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NEOEN

NARROGIN WIND FARM

Environmental Referral Supporting Document

FINAL

October 2024

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Environmental Referral Supporting Document

FINAL

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

Project Director: Rob Karelse
Project Manager: Cormac Collins
Report No. 22847 R17
Date: October 2024

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.

Document Status

Rev No.	Reviewer		Approved for Issue	
	Name	Date	Name	Date
V1	Rob Karelse	30/10/2024	Rob Karelse	30/10/2024

Abbreviations

Abbreviation	Definition
AGL	Above Ground Level
AHD	Australian Height Datum
AVW	Avon-Wheatbelt Bioregion
BAM Act	*Biosecurity and Agriculture Management Act 2007* (WA)
BBAMP	Bird and Bat Adaptive Management Plan
BBUS	Bird and Bat Utilisation Survey
BC Act	*Biodiversity Conservation Act 2016* (WA)
BESS	Battery Energy Storage System
CEMP	Construction Environmental Management Plan
DBCA	Department of Biodiversity, Conservation and Attractions
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DPLH	Department of Planning, Lands and Heritage
DWER	Department of Water and Environment Regulation
EP Act	*Environmental Protection Act 1986* (WA)
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Cth)
GIS	Geographic Information Systems
IBRA	Interim Bio-Regionalisation of Australia Version 7
JAF	Jarrah-Forest Bioregion
MNES	Matters of National Environmental Significance
MWh	Megawatt hour
MW	Megawatt
NVIS	National Vegetation Information System
O&M	Operations and Maintenance
PD Act	*Planning and Development Act 2005* (WA)
PEC	Priority Ecological Community
PMST	Protected Matters Search Tool
RSA	Rotor Swept Area
SM4	Songmeter 4
SWIS	Southwest Interconnected System
TEC	Threatened Ecological Community
VSA	Vegetation System Association
VT	Vegetation Type
WAPC	Western Australian Planning Commission
WoNS	Weeds of National Significance

Executive Summary

Neoen Australia Pty Ltd (Neoen) is investigating the potential development of the Narrogin Wind Farm (the Proposal), located on freehold land approximately 7 km east of the township of Williams and 9 km west of the township of Narrogin in Western Australia. The Proposal will have up to 25 turbines and production capacity up to 200 MW, a Battery Energy Storage System (BESS) with a capacity of 200 MWh and ancillary project infrastructure. Final make and model of the turbines is yet to be confirmed and will depend on the procurement and commercial processes following the Proposal's approval.

This Environmental Referral Supporting Document is submitted to the Environmental Protection Authority as a supporting document for a referral under Part IV of the *Environmental Protection Act 1986 (EP Act)*, by Umwelt Pty Ltd (Umwelt) on behalf of Neoen.

Through pre-referral consultation with the EPA, the following EPA environmental factors are identified as being relevant to the Proposal:

- Flora and Vegetation (Key environmental factor)
- Terrestrial Fauna (Key environmental factor)
- Social Surrounds (Other environmental factor).

Potential impacts of the Proposal on these factors will be managed through adoption of the hierarchy of avoid, minimise, rehabilitate and offset in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021b).

Impacts can be managed through adoption of the mitigation hierarchy and implementation of best practice management measures to ensure there is no significant residual impacts on these factors.

A summary of the Proposal is provided in the following tables (**ES Table 1**, **ES Table 2** and **ES Table 3**) as per EPAs current Environmental Referral Document guidance documents.

ES Table 1 General Proposal Content Description

Proposal title	Narrogin Wind Farm
Proponent name	Neoen Australia Pty Ltd
Short description	Development of a wind farm approximately 7 km east of the township of Williams and 9 km west of the township of Narrogin in Western Australia. The Proposal will involve the construction and operation of up to 25 turbines, a battery energy storage system (BESS) and ancillary infrastructure. It is located across numerous freehold properties that are primarily cleared for agricultural purposes. The Proposal will connect into an existing 220 kV overhead line that intersects the southern boundary of the Project Development Envelope.

ES Table 2 Proposal Content Elements

Proposal element	Location/description	Maximum extent, capacity or range
Physical elements		
Project Development Envelope comprising of the following in the indicative disturbance corridor: • Turbines • Turbine foundations • Hardstands • Electrical connections, substations and grid connection • BESS • Operational and maintenance facility • Permanent meteorological masts • Communication towers • External site access • Internal access roads • Utilities.	See **Figure 1.1** and **Figure 1.2**	Clearing of no more than 7.41 ha of remnant native vegetation and 0.98 of planted native vegetation within the 6,344.1 ha Project Development Envelope. Clearing of no more than a 0.2 ha of native vegetation within the Transport Development Envelope. Clearing extent is conservative and is likely to decrease through the detailed design process.
Construction elements		
• Construction compound and laydown areas • Borrow pits/quarries • Temporary workers accommodation (provisional) • Hardstands • Stockpile areas	**Figure 1.2**	Construction will take approximately 33 months. The Indicative Proposal Footprint is 192 ha.
• Water supply	Within the Project Development Envelope (**Figure 1.1**)	Source will be from a Water Corporation main pipeline that traverses the Project Development Envelope
• Concrete batching plant	Within Project Development Envelope (**Figure 1.1**).	Concrete for the foundations will be mixed at concrete batching plants which are proposed to be part of the laydown areas within the Project Development Envelope. Concrete batching material may be sourced off-site.
• Transport of turbines and associated infrastructure along existing road network	**Figure 1.4**	Clearing of no more than a 0.2 ha of native vegetation and weeds within the 1.85 ha Transport Development Envelope.
Operational elements		
• Wind energy production and battery energy storage. • Transmission connection and substation. • Operations and Maintenance building.	Within Project Development Envelope (**Figure 1.2**)	25 turbines with a production capacity of 200 MW BESS 100 MW / 200 MWh

Proposal elements with greenhouse gas emissions		
Construction elements:		
Scope 1	Clearing of native vegetation – approx. 1,232 t CO2e On-site power generation – approx. 3,100 t CO2e On-site vehicle movements – approx. 500 t CO2e	
Scope 2	Not applicable	
Scope 3	Supply of equipment and materials – approx. 7,066 t CO2e Off-site employee vehicle movements – approx. 1,610 t CO2e Turbine lifecycle emissions are covered under operational elements.	
Operation elements:		
Scope 1	No significant ongoing scope 1 emissions	
Scope 2	No significant ongoing scope 2 emissions	
Scope 3	Supply of equipment and materials – approx.11.6 t CO2e / annum Off-site employee vehicle movements – approx. 11.6 t CO2e / annum	
Rehabilitation		
At the end of the 33-month construction period, temporary construction areas will be returned to pre-construction condition.		
Commissioning		
There are no environmental impacts specific to commissioning.		
Decommissioning		
At the end of the current lease term, a decision will be made whether to: • Decommission the Proposal permanently; or • Remove the old turbines and seek to replace them with new, upgraded models. Decommissioning would include the following: • De-energising plant and equipment • Dismantling and removal of turbines, BESS, ancillary electrical infrastructure and transmission lines, as well as all other aboveground buildings, foundations and equipment • Rehabilitation of disturbed land • Recycling of recyclable materials (including batteries) Decommissioning of some elements may be subject to the landowner's discretion (such as access tracks).		
Other elements which affect extent of effects on the environment		
Proposal time	Maximum project life	The proposed technology is expected to have an economic life of approximately 25–30 years.
	Construction phase	Approximately 33 months.
	Operations phase	Approximately 25–30 years
	Decommissioning phase	Approximately 24 months

ES Table 3 Summary of Potential Impacts, Proposed Mitigation and Proposed Environmental Outcomes

Key environmental factor 1 (Flora and Vegetation)	
Potential impacts	Direct - vegetation clearing. Indirect - edge effects, dust during construction, introduction or spread of weeds.
Mitigation hierarchy	**Avoid:** • Avoiding all confirmed PEC within the Project Development Envelope. • Avoiding all vegetation in good condition or better. • Removing the Additional Survey Area (2,830 ha) from the Project Development Envelope, which avoids any potential impacts to 216 ha of PEC and 234 ha of native vegetation in Good to Very Good condition. • Maximising use of existing disturbed areas and avoiding clearing of native vegetation as far as reasonably practicable. **Minimise:** • Clearing is restricted to edges of degraded and small vegetation patches. • The Transport Development Corridor contains vegetation that is *Eucalypt Woodlands of the WA Wheatbelt PEC* (Priority 3(iii)), although the patch is degraded, is used for gravel storage, and may not meet the 5 ha size threshold. Clearing in this area will the existing cleared stockpile area, areas of highly degraded vegetation, Sheoak and non-native understorey, and will minimise clearing of native Eucalyptus trees as far as possible. • The number of creek crossings has been minimised, with existing crossings utilised and clearing of riparian vegetation minimised. • Measures in the CEMP and Biosecurity Management Plan to minimise potential indirect impacts to flora and vegetation. **Rehabilitate:** • The area of potential PEC (0.2 ha) in the Transport Development Envelope that is proposed to be cleared will be rehabilitated to a similar or better condition to what is currently present following construction of the Project.
Residual impacts, including assessment of significance	• Clearing in the Project Development Envelope will not exceed 7.41 ha of remnant native vegetation and 0.98 ha of planted native vegetation. This area is conservative and likely to decrease as the Project proceeds through detailed design and further avoidance as part of a Part V EP Act Native Vegetation Clearing Permit application. • Clearing in the Transport Development Envelope will not exceed 0.2 ha, and will mostly comprise highly degraded areas, Sheoak and non-native understorey. • Indicative clearing is spread across approximately 20 patches of degraded remnant vegetation, and in the majority of cases (85%) less than 0.5 ha of native vegetation will be removed from the edges of individual patches. Considering the mitigation measures applied, the Proposal is not expected to have a significant residual impact on the biological diversity and ecological integrity of the local and regional flora and vegetation.
Proposed environmental outcomes	Clearing will be limited to the limits specified in the Proposal Content Document, which will not result in significant impacts to flora and vegetation. No clearing of confirmed PEC's in the Project Development Envelope. No direct impact to vegetation in Good condition or better. Clearing of potential PEC in the Transport Development Envelope will be limited to 0.2 ha of degraded vegetation and cleared areas will be rehabilitated.
Assessment of offsets (if relevant)	Offsets are likely to be required for native vegetation clearing via a Part V EP Act Native Vegetation Clearing Permit

Key environmental factor 1 (Flora and Vegetation)	
Key environmental factor 2 (Terrestrial Fauna)	
Potential impacts	Direct – fauna habitat loss, loss of fauna individuals Indirect – habitat fragmentation, loss of fauna habitat connectivity, further spread of pest fauna
Mitigation hierarchy	**Avoid**: • Maximising use of existing disturbed areas and avoiding clearing of native vegetation as far as reasonably practicable, with 96% of the Indicative Proposal Footprint in cleared areas and less than 1% of remnant habitat in the Project Development Envelope proposed to be cleared. • Avoiding Rank 1 (trees with activity at hollow observed) and Rank 2 (trees with hollows of suitable size with chew marks visible) black-cockatoo breeding trees. • Avoiding all PEC within the Project Development Envelope. • Removing the Additional Survey Area (2,830 ha) from the Project Development Envelope. This allowed avoidance of the largest and most intact remnant habitat patch consisting of Good to Very Good condition native vegetation, with the highest quality fauna habitat. • Avoiding placing turbines near areas with higher foraging value for black-cockatoos to reduce likelihood of turbine collision. • Avoiding areas where direct observations of black-cockatoo individuals were recorded. **Minimise**: • Clearing will be limited to 7.41 ha of remnant native vegetation (excluding isolated paddock trees) and 0.98 ha of planted native vegetation in the Project Development Envelope and 0.2 ha of degraded roadside vegetation in the Transport Development Envelope. • Clearing of black-cockatoo foraging habitat has been minimised, with a maximum of 3.32 ha of high-quality habitat scored as “high quality” and 5.07 ha of “low-quality” foraging habitat proposed to be cleared. These clearing areas are spread over 20 separate fragmented and degraded remnant vegetation patches. These areas are conservative and are expected to be reduced through detailed design as the Proposal progresses. • Minimising the number of creek crossings and utilising existing crossings, to minimise any potential impact to dispersal habitat along creeks. • Minimising the bisecting of existing patches of native vegetation, thereby minimising impacts on fauna dispersal. In the majority of cases, native vegetation clearing is along the edges of patches of degraded native vegetation. • Adopting a minimum blade tip height of 49 m AGL, which is above the typical flight height for black-cockatoos thereby minimising collision risk. Black-cockatoos are also not likely to be concentrated in the area based on surveys and assessments completed. • Minimise clearing of Rank 3 black-cockatoo trees. • Measures in the CEMP minimise potential indirect impacts to fauna and fauna habitats. • Implementation of a Bird and Bat Adaptive Management Plan (BBAMP). **Rehabilitate**: • The area of the potential PEC (0.2 ha) in the Transport Development Envelope that is proposed to be cleared will be rehabilitated to a similar or better condition to what is currently present following construction of the Project.

Key environmental factor 1 (Flora and Vegetation)	
Residual impacts, including assessment of significance	Although the Project will result in the removal of suitable foraging and potential breeding habitat for the species, residual impacts to the species are unlikely to be significant due to: • No Rank 1 or 2 trees to be disturbed by the Project, and impact to Rank 3 trees to minimised. • Avoidance of larger, higher-quality patches of foraging and potential breeding habitat. • Restricting clearing to the edges of small, degraded habitat patches and not bisecting larger patches, to minimise any impact to fauna dispersal. • The quantum of habitat that will be retained in the Study Area. • Habitat in adjacent conservation areas that is anticipated to be preferred. • Active management of indirect impacts via the Bird and Bat Adaptive Management Plan and Project CEMP.
Proposed environmental outcomes	Fauna habitat removal will be limited to the clearing limits specified in the Proposal Content Document, which will not result in significant impacts to terrestrial fauna. No Clearing of Rank 1 and Rank 2 black-cockatoo nesting trees. No significant impacts to birds and bats as a result of wind farm operations.
Assessment of offsets (if relevant)	Offsets are likely to be required for native vegetation clearing via a Part V EP Act Native Vegetation Clearing Permit

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1.0 Proposal

1.1 Proposal Content

Neoen Australia Pty Ltd (Neoen) is seeking approval to develop the Narrogin Wind Farm (the Proposal) approximately 7 km east of the township of Williams, 9 km west of the township of Narrogin, and 160 km south-east of Perth, Western Australia (WA) (**Figure 1.1**). The Proposal will involve the construction of up to 25 wind turbines (turbines) with a production capacity up to 200 MW, a battery energy storage system (BESS) with a capacity of 200 MWh, and associated infrastructure. The Proposal will be developed across freehold properties and road reserves, within a Project Development Envelope covering an area of 6,344 hectares (ha). Total ground disturbance for the Proposal will be up to 192 ha, with minimal clearing of native vegetation required.

The Proposal location was selected for development because it has a strong wind resource, is predominantly cleared of native vegetation, has an existing high voltage transmission line located at the southern boundary of the Project Development Envelope, has a low population density, and has access to established transportation corridors and water supply.

The Proposal will be compatible with existing cropping and grazing land uses. It will assist in the clean energy transition and decarbonisation of energy networks in Western Australia which have been identified as key goals for the Western Australian government.

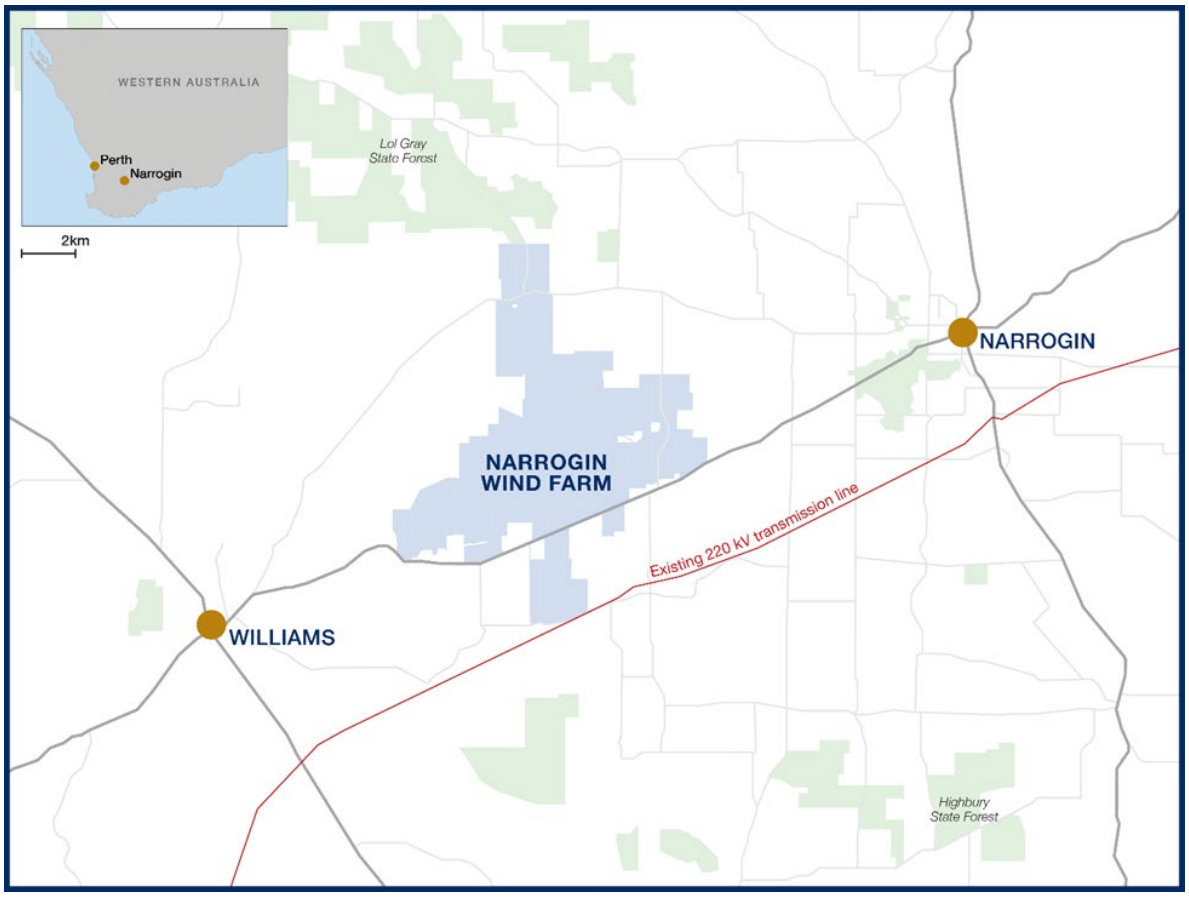


Figure 1.1 Proposal Location

The Proposal will include the following key infrastructure elements and an Indicative Proposal Layout is presented in **Figure 1.2:**

- turbines
- turbine foundations
- hardstands
- electrical connections, substations and grid connection
- BESS
- operational and maintenance facility
- temporary workers' accommodation (provisional)
- construction compound, concrete batching plant and laydown areas
- borrow pits/quarries
- permanent meteorological masts
- communication towers
- external site access
- internal access roads
- utilities.

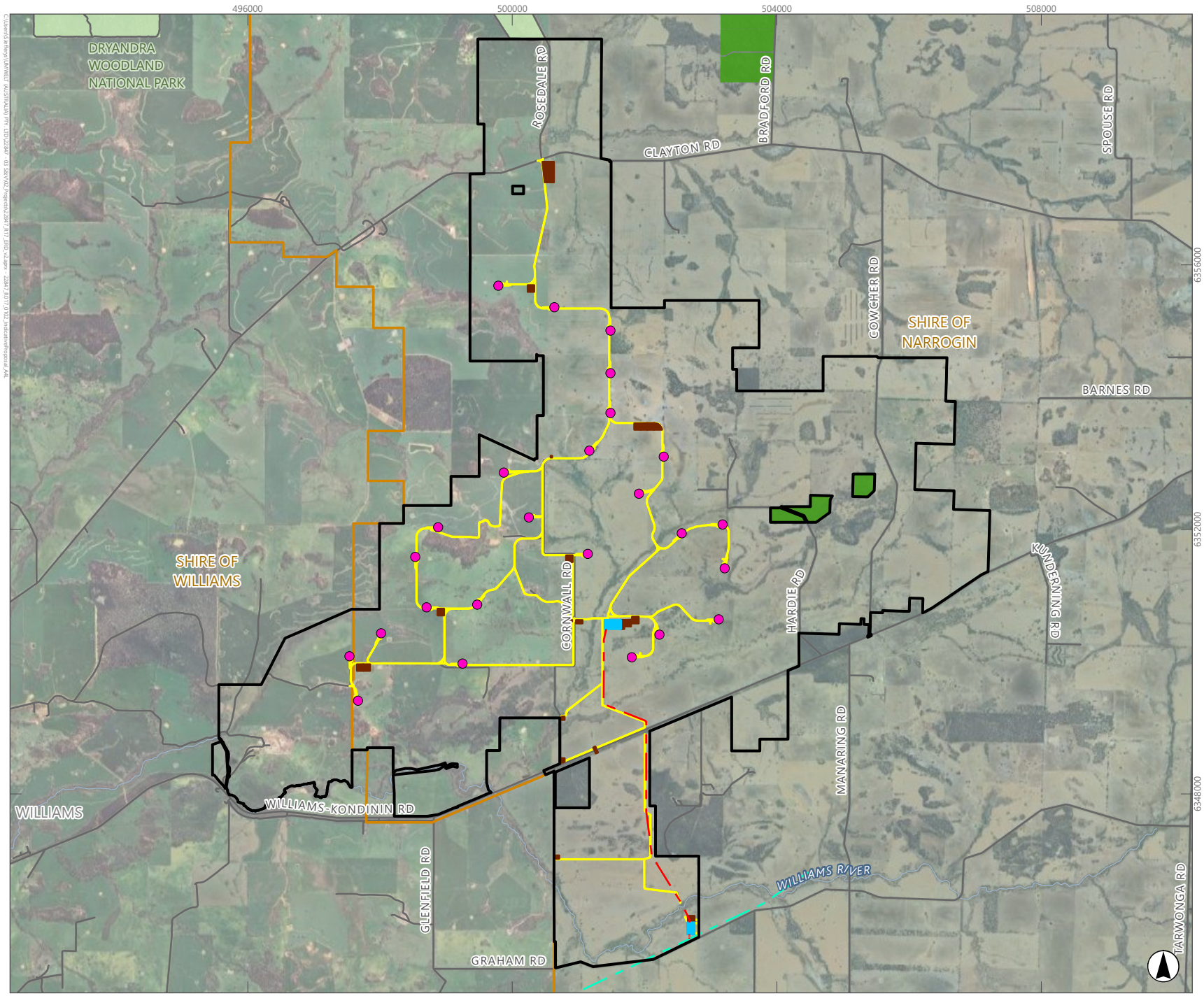
The Proposal will connect into an existing 220 kV transmission line owned and operated by Western Power that intersects the southern boundary of the Project Development Envelope and which forms part of the South West Interconnected System (SWIS).

The Proposal construction period is estimated at approximately 33 months. The workforce is expected to fluctuate in size throughout this period, with an estimated peak construction workforce of 250 personnel. The workforce will likely stay in a nearby townships, with a temporary workers accommodation facility also being considered. Discussions have been held with the Shire of Narrogin on the potential for contributing to shared workforce accommodation.

During operations, both on-site and off-site personnel will manage the Proposal. It is expected that the Proposal will generate approximately 10–15 permanent, full-time jobs throughout its 25–30-year operational life.

Towards the end of its operational life, Neoen may choose to undergo decommissioning and rehabilitation of the land in accordance with a decommissioning management plan and relevant approval conditions. It is possible that Neoen may choose to instead re-power the Proposal by installing new equipment, but this would be subject to future planning and environmental approvals, land agreements and commercial outcomes.

FIGURE 1.2
Indicative Proposal Footprint and Layout

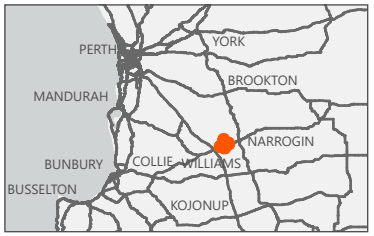


Legend

- Project Development Envelope
- Local Government Area Boundary
- Road
- Existing 220kV Transmission Line
- Major Watercourse
- Nature Reserve
- National Park

Indicative Proposal Footprint

- Turbine
- BESS and Substation
- Overhead Transmission Connection
- Internal Roads and Underground Cabling
- Temporary Construction Infrastructure



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Kilometres

Scale 1:80,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Neoen (2024), DBCA (2023), WP (2023)

For the purposes of this report, the **Project Development Envelope** refers to the boundaries of all involved land parcels where consent has been granted for development of the Proposal and wherein all Proposal infrastructure will be contained. The Project Development Envelope is 6,344 ha and corresponds to the Study Area referenced in supporting reports.

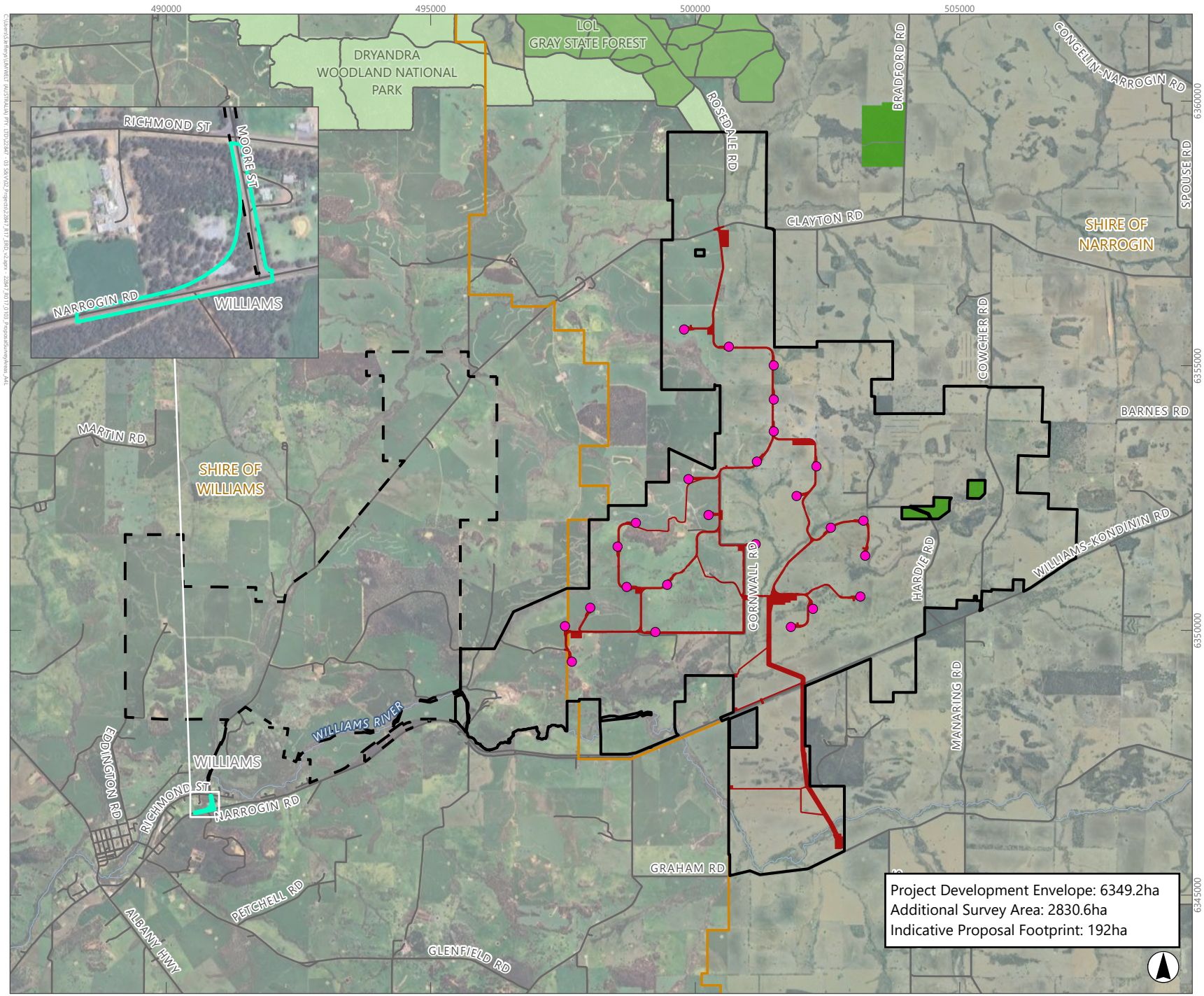
The **Indicative Proposal Footprint** refers to the maximum area of land that will be cleared for installation of all Proposal infrastructure within the Project Development Footprint. It is based on the largest possible layout and has been used to calculate the maximum area of native vegetation clearing (7.41 ha of remnant native vegetation and 0.98 ha of planted native vegetation). Impact assessments within this document are based on the entire Indicative Proposal Footprint being disturbed which is approximately 192 ha.

The **Additional Survey Area** refers to the early conceptual layout of the Proposal and the original much larger study area boundary which surrounded it. This boundary is discussed where appropriate in context of the survey effort applied to the Proposal's ecological assessments and to demonstrate application of the mitigation hierarchy in the design phase (specifically avoidance). No Proposal activities will be undertaken in the Additional Survey Area. The Additional Survey Area is 2,830 ha.

Further to these areas, the **Transport Development Envelope** refers to the minor area of vegetation clearing along the transport route to facilitate turbine transport (refer to **Section 1.1.9**).

The above areas are illustrated on **Figure 1.3.**

FIGURE 1.3
Proposal Survey Areas



Legend

- Project Development Envelope
- Additional Survey Area
- Transport Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Local Government Area Boundary
- Road
- Major Watercourse
- Nature Reserve
- National Park
- State Forest

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2023), DBCA (2023)

1.1.1 Turbines

Up to 25 turbines are proposed, with a maximum overall height (tip height) of 291 m above ground level (AGL). Turbines will have a horizontal axis, and a rotor consisting of three blades with a maximum blade length of up to 91 m and a maximum hub height of up to 200 m. The selected blade length and turbine hub height will be configured so that the tip height does not exceed 291 m. These maximum specifications are summarised in **Table 1.1.**

Table 1.1 Turbine Specifications

Feature	Maximum Specifications
Project generation capacity	Up to 200 MW
Maximum number of turbines	25
Hub Height	Up to 200 m
Tip Height	Up to 291 m
Blade Length	Up to 91 m

The specifications listed in **Table 1.1** are considered to be an upper limit and are intended to provide flexibility for any innovation in turbine design between now and the time of detailed design and construction.

The rotor swept area (RSA) refers to the physical area swept by the rotating blades during operation. For the purposes of this assessment, an inclusive "worst-case" RSA of 49 m AGL to 291 m AGL was considered to account for turbine models with hub heights as low as 140 m. Final turbine selection is subject to procurement and the ability to satisfy the environmental constraints and approval conditions.

1.1.2 Turbine Foundations

Each turbine foundation will comprise a reinforced concrete slab. The size of the turbine foundations may vary depending on imposed loadings, ground conditions, construction methodology and drainage design. Final design will account for geotechnical conditions identified through a detailed investigation.

Construction of the turbine foundations will require the excavation of surface organic soil/sub-soil and other soft overburden until either rock, or a firm stratum is found, with the excavation sides battered back to ensure stability. The excavated soil/sub-soil would be separated and stored safely near to the excavation in stockpiles. The surrounding ground around the turbine base would be restored to tie in with the original and existing surface levels by using the previously stored overburden. Any surplus material would be used for additional landscaping, concrete and surfacing reinstatement.

Concrete for the foundations will be mixed at concrete batching plants which are proposed to be part of the laydown areas within the Project Development Envelope. Concrete batching material may be sourced off-site.

1.1.3 Hardstands

Each turbine requires areas of hardstand to be constructed adjacent to the actual turbine foundation area. These provide stable and suitable areas for the turbine components to be stored and lifted into position by the required cranes.

The construction of each turbine will require a primary large sized crane and a secondary small sized crane. These cranes will require gravel capped hardstands to provide a stable and firm base during the installation of the turbines. The crane hardstands will remain in-situ for the lifetime of the wind farm, in case any cranes are required during the operational phase e.g., to change a blade, undertake any repairs. The pad for the primary crane is typically 100 m x 50 m and the turbine foundation falls within this area, while there can be up to an additional four secondary crane hardstands of 25 m x 15 m each. The area of the permanent handstands in total is approximately 0.65 ha per turbine.

In addition to the permanent hardstands there will be two temporary cleared and graded areas during the construction phase to support the construction of the crane boom and for the laydown of the blades prior to lifting into place. The area for the crane boom is 150 m x 15 m, while the laydown area is 95 m x 20 m. The temporary works areas will be reinstated following construction.

As with the turbine foundations there will be a requirement for the excavation of surface organic soil/sub-soil and other soft overburden. This material will be treated like the material from the turbine foundations and reused where possible.

1.1.4 Substations and Operations and Maintenance Facilities.

The Proposal includes one substation and an operations and maintenance (O&M) facility. The proposed area for the substation and O&M facility will also include vehicle parking spaces, septic ablutions and wash down areas as appropriate.

Power and communication cables will be installed underground between the turbines and will connect back to the substation and the O&M facility. These cables will be laid in cable trenches to allow for continued agricultural activities. The route of the underground cables will typically be adjacent to the internal access roads where available to follow.

The total length of cable reticulation required is estimated to be 250 km but will depend on the final layout of the substation, turbines and O&M facility. Once the trenched areas have been backfilled, the disturbed area will be reinstated.

A Western Power Terminal is proposed at the southern boundary of the Project Development Envelope where the Proposal ties-in to the existing network. This includes the construction of 5 km of overhead line to connect the substation in the centre of the site to the existing Western Power 220 kV line located at the southern boundary of the site. The overhead line will be supported on lattice tower structures up to 60 m tall at 250 m to 400 m intervals. Reduced spans between towers may be required near crossings of rivers and roads, or where there is a change in direction.

The overhead line corridor of up to 70 m wide will require any vegetation that can grow above 3 m to be cleared and has been sited to avoid native vegetation as far as practicable.

1.1.5 Battery Energy Storage System (BESS)

The BESS will be adjacent to the proposed substation area. The specific BESS technology has yet to be selected. However, it will likely be made of lithium-ion and will have capacity to deliver up to 100 MW / 200 MWh of power that can be dispatched to the grid as required. The BESS will include battery containers, inverters, medium-voltage transformers as well as modular electrical buildings containing switchgear and control cabinets. All the equipment in the BESS area will be installed on a permanent hardstand with appropriate drainage and stormwater management. Underground cables will connect the BESS to the substation and export power to the SWIS utilising the same transmission lines as the wind farm.

The BESS area will also include balance of plant including firewater tanks, a separate O&M building from the wind farm, a stores and security.

1.1.6 Construction Compound and Laydown Areas

The construction compound areas will be used to manage construction activities. These compounds will likely include: portacabins (site offices, first aid facilities, canteen facilities, waste disposal and toilets); storage containers for tools and equipment; storage areas for plant, fuel storage, material and components; wash down facilities; and sufficient parking for the workforce, deliveries and visitors. Temporary offices, lunchrooms, and ablutions may also be established on turbine hardstands during the construction period.

These areas will also accommodate temporary storage of construction plant equipment, wind farm components and construction materials prior to moving to their ultimate destination. The areas may also be used for rock crushing and stockpiles, and concrete batching equipment.

The temporary construction compounds and laydown areas will be formed into a hardstand. Prior to forming the hardstand area, the topsoil will be removed and stockpiled adjacent to the hardstand area. The exact locations, nature and number of the temporary construction compounds and laydown areas will be established in consultation with the relevant landowners when a full construction methodology is determined.

Borrow pits and quarries may also be developed for the purposes of supplying fill and concrete batching material.

Following the completion of the construction phase, these areas may be reinstated using the stockpiled topsoil depending on the landowner's requirements.

1.1.7 Meteorological Masts

Two Meteorological Masts may be installed to monitor the climatic conditions and wind speed throughout the life of the Proposal. The masts would be of triangular steel lattice construction, approximately 150 m in height and will be guy wired in three equilateral directions. The mast will be equipped with wind and weather sensors at various heights, allowing for the measurement of wind speed, wind direction, wind shear, wind turbulence and air density. The masts will be installed within or near to the Indicative Proposal Footprint and will not require clearing of any native vegetation.

1.1.8 Communication Towers

Communication towers may be required adjacent to both the substation and Western Power terminal. These towers will provide a secure and robust high-speed microwave radio link extending the existing Telco services. These towers will be up to 60 m tall, with microwave dishes installed between 40 m and 60 m above ground level. Power for the towers will be supplied by primarily from the adjacent facility, however, may also include a tower mounted solar panel and battery system as back-up.

1.1.9 Transport from Port to the Proposal

A Traffic Impact Assessment (TIA) has identified two feasible routes for transport of large Proposal infrastructure (e.g. turbine blades, BESS, transformer) via road to the Project Development Envelope. The most likely route is from the Port of Bunbury (**Figure 1.4**), however transport from the Australian Maritime Complex is also feasible. Based on swept path analyses undertaken, delivery of infrastructure along both routes will require minor clearing (approximately 0.2 ha) of degraded native roadside vegetation at a single intersection (Narrogin Rd and Clayton Rd) within what is referred to in the report as the **Transport Development Envelope**.

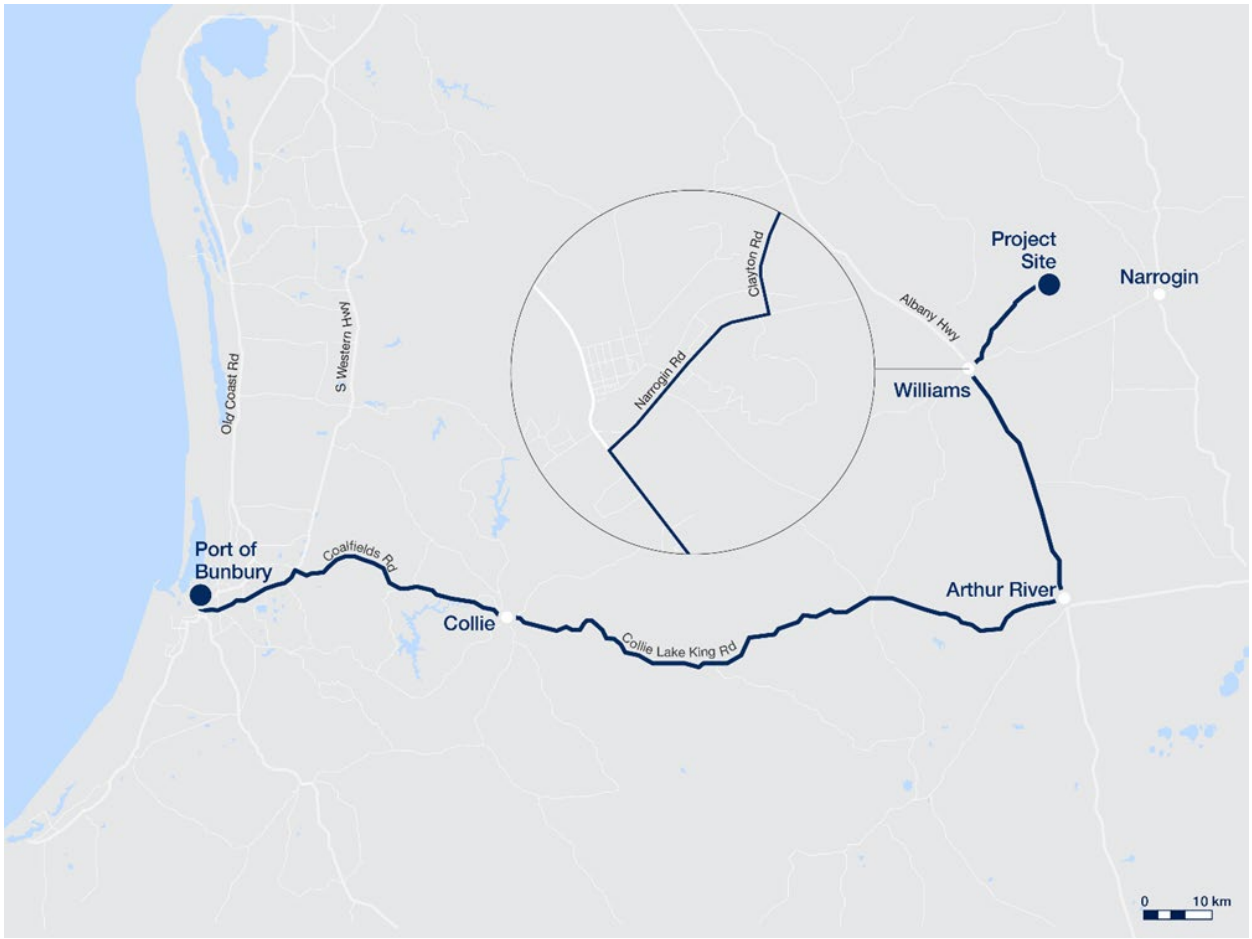


Figure 1.4 Proposal Transport Route

Figure 1.5 below shows the Transport Development Envelope (black outline) and potential clearing area (orange outline). The lot where clearing is proposed is owned by Main Roads WA and is currently used for gravel storage.

Figure 1.5 Transport Development Envelope and Potential Clearing

1.1.10 External Site Access

The main access to the Project Development Envelope is proposed from Clayton Road. As shown in

Figure 1.2, this access will consist of upgrading an existing farm access road opposite Rosedale Road. From this site access point, it is proposed that Proposal traffic will travel south along internal access roads. Most roads are yet to be constructed; however, they are proposed to follow existing farm tracks and crossings as much as possible to minimise clearing required. All primary infrastructure, plant and equipment will be delivered to site via this access point off Clayton Road.

Cornwall Road will be used as a secondary access to the electrical ancillary infrastructure/battery storage/substation area (**Figure 1.2**). Access to the southern portion of the Project Development Envelope, where overhead lines and the Western Power tie in are to be constructed, will be from existing local roads managed by the Local Government Authority, most likely Hancock Road and Glenfield Road.

Appropriate signage will be installed on relevant roads during the construction period to comply with necessary health and safety requirements.

