expected roles and limitations of responding emergency services. Relevant career and volunteer brigades should receive site familiarisation and BESS-specific awareness before commissioning.	

	Operational familiarisation and commissioning The transition from construction to commissioning is a critical period for emergency response preparedness. Before the facility becomes operational, DFES should be provided with final as-constructed documentation, including: • Emergency vehicle access and site layout plans. • Firefighting water and hydrant infrastructure plans. • Fire detection, monitoring and suppression system information. • Battery manufacturer emergency response procedures. • Electrical isolation and emergency shutdown information. • Emergency contacts and site security arrangements. A site familiarisation visit should be arranged for relevant responding brigades, with consideration given to a practical emergency response exercise involving the site operator and DFES. Where practicable, the completed firefighting water infrastructure should also be subject to operational inspection and testing. Operational recommendation: Site familiarisation, emergency response planning, commissioning information and verification of firefighting infrastructure should be completed before the BESS facility is brought into operation.	
DFES Land Use Planning	It is the responsibility of the proponent to ensure the proposal complies with relevant planning and building requirements. This advice does not exempt the applicant/proponent from obtaining approvals that apply to the proposal including planning, building, environmental health or any other approvals required by a relevant authority under written laws.	**Comment only.**

Government of Western Australia
Department of Water and Environmental Regulation

Our ref: REQ-0004872
Enquiries: Annalise Towse, Ph 6250 8039
Email: annalise.towse@dwer.wa.gov.au

Isaac Parfrey
Principal Statutory Planning Officer
Shire of Chittering
PO Box 70
BINDOON WA 6502

Via email – chatter@chittering.wa.gov.au

Dear Isaac,

RE: Application No: PROPOSED BATTERY ENERGY STORAGE SYSTEM - LOT 1261 (RN 722) OLD GINGIN ROAD, MUCHEA

Thank you for providing the above referral for the Department of Water and Environmental Regulation (Department) to consider. The Department has identified that the proposed development application has the potential to impact on environment values and management. Key issues and recommendations that should be addressed are provided below:

Native vegetation clearing
Under section 51C of the *Environmental Protection Act 1986* (EP Act), clearing of native vegetation is an offence unless:

- it is undertaken under the authority of a clearing permit
- it is done after the person has received notice under Section 51DA(5) that a clearing permit is not required
- the clearing is subject to an exemption

Exemptions for clearing that are a requirement of written law, or authorised under certain statutory processes, are contained in Schedule 6 of the EP Act. Exemptions for low impact routine land management practices outside of environmentally sensitive areas (ESAs) are contained in the Environmental Protection (Clearing of Native Vegetation) Regulations 2004 (the Clearing Regulations).

The Department received a clearing permit application CPS 11714/1 on 1 September 2026 from DC Project SPV-I Pty Ltd as trustee for the DC Project to clear 0.9 hectares of native vegetation at the proposal location for the purpose of establishing a bushfire buffer around a Battery Energy Storage System (BESS). This application is currently under assessment.
The extent of the area in the development application appears to be within the area of clearing specified in the clearing permit application. However, the purpose of the clearing permit is to establish a bushfire buffer around the BESS and not clearing for the construction of the BESS.

If further clarification is required, please contact the Department's Native Vegetation Regulation section at admin.nvp@dwer.wa.gov.au or on 6364 7098.

Industry regulation
The Department regulates emissions and discharges from the construction and operation of prescribed premises through a works approval and licensing process, under Part V, Division 3 of the *Environmental Protection Act 1986* (EP Act).

The categories of prescribed premises are outlined in Schedule 1 of the *Environmental Protection Regulations 1987*.

The EP Act requires a works approval to be obtained before constructing a prescribed premises and makes it an offence to cause an emission or discharge from an existing prescribed premises unless they are the holder of a works approval or licence (or registration) and the emission is in accordance with any conditions to which the licence or works approval is subject.

This premises is licensed under Part V of the EP Act (licence number L5939/1988/11) as a Category 8: Mineral sands mining or processing prescribed premises. The Licence Holder is Tronox Management Pty Ltd.

Any changes to the licensed premises will require an amendment application to be submitted by the instrument holder under section 53 of the EP Act and can be authorised through a works approval or licence amendment. Further guidance on changes to prescribed premises can be found in the Department's Industry Regulation Guide to Licensing which can be accessed at:
https://www.wa.gov.au/service/building-utilities-and-essential-services/integrated-essential-services/guideline-industry-regulation-guide-licensing.

Contaminated sites
Please refer to Attachment 1 for further advice provided by the Department's Contaminated Sites Branch.

In the event there are modifications to the proposal that may have implications on aspects of environment and/or water management, the Department should be notified to enable the implications to be assessed.

If you would like more information regarding this matter, please contact Annalise Towse on 6250 8039 or annalise.towse@dwer.wa.gov.au.

Yours sincerely,

Diana Nussey
A/Senior Natural Resource Management Officer

Planning Advice
Swan Avon Region

17 November 2026

Government of Western Australia
Department of Water and Environmental Regulation

Our ref: DMO1178
Enquiries: Balbir Singh, Ph: 08 6364 7182
Email: Balbir.Singh@dwer.wa.gov.au

Issac Parfrey
Principal Statutory Planning Officer
Shire of Chittering

By email: chatter@chittering.wa.gov.au; isaac.parfrey@chittering.wa.gov.au

Dear Issac Parfrey

DEVELOPMENT ASSESSMENT PANEL APPLICATION - PROPOSED BATTERY ENERGY STORAGE SYSTEM; LOT 1261 (RN 722) OLD GINGIN ROAD, MUCHEA

I refer to your email dated 2 October 2026 sent to the Department of Water and Environmental Regulation (the department) regarding the proposed development at the above-mentioned site.

As per the requirements under section 58(6)(b) of the *Contaminated Sites Act 2003* (CS Act), advice is required on the suitability of the classified land for the proposed development.

The central portion of Lot 1261 is currently occupied by a mineral sands processing facility, with the surrounding land comprising a mix of rural, agricultural and industrial uses. The proposed development comprises construction of battery energy storage system within the perimeter of the existing mineral processing plant.

Land at Lot 1261 on Diagram 5326 (the site) was classified under the CS Act as *contaminated – remediation required* on 24 August 2009, and memorial L90474 ML was placed on the certificate of title. The classification was based on soil and groundwater contamination resulting from historical activities of the site. However, the site was considered suitable for ongoing commercial/industrial land use.

As the proposed development does not involve a change to a more sensitive land use, the department has no objection to the proposal and considers that a contamination condition is not required. However, to address potential contamination-related risks, the department recommends that the following advice note be included in any approval granted by the Shire.

Advice:

> An appropriate health and safety plan should be prepared to manage potential exposure risks associated with soil and groundwater contamination if intrusive works, including excavation or dewatering, are undertaken as part of the development.

If you have any further queries, please contact Environmental Officer, Balbir Singh, on 6364 7182.

Yours sincerely

Andrew Miller
SENIOR MANAGER
CONTAMINATED SITES

13 October 2026

Proposed BESS Site
Lot 1261 Old Gingin
Road, Muchea

Proposed BESS Site
Lot 1261 Old Gingin
Road, Muchea

Existing Internal Access Track to BESS Site (To be upgraded)

Existing Secondary Access through to Old Gingin Road

Existing Transformer Location and
Proposed 2x new Transformers Location
New Transformers to
be located here

PART C – OTHER BUSINESS

1. State Administrative Tribunal Applications and Supreme Court Appeals

2. Meeting Closure