1.1.11 Internal Access Roads

Design criteria and mitigation measures were applied to the access track layout to mitigate potential impacts, such as:

- Access tracks will be up to 10 m wide (widths will vary depending on various construction requirements [e.g. Reinforcement batters] topography and cabling requirements).
- Locating tracks on existing farm tracks where possible.
- Regular passing places and turning areas will be instated.
- Watercourse crossings have been minimised.
- Tracks will not be sealed.
- Tracks will be constructed from locally sourced aggregate where available.
- Clearing of native vegetation has been avoided as far as practicable.

The construction of access tracks will vary depending on localised ground conditions. Conditions impacting construction include the existing vegetation, nature of the topsoil, level of moisture in the ground, geotechnical base and localised topography.

Post construction, roads will be maintained as they need to remain passable for oversize over mass loads in the event of a blade replacement during operation.

Hydraulic modelling and an assessment of erosion risk will be undertaken as part of the detailed design phase to avoid adverse impacts outside the Project Development Envelope.

1.1.12 Construction Workforce

It is estimated that the peak construction workforce will comprise of up to approximately 250 staff during a 33-month construction period. Neoen focuses first on hiring local people for projects. It is expected that some of the workforce will commute from the wider local areas and will not require additional accommodation. Other workers may be accommodated in a temporary workers accommodation facility, local rental houses, hotels and motels, and/or Shire owned infrastructure in the surrounding localities and towns.

1.1.13 Operational Workforce

During operations, the Proposal will be managed by both on-site and off-site personnel, employed by, or contracted to Neoen. It is expected that the Proposal will generate approximately 10–15 permanent, full-time jobs throughout its operational life. Neoen will focus first on hiring local people for the Proposal.

Aspects of the Proposal operation dealt with by on-site personnel include:

- Maintenance of turbines and associated infrastructure
- Safety management

- Implementation of environmental conditions
- Community liaison.

1.1.14 Maintenance

The chosen turbine manufacturer will be responsible for maintaining the turbines for a defined period of time following commissioning. Once the manufacturer's obligation expires, a suitably qualified contractor will be employed to visit the site and undertake regular inspection and maintenance activities. Ongoing maintenance of the access tracks will generally be undertaken to ensure safe access to all components requiring maintenance throughout the year.

In addition to regular maintenance activities there will be a need for unscheduled maintenance. Unscheduled maintenance is more likely to be required at the Proposal start up and towards the end of the operational period as the end of the design life is reached.

1.1.15 Decommissioning and Rehabilitation

The proposed technology is expected to have an economic life of approximately 25–30 years. The landowner agreements make provision for an initial lease term of 30 years as well as an additional term of 30 years. At the end of the current lease term, a decision would be made whether to either:

- Decommission the Proposal permanently; or
- Remove the old turbines and seek to replace them with new, upgraded models.

In the event that the Proposal is permanently decommissioned, Neoen would take full responsibility for decommissioning and rehabilitation works. A decommissioning plan would be prepared and submitted to the relevant authority.

Decommissioning would include the following:

- De-energising plant and equipment
- Dismantling and removing turbines, BESS, ancillary electrical infrastructure and transmission lines, as well as all other aboveground buildings, foundations and equipment
- Rehabilitation of disturbed land
- Recycling of recyclable materials (including batteries).

Decommissioning of some elements may be subject to the landowner's discretion (such as access tracks).

As per accepted industry practice, decommissioning does not include the removal of infrastructure that is located more than 600 mm below the surface, as the earthworks required cause considerable and unnecessary vegetation and soil disturbance, and this infrastructure, if left in place, causes no harm to the environment or disruption to agricultural practices.

A Preliminary Decommissioning Plan is provided in **Appendix A.**

1.2 Proposal Alternatives

1.2.1 Need for Renewable Energy Projects

The *Climate Change Act 2022* set Australia's greenhouse gas emissions reduction targets of a 43% reduction from 2005 levels by 2030 and net zero by 2050. In Western Australia, the Government has committed to a whole-of-government 2030 greenhouse gas emissions reduction target of 80% below 2020 levels.

The Proposal aims to contribute to the National and State renewable energy targets by supplying green energy to the South-West Interconnected System (SWIS) via an existing 220 kV transmission line located within the Development Envelope. The Proposal will support an equivalent of over 100,000 households with green energy and will also create local employment and economic opportunities, and support the regional development and diversification of the Narrogin and Williams area.

Climate change is a key threat to a number of environmental factors in Western Australia. In the south-west of WA in particular, increased temperatures and declining rainfall is a threatening process for iconic threatened fauna species such as Carnaby's Cockatoo. Renewable energy proposals such as the Narrogin Wind Farm are vital to reduce carbon emissions and to contribute to mitigating impacts of climate change.

1.2.2 Alternatives Considered

Alternatives considered for the Proposal included locating it in a different area, constructing an earlier iteration of the design with a larger number of turbines and a solar farm (refer **Section 1.2.3**), or a "do nothing" alternative.

The Wheatbelt region of Western Australia is well suited to wind farms for the following reasons:

- Consistent and high wind speeds
- Diverse wind profile relative to existing wind farms north of Perth
- Low vegetation coverage and minimal need for native vegetation clearing
- A rural setting (minimal existing dwellings within close proximity to the Proposal)
- Access to a suitable transmission line within the Project Development Envelope
- Reasonable road access is available

Alternative areas for large-scale wind farms in the Wheatbelt to meet timelines for decarbonisation of the SWIS are limited due to the location of suitable transmission infrastructure that do not require significant upgrades or long-distance transmission corridors to provide network access. These additional requirements may delay potential renewable proposals by years and slow the overall transition of the State's energy network to green energy, particularly within the SWIS. A demand assessment undertaken for the SWIS found from initial modelling that the level of electricity required by 2042 could grow to five times that of 2022. This would necessitate almost ten times the amount of current generation capacity in the SWIS if electricity is to be generated primarily from renewable sources (Department of Energy, Mines, Industry Regulations and Safety (DEMIRS), 2023). Therefore, it is critical that progress towards the transition is commenced as soon as possible to allow demand to be met.

The existing 220 kV transmission line in the south of the Project Development Envelope connects to the major load centres via Muja terminal and utilises the existing infrastructure for generation from the coal power plants thereby replacing existing generation sources known to be retiring within the same transmission network. At 80 km from Muja terminal, the Proposal is also relatively close to a major distribution substation when compared with other eastern wind farms, resulting in lower electricity losses.

The ability of this Proposal to connect to existing transmission assets with minimal additional infrastructure also means that on-going maintenance requirements and costs incurred by Western Power are lower than Proposals that rely on significant expansion of the network.

An additional benefit of this Proposal location is access to Water Corporation's pipeline for construction water purposes and close proximity to a quarry minimising the carbon emissions associated with construction activities.

The "do nothing" alternative for the proposal would further delay the clean energy transition and decarbonisation of energy networks in Western Australia which have been identified as key goals for the Western Australian government (Department of Treasury, 2019; Department of Water and Environmental Regulation (DWER), 2020; Energy Transformation Taskforce, 2020; Western Australian Planning Commission (WAPC), 2021). A key threat for many ecosystems and species, but particularly the listed fauna species considered as part of this assessment, is climate change. Changes to rainfall, temperature extremes, and bushfires may accelerate the decline of these species through a combination of range contractions in response to changing climatic conditions, impacts to suitable habitat from more intense and frequent bushfires, and effects on factors influencing breeding success and timing. Renewable energy projects are critical in addressing these challenges in the long-term by directly reducing emissions from energy production.

1.2.3 Design Evolution to Avoid and Minimise Impacts

Throughout the Proposal design life, the Proponent has sought to avoid adverse and minimise environmental, heritage and social impacts to result in impacts that are reduced to as low as possible. Design evolution has been heavily influenced by findings from the technical studies, feedback from key stakeholders and site constraints. Key design changes implemented include:

- Reduction in the number of turbines from over 40 to 25.
- Reduction in the Project Development Envelope from 9,300 ha to 6,344 ha, to avoid a large block of mapped Priority Ecological Community (PEC) which is also utilised by black-cockatoos.
- Relocation of infrastructure within the Project Development Envelope to avoid areas of very good vegetation, good vegetation and habitat that has a higher potential to support conservation significant fauna.
- Relocation of infrastructure to minimise clearing of native vegetation, with clearing of native vegetation not to exceed 7.41 ha of remanent native vegetation and 0.98 ha of planted native vegetation. The vegetation proposed to be cleared is primarily located along the edges of fragmented and degraded vegetation patches.
- Removal and relocation of turbines to ensure WA Environmental Protection (Noise) Regulations 1997 will be met at existing non-involved sensitive receptors.

- Removal of turbines in consideration of potential aviation impacts.
- Refining the transport route from Port to avoid locations with a high likelihood of having conservation significant fauna.
- Removal and relocation of turbines to reduce visual impact to the town of Williams and adjoining rural residential zoned land that might be developed in future.

1.3 Local and Regional Context

1.3.1 Bioregion

The Project Development Envelope is bisected by the boundary of two Interim Biogeographic Regionalisation of Australia (IBRA) subregions. The western portion of the Project Development Envelope is located in the Northern Jarrah Forest subregion of the Jarrah Forrest IBRA region. The eastern portion of the Project Development Envelope and the Transport Development Envelope is located in the Katanning subregion of the Avon Wheatbelt IBRA region.

A significant majority of the Indicative Proposal Footprint is within the Katanning subregion of the Avon Wheatbelt IBRA region. The Katanning subregion is characterised by a semi-arid dry warm Mediterranean climate (Beecham, 2003), while the Northern Jarrah Forest subregion is characterised by a warm Mediterranean climate with 5-6 dry months per year (Beard, 2015a). Further detail on each of the subregions is provided in **Table 1.2.**

Table 1.2 Biogeographic Subregions of the Project Development Envelope

Subregion	Summary
Northern Jarrah Forest	The Northern Jarrah Forest subregion is located east of the Darling Scarp along the northern section of the Darling Plateau. The subregion is an ancient erosion surface capped with an extensive lateritic duricrust that was dissected by later drainage and overlies Archean granite and metamorphic rock. The subregion features granite hills, locally-rising streams, and rivers originating from the eastern interior, all of which intermittently break up the subregion's surface. From west to east, the plateau experiences increasingly deep dissections before eventually breaking away into isolated remnants. Soils predominantly comprise lateritic gravels and related lateritic podzolic soils which frequently overlie a pallid zone of 30 m or more in thickness. Other features in the region include "massive" ironstone pavements common along ride tops and some slopes (Beard, 2015b; Williams & Mitchell, 2001).
Katanning	The Katanning Subregion belongs to the Avon Wheatbelt region which is characterised as an active drainage area that dissects a Tertiary plateau with gently undulating topography and low relief. The Katanning subregion specifically is an erosional surface with gently undulating rises to low hills with abrupt breakaways. The subregion commonly hosts Proteaceous scrub-heaths rich in endemics that are situated on residual lateritic uplands and derived sandplains. It also contains continuous stream channels flowing in most years and soils that are largely formed in colluvium or in-situ weathered rock (Beecham, 2003).

1.3.2 Land Systems

Land systems are broad descriptions of landform, geology and soils. The Project Development Envelope intersects five land systems, which are characterised as follows (Western Wildlife, 2024):

- **Marradong System**: Plateau remnants, in the central Eastern Darling Range, with sandy gravel, loamy gravel, grey deep sandy duplex and loamy duplex. Jarrah-marri-wandoo forest and woodland. This system intersects less than 1% of the Project Development Envelope.
- **Dryandra System**: Ridges of banded iron formation supporting dense mixed shrublands with emergent native pines, mallees and casuarinas. This system intersects approximately 15% of the Project Development Envelope.
- **Narrogin System**: Interfluves with significant gradient, aggressively stripped by headward incision, at the headwaters of the Hotham and Blackwood catchments. Numerous dolerite dyke swarms. This system intersects approximately 75% of the Project Development Envelope.
- **Dellyanine System**: Undulating rises and low hills on granite, in the southern Zone of Rejuvenated Drainage. Grey sandy duplex (shallow and deep), sandy gravel and red deep sandy duplex. Wandoo-Sheoak woodland. This system intersects approximately 2% of the Project Development Envelope.
- **Quindanning System**: Deep granitic valleys, in the northern and central Eastern Darling Range, with deep sandy duplex soils, shallow sand, loamy duplex and bare rock. Marri-wandoo-york gum-jam woodland. This system intersects approximately 2% of the Project Development Envelope.

1.3.3 Soils and Geology

Soil landscape mapping of WA has been compiled from the results of various surveys across the state by the Department of Agriculture (now the Department of Primary Industries and Regional Development, or DPIRD) (DPIRD, 2022). The Project Development Envelope is located across 14 separate soil-landscape units, as summarised in **Table 1.3**. The most commonly occurring soil-landscape units within the Project Development Envelope are the Noombling subsystem (Narrogin) (61.5%), Noombling subsystem (Dryandra) (12.4%), and Norrine subsystem (Narrogin) (9.6%).

Table 1.3 Soil Landscape Mapping of the Project Development Envelope

Soil Landscape Unit	Name	Description	Mapped Extent in Project Development Envelope (ha)
253MuNO	Norrine subsystem (Marradong)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust.	6.4 0.1%
253QdMN	Michibin subsystem (Quindanning)	Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrop is common Hillslopes containing soils formed by the weathering of fresh rock. Rock outcrop is common.	24.5 0.4%
253QdWL	Williams subsystem (Quindanning)	Valley floor subtended by the steep slopes of the Michibin unit; yellow duplex soils and a lower sandy terrace.	76.3 1.2%

Soil Landscape Unit	Name	Description	Mapped Extent in Project Development Envelope (ha)
257DeBK	Biberkine subsystem (Dellyanine)	Valley floors and footslopes surrounded by gently undulating rises and low hills. Alluvium & colluvium / granite etc. Yellow brown sandy duplexes (mostly deep), wet and semi-wet soils (sometimes saline). Wandoo-Flooded Gum / Jam-Sheoak-Tea.	220.0 3.5%
257DeNB	Noombling subsystem (Dellyanine)	Long gentle and undulating hillslopes and divides. Colluvium over granite, gneiss and sometimes dolerite. Grey and yellow/brown deep sandy duplexes, sandy gravels and shallow duplexes. Marri-Wandoo woodland; Jam-Sheoak understory.	54.9 0.9%
257DeNO	Norrine subsystem (Dellyanine)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust.	0.1 0.0%
257DyBK	Biberkine subsystem (Dryandra)	Valley floors & footslopes with gently undulating rises & low hills. Alluvium and colluvium over granite etc. Yellow brown sandy duplexes, wet and semi-wet soils & brown deep loamy duplexes. Wandoo-Flooded Gum with Jam-Sheoak-Teatree.	257.5 4.1%
257DyNB	Noombling subsystem (Dryandra)	Long gentle and undulating hillslopes and divides. Colluvium / weathered granite, gneiss and some dolerite. Yellow/brown and grey deep sandy duplexes, brown deep loamy duplexes, sandy gravels and shallow duplexes. Marri-Wandoo / Jam-Sheoak.	785.5 12.4%
257DyNO	Norrine subsystem (Dryandra)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust.	22.3 0.4%
257NgBK	Biberkine subsystem (Narrogin)	Valley floor subtended by the gentle slopes of Noombling unit; yellow sandy duplex soils and a narrow, lower, sandy terrace.	100.7 1.6%
257NgNB	Noombling subsystem (Narrogin)	Gently sloping terrain which may extend over local divides; yellow and red duplex soils and associated granite and dolerite outcrops.	3,903.8 61.5%
257NgNBr	Noombling (Narrogin), rocky phase	Gently sloping terrain which may extend over local divides; yellow and red duplex soils and associated granite and dolerite outcrops Gently sloping terrain which may extend over local divides; yellow and red duplex soils and associated granite and dolerite outcrops.	83.6 1.3%
257NgNBrx	Noombling (Narrogin), very rocky phase	Gently sloping terrain which may extend over local divides; yellow and red duplex soils and associated granite and dolerite outcrops.	200.5 3.2%
257NgNO	Norrine subsystem (Narrogin)	A complex of lateritic residuals and associated pediment; gravely sand, sand, duplex yellow soils and duricrust.	608.6 9.6%
		Total	**6,344.1**

1.3.4 Regional Vegetation

The Katanning subregion largely comprises woodlands of Wandoo, York Gum and Salmon Gum, with Jam and Casuarina also common. The subregion is located within the transitional rainfall zone known for the most species-rich areas such as the lateritic uplands of the Wheatbelt's western edge (Beecham, 2003).

The vegetation of the Northern Jarrah Forest subregion comprises Jarrah-Marri forest in the west, with Bullich and Blackbutt in the valleys grading to Wandoo and Marri woodlands in the east and Powder Bark on breakaways. There are extensive but localised sand sheets with Banksia low woodlands. Heath is found on granite rocks and as a common understorey of forests and woodlands in the north and east. The majority of the diversity in the communities occurs on the lower slopes or near granite soils where there are rapid changes in site conditions (Williams & Mitchell, 2003).

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), providing the Pre-European Vegetation spatial dataset (Beard et al., 2013; DPIRD, 2019). The Project Development Envelope intersects nine VSAs as mapped by DPIRD (2019). The primary VSA occurring is Dryandra_1023 (43.8%), followed by Narrogin_1023 (40.5%) and Narrogin_352 (4.6%).

Further details on flora and vegetation and fauna habitats of the Development Envelopes based on surveys completed for the Proposal are provided in **Sections 6.0** and **7.0**.

1.3.5 Surface Water

The Project Development Envelope is encompassed within the Murray River System which is a Proclaimed Surface Water Area (DWER, 2018b). It is intersected by the Williams River and Minniging Brook. Other named watercourses intersected by the Project Development Envelope include Geeralying Brook (tributary to Williams River) and Mujiting Brook (tributary to Minniging Brook), and several smaller drainage channels (Landgate, 2024).

There is one stream gauging station approximately 10 kilometres from the Project Development Envelope and a further three approximately 20 km or more away (DWER, 2022), however none of these gauging stations are located along the watercourses intersecting the Project Development Envelope or their tributaries.

The Project Development Envelope does not intersect any Wheatbelt wetlands mapped by (DBCA, 2017) but contains some riparian vegetation in some areas where watercourses exist. There is one wetland listed as a Ramsar site in the National Directory of Important Wetlands (Toolibin Lake) located approximately 50 km east of the Project Development Envelope.

The nearest Drinking Water Source Protection Area is approximately 50 km to the southwest of the Project Development Envelope.

A flood study has been completed for the Project Development Envelope (Walbridge Gilbert Aztec (WGA), 2024), with the outcomes used to inform the design of the Proposal to avoid and mitigate hydrological risks and impacts. The flood study assessed flooding for the existing condition, established and delineated catchments, developed a flood model to determine peak rates and duration for flood events, developed a 2D hydraulic TUFLOW flood model, and assessed the 0.2%, 0.5%, 1% and 5% Annual Exceedance Probability

(AEP) design rainfall events. Results were processed to create maximum flood maps to show critical design flood parameters, which were then used to inform the design of turbine locations, access roads, the substation and BESS, the overhead powerline, and other structure associated with the Proposal.

Surface water flows is a key consideration in the Proposal design process. The hydraulic model will be updated to assess the impact of the Proposal, and the design will be refined to mitigate impacts and ensure that there are no adverse impacts outside the Project Development Envelope.

1.3.6 Groundwater

The Project Development Envelope is not located within any Proclaimed Groundwater Area (DWER, 2018a; 2024).

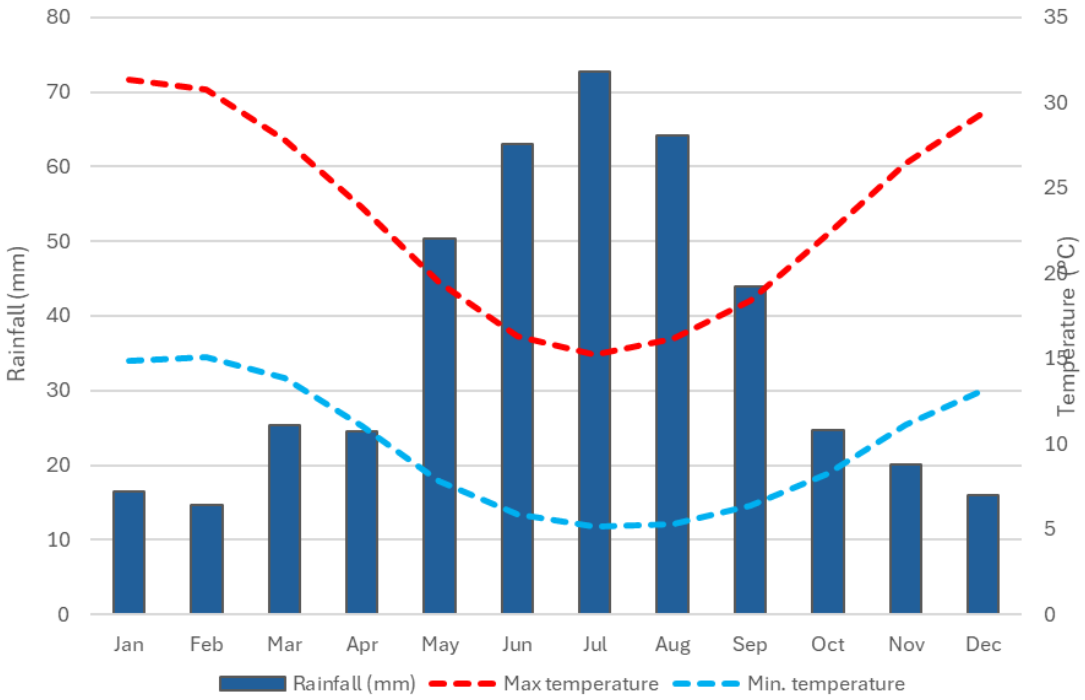
There are a number of bores, wells and other groundwater sampling sites within a 10 km radius of the Project Development Envelope (DWER, 2022). Records obtained from Department of Water and Environmental Regulation (2024) identify that four of the bores were installed for water sampling purposes, with drilled depths of the bores ranging between approximately 0.6 m to 4.0 m. Two of the bores are recorded as being for the purpose of water supply, with recorded drilled depths of approximately 13.0 m, and four bores are recorded as an unknown purpose, with recorded drilled depths between approximately 3.0 m to 4.8 m. The last monitoring recorded for both the water supply and water monitoring bores was in 1979 and 1984.

The lack of water bores in the Project Development Envelope is indicative of the unreliability of the fractured rock system as a water resource. Groundwater within the region is affected by geological features causing flow systems to be discontinuous and compartmentalised (Crossley, 2004).

Groundwater Dependent Ecosystems (GDEs) with a low or moderate potential for groundwater interaction are present in the Project Development Envelope, based on mapping by the Bureau of Meteorology (Bureau of Meteorology (BOM), 2024a). These potential GDEs are the 'medium woodlands' of the 'Murray River Region' (low potential for groundwater interaction) and aquatic GDEs of Minniging Brook (moderate potential). GDE mapping by the Bureau of Meteorology (BOM, 2024a) classifies ecosystems based on the potential for dependence on groundwater. The GDE mapping for Western Australia was derived in 2012 using remote sensing from Landsat and MODIS, with GIS analysis. Accuracy of the dataset is considered high-level and limited. These mapped GDE's have been avoided as far as possible as part of the iterative Proposal design process.

1.3.7 Climate

Climate data was gathered from the Narrogin Station (010614), which is approximately 1.1 km southwest of Narrogin, and therefore the closest weather station to the Project Development Envelope. Monthly averages for rainfall, minimum and maximum temperatures were obtained from 1993 to 2023 (representing a full 30-year climate cycle) and can be seen in **Graph 1.1**. The average temperature ranges from 31.4 °C in January to 5.2 °C in July (BOM, 2024c). The average amount of rain received over the course of a single year in Narrogin is 435.9 mm (BOM, 2024b).



Graph 1.1 Narrogin Climate Statistics (BOM, 2024b; BOM, 2024c)

1.3.8 National Parks, State Forests and Reserves

The Project Development Envelope predominantly consists of land cleared for agriculture and livestock grazing, with interspersed patches of remnant and regrowth woodland that is generally associated with hills and slopes. Key environmental features in proximity to the Project Development Envelope include:

- Dryandra Woodland National Park, located directly adjacent to the northern boundary of the Project Development Envelope
- Lol Gray State Forest, located 500 m north of the Project Development Envelope, which forms a mosaic of protected areas along with Dryandra Woodland National Park
- Bradford Nature Reserve, located 2 km east of the northern boundary of the Project Development Envelope
- Three unnamed Nature Reserves which are surrounded by land parcels associated with the Project Development Envelope
- An unnamed Nature Reserve for the purposes of conservation of flora and fauna, located approximately 2 km south of the Project Development Envelope
- Numerous other Nature Reserves and State Forests located to the south of the Project Development Envelope within a 20 km buffer.

Figure 1.6 illustrates the location of these features in relation to the Project Development Envelope.

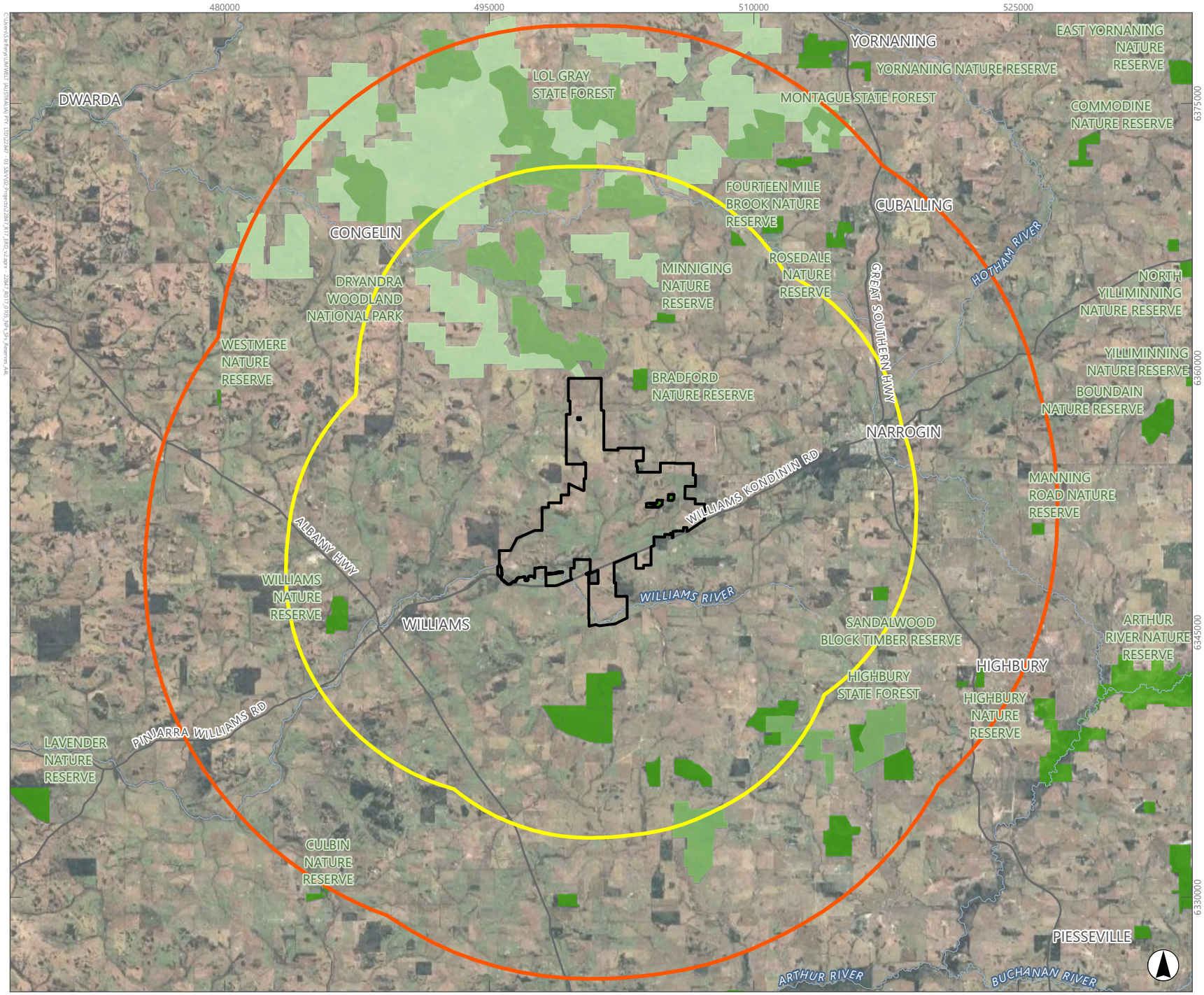


FIGURE 1.6
National Parks, State Forests and Reserves

Legend

- Project Development Envelope
- 12 km Buffer
- 20 km Buffer
- Road
- Major Watercourse
- Nature Reserve
- National Park
- State Forest

0 6 12
Kilometres

Scale 1:300,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2023), DBCA (2023)

1.3.9 Social Context

The Proposal is located predominantly in the Shire of Narrogin, with one turbine proposed to be located within the Shire of Williams. Narrogin and Williams sit within the South-Central subregion of the Wheatbelt.

The Shire of Narrogin covers an area of approximately 1,630 km^2 and has a population of 4,779 (Australian Bureau of Statistics (ABS), 2021). The Shire has a mix of agricultural land, crown land and town sites. Narrogin is a regional centre, providing a range of services and infrastructure to the Narrogin community, as well as for residents from surrounding localities.

The Shire of Williams, located directly west of Narrogin, has a smaller population of 1,021 (as of 2021). The Local Government Area (LGA) covers a land area of approximately 2,300 km^2, which is predominately used for agricultural purposes, producing wool, wheat, oats and beef.

The region in and around the Project Development Envelope is sparsely populated, thereby allowing for the design of the Proposal to meet the relevant noise limits at existing non-involved sensitive receivers.

2.0 Legislative Context

2.1 Environmental Impact Assessment Process

2.1.1 State

In WA, the EP Act is the primary legislative document for environmental regulation and impact assessment. Environmental Impact Assessment (EIA) is covered under Part IV (Divisions 1 and 2) and is required if a proposal is deemed likely to have a significant effect on the environment. Proposals with significant effects are referred to the EPA under Section 38 of the EP Act. If deemed significant the EPA will formally assess the proposal based on any information that is provided during the referral process and sets the level of assessment required. Assessment of specific environmental factors will also be allocated in response to the submission of referral. If the EPA does not deem the environmental impact to be significant, they may issue public advice or determine that the proposal can be managed under other statutory processes.

This Environmental Referral Supporting Document forms the Proposal referral under Section 38 of the EP Act and has been prepared in accordance with the *EPA Environmental Impact Assessment (Part IV Divisions 1 and 2) Procedures Manual* and *Instructions: How to prepare an environmental review document* (EPA, 2024).

2.1.2 Commonwealth

The *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) is administered by the Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW). Under the EPBC Act, if the Minister for the Environment determines that an action is a "controlled action" which would have or is likely to have a significant impact on Matters of National Environmental Significance (MNES) or Commonwealth land, then the action may not be undertaken without prior approval from the Minister for the Environment and Water.

The significance of the proposed action on MNES can be determined through a self-assessment. The significant impact criteria set out in the guideline for each MNES are to assist in determining whether the impacts of the proposed action on any MNES are likely to be significant (e.g. as being important, notable or of consequence, or having regard to its context or intensity).

If after undertaking a self-assessment it is concluded that the action is likely to have a significant impact on any MNES, or if unsure, the action should be referred to the Minster. If the Minister decides that the action is likely to have a significant impact, then the action will be determined as a controlled action requiring approval under the EPBC Act. A separate referral under the EPBC Act has been submitted to DCCEEW.

2.2 Other Approvals and Regulation

Further approvals and regulations will be required prior to undertaking some activities during construction, operation and decommissioning/rehabilitation to minimise environmental impacts. These activities could include clearing of native vegetation, interfering with the bed and banks of watercourses, concrete batching and installation of apparatus for sewerage treatment. Other statutory decision-making processes that will mitigate the potential impacts to the environment as related to the Proposal are listed in **Table 2.1.**

Table 2.1 Other Approvals and Regulations for the Proposal

Authority	Legislation	Approval Required	Ability to mitigate environmental impact
Department of Planning, Lands and Heritage (DPLH)	*Planning and Development Act 2005*	Development Application (via Part 11B Significant Development Pathway). All elements of the Proposal.	**Yes, this decision-making process can mitigate environmental impacts** The DA needs to address relevant parts of the State Planning Framework, including consideration of *State Planning Policy 2.0: Environment and Natural Resources*, *and Guidance Statement 33: Environmental Guidance for Planning and Development*. Aspects related to Social Surroundings and other environmental factors are also considered as part of the DA. A Development Application will be lodged under the Part 11B Significant Development Pathway, and conditions related to management and mitigation of environmental impacts will be applied.
Department of Water and Environmental Regulation (DWER)	Part V Division 2 of the EP Act	Native Vegetation Clearing Permit (NVCP). Clearing of native vegetation.	**Yes, this decision-making process can mitigate environmental impacts** Part V of the EP Act regulates the clearing of native vegetation. DWER assesses significant flora and vegetation, areas of high biological diversity, significant fauna habitat and conservation areas. This aligns with the EPA Environmental Factor Objectives for Flora and Vegetation and Terrestrial Fauna. Any native vegetation clearing that is not exempt under the *Environmental Protection (Clearing of Native Vegetation) Regulations 2004* will be the subject of an NVCP application prior to construction.
Department of Water and Environmental Regulation	Section 11, 17 and 21A of the *Rights in Water and Irrigation Act 1914* (RIWI Act)	Bed and Banks Permit Disturbance to beds and banks of watercourses	**Yes, this decision-making process can mitigate environmental impacts** Under the bed and banks permit application process, an assessment against key environmental considerations is typically undertaken which steps out the management measures to be implemented to minimise environmental impacts to watercourses. A bed and banks permit will be applied for in relation to proposed watercourse crossings.
Department of Biodiversity, Conservation and Attractions	Section 40 of *Biodiversity Conservation Act 2016*	Authorisation to take threatened fauna Potential impacts to threatened fauna individuals, for example due to turbine strike.	**Yes, this process can mitigate environmental impacts** Requirements for Section 40 Authorisation and appropriate mitigations will be discussed with DBCA in the context of potential bird collisions with turbines.

Authority	Legislation	Approval Required	Ability to mitigate environmental impact
Department of Water and Environmental Regulation	Part V Section 52 of the EP Act	Works Approval Concrete batching	**Yes, this decision-making process can mitigate environmental impacts** Should a works approval be required, (e.g. for concrete batching) it will contain appropriate conditions to prevent, control, abate or mitigate pollution or environmental harm during the construction and environmental commissioning phases of a Proposal.
Department of Health	*Health Act 1911* Health (Treatment of sewage and disposal of effluent and liquid waste) Regulations 1974	Application to Construct or Install an Apparatus for the Treatment of Sewage Temporary accommodation (provisional)	**Yes, this decision-making process can mitigate environmental impacts** Should this approval be required, details of the proposed wastewater treatment system will be assessed by the Local Shire and/or Department of Health.
Department of Energy, Mines, Industry Regulation and Safety (DEMIRS)	*Dangerous Goods Safety Act 2004*	Dangerous Goods Licence (DGL) Storage of battery modules on site prior to installation.	**Yes, this decision-making process can mitigate environmental impacts.** A DGL may be required should the BESS be stored on site for a period of time without being connected to the grid. The DGL application will be assessed by DEMIRS and will manage risks associated with the presence of the BESS on site.

2.3 Land Tenure

The lots intersecting the Project Area are primarily Freehold Land owned by private landholders, with some extents of public land comprised of reserves managed by state and local government.

The Proponent has legal access to freehold land under an 'Option to Lease' agreement with the landowners. Once construction has been completed the Option will be exercised and the land occupied by the Proponent's assets will be covered by a lease, and access will be secured via easements.

The appropriate approvals will be sought for access to reserves managed by state and local government, and consultation has commenced with relevant stakeholders.

3.0 Stakeholder Engagement

3.1 Stakeholder Identification and Engagement Mechanisms

Neoen commenced engagement with key stakeholders regarding the Proposal in September 2022. The key objectives of the engagement to date have been:

- To inform stakeholders of the Proposal and its potential impacts to the environment and community.
- To understand the perspectives of local community stakeholders and stakeholder groups such that these perspectives can be considered as part of the Proposal design evolution.
- To engage early with regulators to understand areas of interest and potential concerns, such that these can be considered as part of the Proposal design evolution.

To identify key community stakeholders, a stakeholder identification process was undertaken as part of the development of the Proposals Community Engagement Plan (CEP) (refer **Appendix B**). This process involved identifying community stakeholders with an interest in the Proposal, or those that may be directly and/or indirectly affected, including any potentially vulnerable or marginalised groups.

Stakeholders and their areas of interest that have been identified are summarised in **Table 3.1**. A further breakdown of local and community stakeholders that have been identified and engaged with is provided in **Figure 3.1.**

Table 3.1 Areas of Interest for Different Stakeholder Groups

Stakeholder Group	Stakeholder	Primary Area of Interest
State Government	Department of Water and Environmental Regulation (DWER)	• Ecological surveys and findings • Extent of clearing and other impacts • Referral under EP Act • Surface water and groundwater permitting requirements • Noise assessments and limits • Emissions and discharges
	Department of Planning, Lands and Heritage (DPLH)	• Planning approval in accordance with State Planning Framework • Heritage
	Department of Biodiversity, Conservation and Attractions (DBCA)	• Biodiversity aspects, including black cockatoos • Offset options
	Main Roads WA (MRWA)	• Transport of infrastructure from port to site • Road upgrades and modifications • Approvals and permits
	Public Transport Authority (PTA)	• Crossing of PTA easement
	Water Corporation	• Supply of water for construction
	Western Power (WP)	• Connection to existing WP infrastructure

Stakeholder Group	Stakeholder	Primary Area of Interest
	Southern Ports Authority	• Use of port for delivery of infrastructure
Federal Government	Department of Climate Change, Energy, the Environment and Water	• Impact of Matters of National Environmental Significance • Referral under the EPBC Act
Local Government	Shire of Narrogin	• Community benefit sharing options • Workforce accommodation • Proposal layout and setback distances • Road use and maintenance • Employment opportunities
	Shire of Williams	
	Shire of Collie	• Road use and maintenance
	City of Bunbury	
Traditional Owners	South West Aboriginal Land and Sea Council	• Heritage protection and surveys • Employment and contracting opportunities
	Gnaala Karla Booja Aboriginal Corporation	
	Willman Aboriginal Corporation	
	Kaata-Koorliny Employment & Enterprise Development Aboriginal Corporation (KEEDAC)	
Surrounding landowners	Various	• Overview of Proposal • Near neighbour benefits
Local Community	Community members	• Proposal details • Community benefit sharing options
Service groups, businesses and service providers	Refer **Figure 3.1**	• Impacts on services and business

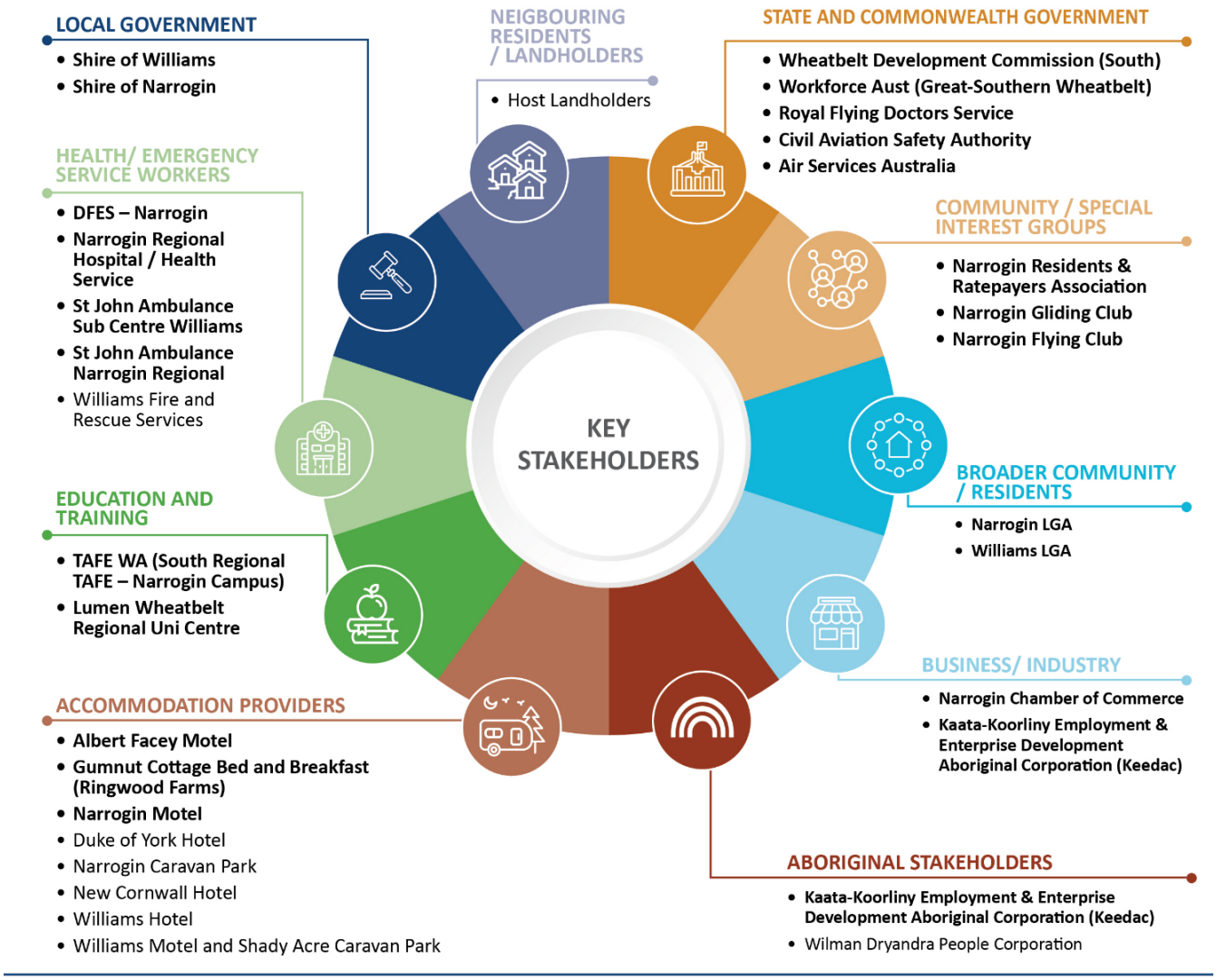


Figure 3.1 Local Stakeholder Groups Consulted

Early community and stakeholder identification and engagement has been undertaken by Neoen with the objective of building relationships with near neighbours and key stakeholders in relation to the Proposal. The stakeholder engagement methods adopted are presented in **Table 3.2.**

Table 3.2 Stakeholder Engagement Mechanisms

Mechanism	Objective	Targeted Stakeholder	Description
Project Briefings / Meetings	To understand approvals required and key issues to be considered/assessed.	Federal, State and Local government agencies	Project briefing meetings, update meetings and pre-referral meetings to identify items to be considered for proposal design, approval and construction and operation.
Letter Correspondence	To inform adjacent landowners of the assessment and development process through the provision of Proposal information and additional opportunity for further engagement	Neighbouring landholders / residents	Letters correspondence containing Proposal information and key engagement mechanisms.
Website	To inform the community about key Proposal information and updates	Broader Community / All	Proposal website established to provide updates throughout proposal life for all stakeholders and a mechanism to provide input/ feedback, including an online feedback form. Website updated with newsletters and information regarding Proposal milestones including advertising the community information sessions.
Local Media	To inform the broader community about key Proposal milestones and extend invitations to community information sessions.	Broader Community / All	Utilisation of local newspapers to inform the broader community about the Proposal and promotional information regarding the community information sessions and Proposal team contact details included with opportunities to provide feedback.
Community Information Booklet	To inform various stakeholder groups and the community about key Proposal information, provide project updates and outline who Neoen is.	Broader community	Neoen has developed a Community Information Booklet which provides an overview of Neoen and the Proposal.
Personal meetings / Interviews	To involve stakeholder groups to understand their concerns and ensure aspirations are considered.	• Local Government • Business / Industry Representatives • Local Service Providers • Education Providers	Semi-structured meetings to identify potential Proposal impacts and opportunities from various stakeholder perspectives and suggestions with regards to mitigation/enhancement strategies. Interviews with key stakeholders conducted between December 2023 – May 2024. A total of 18 participants were involved

Mechanism	Objective	Targeted Stakeholder	Description
Online survey	To involve stakeholder groups to understand their concerns and ensure aspirations are considered.	• Accommodation Providers • Local Service Providers	An online survey sent to stakeholders to identify potential Proposal impacts and opportunities from various stakeholder perspectives and suggestions with regards to mitigation/enhancement strategies. Survey sent out in December 2023 following phone calls and made available until February 2023. A total of 3 stakeholders completed the survey.
Random telephone survey	To involve community members to understand their concerns and perceived opportunities regarding renewable energy projects in the region more broadly.	Residents across Narrogin and Williams LGAs	A random phone survey across the Narrogin and Williams LGAs was conducted between March and April 2024 to gather community perceptions of Neoen and renewable energy project developments. A total of 184 respondents participated in the survey.
Community Information Sessions	To involve various stakeholders groups about key Proposal information	• Community members • Community and special interest groups	Drop-in sessions were held in Narrogin and Williams to provide updated information on Proposal developments and to gather further feedback on the Proposal. The first day of community information sessions were held in June 2023. The second day of community information sessions were held in September 2024.

3.2 Stakeholder Consultation Outcomes

Significant consultation has been undertaken with key Federal, State and Local regulatory authorities in additional to consultation with key landholders, Traditional Owner groups, the community and local service providers.

A summary of outcomes from consultation undertaken to date is presented in **Table 3.3** below.

Table 3.3 Stakeholder Consultation Outcomes

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
State Government Agencies and Regulators			
DWER - EPA Services	July 2023 Phone call Leanne Thompson	• EPA noted that Terrestrial Ecosystem branch is exploring guidance on birds and bats, and that noise and visual impacts expected to be managed via DA. • Discussed EPBC bilateral assessment (Part V) and accredited EPA process (Part IV) • Discussed Aboriginal Cultural Heritage Act reform.	• To continue engaging with EPA through project design process
	August 2023 Pre-referral meeting Leanne Thompson	• Neoen presented studies completed and planned, early Project layout, preliminary key environmental factors • EPA noted that based on information presented: Flora and Vegetation values did not appear significant, black cockatoo impacts and bird/bat impacts generally would require consideration in a referral, Social Surroundings not likely a key factor, and generally the project looks to be a "smaller" project and probably not require assessment through the Part IV process. Also commented that the Principle of Waste Minimisation is a front of mind issue at present.	• Proponent to continue with surveys and studies as described in presentation and will re-engage with the EPA when the Project is more defined.
	July 2024 Pre-referral meeting Alicia Dudzinska	• Neoen presented ecology surveys, assessments and key findings, the design evolution and how it has sought to minimise impacts • Discussed black cockatoo impacts, including flight behaviours, breeding and habitat. • EPA advised that Flora and Vegetation, and Terrestrial Fauna appear to be the key preliminary environmental factors. • Social surroundings not expected to be a key environmental factor and should be addressed through DA process. • Discussed offset options being considered, and EPA notes that offset proposal should seek to provide a net biodiversity gain.	• Key studies have been completed. • Proponent will present Flora and Vegetation and Terrestrial Fauna as key preliminary environmental factors and Social Surroundings as other environmental factor, and include as much info as available on black cockatoos and mitigation of potential impacts. • To include EPA on future offset discussions.
	September 2024 Alicia Dudzinska	• Neoen gave a presentation providing updates since previous pre-referral meeting. • Described the design evolution and design changes made to reduce impacts. • Summarised key outcomes from surveys and assessments, and mitigation measures proposed to further reduce impacts. • Presented residual impacts and their potential significance. • Discussed transport route.	• EPA advised key items appear to have been considered.

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
DWER – Environmental Noise Branch (ENB)	May 2023 to present Meetings, phone calls and emails	• Meeting held with DWER ENB to discuss application of noise levels for noise assessment purposes. • Early DWER ENB advice was that it would be appropriate to model and assess the windfarm noise in accordance with the South Australian Environmental Protection Authority – *Wind Farms Environmental Noise Guidelines*, and adopt the *Environmental Protection (Noise) Regulations 1997* (WA Noise Regulations) lower limit of 35 dB(A) as the base limit at low wind speeds. • In subsequent correspondence via emails, DWER ENB advised they would support an assessment method which was able to demonstrate that a proposal will not exceed the highest of either the assigned noise levels or the background noise level. • DWER ENB also noted the role background noise levels play in noise assessments and advised that for assessment purposes it may be necessary to consider the background noise levels which may reasonably be expected during compliance measurement.	• Detailed Noise Assessment completed noting advice from DWER. • Proponent awaiting further clarification on noise levels to be applied at existing involved receptors.
DWER – Licensing (Kwinana-Peel region)	March 2024 Meeting	• Neoen provided an overview of the project and sought advice on licensing under the EPA Act and RIWI Act. • Discussed preliminary hydrology study and flood risk assessment, DWER noted that this will likely require internal specialist review. • Bed and Banks (B&B) permit - A single permit application could be lodged for the entire project. It would need to nominate the maximum number of crossings, proposed locations and crossing methodology. • Noted Project will refer under Part IV of the EP Act. Should it not be assessed, then a NVCP application for the clearing of native vegetation would be submitted to DWER. • Groundwater abstraction unlikely as site not located in a proclaimed GW area and abstraction unlikely. • Works approvals unlikely to be required for wind turbines.	• Lodge a single B&B permit. • Provide flood modelling info to DWER when required. • Engage further to determine requirements for Works Approval for concrete batching plant.

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
DBCA	February 2024 and September 2024	• Black cockatoos, impacts and mitigations. DBCA officer noted that regional impact to movement or collision strike unlikely to be an issue and would follow up internally to advise further. • Offset requirements and options being investigated	• Once impacts and level of offsetting required are understood, meet with relevant Decision Making Authorities to further discuss option. • Follow up attempts to discuss black-cockatoo movement were unsuccessful.
	March 2024	• Proponent sought feedback on the potential impacts the Proposal may have on DBCA aviation activities. • DBCA advised that as part of the Governments initiative of Grain Harvest Waterbombers, they have three aircraft based out of the Narrogin Aerodrome from the 15th of November to the 30th of December each year. • For the rest of the year the airstrip gets occasional use by water bombers and other DBCA aircraft depending on bushfire activity and other operations. • DBCA has consulted with the main aviation contractor they use, and acknowledge that the turbines will be out of the Narrogin circuit so they should still be able to use the aerodrome as they currently do. However, DBCA further noted that wind farms pose a high risk for any low-level aerial fire suppression operations.	• N/A
DPLH (SDAU)	November 2023, February 2024, June 2024, October 2024	• Introduction to project, discussion about the 2 main potential planning pathway approvals (DAP Pathway or the Part 11B SDAU/ Significant Development pathway), discussion of planning risks, WA Noise Regulations and planning controls, and aspects of Local Planning Policies. • Benefits of pre-lodgement consultation with DPLH. • DPLH noted that should the Project be referred to EPA/DCCEEW, they will rely on them to assess environmental impacts. Further noted that the WAPC can't approve a Planning Approval if it is under assessment by EPA.	• Pre-lodgement engagement recommended. • Part 11B suitable planning approval pathway. • Proponent sought written Pre-lodgement advice and State Referral Coordination Unit support.
MRWA – Wheatbelt Division and South-West Division	June 2024, July 2024 Meeting	• Neoen provided overview of Project and described work undertaken to inform the transport route assessment. Two ports were considered and a numerous alternative road options. Preferred route is from Bunbury port. • Illustrated the swept paths for areas where road modifications may be required in the Wheatbelt district. No major issues identified.	• No key issues identified. Feasible route from port to site identified. • Traffic Management Plan to be shared with MRWA South West Office. • Timing of transport of OSOM will consider shift changes at local mines/businesses.

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
		• Discussed potential clearing within road reserve, project timing and pinch points, and potential for strategic approach noting future similar proposals are likely. • MRWA spoke on options for engaging road works contractors. • MRWA suggested contacting them again in advance of DA submission.	• Contact MRWA prior to DA submission (completed).
	September 2024	• Discussed potential for the Main Roads reserve at the intersection of Clayton Road and Narrogin-Williams Road to be a PEC. Main Roads advised that based on their knowledge of the site it is unlikely to be a PEC due to clearing for a previous laydown area and most species not meeting requirements of the PEC. However a site diagnostic should be completed to confirm this.	• Will complete site assessment should clearing be required.
Public Transport Authority (PTA)	May 2024 Email	• Neoen contacted PTA to understand what approvals would be required. PTA sent through the relevant application form, however at the time the level of detail was unknown. Meeting to be held with PTA to provide greater overview of the Project and understand timing of approvals.	• Complete application form once details are known. • Arrange meeting with PTA to discuss project.
Water Corporation	May 2024 Phone and email	• Discussed options for local water supply options. Neoen noted there is a Shire standpipe in Highbury but is 35 km from the site. Requested information from Water Corp on any closer water supply options. Neoen noted there is a Water Corp mainline running through the site and queried if this could be a potential water supply. Water Corp took queries on board and committed to providing further advice. • Water corporation followed up with information on providing a standpipe nearer to the project area.	• Viable construction water source identified and to be finalised. Water supply proposal issued by Water Corporation to Neoen.
DFES	August 2023	• Consulted on potential EMI impacts. Conclude that only minimal EMI effect on DFES high-band communication, and unlikely any degradation to standalone VHF services.	• No action required.
Western Power	September 2022 to Present Phone, email, and face to face meetings.	• Consulted on commencing a detailed enquiry assessment for the Project. • Neoen attended an enquiry assessment workshop with Western Power. This workshop provided a high-level scope, cost, and timeframe of various connection options were presented to Neoen, to consider how the Project may connect to the SWIS. • Neoen submitted Access Application to Western Power. Currently progressing through technical support studies to support the Connection Application.	• Submitted detailed assessment to Western Power, working through the initiation phase currently, and undertaking technical assessments.

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
Southern Ports Authority	November 2023	• Neoen discussed the potential use of the Bunbury port to deliver equipment and/or infrastructure to the Project area.	• Confirmed the Port is a viable option. • Neoen to confirm shipping types and numbers once turbine model has been selected.
Federal Government			
DCCEEW	October 2023	• Project overview, discussion on proposed surveys. • DCCEEW referred to upcoming guidance on bird and bat surveys, suggested contacting Murdoch black-cockatoo research centre.	• BBUS designed to meet DCCEEW interim guidelines. • Meeting held with Murdoch on black-cockatoo data (further details below).
	May 2024	• Project overview, discussion on design evolution and how it has sought to minimise impacts, overview of ecology surveys, assessments and key findings. • More detailed discussions on risks to birds and bats. In particular black cockatoos. Referral should consider their regional context, their movement and behaviour patterns, and how the Project interacts with these.	• Studies to consider aspects raised by DCCEEW, in particular on bird and bat impacts.
	August 2024	• Discussion on design evolution and how it has sought to minimise impacts. • Overview of ecology surveys, assessments and key findings. • More detailed discussions on risks to birds and bats. In particular black cockatoos.	• Proposal to consider impacts to black cockatoos, particularly on how they use the Study Area and surrounding landscape. • Works and studies at latest meeting appear to address DCCEEW comments from previous meetings.
Airservices Australia	January 2024	• Request for Airservices Australia assessment of the Proposal and its impact on sir services in the area.	• Proponent commits to advising the Vertical Obstacle Data (VOD) team at VOD@airservicesaustralia.com of any need to increase Grid LSALT heights at least two (2) weeks before construction commencing.

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
BOM	October 2023, July 2024	• Initial concerns on previous layout on BOM network were raised based on EMI, and noted as manageable in latest layout.	• Layout had been adjusted to mitigate impact.
Geoscience Australia	August 2023	• No impact on GNSS or Trigonometrical Infrastructure from the Proposal.	• No action.
CASA	N/A	• N/A	• Neoen will engage with CASA prior to lodgement of DA application.
Local Government			
Shire of Narrogin	Formal meetings: August 2023, November 2023, April 2024, May 2024, July 2024 Multiple informal calls and meetings	Across a number of meetings the following items were discussed: • Neighbour benefit schemes and Neoen Community Benefit Sharing. • Setbacks from property boundaries and dwellings. • Iterations of turbine layout were provided. • Potential noise and aviation impacts noted as a concern of the Shire. • Visual and landscape impact not generally a concern to the Shire. • Accommodation for workforce. • Local Planning Policy (LPP) concerns and feedback, with Neoen noting that requirements of the LPP would make most wind projects unviable while being very conservative and not evidence based. • Potential for a special control area (SCA) to prevent sensitive land use encroachment on the wind farm (not supported by the Shire). • Neoen intent to follow Part 11B planning approval pathway.	• Layout amended to avoid and minimise aviation impacts. • Layout ensures compliance with neighbouring dwellings and minimises noise impacts outside the Project Development Envelope. • Shire will be consulted further on workforce accommodation and community fund options.
Shire of Williams	Formal meetings: December 2023, April 2024, July 2024, and August 2024 Multiple informal calls and meetings	Across a number of meetings the following items were discussed: • Local Planning Policy (LPP) concerns and feedback, with Neoen noting that requirements of the LPP would make most wind projects unviable while being very conservative and not evidence based. • Neoen intent to follow Part 11B planning approval pathway. • Accommodation for workforce. • Neighbour benefit schemes and Neoen Community Benefit Sharing.	• Layout has been amended in response to potential setback impacts. • Shire will be consulted further on workforce accommodation and community fund options.

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
Traditional Owners			
South West Aboriginal Land and Sea Council (SWALSC)	July 2023 October 2024	• Neoen provided draft Noongar Standard Heritage Agreement. The Agreement was duly executed by all parties in June 2024. • Neoen provided an Activity Notice to SWALSC which is in the process of being assessed.	• Continue to engage with SWALSC.
Gnaala Karla Booja (GKB) Aboriginal Corporation	February, March, April, August, October 2024	• Neoen contacted GKB and set up a meeting to discuss background on Neoen, the Project Design, Neoen's approach to Aboriginal and Indigenous Peoples – Kaban Wind Farm, NSHA Progress, and Project next steps.	• Neoen provided additional information to GKB on Neoen's Kaban Wind Farm, Qld, and Cultural Heritage Due Diligence report. • Continue to engage with GKB.

Wilman Dryandra People Corporation (WDP)	July 2024
	Meeting
		• Purpose of meeting was to meet the representatives of the group to introduce the Proposal, understand how the WDP would like to be engaged and discuss any initial questions they may have.
		• Key items discussed included:
		  ○ Engagement and communication with WDP going forward.
		  ○ Site survey.
		  ○ Background on Neoen as an organisation.
		  ○ Project need and benefits.
		  ○ Proposal timelines.
		  ○ Employment opportunities.
		  ○ Other community benefits.
		  ○ Noise and visual impacts.
		  ○ Impacts on birds.
			• Continue to engage with WDP.
			• Undertake site survey when layout has been finalised.

Kaata-Koorliny Employment & Enterprise Development Aboriginal Corporation (KEEDAC)	June 2023, July 2024	• Opportunity for employment and training for indigenous school leavers. • Importance of actively engaging with Keedac and keeping them updated. • Pathways for training and education to contribute to the windfarm. Participants in their programs, Thrive Program and Strong Women program, issues for employment after they sort out their issues. • Want to encourage the Aboriginal school kids to learn about wind farms.	• Continue to engage with KEEDAC representatives

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
Surrounding landowners			
Surrounding landowners	September 2022 to Present	• Opportunity for involvement in Narrogin Wind Farm as an involved landowner hosting turbines. • Neoen's development process and different developmental milestones, likely timing of submissions. • Neoen's community and neighbour benefit funds, which have been implemented on other projects. • Invitation to partake in background noise studies. • Face to face meeting invites to talk through Neighbour Benefit Sharing (NBS) scheme. • Detailed information on Neighbour Benefit Sharing Scheme including annual remuneration.	• Neoen is committed to delivering an NBS scheme on the Narrogin Wind Farm to ensure near-neighbours can directly benefit from the region's energy transition. The NBS scheme based on the number of wind turbines within certain distances of a neighbour's primary residence. The nearer the turbines to a primary residence, the higher the amount on offer. • Neoen will continue to engage with surrounding neighbours throughout the projects lifecycle.
Local community			
Community members	September 2022 to Present	Community consultation commenced in September 2022 and involved telephone interviews and surveys, information booklet distribution and four community information sessions in 2024, the latest held on 16 September 2024. The following key community concerns and benefits were identified. <u>Key Concerns</u>: • Incoming construction workforce causing strain on short-term accommodation and the housing market. • Lack of clarity around Project information and the distributive equity of compensation or benefits. • Disruption to existing farming practices. • Impacts to public health and safety. • Reduced amenity due to visual and noise impacts. <u>Key Benefits:</u> • Opportunity for further housing and accommodation development. • Procurement opportunities for local businesses and service providers.	The Project has already commenced implementation of social impact management measures to address the social impacts and realise the community benefits of the Project, including the development of a Community Benefit Sharing program. A number of Community Benefit Sharing initiatives were presented by Neoen during community information sessions, with the community asked to provide ideas for funding in the following areas: • Sporting & Recreation; • Arts, Culture & Events; • Energy Efficiency & Environment; • Health & Wellbeing; • Education & Training;

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
		• Opportunities for employment, training, and upskilling of local people. • Economic benefits due to incoming construction workforce using local businesses. • Increased diversification of the local economy and industry.	• Disaster Relief & Emergency Services; and • Tourism The Project will also deliver a neighbour benefit scheme, going 'above and beyond' the state government's planning requirements for large-scale renewable energy project in WA.
Service providers, businesses and community groups			
Optus	August 2023	• Consulted on potential EMI impacts, and provided feedback on potential interference of turbine layout on services.	• Turbine layout adjusted to mitigate impact.
Telstra	July 2024	• Consulted on potential EMI impacts. No expected impact to Telstra network.	• No action required.
Vodafone	June 2024	• Consulted on potential EMI impacts. No expected impact to Vodafone network.	• No action required.
NBN Co	June and July 2024	• Consulted on potential EMI impacts. No issues with final layout.	• Layout had been adjusted to mitigate impact.
WA Police	July 2024	• Consulted on potential EMI impacts. No concerns with final layout.	• No action required.
DFES – Narrogin		• Consultation undertaken with District Officer. • DFES uses aircraft for fire suppression, for observation and water bombing. Could be impacted by turbines, depending on location and height. If the turbines are a hazard to aircraft, the aircraft can't be used around them. • Expectation is that the turbines and other infrastructure would have a high level of protection and reduction of vulnerability to fire. Fire fighting would then have to rely on more ground based efforts. Project design needs to not increase the risk or impact of fire to neighbours. • If Neoen was largely self-sufficient with fire-fighting resources, and they have an adequate number of fire appliances and their employees were trained to an acceptable level with necessary equipment, that would be good because it would reduce any project fires before they got large. • Reduce the work needed for emergency services. Memorandum of Understanding for DFES and local govts for mutual support – if there was a fire nearby the project, could Neoen lend a helping hand.	• Continue engagement as the Project progresses.

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
		• Sharing info on what hazardous materials may be stored onsite. • Sharing emergency management plans would be useful.	
Royal Flying Doctor Service	July 2024	• RFDS advised that they believe the turbines would not pose an issue for their operation at the present time. • The closest turbine is just on the circling limit for their PC12 aircraft and is not on the live side of the circuit.	• N/A
Narrogin Gliding Club	Various	• Concerns that the turbines pose an increased hazard as the gliders get quite low and close to the paddocks. • Compliance with aviation regulations and what the Shire wants to do with the runways down the track was also raised. If the Shire wants to increase the capacity or rating of the runway to encourage others to come and visit, there are implications in terms of increased setbacks, proximity, height restrictions. • Concerns raised about gliders losing altitude and the added risk rotating turbines create. • Met face to face with the Narrogin Gliding Club relating to concerns if turbines were sited too close to aerodrome.	• Continued engagement, seeking further inputs and advice on Proposal design. • Aviation Impact Assessment (AIA) completed for the Project considered potential impacts to the Narrogin Aerodrome, including gliders.
Narrogin Aero Club	April 2024	• General discussion relating to concerns of potential impacts to flight operations at Narrogin if turbines were sited too close to aerodrome. No formal response provided.	• N/A
Ford Aviation	March 2024	• Email provided highlighting general concerns regarding wind farm development in farming areas, including safety and commercial concerns	• Consider advice in determining final turbine locations.

Narrogin Regional Hospital / Health Service	January 2024	• The Narrogin Health Service do not expect any significant impact on the services it provides from the Narrogin Wind Farm. The introduction of any new business brings welcome workforce opportunities for the Health Service, and the Health Service are confident that they have the capacity to meet the needs of any additional workforce from the wind farm.
		• Proposal benefits identified include:
		  ○ Economic benefits to the community during the construction phase.
		  ○ A more renewable power source should be supported.
		• Proposal challenges identified include:
			• N/A

Stakeholder	Date/s	Issues/Topics Raised	Proponent Responses/Outcomes
		○ Additional competition for the already limited housing stock may impact the ability to attract and retain staff to the health service. ○ A drive in, drive out workforce would result in extra traffic on Williams Road. ○ The noise of the turbines could be an issue for some members of the community.	
Murdoch black cockatoo research centre	March 2024	• Umwelt met with representatives from the Murdoch University Black Cockatoo Research centre to discuss data availability to inform wind farm impact assessments in the Wheatbelt generally. • Murdoch presented tracking data from studies on the Swan-Coastal Plan, but noted that there is a lack of black-cockatoo regional movement data in the Narrogin area and that flight height data is not available from Murdoch's tracking studies. Also noted concern that turbulence from wind farms could impact black cockatoo flight up to 2 km from turbines. Commented that many years (~5) of black cockatoo flight behaviour would be needed to understand potential impacts from wind farms. • Murdoch noted that wind proponents could fund University research on flight behaviour and regional movement.	• BBUS aiming to meet DCCEEW guidelines, and BBAMP provides measures for adaptive management and potential regional assessments of black-cockatoo movements.

4.0 Object and Principles of the EP Act

Section 4A of the EP Act contains the object and principles of the Act. The object of the EP Act is to protect the environment of WA by having regard to the five principles. **Table 4.1** demonstrates how the Proposal has considered the five EP Act principles.

Table 4.1 Consideration of EP Act Principles

Principle	Project Consideration
1. The precautionary principle	A range of environmental, heritage and social studies have been undertaken to determine the baseline values associated with the Project Development Envelope and to identify the environmental factors that could be potentially impacted by the Proposal. The various studies have been undertaken by suitably qualified consultants and undertaken in accordance with relevant EPA guidelines where available. The Proposal design has strongly focussed on avoidance of impacts based on the studies completed. Avoiding impacts to the point of the lowest possible impact is a precautionary approach which limits reliance on minimise, rehabilitate, and offset impacts. Specifically, the precautionary principle has been applied through avoidance by: • Reducing the Project Development Envelope to avoid over 200 ha of Priority Ecological Community (PEC) within the Additional Survey Area, and avoiding the clearing of any PEC within the Project Development Envelope. • As regional movement of black-cockatoos is not well known, the Proposal has taken a precautionary approach of reducing the size of the Project Development Envelope, reducing the number of turbines, and having a minimum blade tip height above the typical flight height for black-cockatoos. Turbines have been removed from areas most likely to provide regional movement corridors for black-cockatoos, including the >200 ha patch of vegetation within the Additional Survey Area, and around the larger patch of habitat under conservation in the eastern part of the project Development Envelope. • Clearing of any good quality vegetation has been avoided, with clearing restricted to only 7.41 ha of remnant native vegetation and 0.98 ha of planted native vegetation which is patchy, fragmented and degraded. Approximately 96% of the Indicative Proposal Footprint is on cleared land. • A preliminary Bird and Bat Adaptive Management Plan (BBAMP) has been prepared and will be implemented. • Although no black-cockatoo species have been directly observed within the Project Development Envelope over a total of 18 survey days (four surveys, including 2 BBUS, a terrestrial fauna survey, and a targeted fauna survey), two additional BBUS are proposed over Spring 2024 and Summer 2025. • Infrastructure has been located outside of areas with higher potential of containing cultural heritage values.
2. The principle of intergenerational equity	Renewable energy projects such as this Proposal promote intergenerational equity by reducing reliance on fossil fuels and lowering greenhouse gas emissions, thereby helping to mitigate climate change and its long-term impacts. The Proposal will seek to create lasting economic benefits, such as job opportunities and technological advancements, which can provide a stable foundation for future economic growth. Measures to avoid and minimise impacts to the environment have been identified and implemented to ensure the value of the environmental and ecological functions are maintained for future generations. The Proposal will use a small proportion of agricultural land and will enable the remainder of the Project Disturbance Envelope to continue to be used for productive purposes.

Principle	Project Consideration
3. Principles relating to improved valuation, pricing and incentive mechanisms	The economic costs associated with the Proposal will be borne by the proponent. The proponent has factored in the costs associated with implementing environmental management, monitoring and offsetting costs which are likely to be required under a Part V clearing permit. Further, the selected Project Development Envelope is an appropriate environmental setting for a wind farm (predominantly cleared land), while having a strong wind resource and being able to directly connect to the SWIS without requiring significant transmission upgrades.
4. The principle of the conservation of biological diversity and ecological integrity	The Proposal has considered the principle of conservation of biological diversity and ecological integrity primarily through site selection and Proposal design, and via the completion of studies to understand biodiversity values in accordance with EPA guidelines. Infrastructure will be primarily located within previously cleared land, areas of higher environmental significance such as PEC's will be avoided, and there will be no clearing of vegetation in good or better condition. Further examples on avoidance of biodiversity values are provided under "1. The precautionary principle" above.
5. The principle of waste minimisation	The Proposal will adopt waste management hierarchy of reduce, re-use, recycle. With the majority of the waste anticipated to be generated during the construction period, key measures to be implemented include: • Design will consider specific material needs to avoid over-estimating requirements and excessive waste generation • Provision of an adequate number of skips and bins, to allow segregation and recycling of material. • Waste will be collected and removed from the Project site. • All project infrastructure metallic components are expected to sold or recycled as described in the Decommissioning Plan.

5.0 Environmental Factors and Objectives

The EPA uses environmental principles, factors, and associated objectives as the basis for assessing a proposal. The EPA has 14 environmental factors, organised into five themes: Sea, Land, Water, Air and People. Each factor has an associated environmental objective, which are used to determine whether the impact can be deemed significant (Environmental Protection Authority (EPA), 2021b).

Neoen considered the Proposal activities and environmental context to identify possible Key Environmental Factors and Other Environmental Factors relevant to the Proposal. This was informed by an assessment of the Project Development Envelope, the Indicative Proposal Footprint and turbine layout, the Transport Development Envelope, outcomes of studies completed to inform the Proposal design and mitigation measures, the regional environmental and social context, and consultation with the EPA (as described in **Table 3.3**).

Table 5.1 lists the environmental factors and classification relevant to this Proposal and indicates the Supporting Document section number for each factor.

Table 5.1 Preliminary Environmental Risk Assessment of Environmental Factors

Theme	Factor	Section	Classification	Basis of Classification
Sea	Benthic communities and habitats	NA	Not assessed environmental factor	Not relevant as the Project Development Envelope is located 120 km from the coast.
	Coastal processes	NA	Not assessed environmental factor	Not relevant as the Project Development Envelope is located 120 km from the coast.
	Marine environmental quality	NA	Not assessed environmental factor	Not relevant as the Project Development Envelope is located 120 km from the coast.
	Marine fauna	NA	Not assessed environmental factor	Not relevant as the Project Development Envelope is located 120 km from the coast.
Land	Flora and Vegetation	**Section 6.0**	Key environmental factor	Native vegetation clearing will be required.
	Landforms	NA	Not assessed environmental factor	No significant landforms identified to be impacted by the Proposal.
	Subterranean fauna	NA	Not assessed environmental factor	The majority of ground disturbance will be for the clearing of access tracks and building pads. The foundations for the turbines will be where excavations are at their deepest, and will be up to 10 m deep. Groundwater extraction if required will be minor, and localised to areas where dewatering may be required for the purposes of installing culverts or similar at creek crossings.

Theme	Factor	Section	Classification	Basis of Classification
				Noting the limited scale of excavations and dewatering, subterranean fauna are not expected to be impacted.
	Terrestrial Environmental Quality	NA	Not assessed environmental factor	The majority of the Project Development Envelope is used for agricultural purposes (primarily sheep and cropping), and approximately 3% of the Project Development Envelope will be disturbed as a result of the Proposal. The Proposal will not result in extensive clearing, irrigation, waste rock storage, disturbance of Acid Sulphate Soils and storage/use of large volumes of contaminants. The quality of the terrestrial environment is not expected to be impacted by the Proposal.
	Terrestrial Fauna	**Section 7.0**	Key environmental factor	The Proposal will remove up to 8.39 ha of native and planted vegetation that provides fauna habitat and six listed species have been recorded in the Project Development Envelope.
Water	Inland Waters	NA	Not assessed environmental factor	The Proposal is not located in close proximity to significant water bodies or wetlands. Toolibin Lake (Ramsar listed) is the nearest significant wetland, approximately 58 km east of the Site. The majority of infrastructure is located outside the 1% AEP flood areas. Access tracks will utilise existing creek crossings where possible, however some of these may need to be upgraded, typically via installation of culverts or a floodway. Dewatering of groundwater will be localised and temporary; likely to only be required for installation of culverts at creek crossings. Construction water will be supplied via the adjacent Water Corporation water supply pipeline. Inland waters are not expected to be impacted by the Proposal.
Air	Air Quality	NA	Not assessed environmental factor	The main potential impact to air quality will be the generation of dust during construction. Dust impacts will be managed using standard practices and implementation of the project Construction Environmental Management Plan. The Proposal is not envisaged to impact on air quality.
	Greenhouse Gas Emissions	NA	Not assessed environmental factor	Greenhouse gas emissions will be less than 100,000 tonnes per annum. The Proposal seeks to ultimately reduce greenhouse gas emissions through the production of renewable energy.

Theme	Factor	Section	Classification	Basis of Classification
People	Social Surroundings	**Section 8.0**	Other environmental factor	No known Aboriginal or historical heritage sites will be impacted by the Proposal and a field survey will be undertaken prior to ground disturbing activities. The Proposal has been designed to ensure compliance with the WA Noise Regulations at existing non-involved sensitive receptors. A Landscape and Visual Impact Assessment (LVIA) has been undertaken for the Proposal and has concluded that there are no significant landscape or visual impacts with the exception of motorists travelling along the Narrogin-Williams Rd.
	Human Health	NA	Not assessed environmental factor	There will be no mining, processing, transporting, storage or emission of radioactive materials.

Based on the above, the preliminary key environmental factors deemed relevant to the construction and operation of the Proposal are:

- Flora and Vegetation (**Section 6.0**.).
- Terrestrial Fauna (**Section 7.0**).

The other environmental factors deemed relevant to the Proposal are**:**

- Social Surrounds (**Section 8.0**)

The remaining environmental factors are not deemed to be relevant to the Proposal and are not discussed further.

6.0 Flora and Vegetation

The Flora and Vegetation factor under EPA guidelines, defines flora as “native vascular plants” and vegetation as “groupings of different flora patterned across the landscape that occur in response to environmental conditions”. The guidelines also specify that the factor flora and vegetation excludes any plantation-based, marine or estuarine plant species/communities (EPA, 2016a).

6.1 EPA Objective

The EPA environmental objective for Flora and Vegetation is “to protect flora and vegetation so that biological diversity and ecological integrity are maintained” (EPA, 2016a).

6.2 Relevant Policy and Guidance

Table 6.1 Policy and Guidance – Flora and Vegetation

Policy/Guidance	Explain how the EPA policy and guidance has been considered
EPA Policy and Guidance	
Environmental Factor Guideline: Flora and Vegetation	This guidance was used to inform the impact assessment undertaken for Flora and Vegetation.
Technical Guidance: Flora and Vegetation Surveys for Environmental Impact Assessment	Flora and vegetation surveys were undertaken in accordance with this guidance document.
Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA)	All data gathered from field surveys has been prepared and submitted in accordance with IBSA guidelines.
Other State or Commonwealth Policy or Guidance	
Biodiversity Conservation Act 2016 (BC Act) (WA)	The Proposal has avoided disturbance of native vegetation as far as reasonably practicable, and no confirmed BC Act listed plants or communities are expected to be impacted by the Proposal.
Biosecurity and Agriculture Management Act 2007 (BAM Act) (WA)	Declared pests under the BAM Act will be considered and managed during the construction and operational phases of the Proposal.
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	The Proposal is undergoing referral under the EPBC Act. An assessment against MNES has been undertaken to support the referral.
Matters of National Environmental Significance: Significant Impact Guidelines 1.1	This guidance was adhered to during the preparation of the EPBC referral to meet current referral standards.

6.3 Receiving Environment

6.3.1 Surveys and Survey Effort

A range of flora and vegetation surveys and assessments have been undertaken within the Development Envelopes and Additional Survey Area to determine the baseline environment and inform Proposal avoidance and design. All areas of the Development Envelopes have been surveyed across the surveys listed below. Details of these surveys are presented in **Table 6.2.**

Table 6.2 Flora and Vegetation Surveys

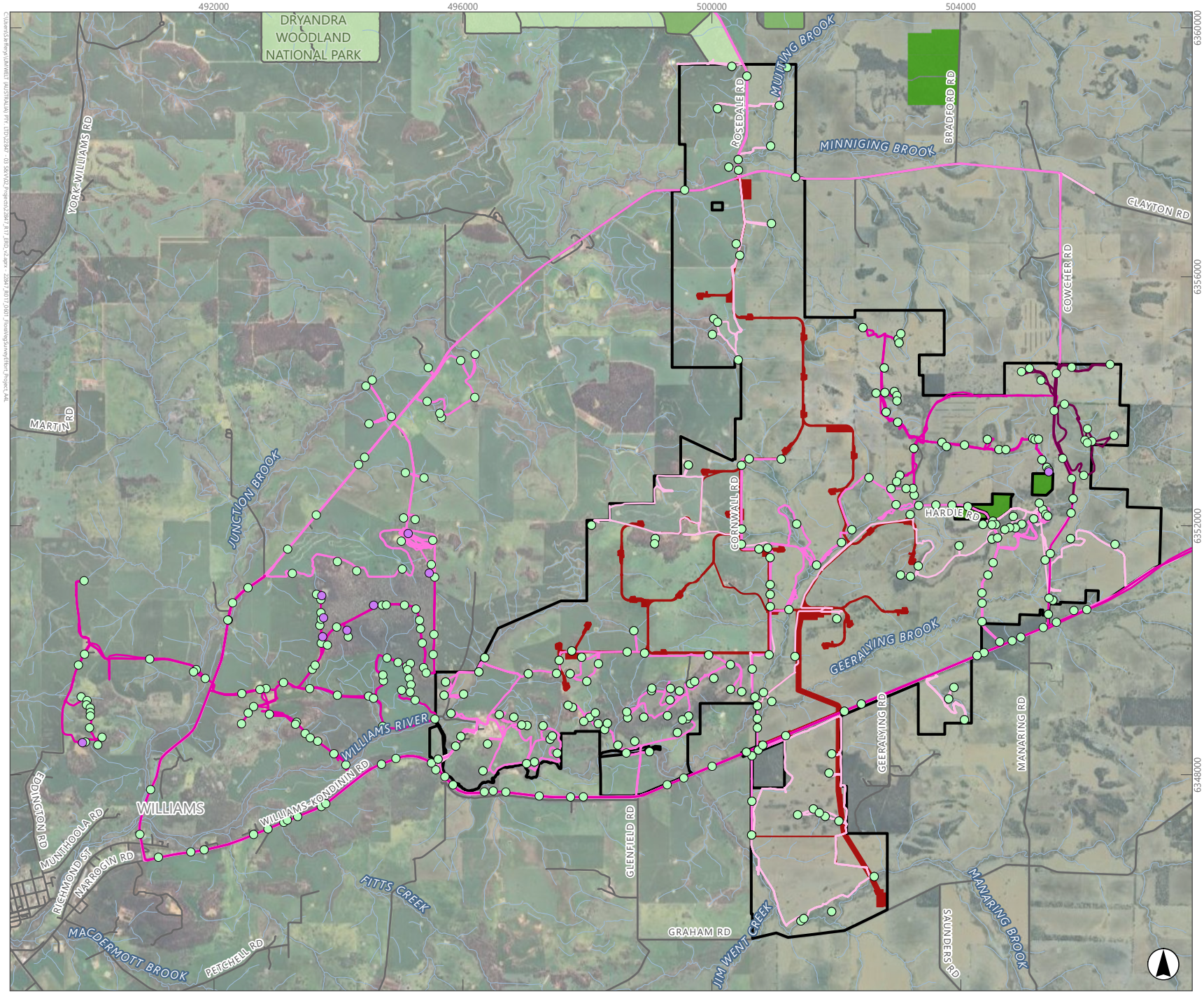
Field Survey	Survey Area	Survey Timing	Survey Guidance	Survey Methods and Effort
Phase 1 Flora and Vegetation Reconnaissance Survey and Fauna Habitat Assessment (Umwelt)	Central area of Project Development Envelope	1–3 May 2023	EPA (2016c) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*.	Literature review and database searches 2 botanists over 4 days 59 vegetation mapping notes
Flora and Vegetation Reconnaissance and Targeted Survey (Umwelt)	Central area of Project Development Envelope	26–29 September 2023	EPA (2016c) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*.	2 botanists over 4 days 2 relevés 182 vegetation mapping notes
	Additional Survey Area	4–6 November 2023		2 botanists over 3 days 7 relevés 104 vegetation mapping notes
	Northeastern area of Project Development Envelope	19 April 2024		2 botanists over 1 day No quadrats or relevés required due to degraded nature of vegetation. 29 vegetation mapping notes
Reconnaissance Flora, Vegetation and Fauna Survey (Umwelt)	Transport Development Envelope	6 August 2024	EPA (2016c) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*.	1 botanist and 1 zoologist over 1 day

6.3.1.1 Vegetation Survey Methodology

Floristic and vegetation structural data recorded as vegetation mapping notes and relevés at waypoints across the Project Development Envelope and Additional Survey Area were examined to define discrete Vegetation Types (VTs). Locations of vegetation mapping notes and relevés were used in conjunction with aerial photograph interpretation, digital elevation models, and soil mapping units to generate discrete VT polygons in a Geographic Information Systems (GIS) environment. Mapping boundaries were developed using aerial photography on a scale of 1:5,000 and reflected changes in vegetation patterns visible at this scale. The scale of mapping was refined within likely disturbance areas once established. The full survey effort for flora and vegetation in the Project Development Envelope and Additional Survey Area is provided in **Figure 6.1.**

FIGURE 6.1

Flora and Vegetation Survey Effort – Project Development Envelope



Legend

- Project Development Envelope
- Indicative Proposal Footprint
- Road
- Watercourse
- Nature Reserve
- National Park
- State Forest
- Relevé
- Vegetation Mapping Note

Track Logs

- Trip 4 – April 2024
- Trip 3 – November 2023
- Trip 2 – September 2023
- Trip 1 – May 2023

0 1.7 3.4

Kilometres

Scale 1:85,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024), DBCA (2023)

VT descriptions were adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual Version 6.0 (Executive Steering Committee for Australian Vegetation Information (ESCAVI), 2003). This model follows nationally agreed guidelines to describe and represent VTs and produces data that is comparable and consistent nation-wide. VTs were defined and described using the structural vegetation classification technique as outlined in EPA Technical Guidance (EPA, 2016c). This technique uses vegetation structure and dominant species to describe VTs with information provided on the height of strata, foliage cover, and dominant species, as well as substrate and landscape factors.

Vegetation condition was described using the vegetation condition scale presented by EPA (2016c) for the South West and Interzone Botanical Provinces. Notes on vegetation condition were taken during the reconnaissance survey at all vegetation mapping note locations. Vegetation condition classifications were applied to the mapped VTs by either categorising whole polygons where the condition was uniform throughout, or dividing existing VT polygons where a change in condition was observed.

The vegetation of the Project Development Envelope was manually compared to descriptions for those PECs returned by the Desktop Assessment or otherwise relevant to the region, to determine whether any vegetation may represent a PEC. Specifically, comparisons of dominant species, soils, topography, and geographical distribution of VTs were made to the applicable diagnostic criteria as per the approved listing or conservation advice for those PECs potentially occurring in the Project Development Envelope.

For the Transport Development Envelope, a desktop assessment was initially undertaken to identify potential key flora, vegetation and fauna values which may be present in the areas identified as potentially requiring clearing along the transport route from Bunbury Port to the Project Development Envelope. Field investigations involved observations at each location. Due to the distance to be covered and the scope of a reconnaissance level survey, priority was placed on ensuring that each site was visually assessed to give an indication of the likelihood of potential conservation significant flora, vegetation or fauna occurring in these areas. Results of the survey were used to further inform avoidance of potential impacts and to refine the transport route.

6.3.1.2 Flora Survey Methodology

Targeted surveys were undertaken in accordance with the EPA (2016c) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*. The extent of targeted survey was assessed at the time of the fieldwork, dependent on environmental conditions and the environmental factors encountered.

Within the Project Development Envelope, a targeted survey was conducted for significant flora in areas of Good or better vegetation condition and to verify the condition of two areas in the northeast of the Project Development Envelope previously assessed as 'Good' condition by the earlier Phase 1 survey. Likewise, an area in the west was also subject to targeted survey for significant flora and to confirm vegetation condition.

An additional three transects were conducted along the major drainage line in the central property of the Project Development Envelope to search for significant flora to confirm the original assertation that the vegetation condition would not support significant flora. Areas of Degraded or Completely Degraded condition were regarded as having very low likelihood of presence of significant flora taxa due to the disturbed nature of the vegetation (generally consisting of a tree layer over pasture weeds, with impacting processes present such as historical clearing and livestock in combination with lack of fences protecting remnant vegetation, as observed during the Phase 1 May 2023 field survey).

6.3.2 Adequacy of Surveys

Surveys were undertaken in accordance with EPA (2016c) *Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment*. The survey effort employed by each survey is deemed appropriate given over 80% of the Project Development Envelope is cleared agricultural land.

The timing of the Phase 1 Reconnaissance survey (1–3 May 2023) in the Project Development Envelope did not coincide with the recommended survey timing provided by the EPA *Technical Guidance for Flora and Vegetation Surveys for Environmental Impact Assessment* (EPA, 2016c). This was not considered to be a limitation as the purpose of this survey was to characterise the vegetation of the project Development Envelope. The remaining targeted surveys were undertaken in Spring 2023 per the guidance.

The spring surveys were preceded by less rainfall than the long-term average, however, this is not considered to have significantly affected the survey with regard to identification of flora taxa. There were no issues related to flora sampling and identification with both annual and perennial (including tuberous and cormous species) flora in good condition.

Not all areas of remnant vegetation were inspected; however, aerial photography interpretation and digital elevation models and contour information, supported by site vegetation mapping notes or observations, assisted in determining VTs for those areas not inspected on foot.

The flora and vegetation surveys provide suitable information on which to base an environmental assessment of flora and vegetation in the Development Envelopes.

6.3.3 Survey Findings

6.3.3.1 Desktop

The Project Development Envelope intersects nine VSAs as mapped by DPIRD (DPIRD, 2019). The primary VSA occurring is Dryandra_1023 (43.8%), followed by Narrogin_1023 (40.5%) and Narrogin_352 (4.6%). All nine VSAs that occur within the Project Development Envelope are summarised in **Table 6.3**, which also details the current extent of VSAs in relation to their pre-European extents and the percentage currently protected for conservation within the Northern Jarrah Forest and Katanning IBRA subregions (DBCA, 2019).

Five VSAs have less than 30% of their pre-European extent remaining as of 2019, with the remaining four having over 30% remaining; likewise, none of the VSAs have over 30% of their pre-European extents protected for conservation in these IBRA subregions. It should be noted that as per DBCA (2019), protected areas in this context are considered to be any areas listed in DBCA-Legislated Lands and Waters dataset (DBCA, 2024) as either Crown reserves or lands managed under Section 8A of the Conservation and Land Management Act 1984 (WA) that have an International Union for Conservation of Nature (IUCN) category of I to IV.

The publicly available dataset for current extents of vegetation in each VSA is not accurate, in both that the dataset is relatively old (2019) and that there are mapping inconsistencies, befit of a regional (State-wide) mapping dataset. While Western Australian Local Government Association (WALGA) categorised the Pre-European Statewide vegetation mapping dataset in 2020 (Western Australian Local Government Association (WALGA), 2020), review of this dataset in the Study Area and its vicinity revealed inaccuracies and inconsistencies, including some areas of vegetation that appear to be remnant not being included this dataset, despite being larger than other nearby remnants which have been included.

Table 6.3 Vegetation System Associations of the Project Development Envelope

VSA	Description	Extent within Northern Jarrah Forest and Katanning IBRA Subregions				Extent within Project Development Envelope
		Pre-European Extent[1] (ha)	Current Extent[1] (ha)	Pre-European Extent Remaining[1] (%)	Current Extent Protected for Conservation[1] (%)	Pre-European Extent (ha)[2]
DRYANDRA_1023	Medium woodland; York gum, wandoo & salmon gum (*Eucalyptus salmonophloia*)	10,388.10	1,505.55	14.49	0.00	2,574.1 40.5%
DRYANDRA_352	Medium woodland; York gum	7,705.15	1,383.51	17.96	0.07	30.5 0.5%
DRYANDRA_5	Medium woodland; wandoo & powderbark (*Eucalyptus accedens*)	31,817.93	15,186.21	47.73	21.84	244.2 3.8%
DRYANDRA_946	Medium woodland; wandoo	1,681.52	874.15	51.99	0.00	11.7 0.2%
NARROGIN_1023	Medium woodland; York gum, wandoo & salmon gum (*Eucalyptus salmonophloia*)	189,088.48	31,369.71	16.59	6.69	2,780.8 43.8%
NARROGIN_1073	Medium woodland; wandoo & mallet	873.12	419.56	48.05	9.72	73.8 1.2%
NARROGIN_352	Medium woodland; York gum	15,729.07	1,730.35	11.00	3.43	294.6 4.6%
NARROGIN_947	Medium woodland; powderbark & mallet	19,255.57	7,726.51	40.12	14.76	194.8 3.1%
WILLIAMS_7	Medium woodland; York gum (*Eucalyptus loxophleba*) & wandoo	11,301.70	1,990.87	17.6	4.27	139.5 2.2%
					Total	**6,344.1**

[1]*Data source: DBCA Statewide Vegetation Statistics: Full Report (DBCA, 2019).*

[2]*Data source: Pre-European Vegetation spatial dataset (DPIRD-006) (DPIRD, 2019).*

Within the Project Development Envelope a total of 56 flora taxa were returned from the database searches (DBCA, 2007; DBCA, 2023a; Department of Climate Change, Energy, the Environment and Water (DCCEEW), 2023). Of the 56 taxa, a total of 16 are Threatened taxa, which includes two terrestrial orchids (*Caladenia dorrienii and Diuris micrantha*) (refer Table 4.2 of **Appendix C**).

The interrogation of DBCA's TEC and PEC Database (DBCA, 2023a)) returned one listed significant vegetation community (Eucalyptus Woodlands of the Western Australian Wheatbelt) with records within the Desktop Study Area (Table 4.3 of **Appendix C**). This community is listed as a Priority 3 (iii) PEC by DBCA. PECs are ecological communities that are not listed as threatened under the BC Act or EPBC Act, but are otherwise considered rare or under threat. PECs are published on DBCA's priority list and classified as either 'priority 1' (P1), 'priority 2' (P2), 'priority 3' (P3) or 'priority 4' (P4). PECs do not have direct statutory protection, and so, whilst their classification is taken into account during State and Local government approval processes, they have the same legal protection as native vegetation.

A manual review of current DBCA TEC and PEC lists (DBCA, 2018b; DBCA, 2022) did not identify any additional significant vegetation communities within, or having the potential to occur within, the Project Development Envelope.

For the Transport Development Envelope, interrogation of the DBCA databases returned two listed significant vegetation communities; 'Eucalyptus Woodlands of the Western Australian Wheatbelt' (Eucalypt Woodland PEC/TEC) and 'Banksia Woodlands of the Swan Coastal Plain' (Banksia Woodland PEC/TEC) within the areas identified as likely to be cleared. Both of these significant communities are listed as Threatened Ecological Communities under the EPBC Act and listed otherwise as Priority Ecological Communities by the DBCA (DBCA, 2023c). Interrogation of the DBCA WA Herbarium Specimen Database and TPFL Database (DBCA, 2024; DBCA, 2024) did not return any known records of significant flora taxa within the areas identified likely to be cleared in the Transport Development Envelope.

6.3.3.2 Field Surveys

Flora

Surveys of the Project Development Envelope recorded a total of 149 discrete flora taxa, including 69 introduced taxa; a total of 37 families were represented, with the Myrtaceae (27 taxa), Poaceae (28 taxa) and Fabaceae (16 taxa) families with the highest number of taxa recorded. Of the 80 taxa considered to be native, many of these were planted within the Project Development Envelope.

No listed significant flora were identified during the 2023–2024 surveys. Historical records of both *Xanthorrhoea brevistyla* (P4) and *Gastrolobium ovalifolium* (P4) were reviewed and found to be erroneous in location accuracy (incorrect coordinates associated with the record).

The 56 significant flora taxa identified as occurring or potentially occurring in the Project Development Envelope based on the desktop assessment were identifiable during the 2023–2024 survey, either because the survey periods coincided with the taxon's flowering period, or the taxon can be identified reliably when in fruit or when sterile. Following completion of the targeted surveys, a likelihood of occurrence assessment was undertaken and has identified:

- 40 taxa are unlikely to occur in the Project Development Envelope, either because no potential habitat is present within the area (due to lack of required substrate, soil or water conditions, or due to degraded nature of the remnant vegetation present), or the Project Development Envelope is outside of the taxon's known range.

- It is considered that the remaining 16 taxa have some level of potential to occur within the Project Development Envelope. It must be noted that the taxa considered to potentially occur within the Project Development Envelope are only considered possible within the area of remnant vegetation in Good condition not subject to Targeted survey in 2023. Excluding this vegetation, all taxa identified as potentially occurring in the Project Development Envelope are considered unlikely to occur, due to vegetation condition being too poor to support habitat for such significant flora taxa.

Further details on the likelihood of occurrence assessment are presented in Table 4.4 of **Appendix C.**

No significant flora taxa were recorded in areas proposed for clearing in the Transport Development Envelope, and given the degraded condition of vegetation are unlikely to occur. Additionally, DBCA searches did not return any known records of significant flora taxa within these areas.

Introduced Flora

Introduced flora comprised 46% of the total number of flora taxa recorded during surveys conducted within the Project Development Envelope, indicating the high levels of clearing for agriculture which are present throughout the area. Note that ten taxa included in this list are taxa that are native to Western Australia, but planted outside of their natural range, and thus are classified as introduced in this context.

Although most introduced taxa identified within the Project Development Envelope were common pasture weeds, three are listed as Weeds of National Significance (WoNS) (Invasive Plants and Animals Committee (IPAC), 2017) and Declared Pests under the WA BAM Act:

- Bridal creeper (Asparagus asparagoides)
- Purple viper's-bugloss (*Echium plantagineum*)
- One-leaf Cape tulip (*Moraea flaccida*).

Vegetation Type

Areas where natural vegetation has been completely permanently removed, with either no or very scattered native taxa (trees) remaining, have been mapped as ‘Cleared’ (Cl) (where discernible at 1:5,000 scale). This category mainly consists of paddocks, with tracks and firebreaks providing a minor proportion of this area. A total of 5,098.9 ha of ‘Cleared Land’ was mapped, representing 80.4% of the Project Development Envelope.

Excluding ‘Cleared Land’, a total of 22 VTs were identified in the Project Development Envelope by the 2023–2024 flora and vegetation surveys. These vegetation types cover 1,146.6 ha representing 18.1% of the Project Development Envelope.

The majority of VTs have been highly modified since European settlement and are no longer considered to be intact remnant vegetation. This is a result of the long history of agricultural activities and other development in the Project Development Envelope, including direct clearing for cropping, pasture, roads and other infrastructure, and grazing by stock. These include areas with primarily only native tree species remaining, areas with only planted native trees and shrubs, and areas with almost exclusively weed or crop species. Remnant vegetation was mapped primarily as occurring either on drainage lines, or on the tops of hills influenced by either granite or laterite; these areas being the least favoured for agricultural purposes.

A further 96.6 ha (1.5%) of the Project Development Envelope is considered to be Planted (Pl), where the natural vegetation has been cleared and replaced with assorted flora taxa, some of which are native taxa (for example, *Eucalyptus loxophleba* subsp. *loxophleba*).

One small area within the Project Development Envelope (1.8 ha, 0.03%) was not assessed (NA) during the surveys, as it was fenced off from agricultural activities and was continuous with an adjacent reserve.

Further details of the vegetation types identified in the Project Development Envelope are presented in **Table 6.4**. Their mapped distribution is illustrated in **Figure 6.2**.

Vegetation types recorded in the areas surveyed within the Transport Development Envelope primarily comprised of:

- Remnant native *Eucalyptus* species and *Corymbia calophylla* interspersed with apparent planted native species (mainly *Agonis flexuosa* and *Allocasuarina* sp.) over non-native understory.
- Planted native *Eucalyptus* and *Corymbia calophylla* over *Calothamnus* sp. and occasional *Acacia* sp. over a non-native understory
- *Corymbia calophylla* and planted pine trees over non-native understory
- Planted *Eucalyptus* and *Allocasuarina sp*. over non-native understory.
- Native *Eucalyptus* (*E. wandoo, E. loxophleba*) over *Allocasuarina* sp. and *Acacia* sp. over some native understory species, but mostly non-native
- Native *Eucalyptus* (mostly *E. loxophleba*), *Acacia* and *Allocasuarina* sp. mixed canopy, over mixed understory of some natives species however mostly non-native species
- Scattered remnant native *Eucalyptus* over tall *Acacia* sp. and *Allocasuarina* sp. over a non-native understory.
- Scattered *Eucalyptus wandoo* over *Allocasuarina* sp. over a non-native understory.
- Alternating dominance of remnant *Eucalyptus* species (*E. wandoo, E. rudis, E. loxophleba*) and occasional *Corymbia calophylla* over low trees of *Acacia* sp. and *Allocasuarina* sp. shrubs. Varying level of native understory present. This is for a 10 km stretch of road that will not be cleared but occasional overhanging branches may need to be pruned back.

Table 6.4 Vegetation Types in the Project Development Envelope

Vegetation Type Code	Significant Veg Type	Extent within Project Development Envelope (ha)
VT1	Low to mid isolated trees to woodland of *Eucalyptus rudis* subsp. *rudis*, occasionally over tall isolated shrubs to tall open shrubland of *Acacia acuminata* and *Acacia saligna* over mid open sedgeland of **Juncus acutus* subsp. *acutus* over low closed tussock grassland of pasture weeds on brown sandy loam on drainage lines.	164.1 (2.6%)
VT2	Low to mid open woodland of *Corymbia calophylla* over isolated tall shrubs of *Acacia saligna* and *Acacia microbotrya* over tall open sedgeland of **Typha orientalis* over low open sedgeland of **Juncus acutus* subsp. *acutus* over low tussock grassland of pasture weeds on brown sandy clay loam on drainage lines on slopes.	9.9 (0.2%)
VT3	Low open woodland of *Allocasuarina huegeliana* over isolated tall shrubs of *Acacia saligna, Acacia microbotrya* and *Acacia acuminata* over low open sedgeland of **Juncus acutus* subsp. *acutus* over low tussock grassland of pasture weeds on brown sandy clay loam adjacent to drainage lines on slopes.	17.9 (0.2%)
VT4	Low to mid woodland to open woodland of *Eucalyptus loxophleba* subsp. *loxophleba* over low closed tussock grassland of pasture weeds on brown-red clay loam on slopes.	63.4 (1.0%)
VT5	Tall shrubland of *Acacia acuminata* with isolated low to mid scattered trees of *Eucalyptus loxophleba* subsp. *loxophleba* and *Corymbia calophylla* over low tussock grassland of pasture weeds on red-brown sandy clay loam on lower slopes with granite outcropping.	7.9 (0.1%)
VT6	Low to mid woodland to open woodland of *Corymbia calophylla* and occasional *Eucalyptus wandoo* subsp. *wandoo*, *Eucalyptus astringens* subsp. *astringens* and/or *Allocasuarina huegeliana* over low tussock grassland to low open tussock grassland of pasture weeds on lateritic ridges and upper slopes with lateritic gravel on brown loam.	186.5 (2.9%)
VT7	Low to mid woodland to open woodland of *Eucalyptus rudis* subsp. *rudis* and *Eucalyptus loxophleba* subsp. *loxophleba* over low sedgeland to open sedgeland of **Juncus acutus* subsp. *acutus* over low tussock grassland of pasture weeds on drainage lines with red-brown clay loam on gentle slopes.	360.1 (5.6%)
VT8	Low to mid woodland of *Eucalyptus astringens* subsp. *astringens* and occasionally *Eucalyptus gardneri* subsp. *gardneri* on brown-red clay loam with some lateritic outcropping on the edge of breakaways, crests, and upper slopes.	88.5 (1.3%)
VT9	Low open woodland of *Eucalyptus drummondii* over low open tussock grassland of pasture weeds on red-brown sandy loam with lateritic outcropping on edges of breakaways or crests.	0.4 (0.006%)

Vegetation Type Code	Significant Veg Type	Extent within Project Development Envelope (ha)
VT10	Isolated trees to mid open woodland of *Eucalyptus wandoo* subsp. *wandoo* and *Corymbia calophylla* over low tussock grassland of pasture weeds on red-brown sandy loam with laterite extensions on upper slopes.	65.2 (1.0%)
VT11	Low to mid open woodland of *Corymbia calophylla* and *Eucalyptus wandoo* subsp. *wandoo* and *Allocasuarina huegeliana* with occasional *Eucalyptus drummondii* over tussock grassland to open tussock grassland of pasture weeds on lateritic ridges and upper slopes with lateritic gravel on brown loam.	5.8 (0.09%)
VT12	Mid woodland of *Allocasuarina huegeliana* and *Eucalyptus wandoo* subsp. *wandoo* over tall open shrubland of *Banksia sessilis* var. *sessilis*, sometimes with *Santalum murrayanum* over sparse sedgeland of *Gahnia aristata* on laterite hills.	0.4 (0.008%)
VT13	Mid woodland of *Eucalyptus accedens* and *Eucalyptus astringens* subsp. *astringens* over isolated clumps of grasses of pasture weeds on lateritic slopes.	0.8 (0.01%)
VT14	Mid open woodland of *Eucalyptus wandoo* subsp. *wandoo,* sometimes with *Eucalyptus marginata* subsp. *marginata* and occasional *Corymbia calophylla* over low to mid open shrubland of mixed species over low sparse tussock grassland with laterite or granite.	10.2 (0.2%)
VT15	Low open woodland of *Eucalyptus dorrienii* over low open tussock grassland of pasture weeds on red-brown sandy loam with lateritic outcropping on edges of breakaways or crests.	0.1 (0.002%)
VT16	Mid open woodland of *Allocasuarina huegeliana,* occasional *Eucalyptus wandoo* subsp. *wandoo* or *Eucalyptus loxophleba* subsp. *loxophleba*, associated with granite outcropping.	15.3 (0.2%)
VT17	Mid woodland of *Casuarina obesa* over **Juncus acutus* subsp. *acutus* mid sedgeland, associated with drainage or outwash areas with brown sandy loam.	4.1 (0.06%)
VT18	Mid sedgeland of **Juncus acutus* subsp. *acutus*, with no overstorey, or with occasional *Eucalyptus wandoo* subsp. *wandoo* and *Allocasuarina huegeliana* in drainage lines.	10.5 (0.1%)
VT19	Mosaic, disturbed. Mid open woodland of *Casuarina obesa, Eucalyptus* spp. and assorted planted species, both local and exotic over low tussock grassland of pasture weeds, with saline influences, associated with drainage and outwash areas with brown sandy loam.	14.1 (0.2%)

Vegetation Type Code	Significant Veg Type	Extent within Project Development Envelope (ha)
VT21	Isolated trees to mid open woodland of *Eucalyptus loxophleba* subsp. *loxophleba* and *Allocasuarina huegeliana* with occasional *Corymbia calophylla* and/or *Eucalyptus rudis* subsp. *rudis*, tall isolated shrubs of *Acacia acuminata* and sometimes *Acacia microbotrya* on slopes with exposed granite and brown sandy clay loam.	74.2 (1.2%)
VT22	Isolated trees to mid open woodland of *Eucalyptus wandoo* subsp. *wandoo* with *Allocasuarina huegeliana*, occasionally with *Eucalyptus loxophleba* subsp. *loxophleba* over low tussock grassland of pasture weeds on granite outcropping.	2.1 (0.03%)
VT23	Mosaic of isolated remnant native trees, including *Eucalyptus wandoo* subsp. *wandoo, Eucalyptus loxophleba* subsp. *loxophleba, Corymbia calophylla, Eucalyptus rudis* subsp. *rudis, Eucalyptus astringens* subsp. *astringens, Allocasuarina huegeliana* and isolated mid to tall shrubs *of Acacia acuminata, Acacia microbotrya* and *Acacia saligna*, occasionally *Hakea prostrata* or *Banksia sessilis* var. *sessilis,* over low tussock grassland of pasture weeds; associated with road verges.	44.3 (0.7%)
Pl	Planted trees of local and other exotic species over pasture weeds on brown loam on slopes or undulating plains.	96.6 (1.5%)
Cl	Cleared areas with occasional isolated (remnant native and exotic) trees over pasture weeds.	5,098.9 (80.4%)
NA	Not Assessed	1.8 (0.03%)

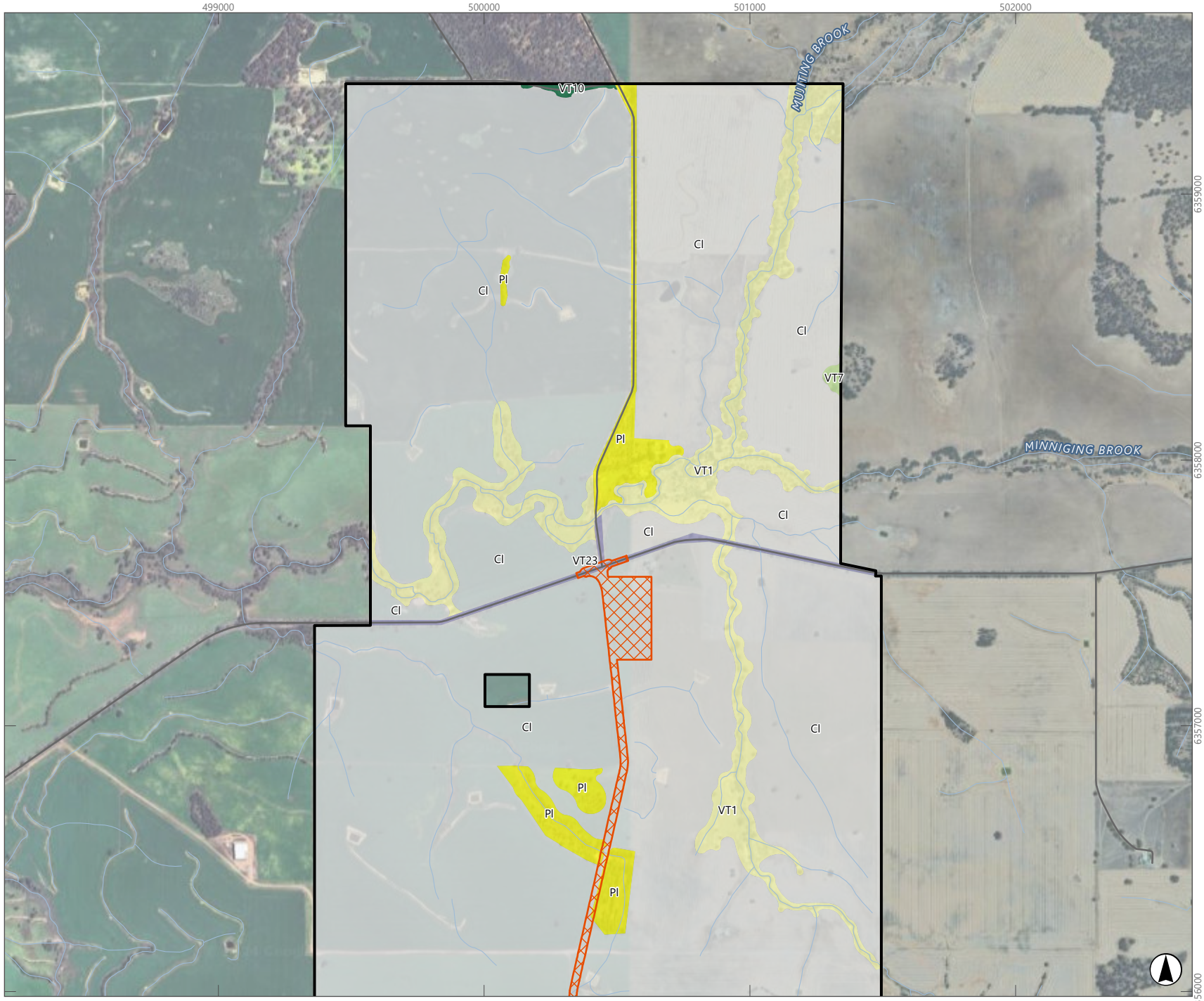


FIGURE 6.2.1
Vegetation Types of the Project Development Envelope

Legend

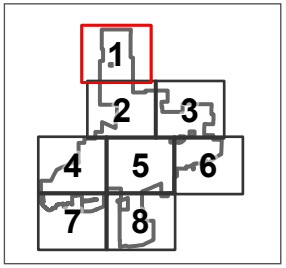
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT1
- VT7
- VT10
- VT23

Other Areas Mapped

- CI
- PI



0 400 800

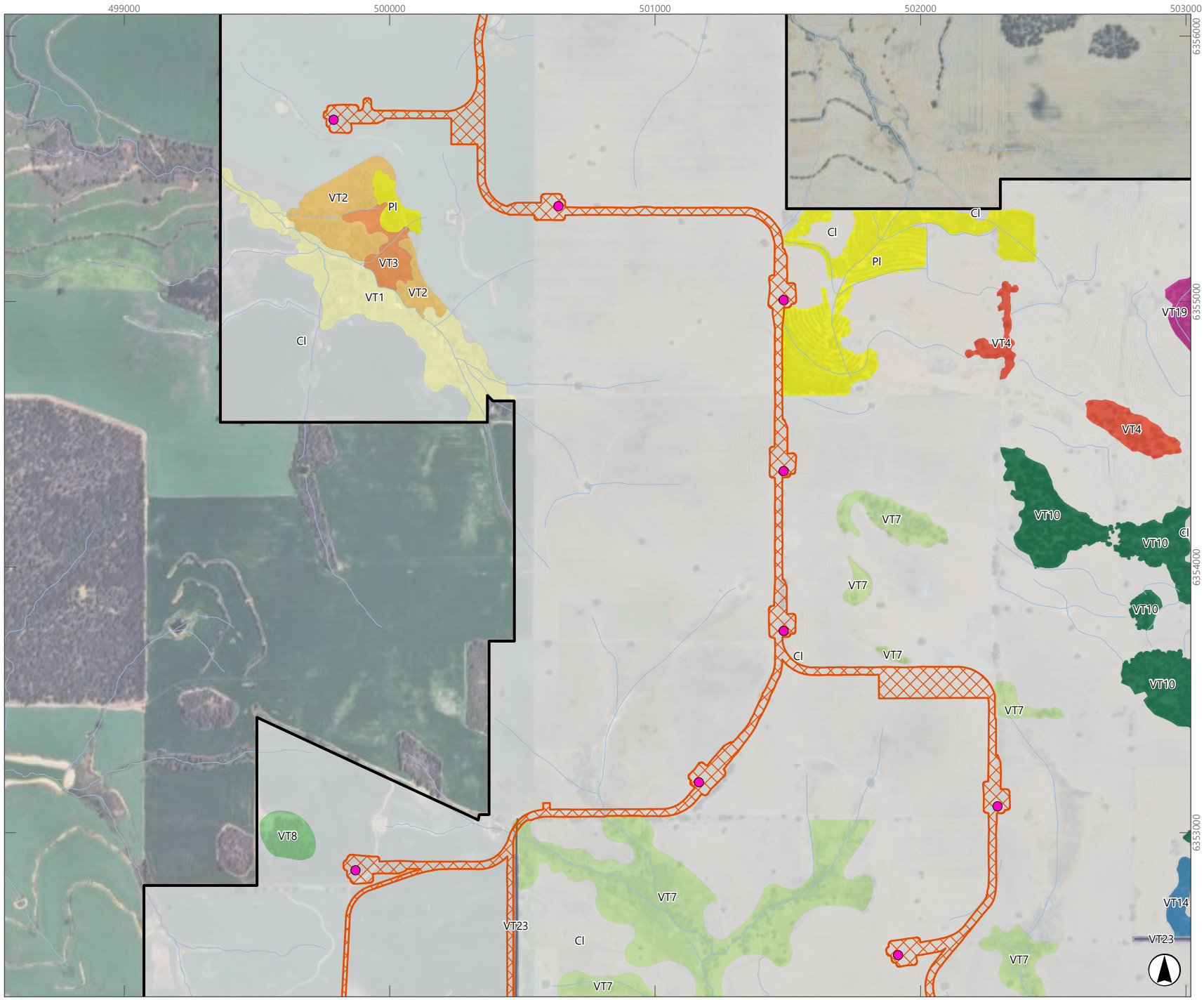
Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

FIGURE 6.2.2
Vegetation Types of the Project Development Envelope



Legend

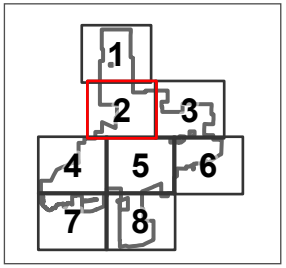
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT1
- VT2
- VT3
- VT4
- VT7
- VT8
- VT10
- VT14
- VT19
- VT23

Other Areas Mapped

- CI
- PI



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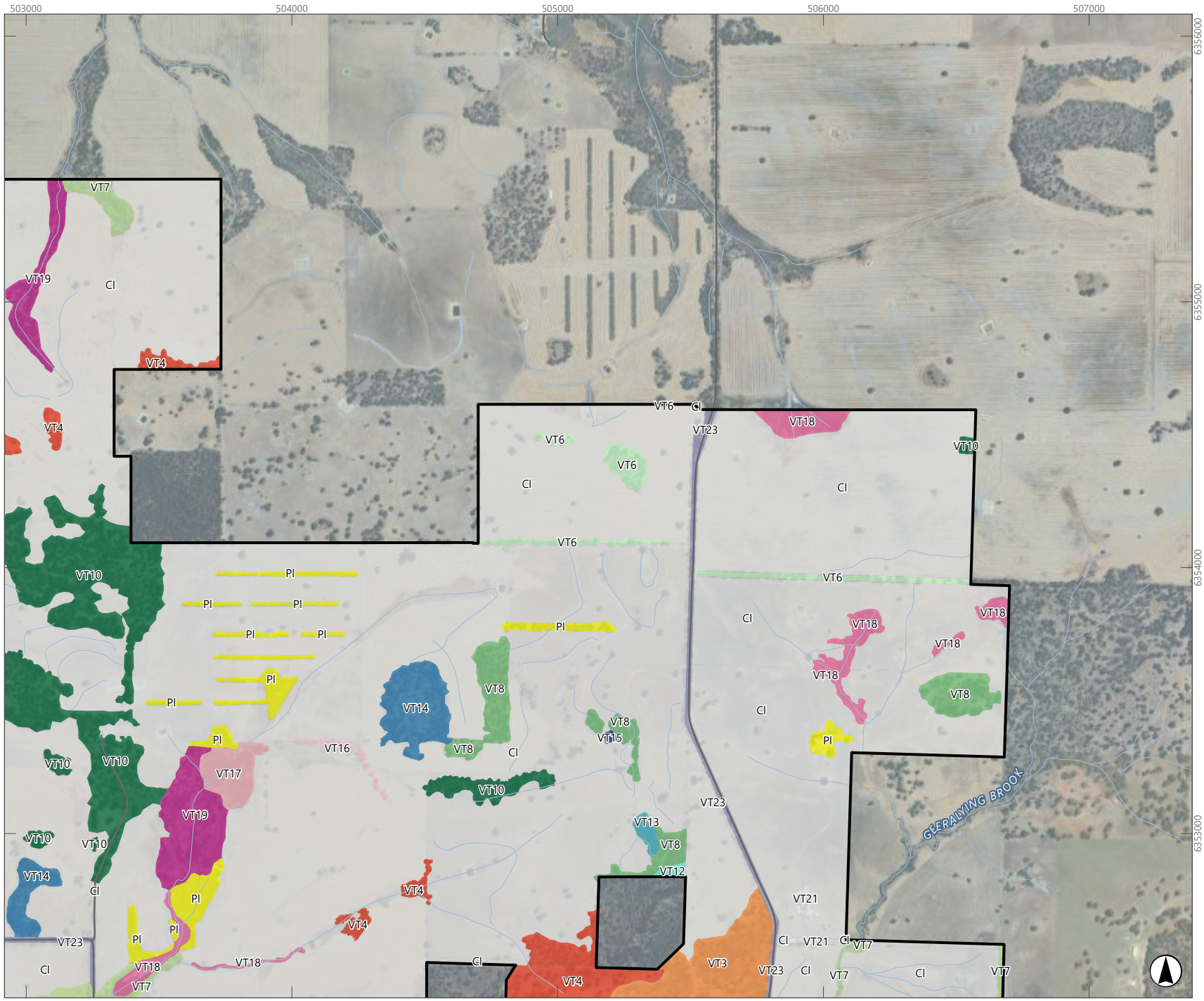
Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

FIGURE 6.2.3
Vegetation Types of the Project Development Envelope



Legend

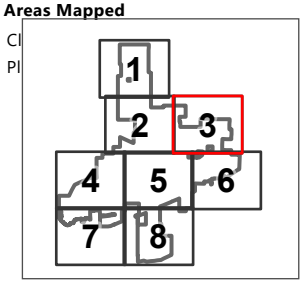
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT3
- VT4
- VT6
- VT7
- VT8
- VT10
- VT12
- VT13
- VT14
- VT15
- VT16
- VT17
- VT18
- VT19
- VT21
- VT23

Other Areas Mapped

- CI
- PI



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GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

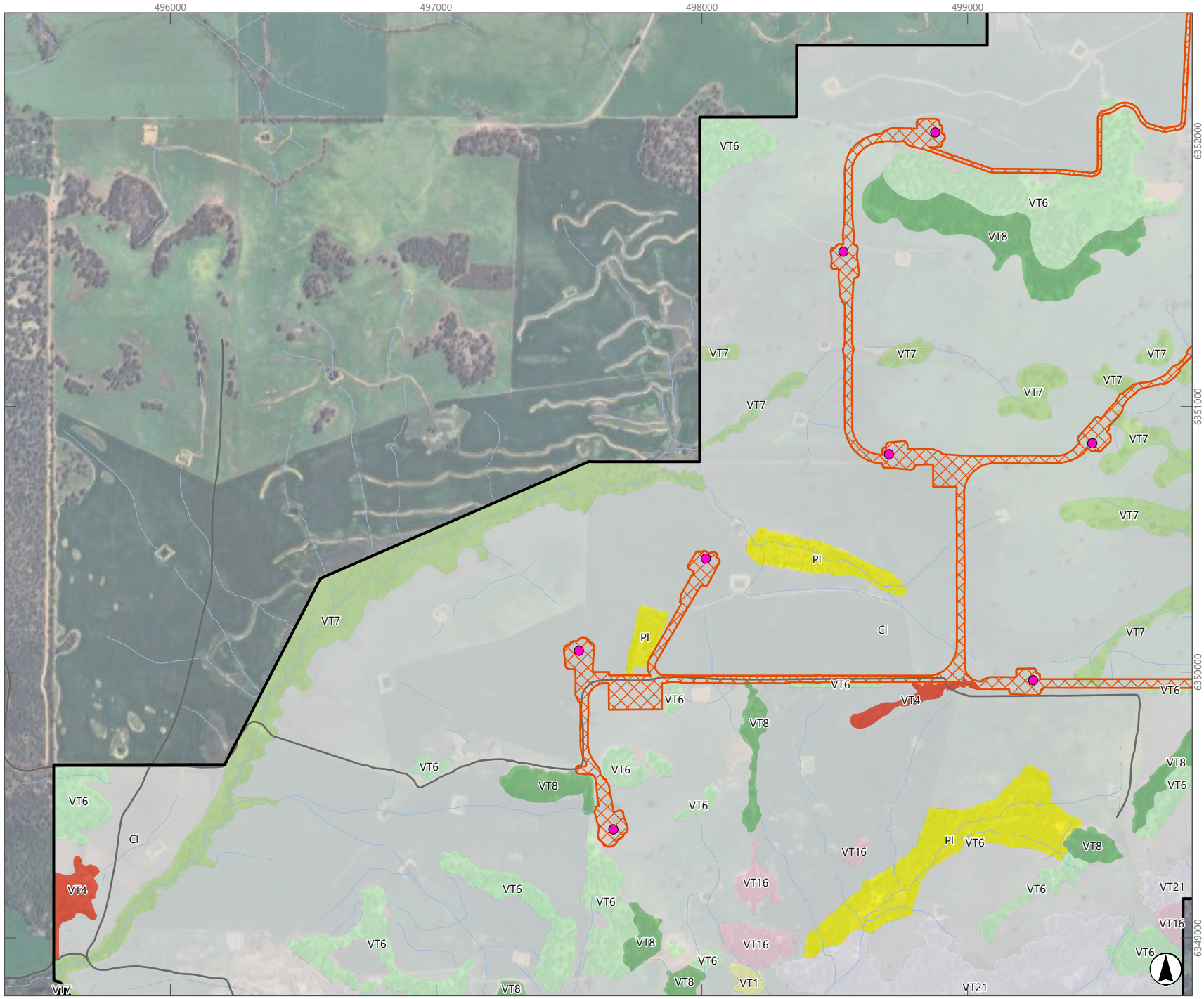


FIGURE 6.2.4

Vegetation Types of the Project Development Envelope

Legend

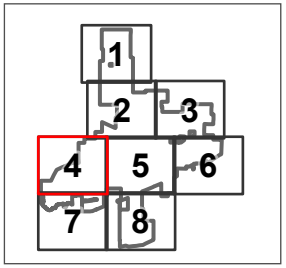
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT1
- VT4
- VT6
- VT7
- VT8
- VT16
- VT21

Other Areas Mapped

- CI
- PI



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Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

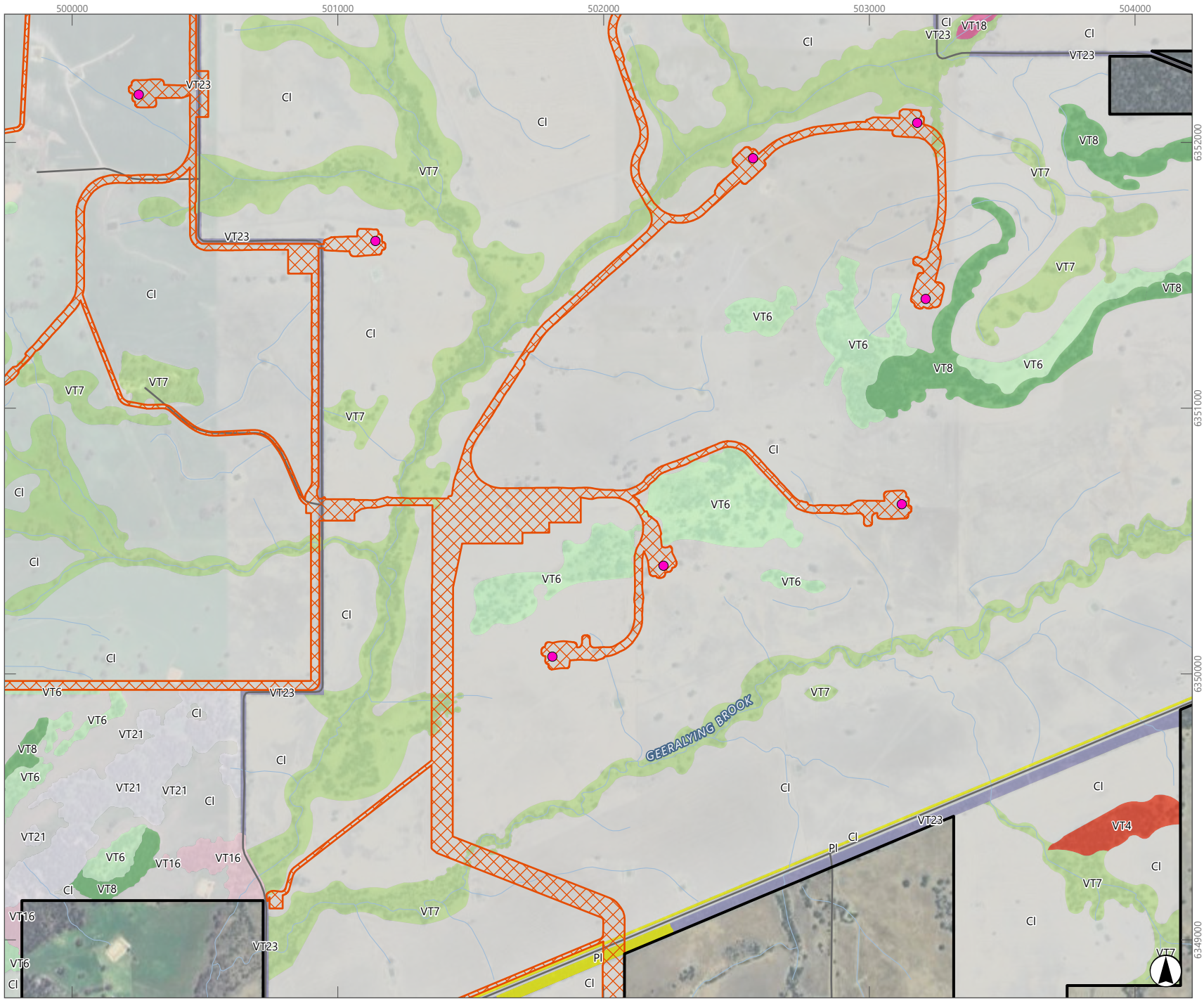


FIGURE 6.2.5

Vegetation Types of the Project Development Envelope

Legend

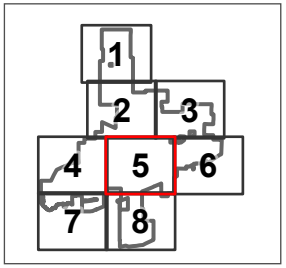
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT4
- VT6
- VT7
- VT8
- VT16
- VT18
- VT21
- VT23

Other Areas Mapped

- CI
- PI



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Metres

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GDA2020 MGA Zone 50

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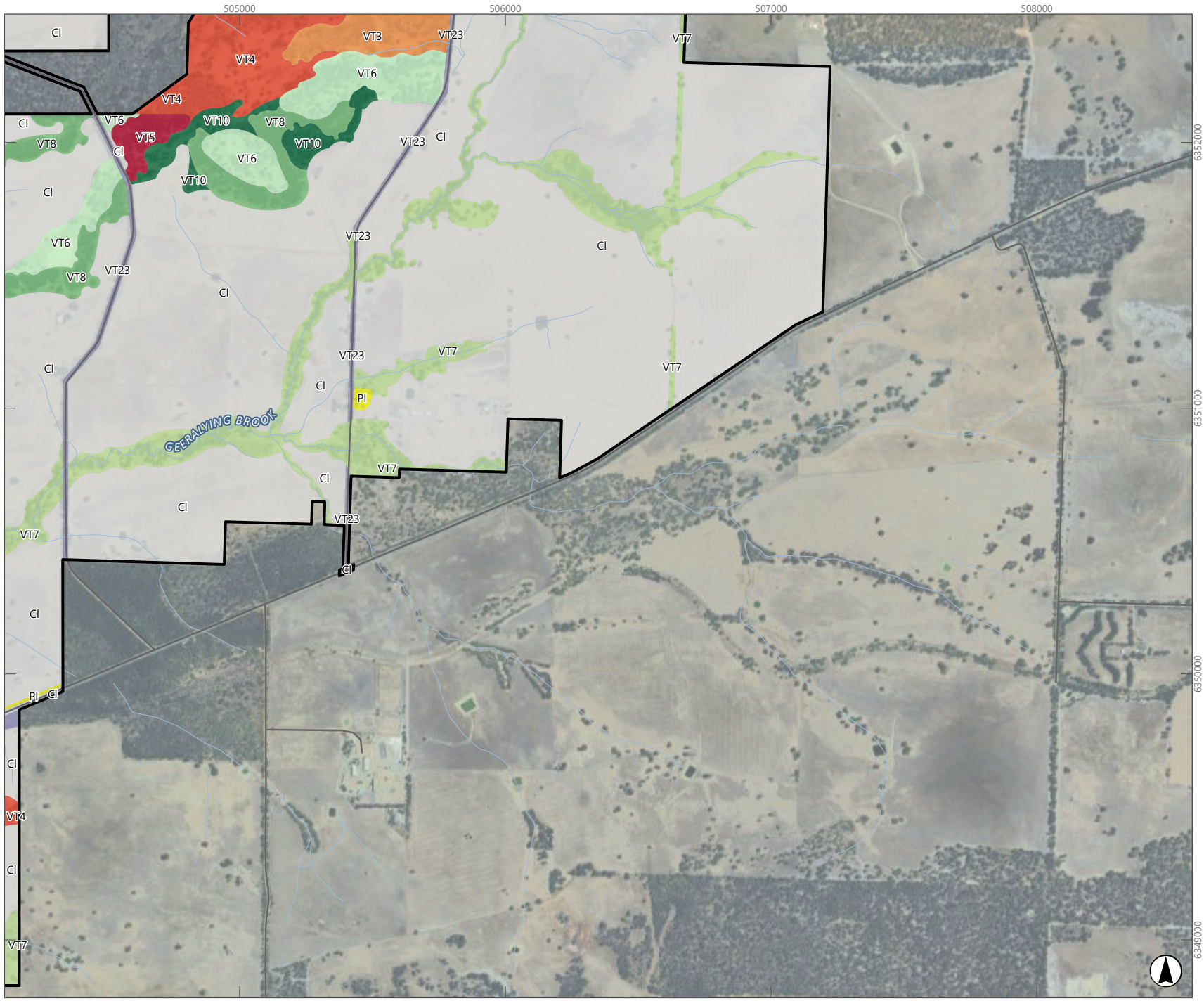


FIGURE 6.2.6

Vegetation Types of the Project Development Envelope

Legend

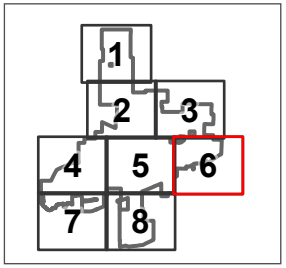
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT3
- VT4
- VT5
- VT6
- VT7
- VT8
- VT10
- VT23

Other Areas Mapped

- CI
- PI



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GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

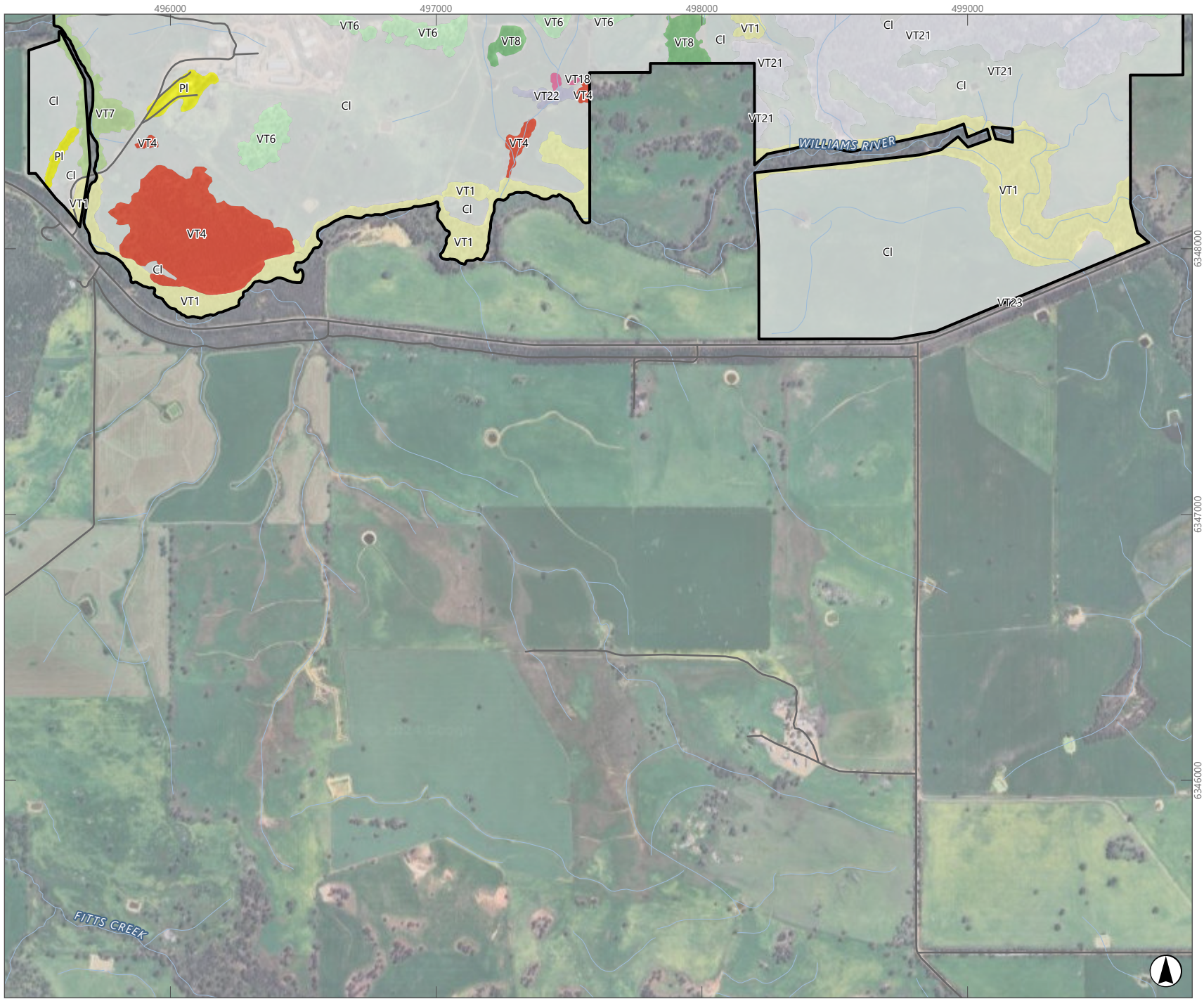


FIGURE 6.2.7

Vegetation Types of the Project Development Envelope

Legend

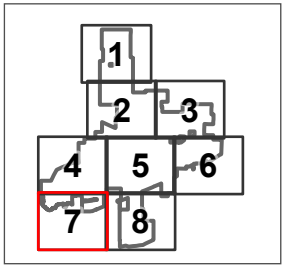
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT1
- VT4
- VT6
- VT7
- VT8
- VT16
- VT18
- VT21
- VT22
- VT23

Other Areas Mapped

- CI
- PI



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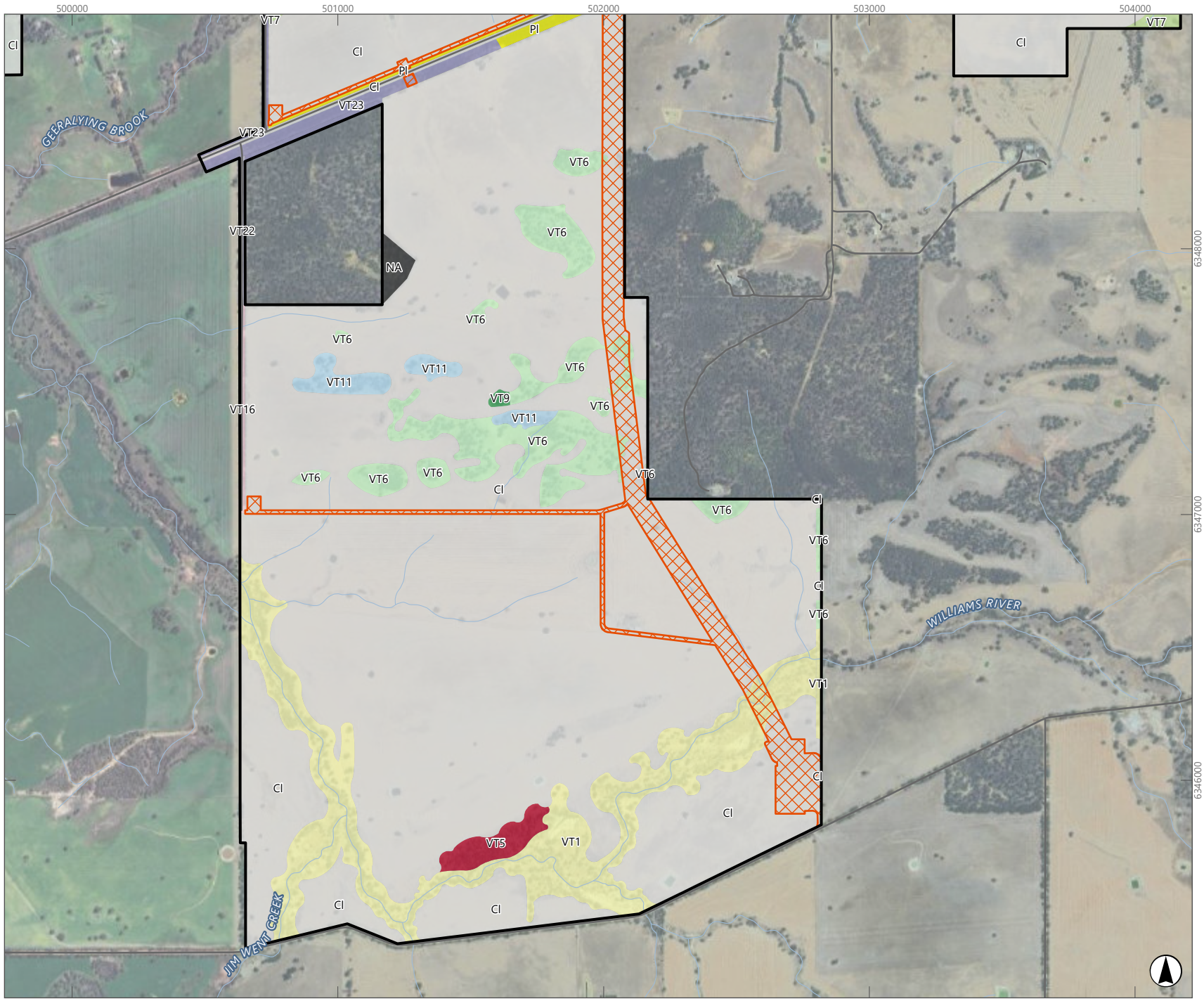
Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

FIGURE 6.2.8
Vegetation Types of the Project Development Envelope



Legend

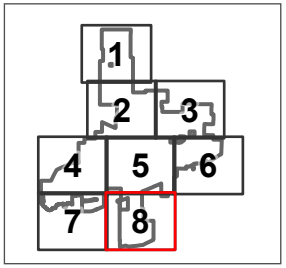
- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Type

- VT1
- VT5
- VT6
- VT7
- VT9
- VT11
- VT16
- VT22
- VT23

Other Areas Mapped

- CI
- NA
- PI



0 400 800

Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

Vegetation Condition

The majority of the Project Development Envelope has been mapped as 'Completely Degraded' (5,221.5 ha, 82.3%). This largely consists of areas mapped as Cleared land ('Cl') and Planted ('Pl') areas, in which the land has been cleared for pasture or cropping (**Figure 6.3**). Little to no native vegetation remains in these areas, although isolated remnant trees do occur. A small extent (25.9 ha) of VTs 7, 10, 18 and 19 were also mapped as Completely Degraded.

1,120.2 ha (17.6%) of the Project Development Envelope was mapped as being in 'Degraded' condition. These areas predominately consisted of native trees over no or very little understorey taxa, and high levels of introduced (weed) taxa.

A very small portion of the Project Development Envelope was mapped as being in 'Good' condition (0.4 ha, 0.008%). This condition rating was mapped across one patch of remnant vegetation, being located adjacent to an unnamed reserve.

Due to the history of clearing, logging and grazing in the Project Development Envelope, there was no vegetation observed that was in 'Pristine', 'Excellent' or 'Very Good' condition.

All vegetation in areas that may be cleared within the Transport Development Envelope were mapped as either Completely Degraded or Degraded.

Vegetation Significance

A total of 41.8 ha of the *Eucalyptus Woodlands of the Western Australian Wheatbelt* PEC has been identified within the Project Development Area (**Figure 6.4**), across five patches. These are represented by patches of VT8 (36.4 ha) and VT6 (5.2 ha) and are all in Degraded condition. The remaining VT patches within the Project Development Envelope do not meet the requirements of the PEC as assessed in the Flora and Vegetation Assessment (**Appendix C**) , mostly due to condition requirements including lack of native understorey and covers of introduced taxa exceeding 70% of the understorey in most cases.

The majority of areas that may be cleared in the Transport Development Envelope did not reveal any indication of likely occurrence of the 'Eucalypt Woodlands of the Western Australian Wheatbelt' PEC or 'Banksia Woodlands of the Swan Coastal Plain' TEC, with the exception of areas assessed at the intersection of Clayton Rd and Narrogin-Williams Hwy.

Initial observations indicate that the patch of vegetation on the west side of Clayton Rd may meet the criteria of the Eucalypt Woodlands PEC. Patch characteristics that would indicate occurrence of Eucalypt Woodland PEC include:

- Occurs within the IBRA Avon Wheatbelt 1 and 2 subregions.
- Crown cover minimum of 10 % (crown measured as if they are opaque).
- Key species of the tree canopy are relevant species of Eucalyptus.
- A native understory is present comprising of some native understory species, but mostly non-native.

However, as the patch of vegetation is approximately 5.4 ha including completely degraded areas (tracks and gravel pits) and 4.84 ha excluding completely degraded areas, the area might not meet the listing criteria.

Up to 0.2 ha of vegetation may need to be removed at this location to allow for the delivery of the turbine blades to site. It should be noted that vegetation in this area has been mapped as degraded, and a portion of the 'patch' is used for gravel storage. Further correspondence with Main Roads WA following the survey indicates that areas near the stockpiles are completely degraded and areas with Sheoaks and non-native species would not be considered the PEC.

The vegetation patch south of the intersection between Clayton Rd and Narrogin-Williams Hwy is not likely to meet the criteria for the Eucalypt Woodland PEC, however, determination of this would require conducting further assessment of the broader vegetation patch. No vegetation clearing will occur at this location.

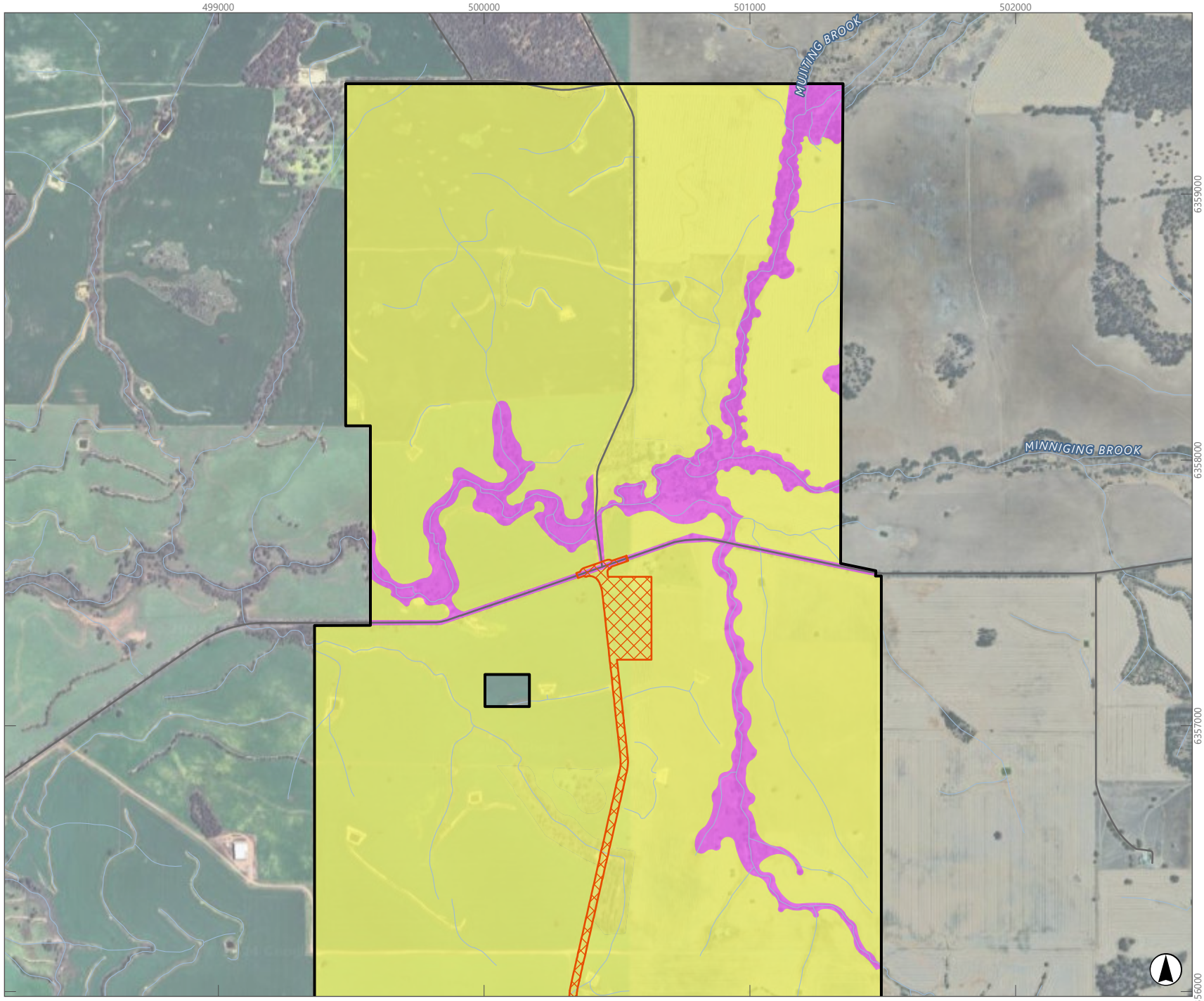


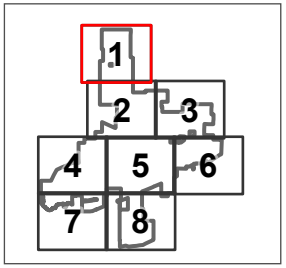
FIGURE 6.3.1
Vegetation Condition of the Project Development Envelope

Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Degraded
- Completely Degraded



0 400 800

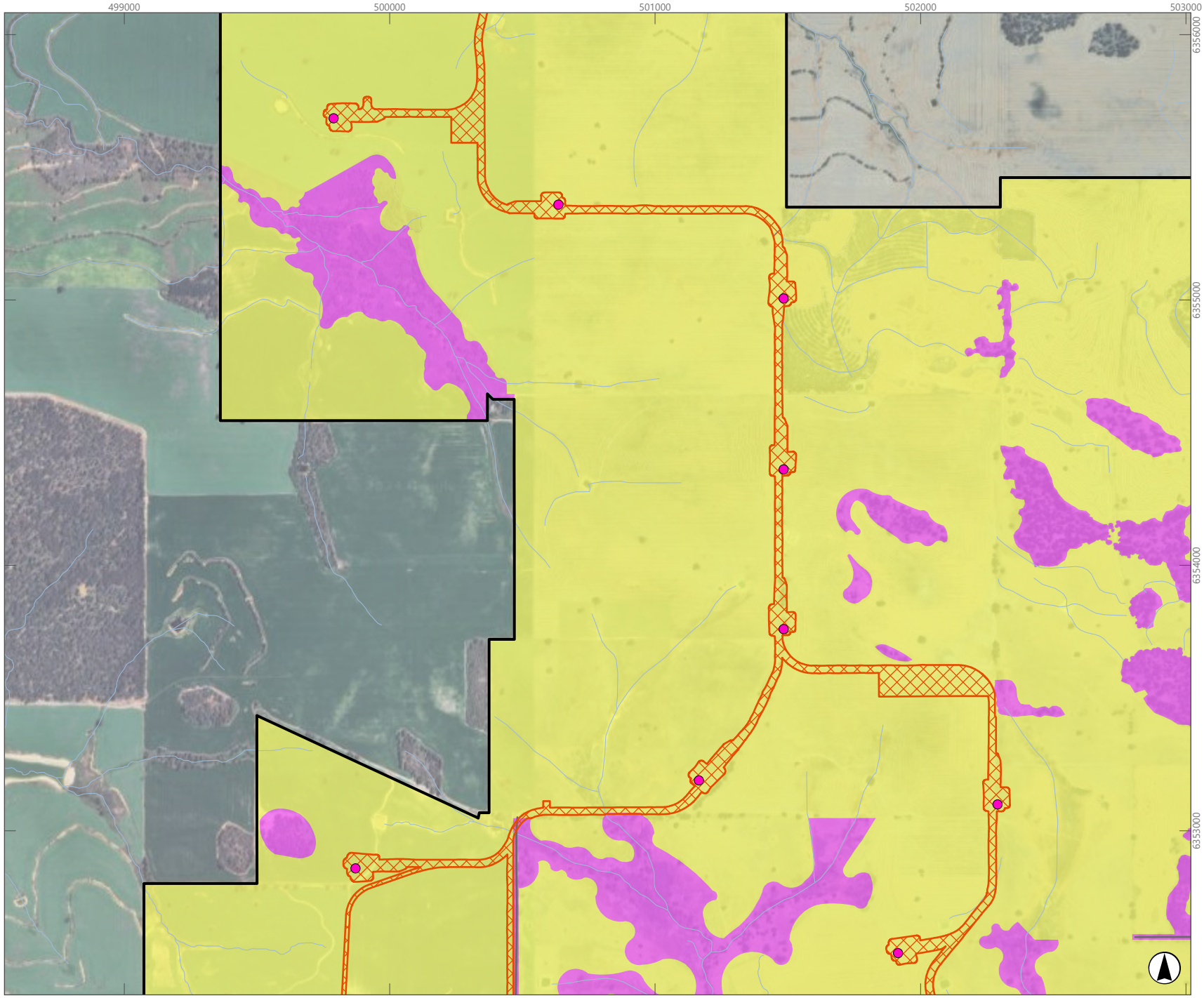
Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

FIGURE 6.3.2
Vegetation Condition of the Project Development Envelope

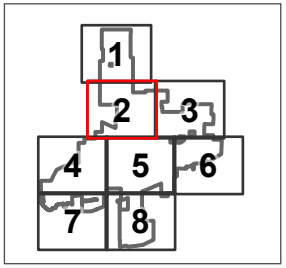


Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Degraded
- Completely Degraded



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Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

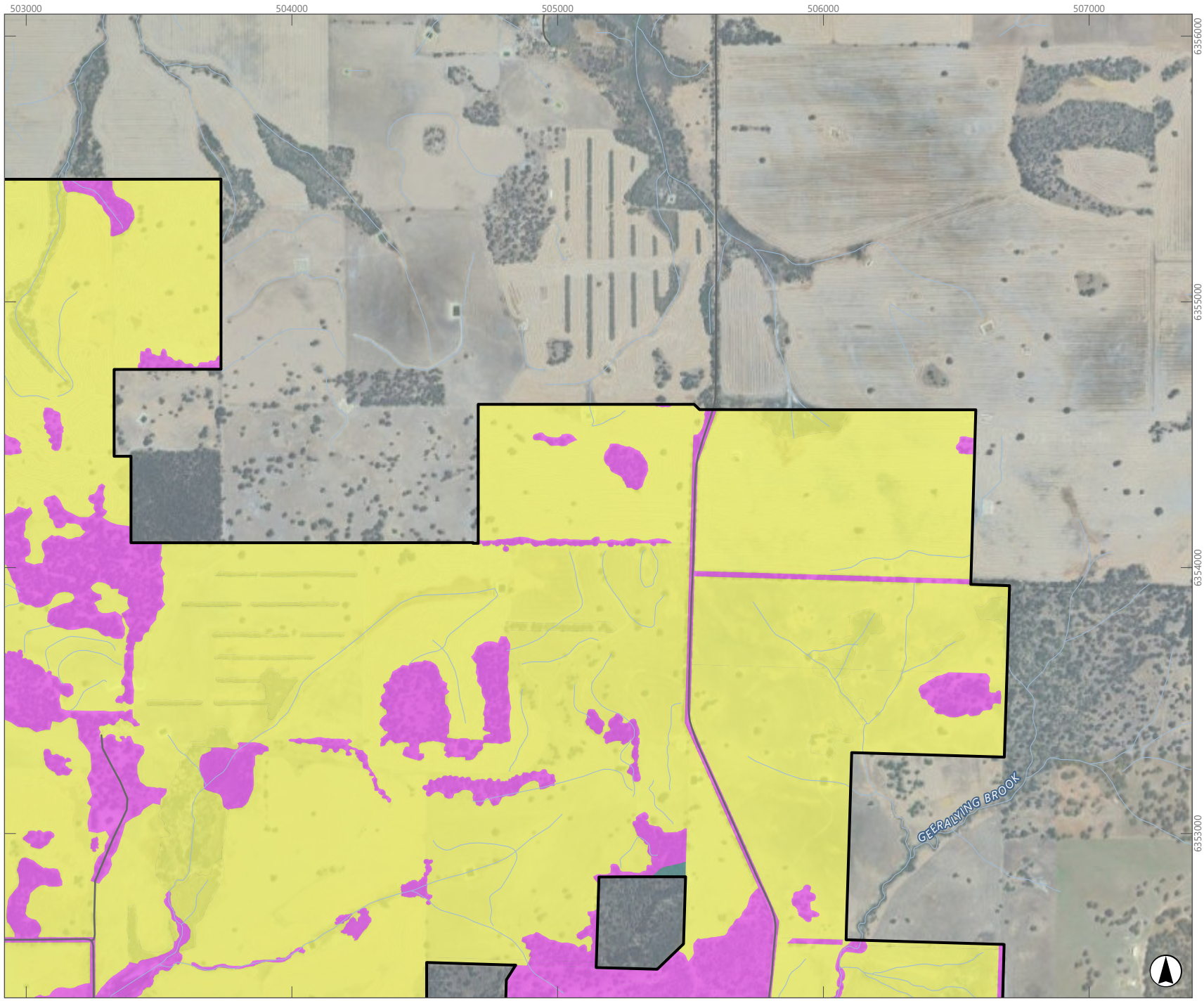


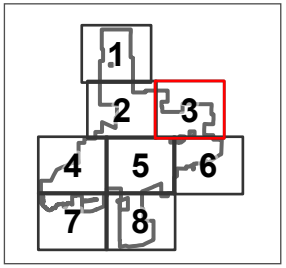
FIGURE 6.3.3
Vegetation Condition of the Project Development Envelope

Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Good
- Degraded
- Completely Degraded



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Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

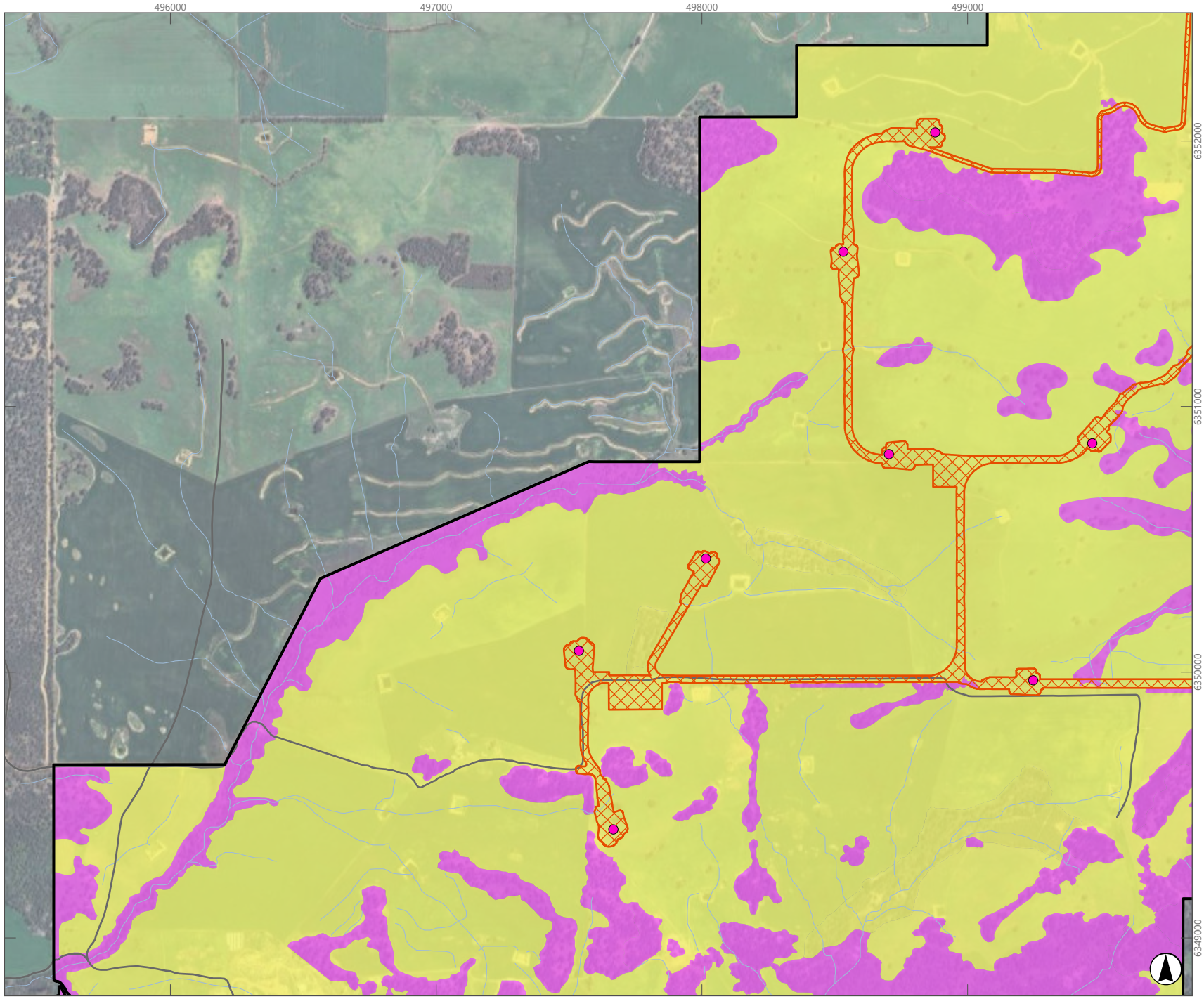


FIGURE 6.3.4

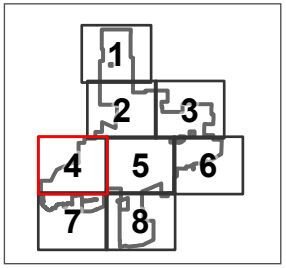
Vegetation Condition of the Project Development Envelope

Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Degraded
- Completely Degraded



0 400 800

Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

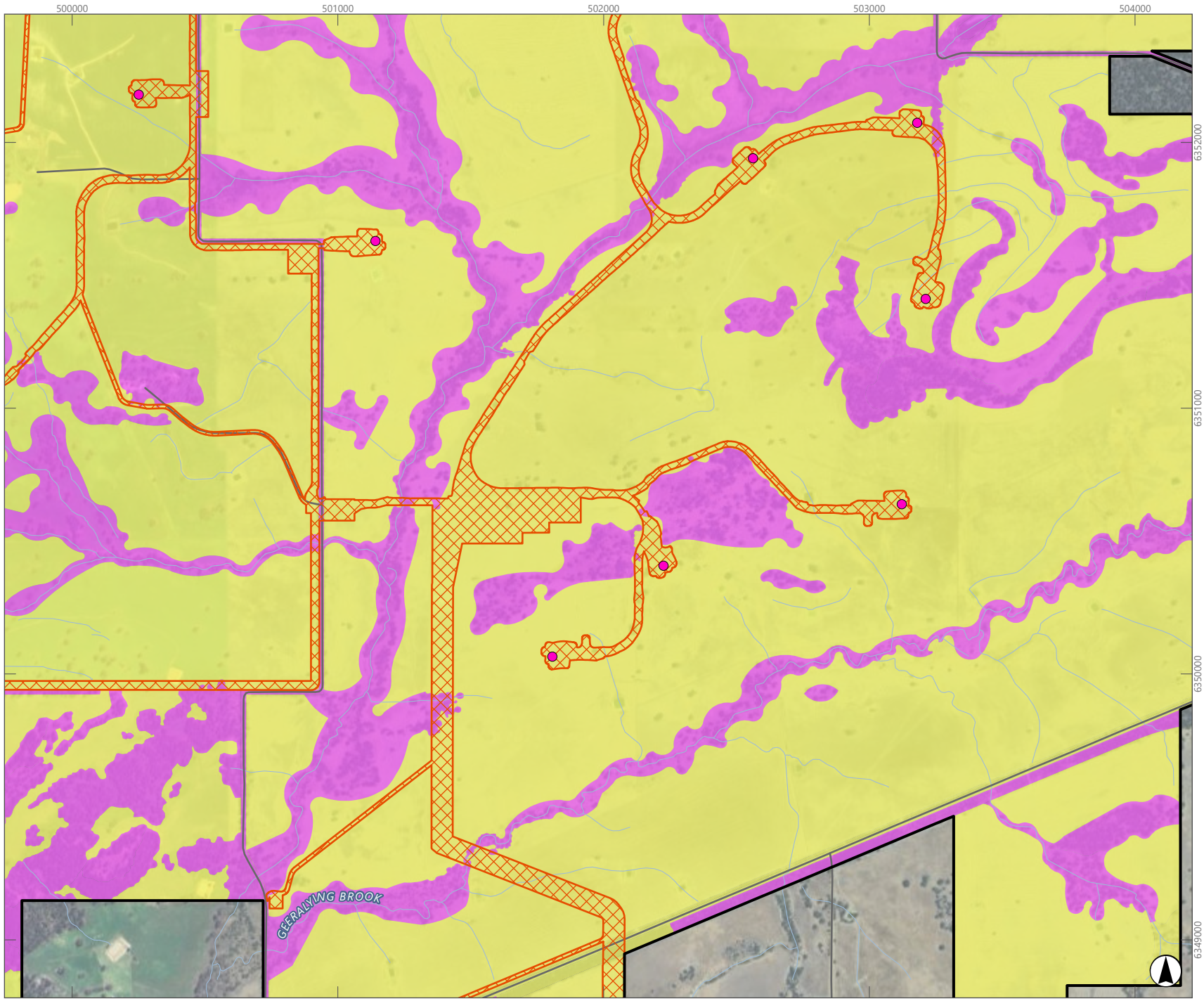


FIGURE 6.3.5

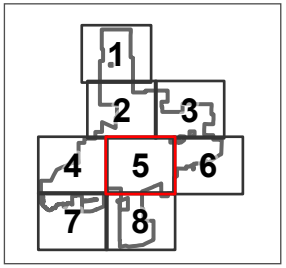
Vegetation Condition of the Project Development Envelope

Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Degraded
- Completely Degraded



0 400 800

Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

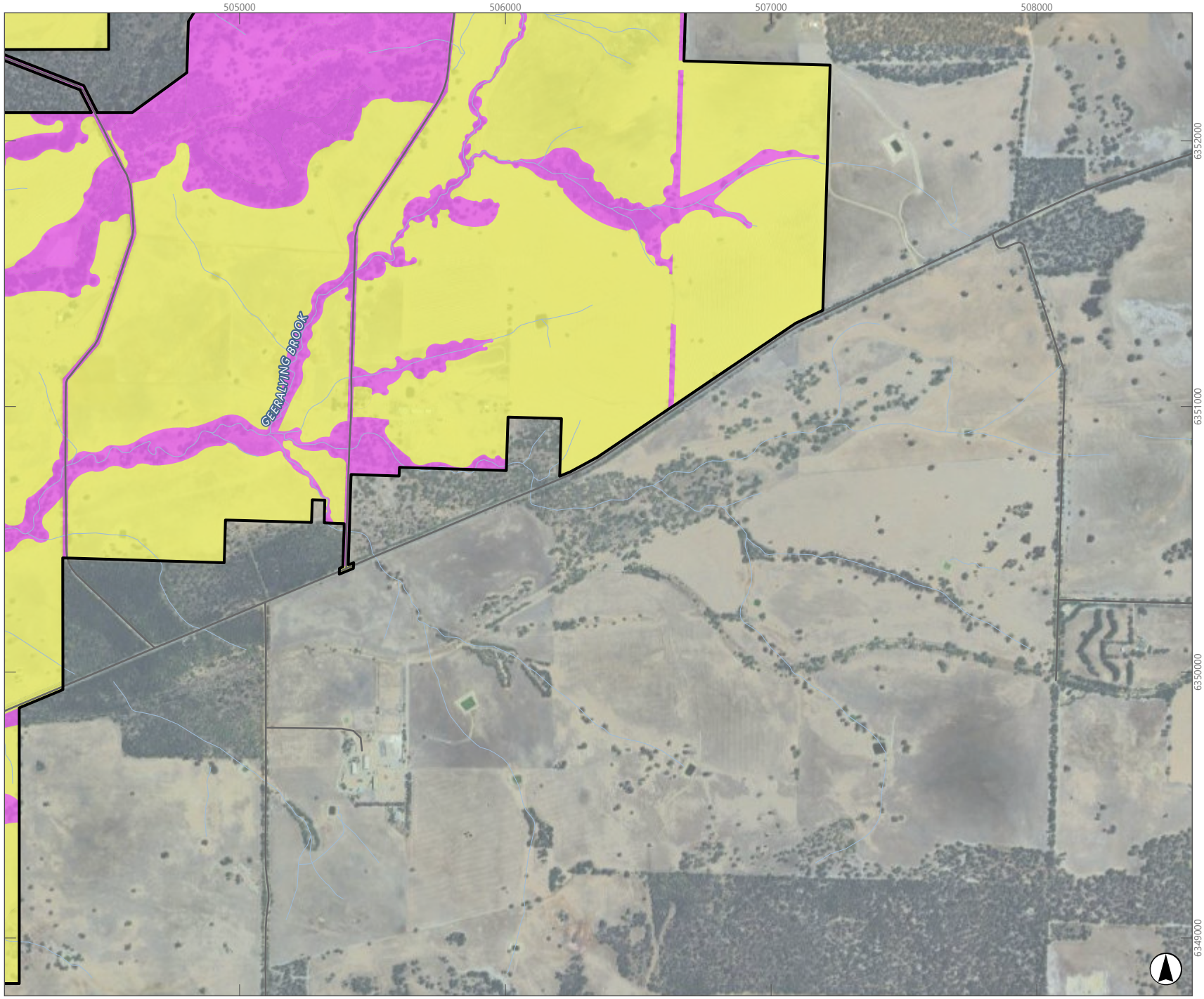


FIGURE 6.3.6

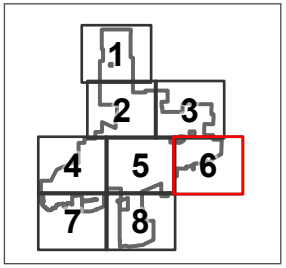
Vegetation Condition of the Project Development Envelope

Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Degraded
- Completely Degraded



0 400 800

Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

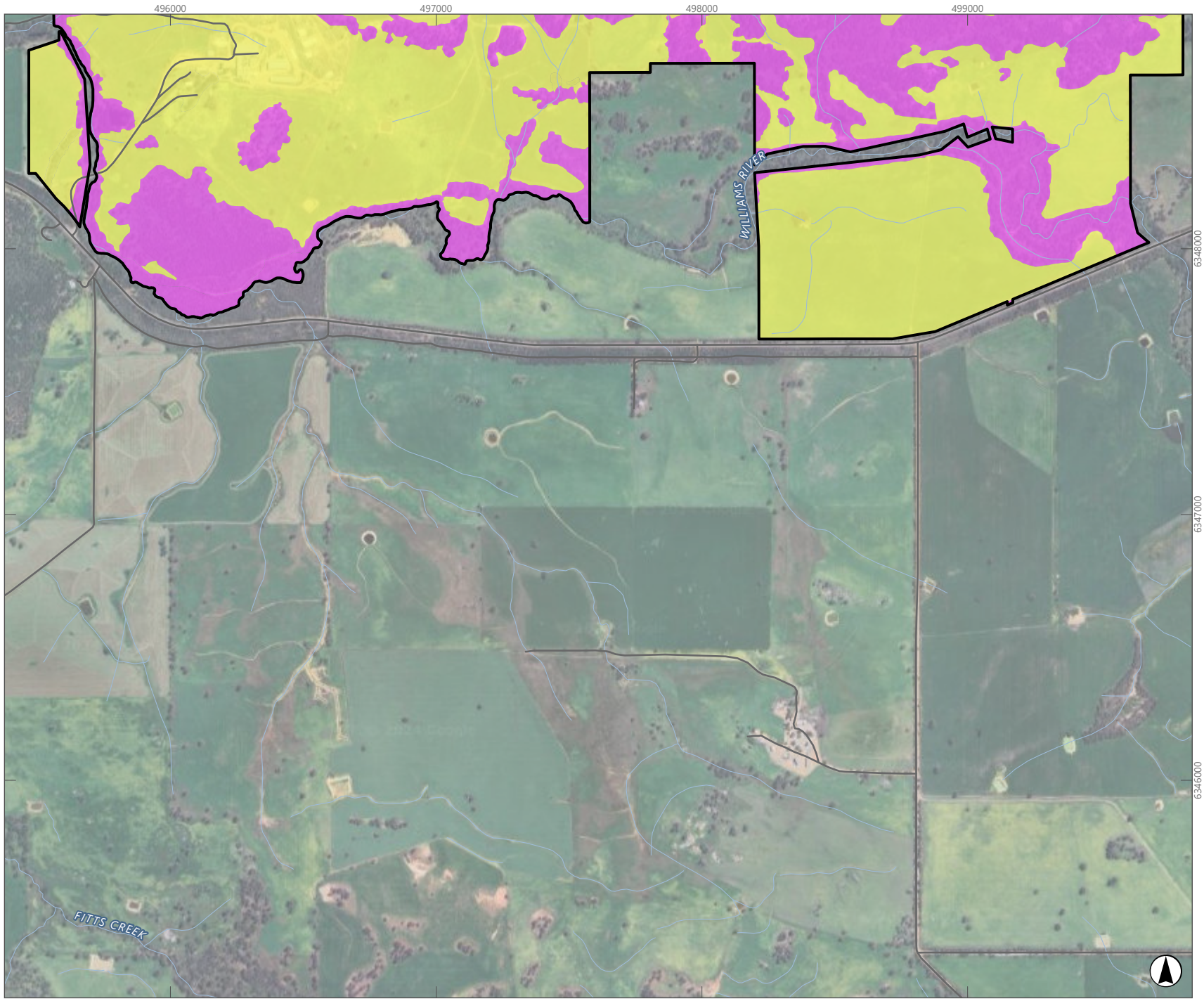


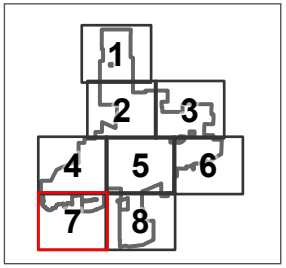
FIGURE 6.3.7
Vegetation Condition of the Project Development Envelope

Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Degraded
- Completely Degraded



0 400 800

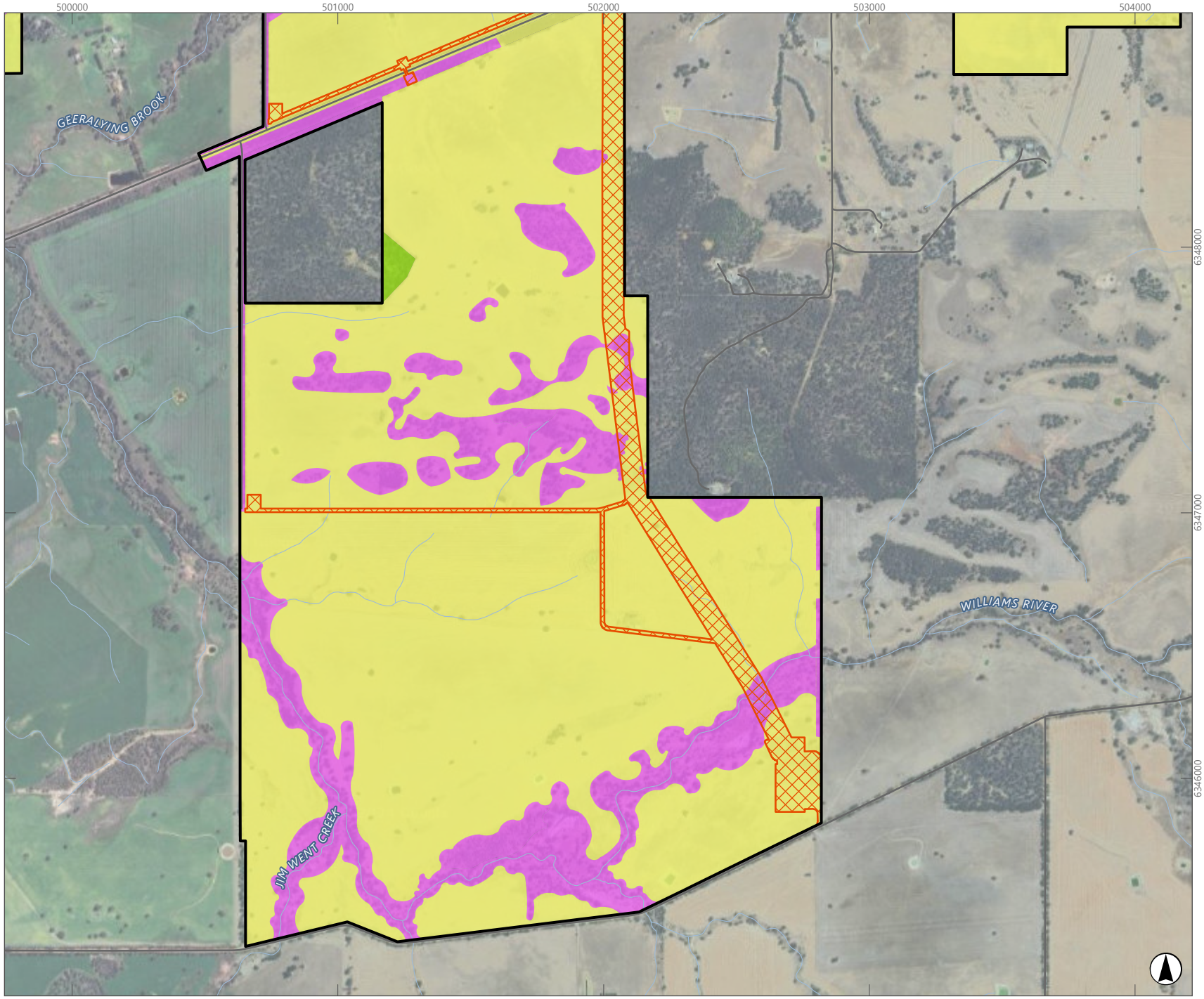
Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

FIGURE 6.3.8
Vegetation Condition of the Project Development Envelope

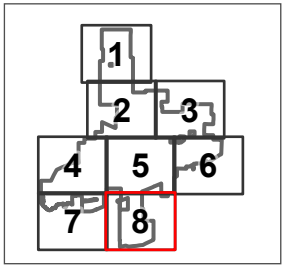


Legend

- Study Area
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Vegetation Condition

- Degraded
- Completely Degraded
- Not Assessed



0 400 800

Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

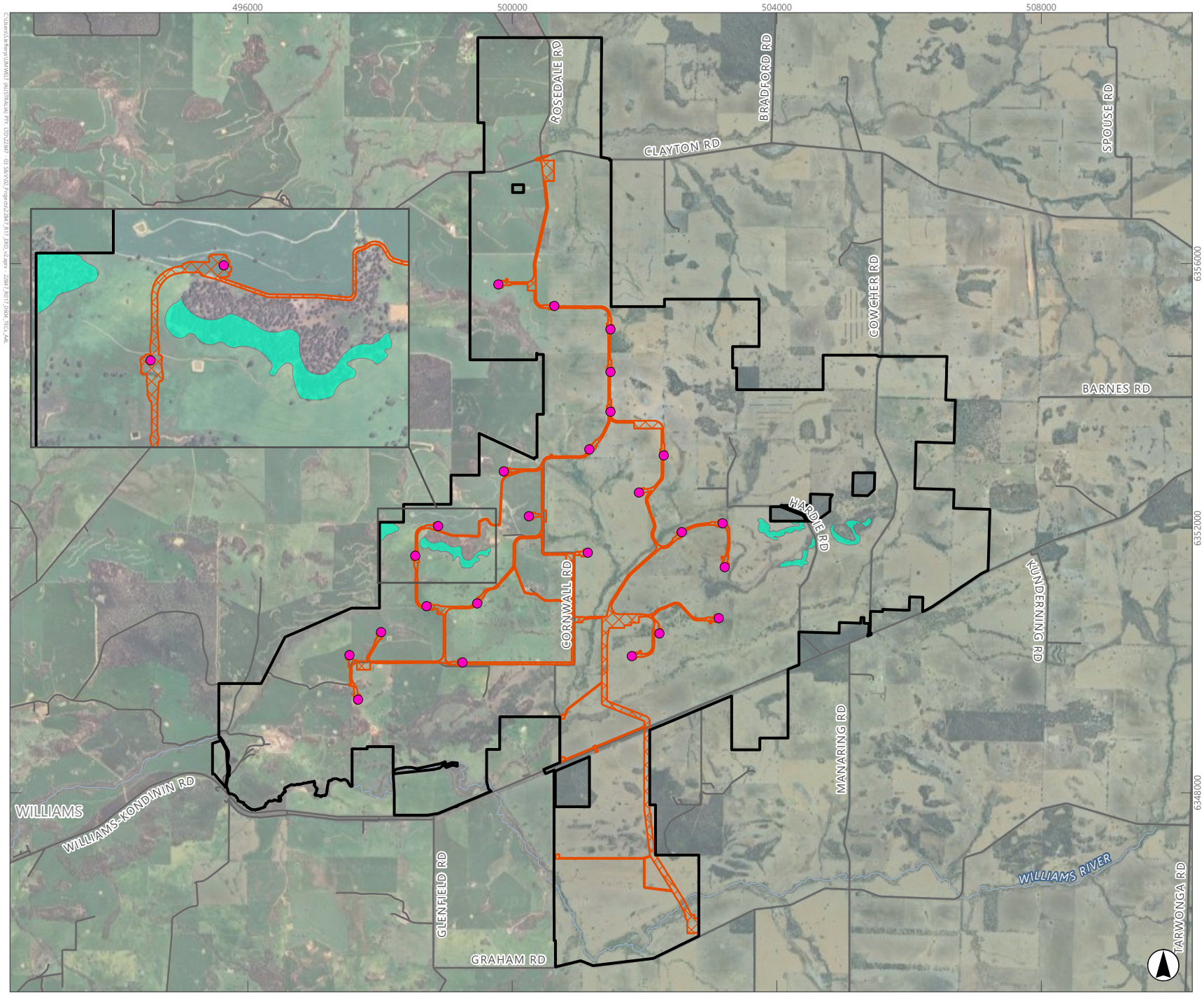


FIGURE 6.4

Priority Ecological Communities in the Project Development Envelope

Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Major Watercourse
- Eucalyptus Woodlands of the Western Australian Wheatbelt PEC

0 1.6 3.2

Kilometres

Scale 1:80,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

6.4 Potential Environmental Impacts

The Proposal has the potential to impact on flora and vegetation within the Development Envelopes. Potential direct and indirect impacts are listed below.

6.4.1 Potential Direct Impacts

The Proposal may result in the following potential direct impacts to flora and vegetation.

Table 6.5 Potential Direct Impacts to Flora and Vegetation

Proposal Activity	Potential Direct Impact
Clearing of native vegetation	Loss of conservation significant flora
	Loss of vegetation

6.4.2 Potential Indirect Impacts

The Proposal may result in the following potential indirect impacts to flora and vegetation.

Table 6.6 Potential Indirect Impacts to Flora and Vegetation

Proposal Activity	Potential Indirect Activity
Establishment of linear infrastructure (access tracks)	Edge effects leading to reduced vegetation condition in proximity to cleared areas.
Construction	Introduction or increased spread of weeds. Increased dust generation leading to dust settling on adjacent vegetation. Erosion leading to sedimentation on adjacent vegetation.
Hot works	Loss of native vegetation in the event of a fire.

An assessment of impacts, following implementation of the mitigation measures described below, is presented in **Section 6.6** for both direct and indirect impacts.

6.5 Mitigation

The mitigation hierarchy has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021b). Avoiding and minimising impacts has been applied rigorously to the design process to date on the Project, and will continue during detailed design, construction, and operations, to mitigate the Proposal's impact on flora and vegetation.

These principles and the order in which they have sought to be applied are as follows.

- **Avoid**: locating activities to avoid direct and indirect impacts on flora and vegetation.
- **Minimise**: minimising direct and indirect impacts where they cannot be completely avoided
- **Rehabilitate**: actively repairing, rehabilitating or restoring temporary impacted areas as soon as possible to promote long-term recovery
- **Offset** (where necessary): providing suitable offsets for activities that result in significant adverse environmental impacts.

6.5.1 Avoid

Numerous Proposal design iterations were undertaken with consideration of ecological values identified and mapped during the field survey program. As no Threatened flora species were recorded during flora and vegetation surveys, avoidance measures focused on avoiding areas of Good or better condition native vegetation and areas mapped as Eucalypts of the Western Australian Wheatbelt PEC. An early design required over 40 ha of native vegetation clearing, however through an iterative design process the total native vegetation clearing has been reduced by over 80% to 7.41 ha of native remnant vegetation and 0.98 ha of planted native vegetation within the Project Development Envelope.

The following measures have been implemented to **avoid** potential impacts to significant flora and vegetation within the Project Development Envelope:

- Avoiding all PEC within the Project Development Envelope.
- Avoiding all vegetation in good condition or better, which are the only vegetation patches where conservation significant flora have the potential to occur.
- Removing the Additional Survey Area (2,830 ha) from the Project Development Envelope. This avoids any potential impacts to 216 ha of PEC and 234 ha of native vegetation in Good to Very Good condition. This avoidance corresponded to a 30% overall reduction in the Project Development Envelope.
- Maximising use of existing disturbed areas and avoiding clearing of native vegetation as far as reasonably practicable.

6.5.2 Minimise

The below listed industry standard and best practice measures will be implemented to **minimise** potential impacts to significant flora and vegetation. These mitigation strategies are included in the Preliminary Construction Environmental Management Plan (CEMP) a copy of which is provided in **Appendix D.** The Preliminary CEMP will support approvals and be used as a foundation for the detailed CEMP which will be developed later as the Proposal progresses to the detailed design phase.

- Vegetation clearing will not exceed 7.41 ha of remnant native vegetation and 0.98 ha of planted native vegetation within the Project Development Envelope and 0.2 ha within the Transport Development Envelope. This clearing area is conservative based on the Indicative Proposal Footprint and is expected to decrease as the detailed design progresses.
- Clearing of the potential PEC on the western side of Clayton Road will utilise the existing cleared stockpile area, areas of highly degraded vegetation, Sheoak and non-native understorey, and will minimise clearing of native Eucalyptus tree species as far as possible.
- A native vegetation clearing procedure will be developed for the Proposal to minimise the total area of land disturbance and avoid unnecessary native vegetation clearing.
- Personnel involved in native vegetation clearing activities will be required to undertake internal Proposal specific land clearing training to minimise the risk of unplanned, unnecessary, or unauthorised clearing. This will outline regulatory requirements, management actions or controls to be implemented.

- Approved areas of land disturbance will be marked out prior to clearing and records of land disturbance will be kept in a register to support compliance audits and reporting.
- Micro-siting of infrastructure will be undertaken to further minimise native vegetation clearing where possible.
- The number of creek crossings has been minimised, and where crossings are necessary, existing crossings are utilised where practicable to reduce the clearing of riparian vegetation.
- The potential for the import and spread of weeds will be minimised. A Biosecurity Management Plan will be developed that includes the following measures:
    - All ground disturbing plant and equipment will enter site clean and free of weeds or dieback.
    - Upon arrival to site, ground disturbing plant and equipment will be subject to a weed and seed inspection prior to entry. A record of the inspection details and whether the plant / equipment has been deemed to be weed and seed free will be retained.
    - Where plant and equipment does not pass the weed and seed inspection, the plant / equipment shall be further cleaned at a dedicated wash down area and re-inspected.
    - Weed infested areas that are identified will be avoided where practicable.
    - Prior to leaving weed infested areas, the plant and equipment will be brushed down.
    - Prior to entering the Development Envelopes, the origin of fill material will be determined and certified where applicable. Where practicable, the fill should be from a quarry (i.e. not reused from another site) that has a Dieback Management Plan in place.
- The generation of dust and potential impacts will be minimised via implementation of the CEMP. Key measures to be implemented include:
    - Use of dust suppression techniques to minimise generation of dust (e.g., watering access roads)
    - Implementation of speed limits on access roads, informed by appropriate signage as required
    - Undertaking clearing activities in a progressive manner thereby limiting exposed areas.
- The potential for fire will be minimised via implementation of the CEMP and Project Bushfire Management Plan. Key measures to be implemented include:
    - Hot / hazardous works will not be undertaken during a Total Fire Ban or on a day with a Fire Danger Rating of Extreme or Catastrophic
    - Fire extinguishers will be in place at high-risk facilities and in site plant and vehicles.
    - The under carriage and radiators of site plant and vehicles shall be free from vegetation.

6.5.3 Rehabilitate

All proposed native vegetation clearing in the Project Development Envelope is required to support permanent infrastructure. This limits the potential for rehabilitation of native vegetation clearing areas until Project de-commissioning. Areas cleared for temporary infrastructure in the Project Development Envelope will be confined to previously disturbed areas. These areas will be rehabilitated to their pre-disturbance conditions when no longer required.

In the Transport Development Envelope, areas of the potential PEC on the west side of Clayton Road that are proposed to be cleared will be rehabilitated to a similar or better condition to what is currently present.

6.5.4 Offsets

Offsets are expected to be required via a Part V EP Act Native Vegetation Clearing Permit (**Section 9.0**).

6.6 Assessment and Significance of Residual Impact

The assessment of impacts focuses on potential residual impacts of the Proposal on significant flora and vegetation types, following implementation of the mitigation measures detailed above. Significant flora and vegetation types in the Development Envelopes comprise:

- Eucalyptus Woodlands of the Western Australian Wheatbelt PEC
- VSAs with less than 30% of the original extent remaining.

In undertaking the following assessment, EPAs objective for flora and vegetation has been considered:

'To protect flora and vegetation so that biological diversity and ecological integrity are maintained'.

6.6.1 Direct Residual Impacts to Flora and Vegetation

Native vegetation clearing has been avoided and minimised as far as possible within the Project Development Envelope and consists primarily of the removal of vegetation at the perimeter of degraded patches. While up to 7.41 ha of remnant native vegetation and 0.98 ha of planted native vegetation is proposed to be cleared in the Project Development Envelope, the clearing will be spread across approximately 20 patches of degraded remnant vegetation, and in the majority of cases (85%) less than 0.5 ha of native vegetation will be removed from the individual patches. Furthermore, no areas of vegetation in good condition or better will be cleared.

The Proposal will not clear areas of vegetation in Good condition or better. Additionally, no conservation significant flora species were identified during the surveys and the Proposal is not expected to impact on any conservation significant flora species.

Areas of vegetation that meet the diagnostic criteria for the *Eucalypt Woodlands of the Western Australian Wheatbelt PEC* (43 ha) have been avoided within the Project Development Envelope.

Transport of the turbine blades to site may require the removal of up to 0.2 ha of an area that is potentially *Eucalypt Woodlands of the Western Australian Wheatbelt* PEC. The vegetation will be cleared at a single turning point along the route (corner of Clayton Rd and the Narrogin-Williams Highway). The vegetation is located within a Lot managed by MRWA which has evidence of gravel storage. The vegetation required to be removed is on the outer edge of the patch, is located adjacent to the road and has been mapped as Degraded. Clearing of the potential PEC will utilise the existing cleared stockpile area, areas of highly degraded vegetation, Sheoak and non-native understorey, and will minimise clearing of native Eucalyptus tree species as far as possible. The cleared area will be rehabilitated following completion of transport of infrastructure.

Direct impacts on VSAs, VT's and areas of different Vegetation Condition within the Project Development Envelope is presented in the Tables below. Due to the single location and minor level of clearing proposed (0.2 ha), this information has not been presented for the Transport Development Envelope.

Based on the information above and presented in the below tables, the Proposal is not expected to have a significant residual impact on the biological diversity and ecological integrity of the local and regional flora and vegetation.

Table 6.7 Direct Impact to Vegetation Condition in Project Development Envelope

Vegetation Condition	Area of Vegetation Condition within Project Development Envelope		Direct Impacts to Vegetation Condition (based on Indicative Proposal Footprint)		
	Area (ha)	Proportion (%)	Area (ha)	Proportion of Vegetation Condition Impacted within Project Development Envelope (%)	Proportion of Indicative Proposal Footprint (%)
Good	0.4	0.01%			
Degraded	1,120.2	17.69%	7.41	0.66%	3.86%
Completely Degraded	5,221.5	82.43%	184.59	3.53%	96.14%
Not Assessed	1.8	0.03%			
TOTAL	**6,334.1**		**192**		

Table 6.8 Direct Impact to VSAs in Project Development Envelope

VSA	Description	Pre-European Extent[1] (ha)	Current Extent[1] (ha)	Pre-European Extent Remaining[1] (%)	Current Extent Protected for Conservation[1] (%)	Pre-European Extent in Project Development Envelope (ha)[2]	Proportion of Current Extent of VSA Impacted (Native Vegetation component)
DRYANDRA_1023	Medium woodland; York gum, wandoo & salmon gum (*Eucalyptus salmonophloia*)	10,388.10	1,505.55	14.49	0.00	2,574.1 40.5%	2.67 ha 0.177%
DRYANDRA_5	Medium woodland; wandoo & powderbark (*Eucalyptus accedens*)	31,817.93	15,186.21	47.73	21.84	244.2 3.8%	0.13 ha 0.001%
NARROGIN_1023	Medium woodland; York gum, wandoo & salmon gum (*Eucalyptus salmonophloia*)	189,088.48	31,369.71	16.59	6.69	2780.8 43.8%	2.85 ha 0.009%
NARROGIN_1073	Medium woodland; wandoo & mallet	873.12	419.56	48.05	9.72	73.8 1.2%	1.36 ha 0.324%
NARROGIN_352	Medium woodland; York gum	15,729.07	1,730.35	11.00	3.43	294.6 4.6%	0.40 ha 0.023%
Total		**6,344.1**				**7.41**	

1 Data source: DBCA Statewide Vegetation Statistics: Full Report (DBCA, 2019).

2 Data source: Pre-European Vegetation spatial dataset (DPIRD-006) (DPIRD, 2019a).

Table 6.9 Direct Impact to Vegetation Types in Project Development Envelope

Vegetation Type Code	Significant Veg Type	Extent within Project Development Envelope (ha)	Direct Impact to Vegetation Types (based on Indicative Proposal Footprint)	
			Area Impacted (ha)	Proportion of VT Impacted within Project Development Envelope (%)
VT1	Low to mid isolated trees to woodland of *Eucalyptus rudis* subsp. *rudis*, occasionally over tall isolated shrubs to tall open shrubland of *Acacia acuminata* and *Acacia saligna* over mid open sedgeland of **Juncus acutus* subsp. *acutus* over low closed tussock grassland of pasture weeds on brown sandy loam on drainage lines.	164.1 (2.6%)	1.17	0.71%
VT4	Low to mid woodland to open woodland of *Eucalyptus loxophleba* subsp. *loxophleba* over low closed tussock grassland of pasture weeds on brown-red clay loam on slopes.	63.4 (1.0%)	0.14	0.22%
VT6	Low to mid woodland to open woodland of *Corymbia calophylla* and occasional *Eucalyptus wandoo* subsp. *wandoo*, *Eucalyptus astringens* subsp. *astringens* and/or *Allocasuarina huegeliana* over low tussock grassland to low open tussock grassland of pasture weeds on lateritic ridges and upper slopes with lateritic gravel on brown loam.	186.5 (2.9%)	1.89	1.01%
VT7	Low to mid woodland to open woodland of *Eucalyptus rudis* subsp. *rudis* and *Eucalyptus loxophleba* subsp. *loxophleba* over low sedgeland to open sedgeland of **Juncus acutus* subsp. *acutus* over low tussock grassland of pasture weeds on drainage lines with red-brown clay loam on gentle slopes.	360.1 (5.6%)	2.61	0.72%
VT8	Low to mid woodland of *Eucalyptus astringens* subsp. *astringens* and occasionally *Eucalyptus gardneri* subsp. *gardneri* on brown-red clay loam with some lateritic outcropping on the edge of breakaways, crests, and upper slopes.	88.5 (1.3%)	0.01	0.01%

Vegetation Type Code	Significant Veg Type	Extent within Project Development Envelope (ha)	Direct Impact to Vegetation Types (based on Indicative Proposal Footprint)	
			Area Impacted (ha)	Proportion of VT Impacted within Project Development Envelope (%)
VT21	Isolated trees to mid open woodland of *Eucalyptus loxophleba* subsp*. loxophleba* and *Allocasuarina huegeliana* with occasional *Corymbia calophylla* and/or *Eucalyptus rudis* subsp. *rudis*, tall isolated shrubs of *Acacia acuminata* and sometimes *Acacia microbotrya* on slopes with exposed granite and brown sandy clay loam.	74.2 (1.2%)	0.23	0.31%
VT23	Mosaic of isolated remnant native trees, including *Eucalyptus wandoo* subsp. *wandoo, Eucalyptus loxophleba* subsp. *loxophleba, Corymbia calophylla, Eucalyptus rudis* subsp. *rudis, Eucalyptus astringens* subsp. *astringens, Allocasuarina huegeliana* and isolated mid to tall shrubs *of Acacia acuminata, Acacia microbotrya* and *Acacia saligna*, occasionally *Hakea prostrata* or *Banksia sessilis* var. *sessilis,* over low tussock grassland of pasture weeds; associated with road verges.	44.3 (0.7%)	1.36	3.07%
Pl	Planted trees of local and other exotic species over pasture weeds on brown loam on slopes or undulating plains.	96.6 (1.5%)	0.98	1.01%
Cl	Cleared areas with occasional isolated (remnant native and exotic) trees over pasture weeds.	5098.9 (80.4%)	183.61	3.60%

6.6.2 Indirect Residual Impacts to Flora and Vegetation

The Proposal has the potential to indirectly impact flora and vegetation in and around the Development Envelopes. The potential residual indirect impacts are described below.

6.6.2.1 Edge effects

Edge effects in ecology are identified as any difference in environment between the edge and interior of a particular vegetation patch. Environmental characteristics which differ across edges cover many components of the environment including vegetation (e.g., structure, composition, functioning), fauna and their habitat, and soil (Murcia, 1995).

Edges and their effects can be created through clearing of vegetation, such as new edges created by roads. The distance the effect spreads from the edge, known as edge permeability, can be highly variable and depends upon many factors such as vulnerability of the ecosystems, degree of change in land use, intensity of this use and chance events (Murcia, 1995).

Given the degraded nature of the remnant vegetation patches present, including impacts by livestock and weeds throughout remnant vegetation patches that are not fenced, any edge effects that do occur are very unlikely to result in significant impacts to the integrity of these patches.

The potential for residual impact as a result of edge effects is considered low.

Potential environmental impacts including introduction of weeds and physical disturbance to vegetation can be managed through good site practices, vehicle restrictions and implementation of the CEMP (**Appendix D**).

6.6.2.2 Unauthorised Clearing

Proposals where ground disturbance is required carry the risk of unplanned, unnecessary, or unauthorised native vegetation clearing. This could be via clearing outside of the approved Disturbance Envelopes or clearing of areas within the Development Envelopes that are not required to be cleared. This risk is greatest during the construction period and can be increased by having multiple contractors and unclear roles and responsibilities.

The CEMP and Project land disturbance procedure will include measures to minimise the risk of accidental native vegetation clearing. Additionally, independent third party audits and inspections will be regularly undertaken to assess CEMP compliance. The residual impact to significant flora and vegetation from accidental disturbance is considered low.

6.6.2.3 Introduction and Spread of Weeds

Weeds are already common on site noting 46% of the total number of flora taxa recorded during surveys of the Project Development Envelope were introduced flora. Although most were common pasture weeds, three weed species listed as Weeds of National Significance (WoNS) and Declared Pests under the BAM Act were recorded.

Movement of vehicles and machinery, ground disturbance, vegetation clearing, import of fill, soil handling and soil storage can introduce, transport, and promote establishment of weeds in the Development Envelopes.

The introduction and spread of weeds will be managed through the implementation of the CEMP and a Biosecurity Management Plan. Through implementation of these plans, and noting the pre-construction status of weeds within the Development Envelopes, the residual impact associated with the introduction and spread of weeds is considered to be low.

6.6.2.4 Dust Emissions

Dust impacts from the Proposal are expected to be restricted to vegetation directly adjacent to the access tracks and in areas near stockpiles where soil is exposed and can be disturbed through vehicle movement and wind erosion. The dust will be chemically inert, and as such, any potential impacts will be physical in nature, such as blocking of plant stomata and reduction in light penetration to the leaf surface, potentially reducing photosynthetic capacity. This may lead to a reduction in the health and vigour of vegetation directly adjacent to tracks.

To reduce this impact, dust will be managed throughout the construction phase via best practice dust management measures as specified in the CEMP.

To further protect potential indirect impacts to PECs in the Project Development Envelope, a minimum 40 m separation buffer will be applied between the Final Project Footprint and PECs

The residual impact to significant flora and vegetation from dust emissions is expected to be low.

6.6.2.5 Soil Erosion

Removal of vegetation and disturbance to the soil profile through clearing and construction activities can lead to soil erosion, which in turn can lead to increased input of sediment into waterways. Increased sediment in waterways can lead to siltation of watercourses and a reduction in water quality of creeks, rivers, and other drainage lines. Through erosion, important topsoil can be lost, leading to exposure of subsoil which often has poor physical and chemical properties.

Key Proposal infrastructure has been setback from creeklines and the majority of infrastructure is located outside the 1% AEP flood prone areas.

Through the placement of infrastructure and implementation of best practice stormwater management measures outlined in the CEMP, the residual impact associated with soil erosion is deemed to be low.

6.6.2.6 Fire

Activities such as vegetation clearing, hot works and BESS operations have the potential to start fires. Uncontrolled fires can significantly impact personnel, equipment and the surrounding environment.

A Bushfire Management Plan will be developed for the Proposal and construction and operational works will be undertaken in accordance with the Plan. Additionally, the CEMP will include mitigation measures to reduce the risk for fires starting and spreading. Furthermore, remnant vegetation is present throughout the Project Development Envelope in patches rather than large blocks, thereby reducing the potential for a fire to spread.

The residual impact to significant flora and vegetation from fire is considered to be low.

6.6.3 Significance of Residual Impact

The residual impact of the Proposal to significant flora and vegetation in the region is not expected to be significant. **Table 6.10** provides an assessment of the significance of residual impacts with reference to the "consideration of significance" matters listed in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021b).

Table 6.10 Significance of Residual Impact to Flora and Vegetation

Significance matters	Significance of residual impact of the Proposal in the regional context
Object and principles of the Act	Specialist surveys and assessments have been undertaken to reduce scientific uncertainty. The studies have been undertaken by suitably qualified consultants and includes flora and vegetation surveys of the Development Envelopes in accordance with EPA guidelines. Proposal design has strongly focussed on avoidance of impacts based on the studies completed. Avoiding impacts to the point of the lowest possible impact is a precautionary approach which limits reliance on minimise, rehabilitate, and offset impacts. Specifically, the precautionary principle has been applied through: • Reducing the Project Development Envelope to avoid over 200 ha of PEC, and avoiding the clearing of any PEC within the Project Development Envelope. • Avoiding the clearing of native vegetation in Good condition or better. • Restricting clearing to a maximum of 7.41 ha of fragmented and degraded remnant vegetation, and 0.98 ha of planted native vegetation. Clearing to this maximum amount would result in 96% of the Indicative Proposal Footprint being constructed on cleared land, and only 0.66% of degraded remnant vegetation in the Project Development Envelope with limited flora and vegetation values being directly impacted.
Values, sensitivity, and quality of the environment that is likely to be impacted	No Threatened Flora were identified within the Development Envelopes. No PEC's or vegetation in Good condition of better will be impacted in the Project Development Envelope. Remnant native vegetation in the Project Development Envelope is patchy and degraded noting the primary land use is for agriculture. Native vegetation likely to be cleared in the Transport Development Envelope is Completely Degraded to Degraded due to it being located directly adjacent to State and Shire roads. A maximum of 0.2 ha of degraded road verge which is potentially a PEC will be cleared in the Transport Development Envelope.
All stages and components of the proposal	The impact assessment considers all components of the Proposal that might impact flora and vegetation.
Extent (intensity, duration, magnitude, and footprint) of likely impacts	A maximum of 7.41 ha of native remnant vegetation and 0.98 ha of native planted vegetation will be cleared in the Project Development Envelope. This results in 0.66% of current native remnant vegetation in the Project Development Envelope being cleared and 1% of the current planted native vegetation present being cleared. Vegetation clearing will be undertaken progressively over a 33 month period and will be done so in accordance with the Project's land disturbance clearing procedure to avoid unnecessary or over clearing.

Significance matters	Significance of residual impact of the Proposal in the regional context
	Clearing in the Transport Development Envelope will be limited to 0.2 ha and will be rehabilitated.
Resilience of the environment to cope with the impacts, including pressures such as climate change	The majority of the Project Development Envelope has already been cleared for agricultural purposes. Climate change is predicted to lead to increased drought and extreme weather events in the region, which would increase pressure on native vegetation. The Proposal seeks to generate renewable energy, thereby seeking to address climate change pressures.
Application of the mitigation hierarchy	The Project Development Envelope has avoided PEC's and all vegetation in Good condition or better. The Indicative Proposal Footprint has minimised the clearing of native vegetation as much as reasonably practicable, with only 0.66% of current native remnant vegetation in the Project Development Envelope being cleared and 1% of the current planted native vegetation present being cleared. Clearing of the native trees in the potential PEC along the transport route will be minimised, and the clearing area will be rehabilitated.
Consequence of the likely impacts	The impact assessment considers both direct and indirect impacts. Indirect impacts are not expected to extend beyond the Development Envelopes.
Likely environmental outcomes, and whether they are consistent with the EPA environmental factor objectives	Likely environmental outcomes are presented in **Section 6.7**
Cumulative effects	Cumulative effects are assessed in Section **12.0**
Holistic impacts	Holistic impacts are assessed in Section **11.0**
Level of confidence in the predicted residual impacts and success of the proposed mitigation	Impact assessments were based on assessing the maximum area of land that will be cleared for installation of all Proposal infrastructure. Actual disturbance is likely to be lower, therefore the predicted residual impacts over-estimate the likely direct impact to flora and vegetation. The proposed mitigation measures are intended to reduce the impact to native vegetation as low as practicable. Furthermore, the mitigation measures proposed in the CEMP (**Appendix D**) are common practice and the risk of indirect impacts to significant flora and vegetation are predicted to be low.
Public interest about the likely effect on the environment	The Proposal is in the wider public interest, as it will: • be consistent with the WA Government's vision for a secure, reliable, affordable and clean energy future for the state. • assist in meeting Australia's renewable energy targets as well as future electricity demands without the production of additional greenhouse gases. • facilitate direct employment for up to approximately 250 personnel during construction and 10 - 15 permanent personnel during operations. Community consultation has not indicated that there are concerns about impacts to Flora and Vegetation.

6.7 Environmental Outcomes

Environmental outcomes and conditions to protect significant flora and vegetation values are proposed in **Table 6.11**.

Implementation of the Proposal in accordance with the Proposal Content Document and the below proposed outcomes will protect flora and vegetation so that biological diversity and ecological integrity in the region are maintained.

Table 6.11 Proposed Environmental Outcomes for Significant Flora and Vegetation

Proposed environmental outcomes	Consistent with EPA objective	How environmental outcomes can be measured and assured	Manageable under Other Statutory Mechanism
Native vegetation clearing will be limited to the native vegetation clearing limits specified in the Proposal Content Document, which will not result in significant impacts to flora and vegetation.	Yes	Proposal Content Document defines extent of Development Envelopes. Internal land disturbance procedures and record keeping. Regular environmental compliance reporting.	Yes via NVCP under Part V of EP Act.
No clearing of PEC's within the Project Development Envelope	Yes	Project Development Envelope avoids PECs. Internal land disturbance procedures and record keeping.	Yes via NVCP under Part V of EP Act.
Clearing of potential PEC within the Transport Development Envelope not to exceed 0.2 ha	Yes	Internal land disturbance procedures and record keeping. Regular environmental compliance reporting.	Yes via NVCP under Part V of EP Act.
No direct impact to vegetation in Good condition or better	Yes	Development Envelopes avoid areas with Good condition vegetation or better Regular environmental compliance reporting.	Yes via NVCP under Part V of EP Act.

7.0 Terrestrial Fauna

The Terrestrial Fauna factor, under EPA guidelines, defines terrestrial fauna as "animals living on land or using land (including aquatic systems) for all or part of their lives. Terrestrial fauna includes vertebrate (birds, mammals including bats, reptiles, amphibians, and freshwater fish) and invertebrate (arachnids, crustaceans, insects, molluscs and worms) groups". EPA defines fauna habitat as "the natural environment of an animal or assemblage of animals, including biotic and abiotic elements, that provides a suitable place for them to live (e.g. breed, forage, roost or seek refuge)" (EPA, 2016b).

7.1 EPA Objective

The EPA's environmental objective for Terrestrial Fauna is "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained" (EPA, 2016b).

7.2 Relevant Policy and Guidance

Table 7.1 Policy and Guidance – Terrestrial Fauna

Policy/Guidance	Explain how the EPA policy and guidance has been considered
EPA Policy and Guidance	
Environmental Factor Guideline: Terrestrial Fauna (EPA, 2016b)	This guidance was used to inform the impact assessment undertaken for terrestrial fauna.
Technical Guidance: Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (EPA, 2020)	Terrestrial fauna surveys were undertaken in accordance with this guidance document.
Instructions for the preparation of data packages for the Index of Biodiversity Surveys for Assessments (IBSA) (EPA, 2020)	All data gathered from field surveys has been prepared and submitted in accordance with IBSA guidelines.
Other State or Commonwealth Policy or Guidance	
Biodiversity Conservation Act 2016 (WA) (BC Act)	The Proposal has avoided disturbance of fauna habitat as far as reasonably practicable. Should listed fauna need to be removed, a Section 40 Licence under the BC Act will be sought.
Biosecurity and Agriculture Management Act 2007 (WA) (BAM Act)	Declared pests under the BAM Act will be considered and managed during the construction and operational phases of the Proposal.
Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act)	The Proposal is undergoing referral under the EPBC Act. An assessment against MNES has been undertaken to support the referral.
Matters of National Environmental Significance: Significant Impact Guidelines 1.1	This guidance was adhered to during the preparation of the EPBC referral to meet current referral standards.

7.3 Receiving Environment

7.3.1 Surveys and Survey Effort

A range of fauna surveys and assessments have been undertaken within the Development Envelopes and Additional Survey Area to determine the baseline environment and inform Proposal avoidance and design.

Survey methods for terrestrial fauna were developed and undertaken in accordance with the EPA (2020) *Technical Guidance—Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. For the three Threatened black cockatoo species with a potential to occur in the Study Area, the DCCEEW (DAWE, 2022) *Referral Guideline for 3 WA Threatened Black Cockatoo Species* and Bamford (2020) method was utilised for mapping and characterising foraging and breeding habitat. Fauna surveys were conducted within representative locations of all fauna habitat types.

Table 7.2 lists the terrestrial fauna surveys undertaken to inform Proposal design and approvals. A summary of the survey effort is provided in **Table 7.3** and illustrated in **Figure 7.1.**

Further details on survey efforts are presented in the Vertebrate Fauna Survey (**Appendix E**) and the BBUS Summary Report (provided as part of **Appendix F**).

Table 7.2 Fauna Surveys

Field Survey	Survey Area	Survey Timing
Flora and Vegetation Reconnaissance Survey and Fauna Habitat Assessment (Umwelt)	Central area of Project Development Envelope	1–3 May 2023
Basic Fauna Survey^ (Western Wildlife)	Project Development Envelope and Additional Survey Area	23–27 October 2023
Spring Bird and Bat Utilisation Survey (Umwelt)	Project Development Envelope and Additional Survey Area	23–28 October 2023
Summer Bird and Bat Utilisation Survey (Umwelt)	Project Development Envelope and Additional Survey Area	5–9 February 2024
Targeted Fauna Habitat Assessment (Umwelt)	Previous iteration of indicative Proposal footprint	10–11 June 2024
Reconnaissance Flora, Vegetation and Fauna Habitat Assessment (Umwelt)	Transport Development Envelope	6 August 2024

^ Some remote sensing equipment (camera traps and passive acoustic recorders) remained in the field until retrieval on 24 and 25 November 2023.

Table 7.3 Fauna Survey Techniques and Effort

Technique	Description	Survey Effort		
		Project Development Envelope	Additional Survey Area	Total
Bird Survey (fixed-point)	Diurnal birds were sampled using a fixed-point count method involving timed 30-minute intervals across eight vantage points in the Study Area and three in the Additional Survey Area to assess site utilisation and flight behaviour. Vantage points were established at high points of habitat types representative of those found across the Project Development Envelope and Additional Survey Area. Each vantage point was surveyed during four sampling windows per day (early morning, late morning, early afternoon, and late afternoon) to minimise sampling bias. At each vantage point, a single observer recorded the following information for each observation: • species and abundance • observation type (visual or aural) • distance and direction from the observer (to the nearest 10 m and 10° respectively) • approximate height AGL of the observed bird/s (to the nearest 10 m) • direction of flight (to the nearest 10°) • flight pattern (i.e., not flying, local movement, directional flight, circling, swooping, varied, other) • behaviour (i.e., flight, foraging, perching, mating, aggressive interactions, hollow inspection, nesting, on station). Surveys were completed in Spring 2023 and Summer 2024.	64 cumulative hours across 8 locations	24 cumulative hours across 3 locations	88 cumulative hours
Camera Trapping	A total of 39 camera traps were deployed at strategic locations across the Project Development Envelope and Additional Survey Area to record visitation by nocturnal and diurnal fauna over a month. Each trap was deployed with a non-reward bait lure of a fish oil-soaked sponge in a perforated plastic container. The bait lure was secured to the ground and the camera secured to a stake or nearby tree. The camera images were reviewed by a qualified zoologist, and all vertebrate fauna were identified to species level where possible.	685 trap-nights across 21 locations	591 trap-nights across 18 locations	1,276 trap-nights

Acoustic Monitoring	Anabat passive bat detector devices were deployed at BBUS vantage points to record visitation by bats between dusk and dawn in vegetated areas during the basic fauna survey and BBUS. Detectors were deployed across three survey events, with two in Spring 2023 and one in Summer 2024. Songmeter 4 (SM4) passive acoustic detectors were set to record between dusk and dawn during the basic fauna survey in Spring 2023 for 18 nights across October and November 2023. Each unit was secured to a tree, about 1.5 m off the ground. All bird species were able to be identified were recorded.	Anabat: 36 trap-nights across 9 locations SM4: 36 trap-nights across 2 locations	Anabat: 21 trap-nights across 6 locations SM4: 36 trap-nights across 2 locations	Anabat: 57 trap-nights SM4: 72 trap-nights
Fauna Habitat Assessment	Habitat assessments were undertaken across the Project Development Envelope and Additional Survey Area with the aim of sampling the heterogeneity present in each habitat in both large and small remnant patches. A fauna habitat assessment was initially undertaken concurrently with the reconnaissance flora and vegetation assessment, and the habitats were later verified and refined during the basic fauna survey. Further targeted habitat assessments were completed in 2024 to ground-truth the presence and extent of Threatened fauna habitat for the Chuditch and Red-tailed Phascogale within areas of the Project Development Envelope. This targeted assessment also provided an opportunity to categorise and assess key fauna habitats for their significance to Threatened fauna species.	N/A	N/A	N/A
Black Cockatoo Habitat Assessment	The vegetation in the Project Development Envelope was assessed for the presence and extent of breeding, foraging, and roosting habitat, and scored using the (DAWE, 2022) referral guideline for broad-scale mapping across the Project Development Envelope. This was later refined within areas of the indicative Proposal footprint at a finer-scale using the Bamford (2020) method.	N/A	N/A	N/A
Incidental Observations	At all times, observations of fauna were noted when they contributed to the accumulation of information on the fauna of the Project Development Envelope. These included casual observations of reptiles, mammals, and birds seen while travelling between sites or while undertaking other activities.	N/A	N/A	N/A

In addition to the surveys referenced in **Table 7.3,** species specific survey methods were applied to target the Threatened and Specially Protected fauna considered as part of the desktop assessment to have a moderate or greater likelihood of occurrence within the Project Development Envelope:

- Threatened black-cockatoo species (Baudin's Black-Cockatoo [*Zanda baudinii*], Carnaby's Black-Cockatoo [*Zanda latirostris*], and Forest Red-tailed Black-Cockatoo [*Calyptorhynchus banksii naso*])
- Chuditch (Dasyurus geoffroii)
- Red-tailed Phascogale (*Phascogale calura*)
- Fork-tailed Swift (*Apus pacificus*)
- Peregrine Falcon (*Falco peregrinus*).

Details on how the surveys undertaken aligned with the recommended survey techniques for each of these species is presented below.

Threatened Black-Cockatoo Species

Surveys for the three Threatened black-cockatoo species likely to occur within the Project Development Envelope (Carnaby's Black-Cockatoo [*Zanda latirostris*], Baudin's Black-Cockatoo [*Zanda baudinii*] and the Forest Red-tailed Black-Cockatoo [*Calyptorhynchus banksii naso*]) were undertaken in accordance with the DCCEEW (DAWE, 2022) *Referral guideline for 3 WA threatened black cockatoo species* and the WA Environmental Protection Authority (EPA) (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*. The alignment of survey techniques with these guidelines is described in **Table 7.4**. The system adopted for ranking of potential black-cockatoo trees is presented in **Table 7.5.**

Table 7.4 Black-Cockatoo Survey Methodology

Recommended methodology	Field survey alignment
Survey timing (wheatbelt) (DAWE, 2022)**:** • Baudin's Black-Cockatoo – Breeding habitat and foraging habitat in proximity - possible presence on western margins during breeding season (October to March). • Carnaby's Black-Cockatoo – Breeding habitat and foraging habitat in proximity - July to December; some individuals occur all year. • Forest Red-tailed Black-Cockatoo – Breeding habitat and foraging habitat in proximity - possible presence on margins, depending upon resource availability. **Survey technique:** • Primary survey techniques for birds include observational or acoustic surveys (EPA, 2020): ○ these may involve fixed time and position counts, transect searches and/or area searches	**Survey timing:** • Field surveys for black cockatoo species were undertaken at various intervals between October 2023 and June 2024. **Survey techniques** • Opportunistic records – observations made opportunistically during field surveys (including visual, aural, and signs of secondary evidence) were recorded. • Fixed-point count method – 11 vantage points were surveyed using the fixed-point count method across four days during two separate survey phases (totalling eight days across spring and summer). Details of flight heights, general behaviour, and number of individuals were recorded and surveys were undertaken at early morning, late morning, early afternoon, and late afternoon.

Recommended methodology	Field survey alignment
○ should be undertaken during peak activity periods typically after dawn and before dusk, avoiding wet, windy, and extremely hot conditions ○ sites should be surveyed more than once in a consistent manner at different times of the day across different days. • Habitat assessments for black-cockatoos need to be informed by field observations on the presence of breeding habitat (known, suitable or potential nesting trees), foraging habitat, or night roosting habitat (DAWE, 2022): ○ observations include presence and size of hollows, chewing around hollow entrances, feeding signs or feeding debris, and sightings of the birds and observations of their behaviour. ○ Foraging habitat assessments should be undertaken in accordance with the DCCEEW Foraging Habitat Quality Scoring Tool	• Acoustic monitoring (Songbird meter 4) - passive acoustic detectors were set to record between dusk and dawn totalling 74 trap-nights. • Habitat assessments: ○ vegetation data and habitat assessments in all representative habitat types were used to assess the suitability for foraging habitat based on DAWE (2022) ○ similarly, potential breeding habitat was assessed as any vegetation containing tree species known to be used for breeding, with records of any hollows opportunistically identified also taken. ○ Targeted breeding and foraging habitat surveys for most potential trees within or in proximity to the indicative Proposal footprint were also assessed using the Bamford (2020) method. The Bamford (Bamford Consulting Ecologists (BCE), 2020) method is adapted from the DAWE (2022) scoring method with a more detailed approach that is also aligned with the Commonwealth offset guidelines for habitat scoring.

Table 7.5 Black-Cockatoo Potential Breeding Tree Ranking

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 >8 m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in hollows <5 m 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.

Chuditch (*Dasyurus geoffroii*) and Red-tailed Phascogale (*Phascogale calura*)

Surveys for the Chuditch and Red-tailed Phascogale were undertaken in accordance with the WA EPA (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment* as outlined in **Table 7.6**.

Table 7.6 Chuditch and Red-tailed Phascogale Survey Methodology

Recommended methodology	Field survey alignment
Survey Techniques Primary recommended survey techniques listed by EPA (2020) for medium-sized mammals (>30 g , <2,500 g) include: • Box traps and cage traps. • Opportunistic records via searching for tracks and other signs. • Camera traps for which baits can be used to attract targeted fauna to camera trap monitoring area.	**Survey techniques** Opportunistic records: • Observations of fauna and fauna evidence were noted when they contributed to the accumulation of information on the fauna of the site while travelling between sites or while undertaking other activities. • General location for common species, and conservation significant species were recorded with a GPS location. **Camera traps:** • Total of 39 camera traps deployed for a month with a non-reward bait lure of a fish oil-soaked sponge in a perforated plastic container giving a total of 1,276 trap-nights across the Project Development Envelope and Additional Survey Area. • Camera images were reviewed by a qualified zoologist and all vertebrate fauna were identified to species level where possible.

Fork-tailed Swift (*Apus Pacificus*) and Peregrine Falcon (*Falco peregrinus*)

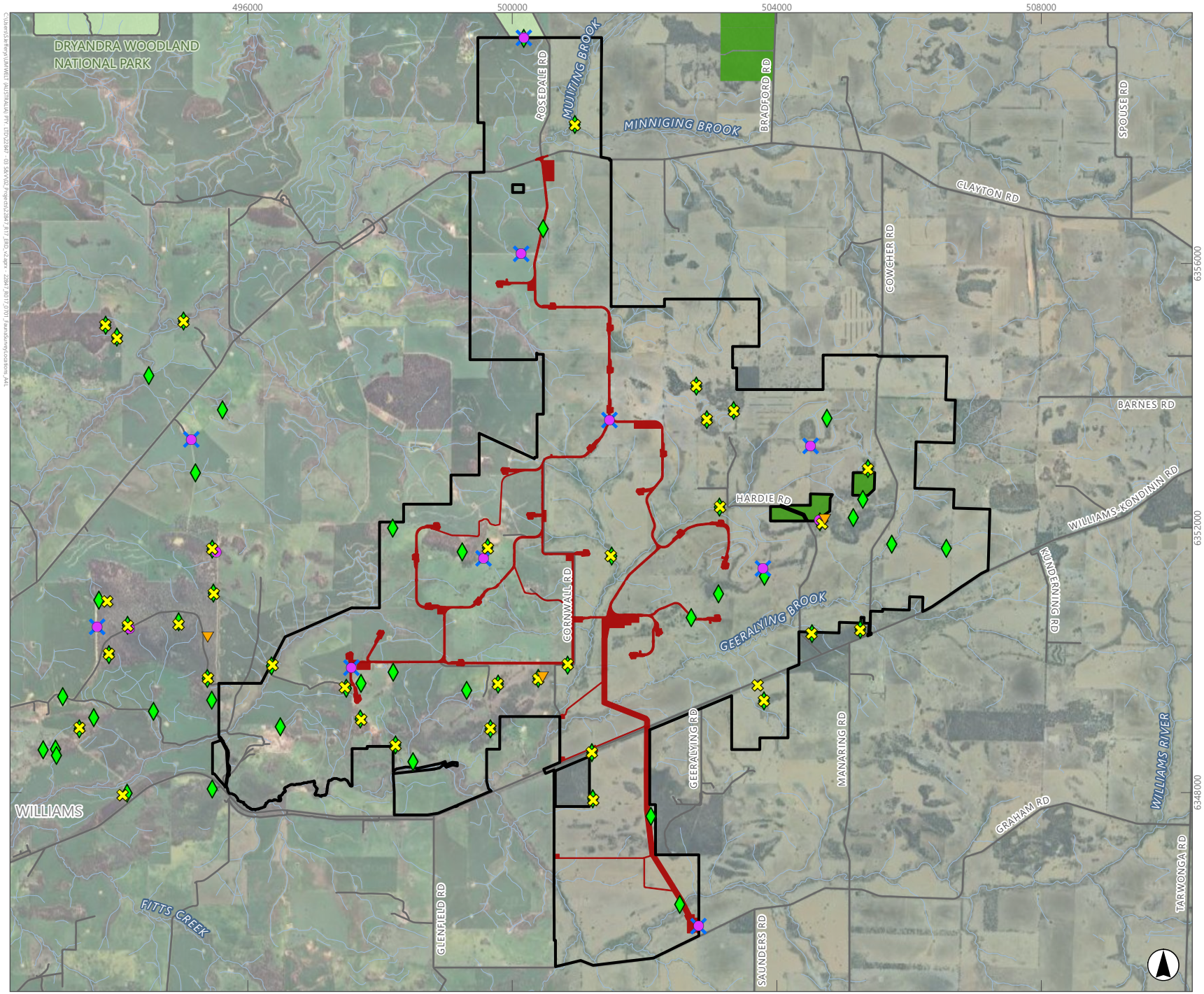
Surveys for the Fork-tailed Swifts and Peregrine Falcon were undertaken in accordance with the WA EPA (2020) *Technical Guidance – Terrestrial vertebrate fauna surveys for environmental impact assessment*, and surveys for the Fork-tailed Swift also considered the *Draft referral Guideline For 14 Birds Listed as Migratory Species Under the EPBC* (Department of the Environment, 2015) as outlined in **Table 7.7.**

Table 7.7 Fork-tailed Swift and Peregrine Falcon Survey Methodology

Recommended methodology	Field survey alignment
Survey Techniques The *Draft referral Guideline For 14 Birds Listed as Migratory Species Under the EPBC Act* lists the following considerations for surveying swifts (Department of the Environment, 2015): • Surveying should be conducted by an experienced person from an elevated viewpoint during the Austral Summer, and prevailing weather conditions should be noted as this can greatly affect the likelihood of occurrence. • Fork-tailed Swifts high in the air have a distinctive vocalisation, recognisable to experienced observers.	**Survey techniques** Fixed-point count method • 11 vantage points at high points in the landscape were surveyed using the fixed-point count method during two separate survey phases by experienced zoologists (totalling eight days across spring and summer). Details of flight heights, general behaviour, and number of individuals were recorded, and surveys were undertaken at early morning, late morning, early afternoon, and late afternoon.

• As they are transitory at most sites, it is unlikely to record occurrences during specific surveys of short duration and records from local observers should be utilised. The WA EPA (2020) Technical Guidance – Terrestrial vertebrate fauna surveys lists the following techniques for surveying bird species which may be relevant to swifts and falcons: • Opportunistic observations: All vertebrate fauna detected while travelling from one site to another/undertaking other general tasks should be recorded. The location and habitat where the signs or species were observed should be recorded. • Acoustic surveys using audible calls: Listening to the dawn chorus at a site will give an understanding of the bird species that have roosted in the area the preceding night and may identify cryptic species that are hard to detect visually.	Opportunistic observations: • All observations or evidence of fauna were noted when they contributed to the accumulation of information on the fauna of the site and recorded while travelling between sites or while undertaking other activities. • General location was recorded for common species, and conservation significant species were recorded with a GPS location. Acoustic surveys – audible calls: • Four Songmeter 4 (SM4) passive acoustic detectors were set to record between dusk and dawn with each unit secured to a tree, about 1.5 m off the ground. • The detectors recorded until the batteries ran out, giving about 18 nights per unit, or a total of 72 trap-nights. • The SM4 data were reviewed by a qualified zoologist (Malu Fauna (2024) and all bird species recorded were able to be identified.

FIGURE 7.1
Fauna Survey Locations



Legend

- Project Development Envelope
- Indicative Proposal Footprint
- Road
- Watercourse
- Nature Reserve
- National Park

Survey Effort

- Bat Detector
- Camera Trap
- Passive Acoustic Detector
- Vantage Point
- Habitat Assessment

0 1.6 3.2

Kilometres

Scale 1:80,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024), DBCA (2023)

7.3.2 Adequacy of Surveys

Exact counts of birds are limited to visual observations. As such and for the purposes of this report and data analyses, all aural observations will be assigned a count of one individual.

There were access limitations to some of the vantage point locations originally selected in the Project Development Envelope via aerial imagery for the 2023 Spring BBUS survey. These were relocated once on-site to suitable locations nearby with sufficient visual coverage of the surrounding landscape. The same locations were then utilised for the 2024 Summer BBUS survey.

Temperatures reached 40°C on the final day (February 9th) of the Summer BBUS. This may have led to a decrease in bird activity across the Project Development Envelope during the hottest part of the day.

Bat surveys were limited to use of stationary bat-detector devices recording calls of bat species. No active trapping was undertaken. Bat species density is impossible to estimate from echolocation records. Bat presence at a series of sites is therefore substituted as an approximate guide to the relative numbers of each species using the Study Area (Bat Call WA, 2024).

No other survey limitations were present.

7.3.3 Survey Findings

7.3.3.1 Desktop

Database searches of a 40 km buffer around a point central to the Project Development Envelope were undertaken to identify the vertebrate fauna that may occur in the area. The following databases were searched:

- Atlas of Living Australia (ALA) Database (2024)
- Dandjoo (DBCA, 2023)
- DBCA's Threatened and Priority Fauna Database (DBCA, 2023d)
- EPBC Act Protected Matters Search Tool (DCCEEW, 2024b)
- Index of Biological Surveys for Assessment (IBSA) Database (EPA, 2020).

Based on these searches, faunal assemblage with the potential to occur included up to 12 frogs, 46 reptiles, 158 birds, 27 native mammals and five introduced mammals.

Table 7.8 presents the number of vertebrate species potentially occurring in the Project Development Envelope, along with the conservation status for species listed under the BC Act. Western Wildlife (2024) notes that as most of the habitat in the Project Development Envelope is degraded, particularly the understory vegetation, the faunal assemblage is likely to be less species rich than in undisturbed habitats and it is unlikely that all of the potential species occur. However, as these species all occur in the region, and there are large areas of remnant vegetation in close proximity to the Project Development Envelope, it is difficult to state with certainty which of these species do or do not occur.

Table 7.8 Summary of Vertebrate Fauna Potentially Occurring in the Project Development Envelope

Taxon	Predicted Species	Introduced Species	Conservation Significant Species			
			Threatened	Migratory	Specially Protected	Priority
Amphibians	12	0	-	-	-	-
Reptiles	46	0	-	-	-	1
Birds	158	3	5	2	1	3
Mammals	32	5	4	-	1	6
Total	**248**	**8**	**9**	**2**	**2**	**10**

Interrogation of the DBCA Threatened and Priority Fauna database (2023d) identified 65 listed fauna species that could potentially occur within areas that may be cleared within the Transport Development Envelope. It should be noted that the Transport Development Envelope covers a liner distance of approximately 150 km, thereby increasing the numbers of listed fauna that may occur within it.

7.3.3.2 Fauna Habitats

Five broad habitat types were mapped within the Project Development Envelope by Western Wildlife (2024) (**Appendix E**). Further details on these mapped habitats are described in **Table 7.9** and illustrated in **Figure 7.2**.

Specific habitat requirements for conservation significant species with a moderate or greater likelihood of occurrence are described in **Section 7.3.4** (threatened species) and **7.3.5** (specially protected species and priority species).

Table 7.9 Fauna Habitats of the Project Development Envelope

Habitat Type	Important Habitat Elements	Area (ha)
Eucalypt woodland on laterite rise	• Laterite outcropping and surface rocks provide shelter habitat for reptiles. • Fallen timber, logs, woody debris, and leaf litter provides shelter for reptiles and small mammals. • Tree hollows provide habitat for hollow nesting birds, roosting bats, and some arboreal reptiles and mammals. • Where present, Marri (*Corymbia calophylla*), Jarrah (*Eucalyptus marginata),* and/or an understory of shrubby *Banksia* (e.g. *B. sessilis*) may provide foraging habitat for Threatened black cockatoos. • Wandoo (*Eucalyptus wandoo*), Jarrah and Marri potentially provide breeding habitat for black-cockatoo species listed under the BC Act and EPBC Act.	404.6
Eucalypt-Sheoak woodland with granites	• Fallen timber, logs, woody debris, and leaf litter provides shelter for reptiles and small mammals. • Tree hollows provide habitat for hollow nesting birds, roosting bats and some arboreal reptiles and mammals. • Dense vegetation provides nesting habitat for birds. • Exfoliating rock on granite outcrops and granite boulders provide shelter for reptiles. • Ephemeral rock pools and seasonally wet runoff areas provide breeding habitat for frogs. • York Gum (*Eucalyptus loxophleba*) or Wandoo potentially provide breeding habitat for Threatened black-cockatoos.	181

Habitat Type	Important Habitat Elements	Area (ha)
Creekline	• Tree hollows may support breeding and roosting by birds, bats and arboreal reptiles. • Fallen timber and hollow logs may provide shelter for reptiles and mammals. • Seasonally wet areas may provide frog breeding habitat. • Linear corridors of vegetation may provide 'wildlife corridors' promoting the movement of fauna through the landscape. • Where present, Marri (C*orymbia calophylla*) may provide foraging habitat for Threatened black cockatoos. • Where present, Marri, Flooded Gum (*Eucalyptus rudis*) and York Gum (*Eucalyptus loxophleba*) potentially provide breeding habitat for Threatened black-cockatoos.	563
Planted	• Linear corridors of vegetation may provide 'wildlife corridors' promoting the movement of fauna through the landscape.	96.7
Cleared	• Pasture may provide foraging habitat for macropods and birds that forage in open habitats. • Crops such as Canola may provide foraging habitat for birds, including Carnaby's Black-Cockatoo. • Farm dams may provide frog breeding habitat and breeding and foraging habitat for a small number of waterbirds. • Isolated paddock trees may provide foraging and/or breeding habitat for birds and roosting habitat for bats.	5,098.9

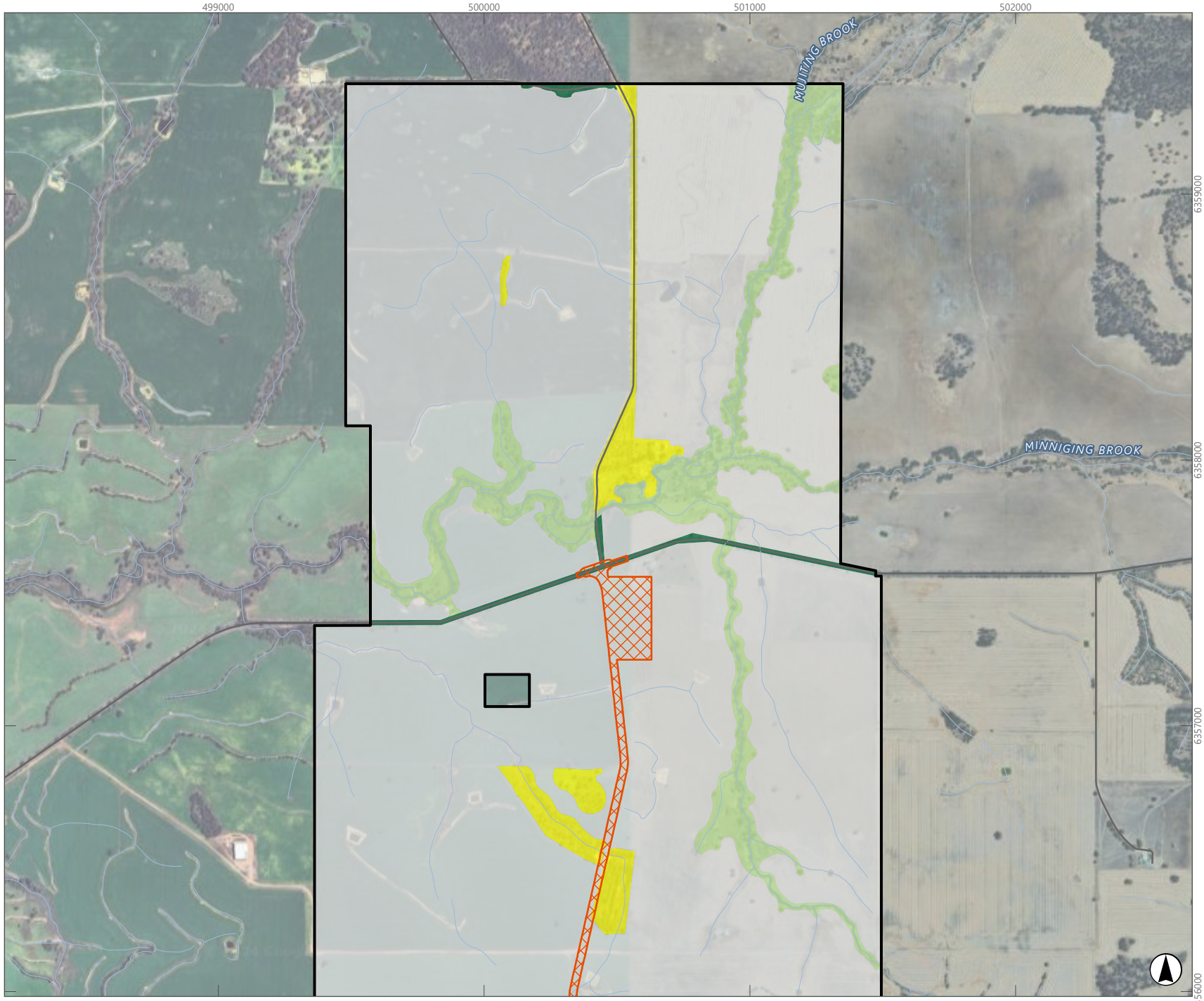


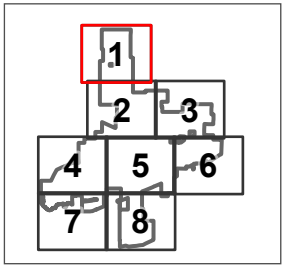
FIGURE 7.2.1
Terrestrial Fauna Habitats of the Project Development Envelope

Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



0 400 800

Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

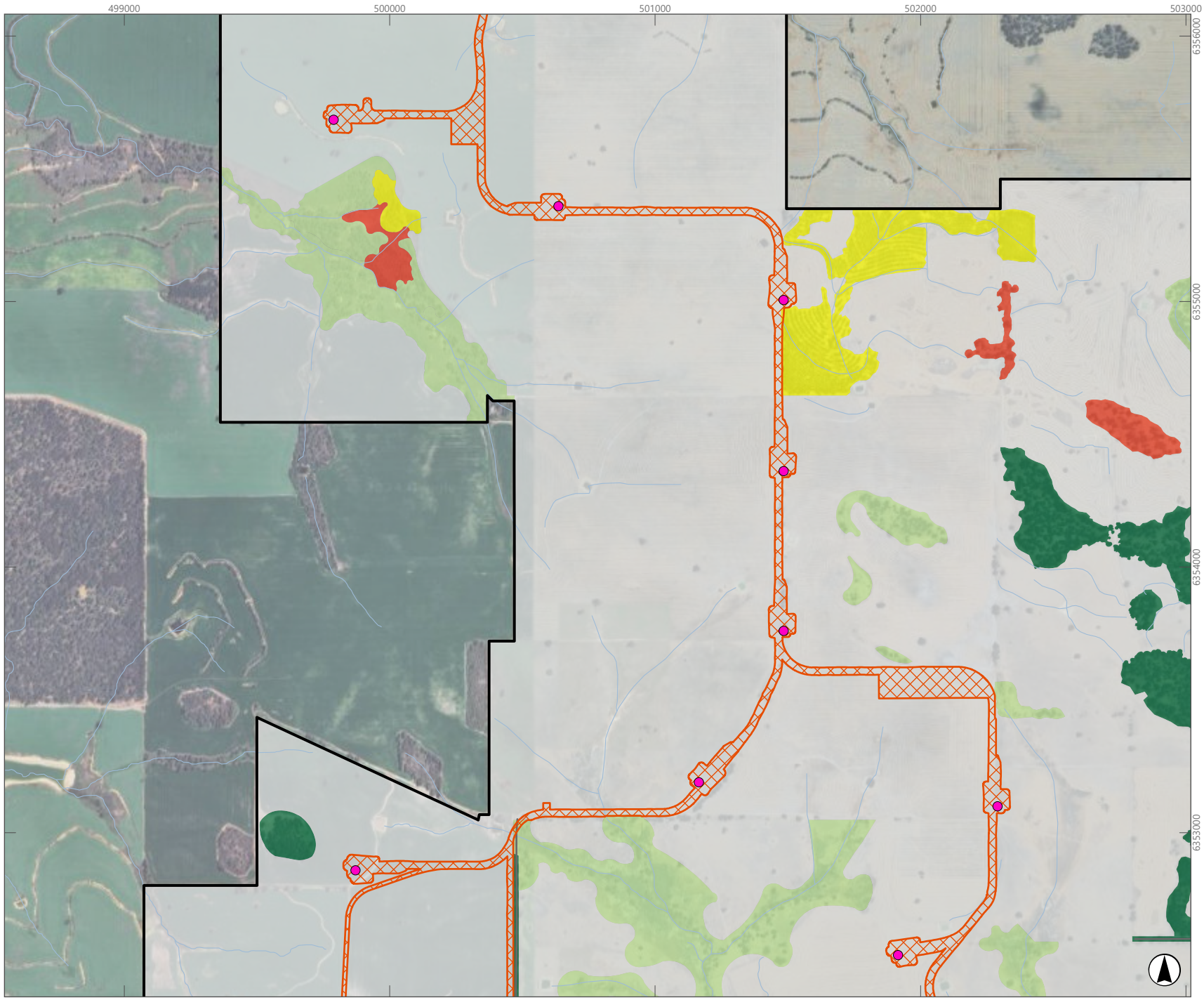


FIGURE 7.2.2

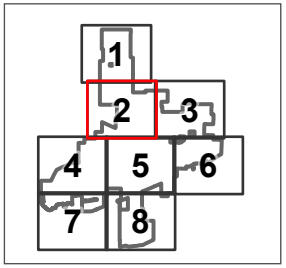
Terrestrial Fauna Habitats of the Project Development Envelope

Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt - Sheoak woodland with granites
- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



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Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

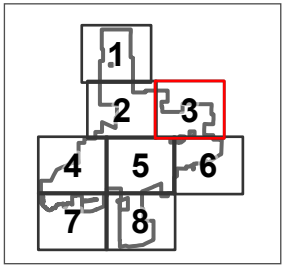
FIGURE 7.2.3
Terrestrial Fauna Habitats of the Project Development Envelope

Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt - Sheoak woodland with granites
- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



0 400 800

Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

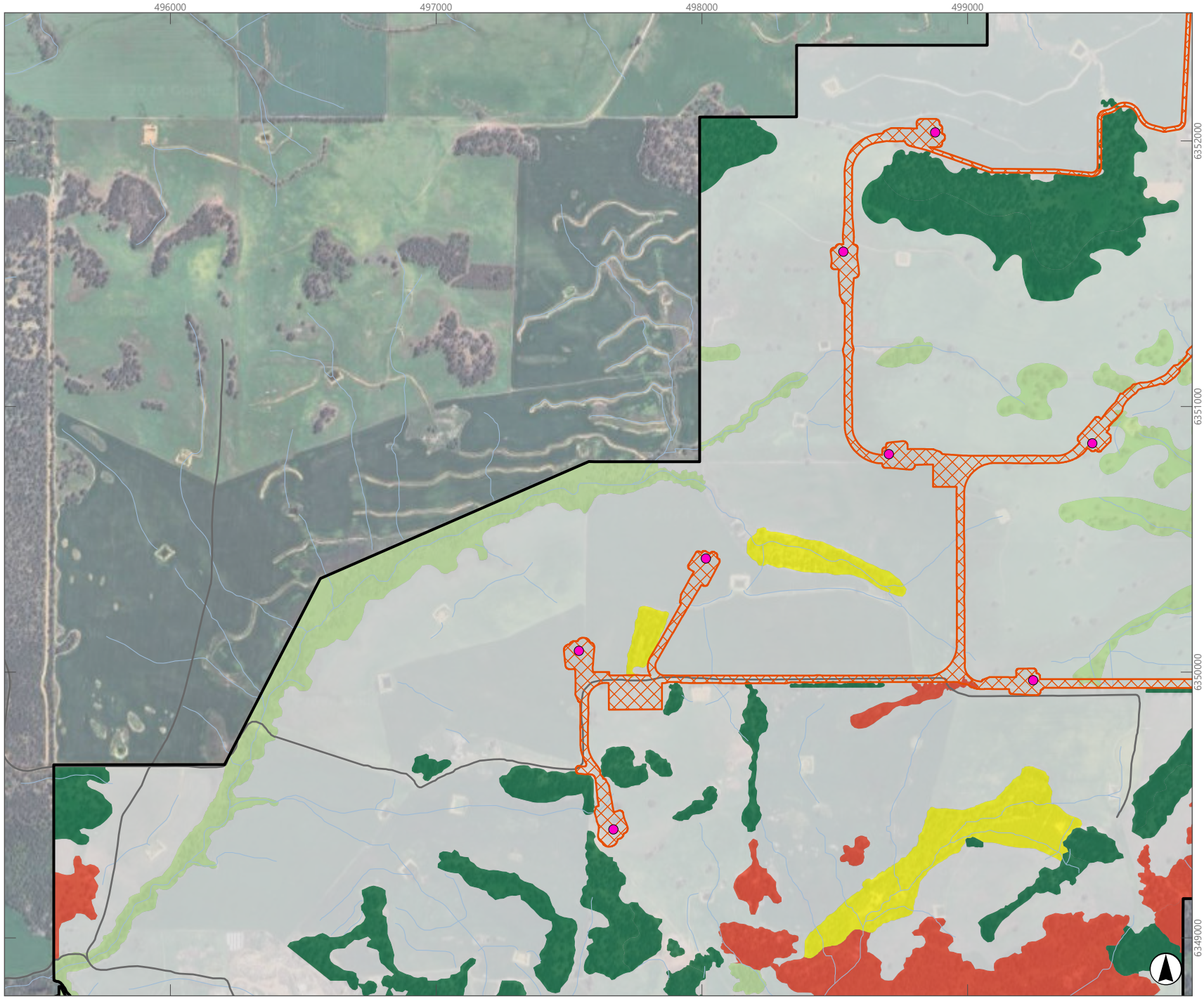


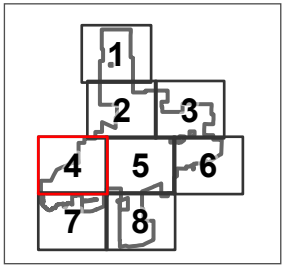
FIGURE 7.2.4
Terrestrial Fauna Habitats of the Project Development Envelope

Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt - Sheoak woodland with granites
- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



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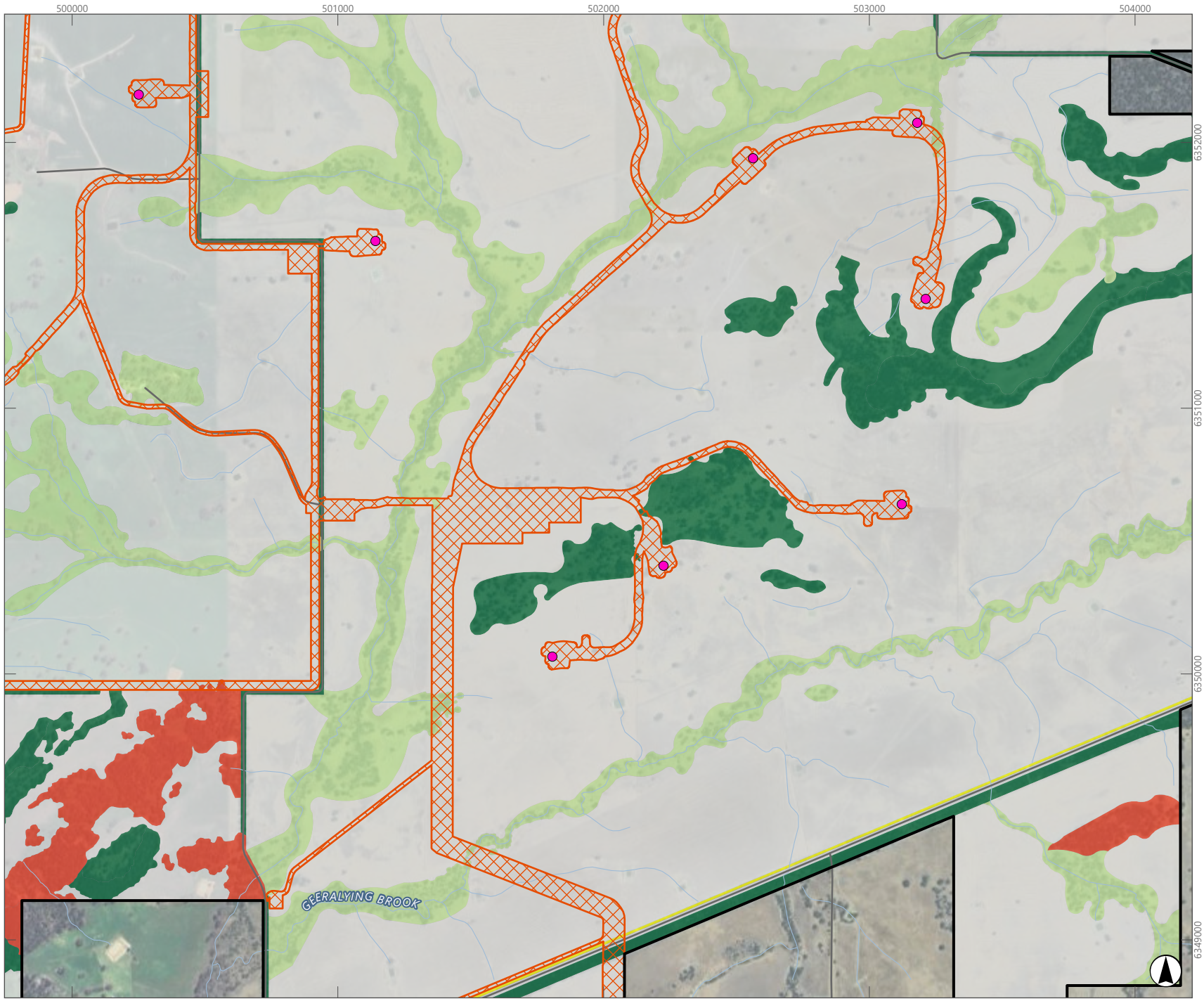
Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

FIGURE 7.2.5
Terrestrial Fauna Habitats of the Project Development Envelope

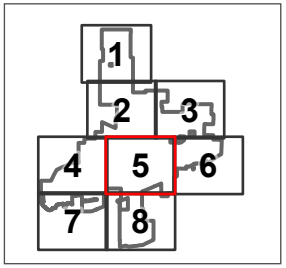


Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt - Sheoak woodland with granites
- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



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Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

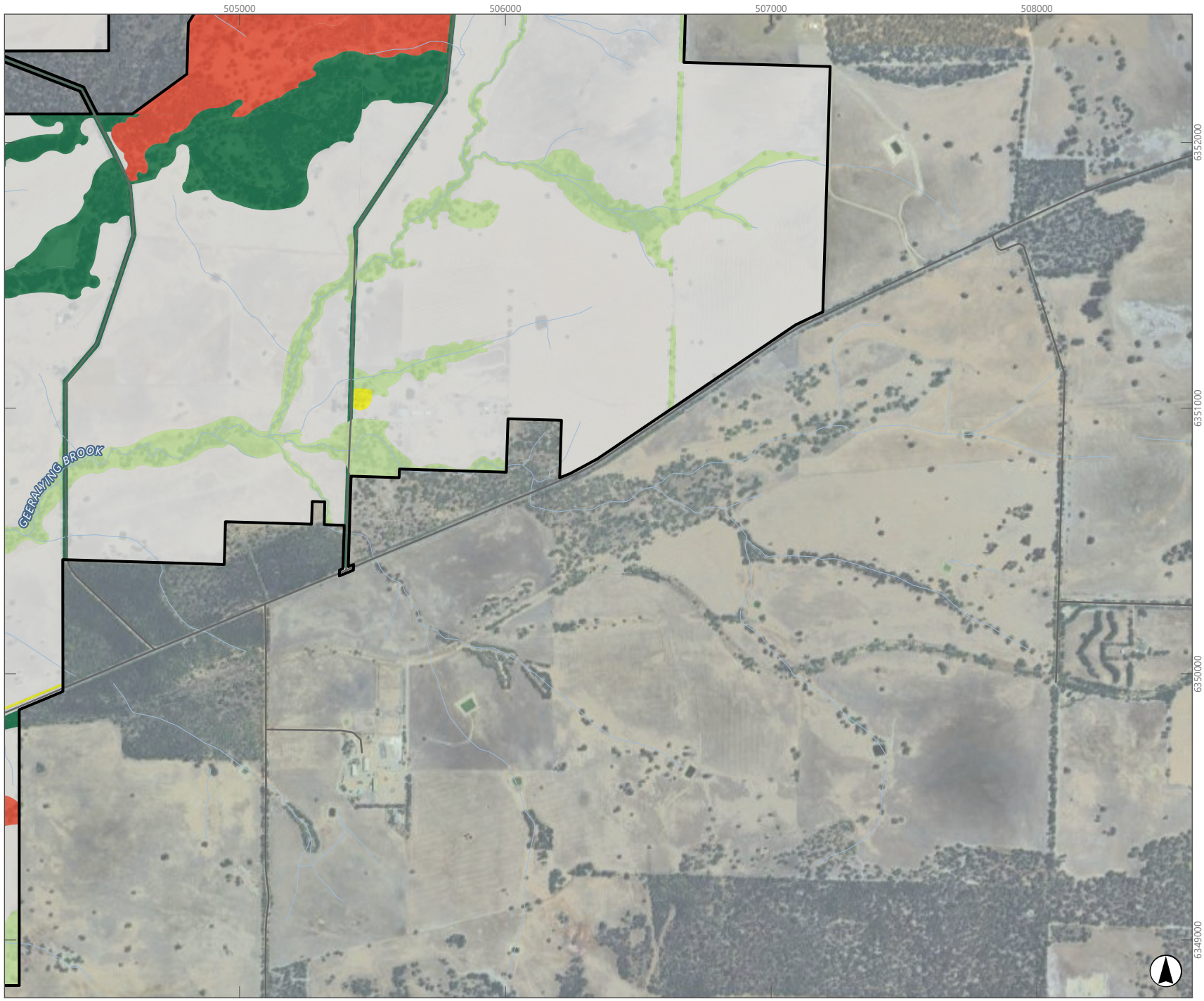


FIGURE 7.2.6

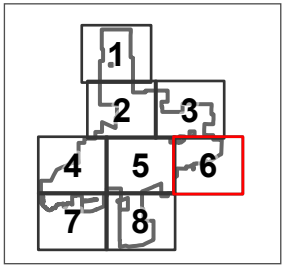
Terrestrial Fauna Habitats of the Project Development Envelope

Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt - Sheoak woodland with granites
- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



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Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

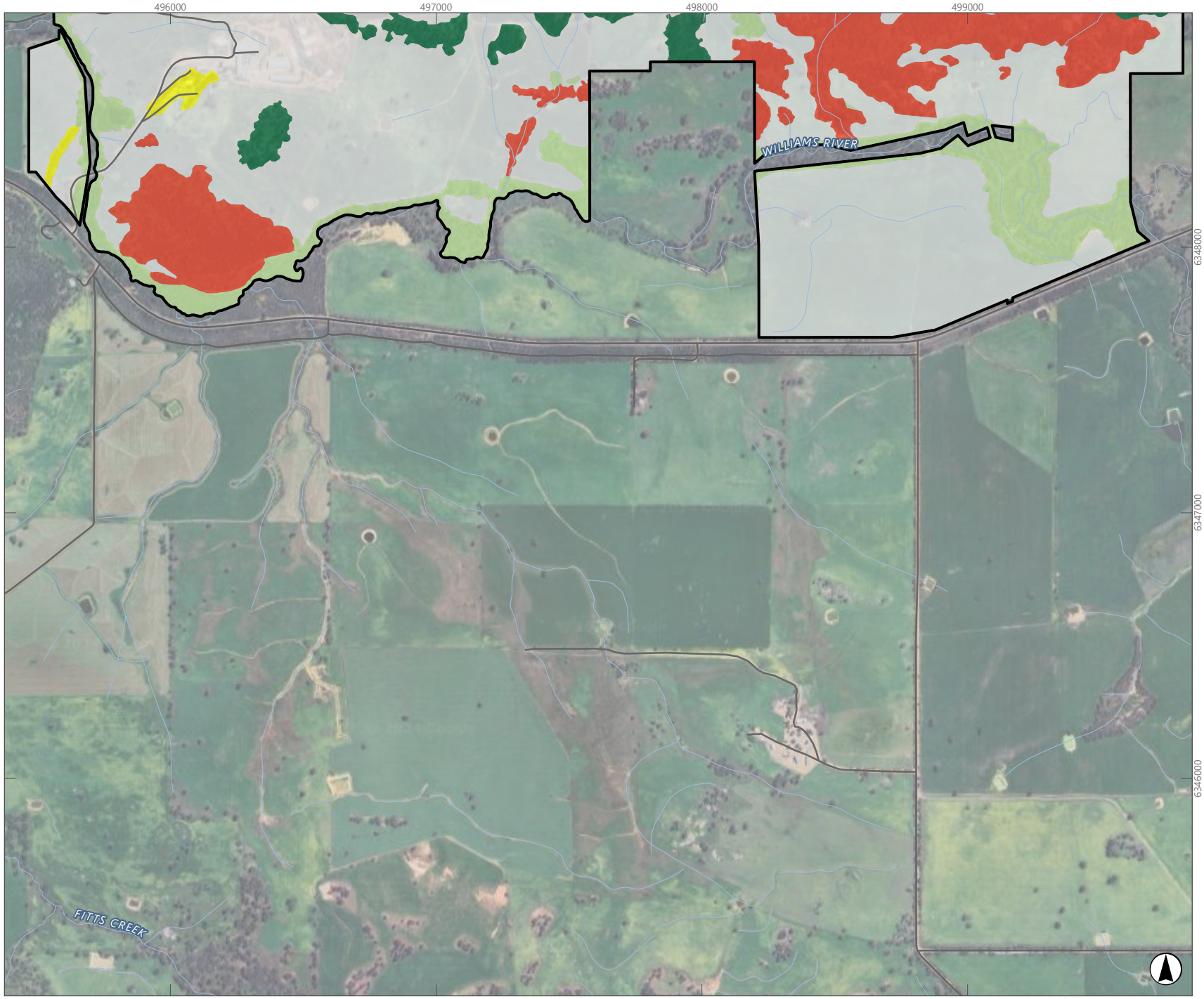


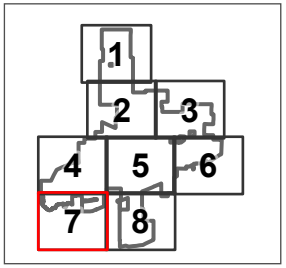
FIGURE 7.2.7
Terrestrial Fauna Habitats of the Project Development Envelope

Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt - Sheoak woodland with granites
- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



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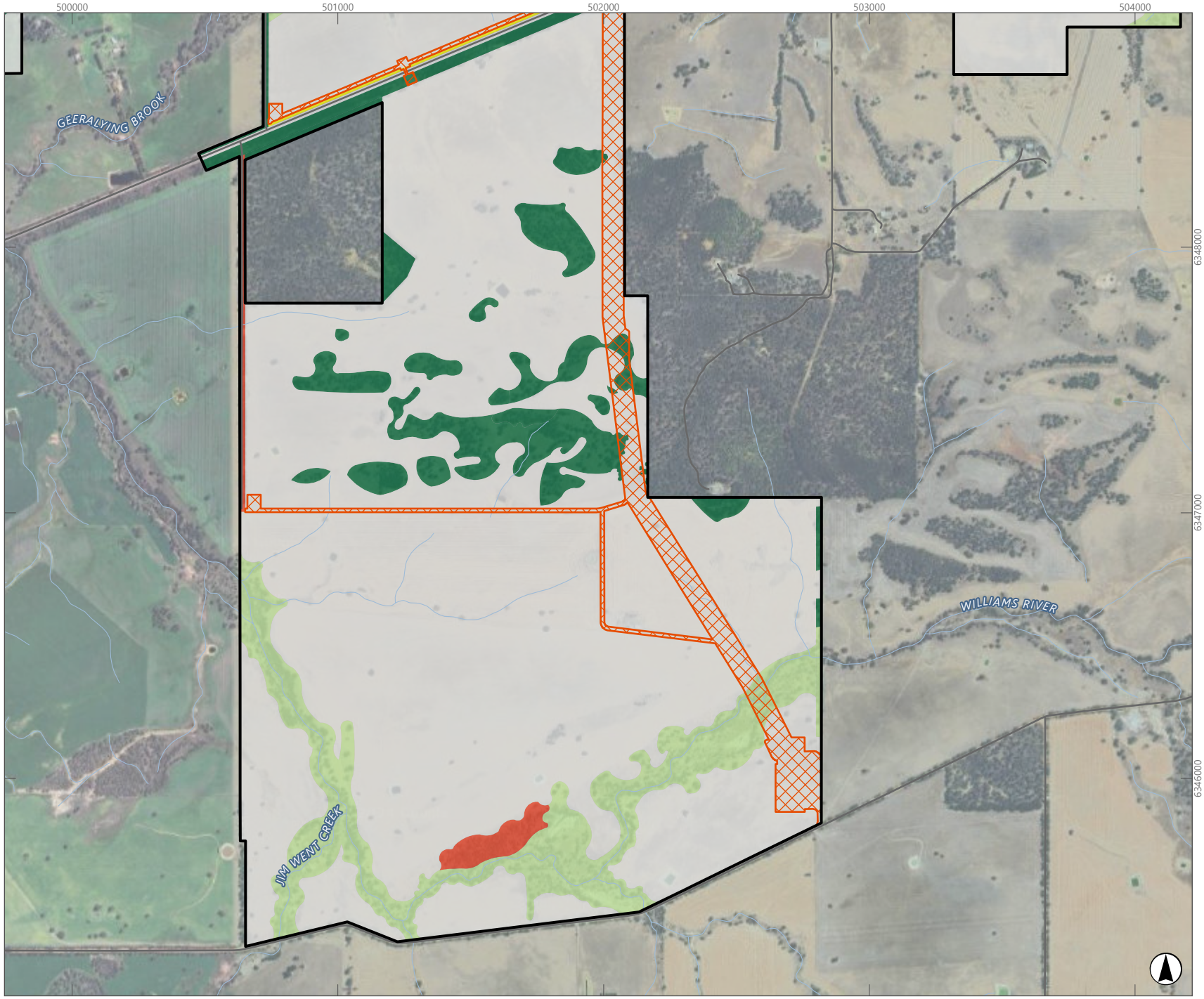
Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

FIGURE 7.2.8
Terrestrial Fauna Habitats of the Project Development Envelope

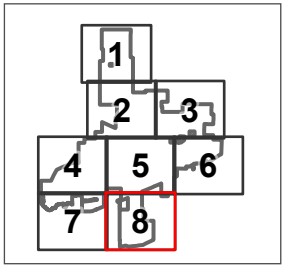


Legend

- Project Development Envelope
- WTG Location
- Indicative Proposal Footprint
- Road
- Watercourse

Fauna Habitats

- Eucalypt - Sheoak woodland with granites
- Eucalypt woodland on laterite rise
- Creekline
- Planted
- Cleared



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Metres

Scale: 1:20,000 at A4

GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024)

7.3.3.3 Vertebrate Fauna

Field surveys within the Project Development Envelope recorded 111 fauna species, comprising 90 birds, 17 mammals (including 8 bats), 3 reptiles and 1 amphibian. These records are unlikely to represent all the species present, as the methods used to observe fauna in this survey targeted certain fauna classes, and those such as reptiles are likely to be underrepresented in the results.

Seven listed fauna species were recorded within the Project Development Envelope during the fauna survey program, as outlined in **Table 7.10**. The locations of these records are shown on **Figure 7.3**.

Table 7.10 Listed Fauna Species Recorded within Project Development Envelope

Common Name	Scientific Name	EPBC Act	BC Act	DBCA Priority	Notes
Threatened Species					
Carnaby's Black-Cockatoo	*Zanda latirostris*	EN	EN	-	Foraging evidence recorded in the Project Development Envelope during field survey and recorded visually and aurally in the Additional Survey Area. A seasonal visitor, this species is likely to forage and/or roost in the Project Development Envelope and may breed in large tree hollows, though no active or historical evidence of breeding was recorded.
Chuditch	*Dasyurus geoffroii*	VU	VU	-	Recorded on a single camera trap on a single night within the Project Development Envelope. Resident in Dryandra Woodland National Park, this species is very mobile and likely to occur in the Project Development Envelope, at least for dispersal. Hollow logs and burrows are important for this species.
Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	VU	VU	-	Foraging evidence recorded during field surveys within the Project Development Envelope. A seasonal visitor, this species may forage and/or roost in the Project Development Envelope and may breed in large tree hollows, though no active or historical evidence of breeding was recorded.
Specially Protected					
Peregrine Falcon	*Falco peregrinus*	-	OS	-	Observed during field survey. A foraging visitor over pasture that may breed in tall trees.
Red-tailed Phascogale	*Phascogale calura*	VU	CD	-	Recorded on a single camera trap within the Project Development Envelope and two camera traps within the Additional Survey Area. The Project Development Envelope is within the range of this species, there are many records in the surrounding area and there is potentially suitable habitat available in woodlands.

Common Name	Scientific Name	EPBC Act	BC Act	DBCA Priority	Notes
DBCA Priority Fauna					
Inland Western Rosella	*Platycercus icterotis xanthagenys*	-	-	P4	Observed during field survey in the Additional Survey Area. This species is likely to be an uncommon breeding resident of woodlands in the Project Development Envelope.
Western False Pipistrelle	*Falsistrellus Mackenzie*	-	-	P4	Recorded during the field survey in all habitats within the Project Development Envelope. The detection rate was unexpected, potentially indicating that there is a seasonal presence in the area attracted by flowering vegetation (Bat Call WA, 2024)

Key to status: Cr = Critically Endangered, En = Endangered, Vu = Vulnerable, Mi = Migratory, OS = Other Specially Protected, CD = Conservation Dependent, P1 – P4 = Priority 1 – 4, LS = Locally Significant.

In the areas surveyed along the potential transport route, three species of conservation significance were recorded indirectly. Clearing has been avoided at all these locations through modifications to the route and they will not be impacted. These species and locations are as described below:

- Forest Red-tailed Black-Cockatoo: foraging evidence (Marri) was noted at the intersection of Forrest Hwy and Raymond Dr (old debris) and at Cameron Rd (Collie) (recent and intermediate-aged debris).
- Baudin's Black-Cockatoo: foraging evidence (Marri) was noted at the intersection of Forrest Hwy and Raymond Dr (recent debris) and at Cameron Rd (Collie) (intermediate and old debris).
- Western Ringtail Possum: old dreys (no fresh material, not occupied) were recorded at the intersection of Forrest Hwy and Raymond Dr.

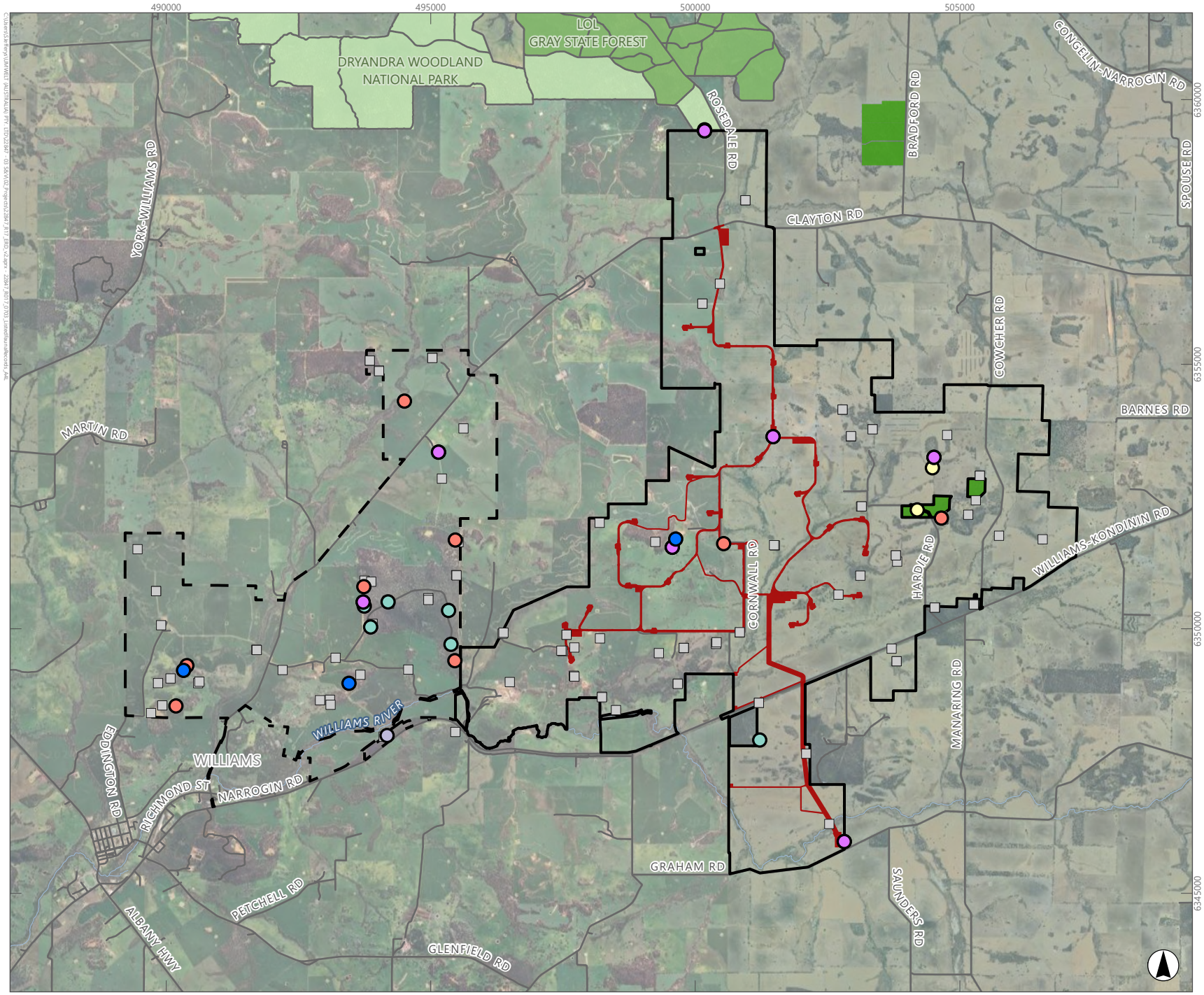


FIGURE 7.3

Listed Fauna Records within Project Development Envelope and Additional Survey Area

Legend

- Project Development Envelope
- Additional Survey Area
- Indicative Proposal Footprint
- Road
- Major Watercourse
- Nature Reserve
- National Park
- State Forest
- Fauna Survey Effort
- Carnaby's Black-Cockatoo (*Zanda latirostris*)
- Forest Red-tailed Black Cockatoo (*Calyptorhynchus banksii naso*)
- Peregrine Falcon (*Falco peregrinus*)
- Western Rosella (*Platycercus icterotis*)
- Red-tailed Phascogale (*Phascogale calura*)
- Western False Pipistrelle (*Falsistrellus mackenziei*)

0 2 4

Kilometres

Scale 1:100,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2024), DBCA (2023), Western Wildlife (2024)

Introduced Fauna

Of the 111 fauna species recorded in the Project Development Envelope, eight are introduced (three bird and five mammals), representing 7% of the total fauna recorded. The introduced fauna recorded were:

- Laughing Kookaburra (*Dacelo noveguineae*)
- Black Rat (Rattus rattus)
- European Red Fox (Vulpes vulpes)
- Feral Cat (*Felis catus*)
- European Rabbit (Oryctolagus cuniculus)
- House mouse (*Mus musculus*)
- Domestic (Feral) Pigeon (*Columba livia*)
- Spotted Turtle Dove (*Spilopelia chinensis*).

7.3.3.4 Likelihood of Occurrence for Listed Fauna Species

A likelihood of occurrence assessment was undertaken for listed vertebrate fauna species within the Project Development Envelope. The assessment is based on that provided in Western Wildlife (2024) (**Appendix E)** and has been revised against the desktop assessment results and any records obtained during the BBUS surveys (provided as part of **Appendix F**). The results for those species assessed as having a moderate likelihood of occurrence or greater in the Project Development Envelope are presented in **Table 7.11.**

Table 7.11 Likelihood of Occurrence Summary for Listed Fauna Species in the Project Development Envelope

Common Name	Scientific Name	EPBC Act Status (Cth)	BC Act Status (WA)
Known			
Carnaby's Black-Cockatoo	*Zanda latirostris*	Endangered	Endangered
Chuditch	*Dasyurus geoffroii*	Vulnerable	Vulnerable
Forest Red-Tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	Vulnerable	Vulnerable
Red-tailed Phascogale	*Phascogale calura*	Vulnerable	Conservation Dependent
Peregrine Falcon	*Falco peregrinus*	Not listed	Other specially protected
Western Rosella (inland)	*Platycercus icterotis xanthogenys*	Not listed	Priority 4
Western False Pipistrelle	*Falsistrellus mackenziei*	Not listed	Priority 4
High			
Central Long-eared Bat	*Nyctophilus major tor*	Not listed	Priority 3

Moderate			
Barking Owl (southwest subpop.)	*Ninox connivens connivens (southwest subpop.)*	Not listed	Priority 3
Baudin's Black-Cockatoo	*Zanda baudinii*	Endangered	Endangered
Fork-tailed Swift	*Apus pacificus*	Migratory	Migratory
Masked Owl (southern subspecies)	*Tyto novaehollandiae novaehollandiae*	Not listed	Priority 3

No conservation significant species have a known or high likelihood of occurrence in the Transport Development Envelope. The Chuditch, Red-tailed Phascogale, Brush-tailed Phascogale, Quenda, and Western Falsistrelle have a moderate likelihood of occurrence. All surveyed areas along the potential transport route with conservation significant species with a known or high likelihood of occurrence have been avoided as part of the transport route design.

7.3.4 Threatened Species Occurrence and Potential Habitat

Further information on distribution, occurrence, threats and potential habitat within the Project Development Envelope is provided below for species listed as threatened under the BC Act with a Moderate or higher likelihood of occurrence.

7.3.4.1 Threatened Black Cockatoo Species

The three species of black cockatoo are listed under the BC Act as follows:

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

The following sections describe the distribution and habitat requirements, threats, and occurrence and potential habitat in the Project Development Envelope and broader region for these species.

Distribution and Habitat Requirements

The Forest Red-tailed Black-Cockatoo is endemic to the south-west of Western Australia, from around Gingin in the north, east to Mount Helena, North Bannister and Mount Saddleback, and south to around Albany (Johnstone & Storr, 2004). In recent years there appears to have been a distinct expansion of the range of this species to the Swan Coastal Plain, including many suburbs within the Perth metropolitan area, as well as east into the Wheatbelt region. The species is generally restricted to areas of Jarrah-Marri forest, farmlands with remnant trees and urban landscapes. They are currently considered not to undergo regular migration, but may make seasonal movements in response to food resource and water availability (DCCEEW, 2024a).

Baudin's Cockatoo is endemic to the south-west of Western Australia, from around Perth to around Albany. Similar to the Forest Red-tailed Black-Cockatoo, there appears to have been an expansion of the range of this species on to the Swan Coastal Plain in recent years, including many suburbs within the Perth metropolitan area. It is generally restricted to areas of Jarrah-Marri forest and farmlands with remnant trees or pine plantations. This species is not expected to regularly occur within the Project Development

Envelope and has thus been assigned a Moderate likelihood of occurrence due to its potential as an occasional or irregular visitor.

The Forest Red-tailed Black-Cockatoo and Baudin's Black-Cockatoo are both diurnal granivores, feeding predominantly on the seeds of Jarrah and Marri (Johnstone et al., 2013a; Johnstone & Kirkby, 2019) though they have also adapted to foraging on urban (introduced) plant species. They are reliant on large tree-hollows in eucalypts (especially Marri) for breeding (DAWE, 2021a, DAWE, 2021b; Johnstone et al., 2013b). The Forest Red-tailed Black-Cockatoo may preferentially use hollows that are in close proximity to each other, rather than hollows throughout the landscape (Johnstone et al., 2013a).

Carnaby's Black-Cockatoo is endemic to south-western Western Australia, from Kalbarri in the north, east to Merredin and Ravensthorpe, and then further east along the south coast to the Esperance area (DAWE, 2021c; Johnstone & Storr, 1998). They breed (July to December) predominantly in the east of its range with a migration to coastal areas in the non-breeding period. In recent years, however, the species has expanded its breeding range westward and south into the Jarrah-Marri forests of the Darling Scarp and into the Tuart forests of the Swan Coastal Plain (DAWE, 2021c). Carnaby's Black-Cockatoo are heavily reliant on areas of Banksia woodland and proteaceous shrubland/heath for foraging (DAWE, 2021c; Johnstone & Storr, 1998).

Carnaby's Black-Cockatoo are diurnal granivores, feeding predominantly on the seeds of the Proteaceae (especially banksias), but are also known to feed on a very wide variety of plants, including non-native ornamentals and plantation species such as pine (DAWE, 2021c; DPAW, 2013; Groom, 2011; Johnston et al., 2016; Valentine & Stock, 2008). They are reliant on large tree-hollows in eucalypts (especially smooth barked species such as Wandoo and Salmon Gum) for breeding (DAWE, 2021c; Johnstone & Storr, 1998; Saunders, 1974).

Threats

Key threats to the Forest Red-tailed Black Cockatoo and Baudin's Black-Cockatoo are habitat loss, habitat degradation, nest hollow shortage, and competition for available nest hollows from other parrots and feral honeybees (DAWE, 2021a, DAWE, 2021b). Feral honeybees (*Apis mellifera*) pose a significant threat to the ability of black cockatoo species to survive and breed, and hollow invasion by feral honeybees is likely to increase with the southward movement of bees in response to the predicted warmer climate in south-west WA (Department of Environment and Conservation (DEC), 2008).

Key threatening processes for Carnaby's Black-Cockatoo include habitat loss, habitat degradation, nest hollow shortage, and competition for available nest hollows from other parrots and feral honeybees, illegal shooting, and illegal trade (Burbidge, 2004; DAWE. 2021c). As per the species SPRAT database, other recognised potential threats to the species include:

- Decline in tree health due to *Phytophthora cinnamomi* or 'dieback' (root rot).
- Decreasing rainfall, changes to rainfall patterns and higher temperatures in the south-west of Western Australia due to climate change.
- Fire events leading to loss of productive foraging habitat.
- Vehicle strike.
- Low rate of recruitment which is likely to limit the ability to sustain or recover numbers.

While the above threatening processes are not specified for the Forest Red-tailed Black-Cockatoos or Baudin's Black-Cockatoos, it is likely that these same processes also apply.

Occurrence and Potential Habitat in the Broader Region and in the Study Area

Within the broader region, there is approximately 27,255 ha of land managed and protected for conservation purposes within a 20 km radius of the Study Area and approximately 9,268 ha within a 12 km radius (DBCA, 2024). Much of this land consists of the Lol Gray State Forest and Dryandra Woodland National Park located to the north of the Project Development Envelope, which have a number of records for these species in the eBird (Cornell Lab of Ornithology, 2024) database and is known to contain habitat species suitable for black cockatoo foraging, breeding, and roosting.

The WA Department of Primary Industries and Regional Development has mapped a total of 49,139 ha of native vegetation within a 20 km radius of the Project Development Envelope, and 19,934 ha within a 12 km radius (DPIRD, 2023), much of which is located within the lands managed and protected for conservation captured above but also includes remnant roadside vegetation and native vegetation occurring within freehold land.

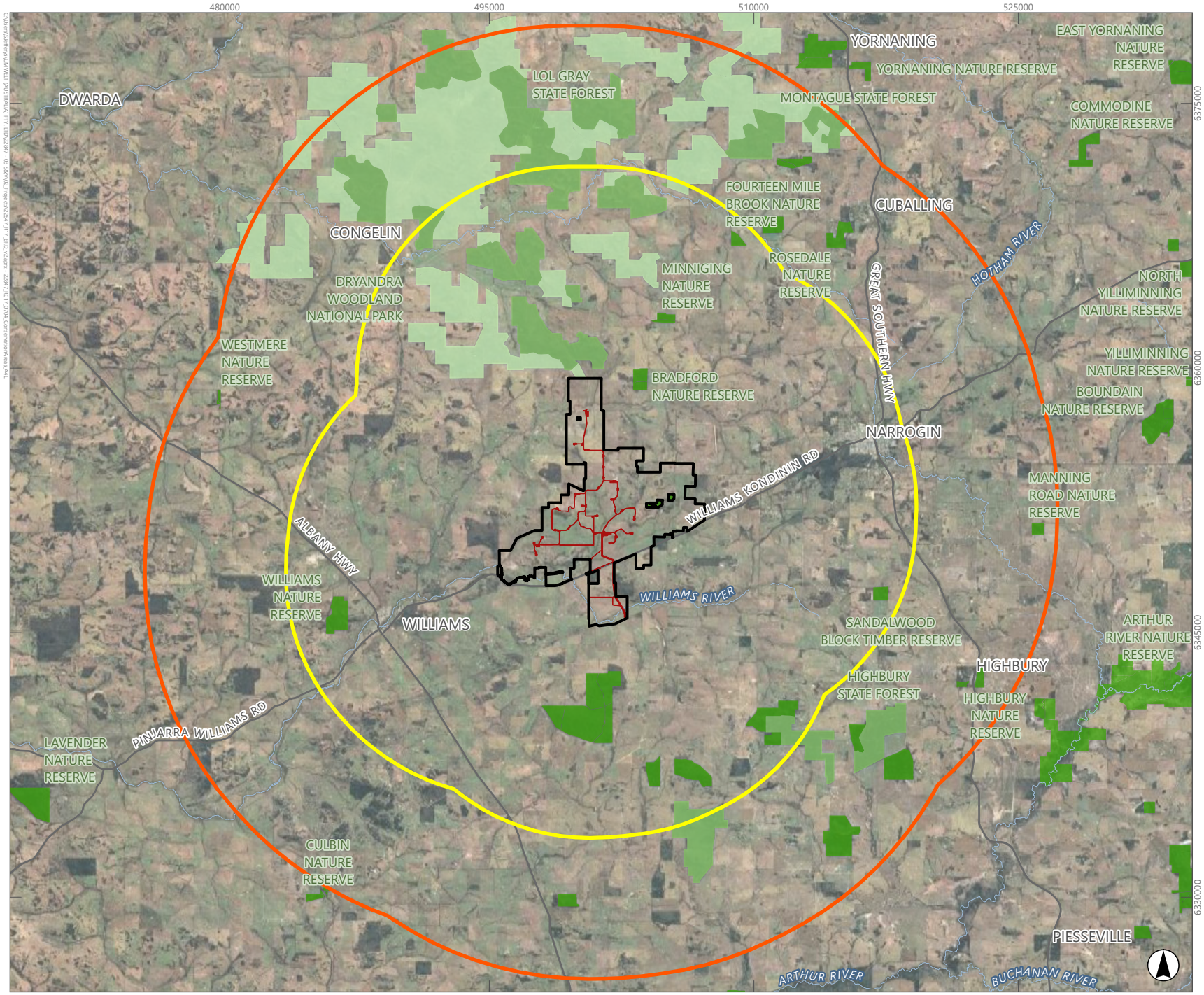


FIGURE 7.4

Conservation Areas within a 12km and 20km Radius of the Project Development Envelope

Legend

- Project Development Envelope
- Indicative Proposal Footprint
- 12 km Buffer
- 20 km Buffer
- Road
- Major Watercourse
- Nature Reserve
- National Park
- State Forest

0 6 12

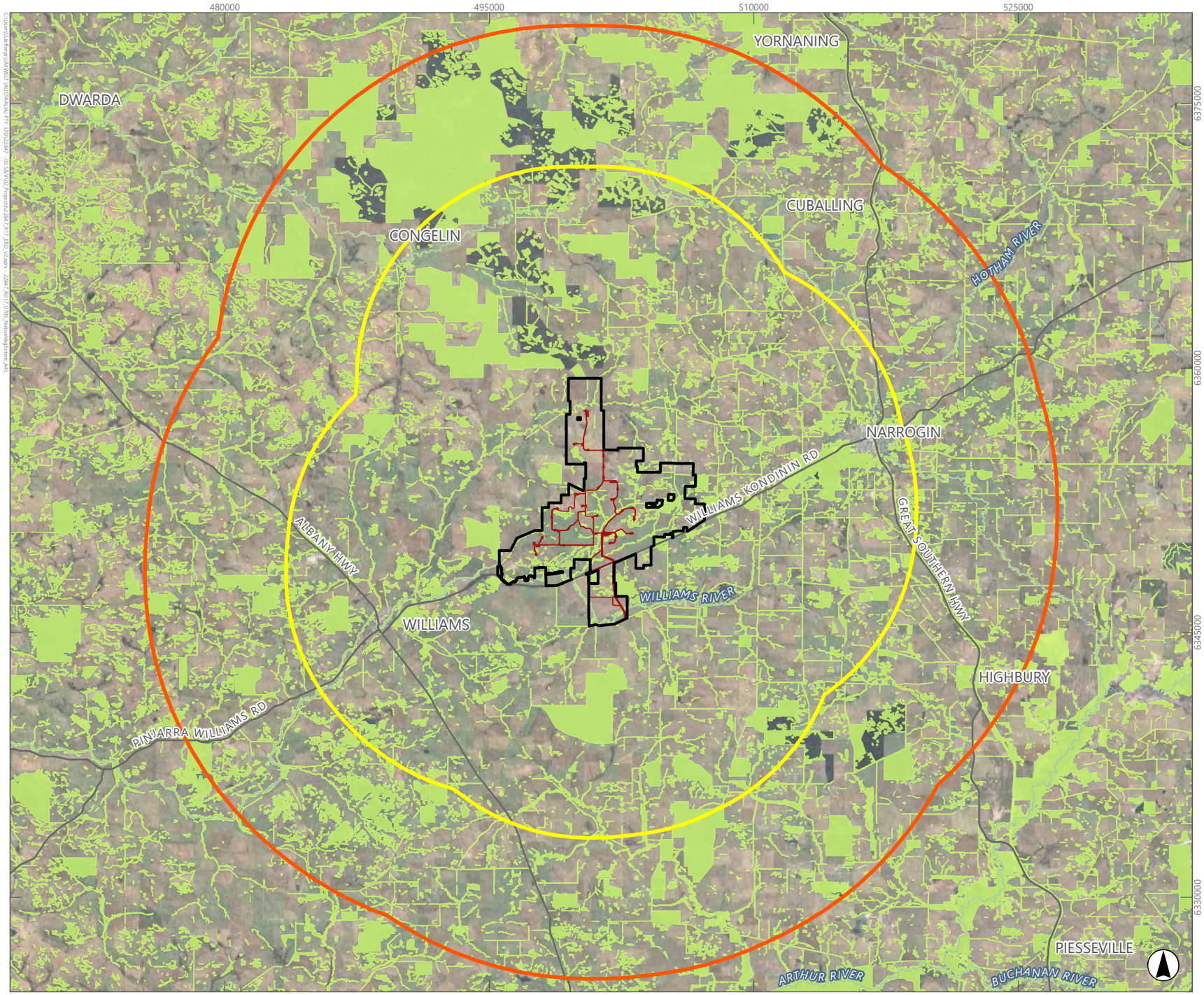
Kilometres

Scale 1:300,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2023), DBCA (2023)

FIGURE 7.5

Native Vegetation Extent within a 12 km and 20 km Radius of the Project Development Envelope



Legend

- Project Development Envelope
- Indicative Proposal Footprint
- 12 km Buffer
- 20 km Buffer
- Road
- Major Watercourse
- Native Vegetation Extent (DPIRD-005)

0 6 12

Kilometres

Scale 1:300,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2023), DPIRD (2023)

To understand the occurrence of black cockatoos within the Project Development Envelope, surveys were undertaken in accordance with the EPA *Technical Guidance for Terrestrial Vertebrate Surveys*, while ecological values were based on the definitions of breeding, foraging, and roosting habitat as per the EPBC Act referral guidelines. These were later refined to targeted fine-scale mapping within areas of the Indicative Proposal Footprint using the Bamford (2020) method (**Appendix G**) which adapts and expands upon the EPBC Act referral guidelines for scoring black-cockatoo habitat. A desktop assessment of records within the region surrounding the Project was also undertaken to understand species' utilisation and occurrence in the wider area.

There was no direct or indirect evidence (e.g. guano deposits, discarded feathers) of roosting within the assessment area during targeted habitat assessments undertaken for fine-scale mapping, and as such no roosting habitat has been mapped within the Study Area.

Foraging habitat types for black-cockatoo species mapped across the Project Development Envelope and scored using the DAWE (2022) method as part of the broadscale mapping are presented in **Table 7.12**. Figures displaying the different foraging habitats are provided in **Appendix E.**

Table 7.12 Broadscale Black-Cockatoo Foraging Habitat Mapping (Western Wildlife, 2024)

Category	Description	Extent in Study Area (ha)
Foraging habitat (shrubby *Banksia* spp. In understory)	Shrubby *Banksia* spp., such as Parrotbush (*Banksia sessilis*), are important food-plants for Carnaby's Cockatoo and a lesser extent to Baudin's Cockatoo.	0.5
Foraging habitat (woodlands containing Marri, Jarrah and shrubby *Banksia* spp.)	Marri (*Corymbia calophylla*) is an important food-plant for all three black-cockatoo species, Jarrah (Eucalyptus marginata) is important to the Forest Red-tailed Black-Cockatoo and shrubby Banksia spp. are important food-plants for Carnaby's Cockatoo and a lesser extent to Baudin's Cockatoo. Rock Sheoak (*Allocasuarina huegeliana*) also occurs, providing a less important food-plant for the Forest Red-tailed Black-Cockatoo.	57.4
Foraging habitat (woodlands containing Marri)	Marri is an important food-plant for all three black-cockatoo species and is particularly important for the Forest Red-tailed Black-cockatoo and Baudin's Cockatoo. Woodlands dominated by Marri are likely to provide a greater density of this important food plant than woodlands with a lesser density of Marri. Rock Sheoak (*Allocasuarina huegeliana*) also occurs, providing a less important food-plant for the Forest Red-tailed Black-Cockatoo.	149.3
Foraging habitat (woodlands with Marri as a dominant species)		200.7
Possible foraging habitat if food plants are present	Some eucalypt woodlands may contain a small proportion of food-plants, including occasional Marri trees or shrubby *Banksia* spp., or stands of Rock Sheoak. Planted areas often include eucalypts, including local and non-local species, some of which may provide foraging habitat. Not all planted areas are likely to provide foraging habitat.	284.3
Possible foraging habitat in isolated paddock trees.	Cleared areas contain remnant eucalypts as individual trees or small patches, some of which may be Marri or Jarrah and therefore black-cockatoo food-plants. Areas planted to Canola may also provide foraging habitat	5,015.9
Unlikely to contain foraging habitat	Vegetation or cleared areas lacking food-plants for cockatoos.	553
	Total	**6,344.1**

Foraging habitat patches were refined and rescored across approximately 60% of the Indicative Proposal Footprint as part of a detailed fauna habitat assessment (**Appendix G**) using the BCE (2020) method (Umwelt, 2024a). The remaining 40% of the Indicative Proposal Footprint was assessed and scored at a desktop level using vegetation type mapping, vegetation mapping notes, and aerial imagery. Areas of foraging habitat based on fine-scale mapping within the Indicative Proposal Footprint is presented in **Table 7.13.**

It should be noted that during the targeted assessment, some broadscale foraging habitat types originally mapped as "Unlikely to contain foraging habitat" were rescored for foraging habitat (specifically creekline habitats) using the BCE (2020) method.

Further, detailed design as the project progresses is expected to decrease the areas of clearing required.

Table 7.13 Fine-scale Black-Cockatoo Foraging Habitat Mapping

Black-Cockatoo Species	Foraging Habitat Quality Score	Extent within Indicative Proposal Footprint (ha)
Forest Red-tailed Black-Cockatoo	0	1.69
	2	1.64
	3	1.74
	5	0.35
	6	2.97
	Total (excluding habitat quality scores of 0)	**6.70**
Baudin's Black-Cockatoo	0	1.66
	2	1.67
	3	1.74
	5	0.35
	6	2.97
Carnaby's Black-Cockatoo	2	1.63
	3	3.44
	6	3.32
	Total (excluding habitat quality scores of 0)	**8.39**

Breeding habitat types were mapped at a broad scale across the Study Area as presented in **Table 7.14** and shown in **Appendix E.**

Table 7.14 Broadscale Black-Cockatoo Breeding Habitat Mapping (Western Wildlife, 2024)

Category	Description	Extent within Study Area (ha)
Potential breeding habitat (contains tree species known to support breeding)	Many of the woodlands in the study area include tree species known to support breeding (DAWE 2022), including Wandoo (Eucalyptus wandoo), Marri (*Corymbia calophylla*), York Gum (*Eucalyptus loxophleba*) and Jarrah (Eucalyptus marginata) and Powderbark wandoo (*Eucalyptus accedens*). Note that even within this habitat, particularly in the smaller patches, many of the trees are small (below diameter at breast height thresholds), possibly due to past logging of mature trees.	1,013.9
Potential breeding habitat in Isolated Paddock Trees	Cleared areas contain remnant eucalypts as individual trees or small patches, many of which are likely to be tree species known to support breeding.	5,035.1
Possible breeding habitat (contains eucalypts, but not species known to support breeding)	Woodlands including Brown Mallet (*Eucalyptus astringens*), Drummond's Gum (*Eucalyptus drummondii*) and/or *Eucalyptus dorrieni*i are not known to support breeding, but any suitably sized hollow may be used by cockatoos (DAWE 2022), so these areas cannot be entirely excluded.	90.8
Unlikely to be current breeding habitat, but may provide breeding habitat in the future	Planted areas often include eucalypts, including local and non-local species. Eucalypts usually take many years (200+) to form suitably-sized hollows, so planted areas are usually too young to contain breeding habitat.	107.9
Not breeding habitat	Treeless areas, or woodlands lacking eucalypts, are not breeding habitat.	96.4
	Total	**6,344.1**

Finer scale breeding habitat mapping was completed for approximately 60% of the Indicative Proposal Footprint during the targeted habitat assessment. This involved assessing individual trees using the BCE (2020) method. The targeted assessment recorded a total of 109 trees that met the potential black-cockatoo nest-tree criteria of DAWE (2022) which were ranked based on the categories provided in **Table 7.5**. The total number according to each rank is provided in **Table 7.15**. The remaining unassessed areas will be assessed prior to construction.

Table 7.15 Ranking of Potential and Suitable Nest-Trees Recorded

Nest-Tree Ranking	Description	Number Recorded within 60% of Indicative Proposal Footprint
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.	0
2	Hollow of suitable size visible with chew marks around entrance. Record if chew-marks are recent or old.	0

Nest-Tree Ranking	Description	Number Recorded within 60% of Indicative Proposal Footprint
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 >8 m; but note that hollow height is contextual. Carnaby's Black-Cockatoo will nest in hollows <5 m so in a Wheatbelt breeding site a lower criterion may be more appropriate.	5
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.	1
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.	103
	Total	**109**

Information on flight characteristics of black-cockatoos in the context of turbine collision is provided in **Section 7.6.2.1**.

A summary of findings for each species is provided below.

Summary of Findings for Forest Red-Tailed Black Cockatoo

- The Forest Red-tailed Black-Cockatoo is known to occur within the Project Development Envelope from the presence of aged foraging material for the species found during targeted habitat assessments in 2024. Five records of foraging material were identified, with most of these aged as "very old" and likely to be greater than one or two years since foraging. Individuals were not recorded within the Project Development Envelope over four surveys of a total of 18 days.

- The Forest Red-tailed Black-Cockatoo was recorded in the Additional Survey Area outside of the Project Development Envelope during the fauna survey conducted by Western Wildlife, with a small flock of probably two birds heard in the southern part of the Additional Survey Area in Eucalypt Sheoak woodland. No evidence of foraging was recorded during this survey event despite the abundance of Marri, a favoured food-plant (Western Wildlife, 2024), and scant evidence found during the targeted habitat assessments further indicate that the species is unlikely to occur in large flocks or as a resident of the Project Development Envelope. The Additional Survey Area has been removed from the Project to avoid potential impacts to the area where this species was recorded.

- Approximately 60% of the Indicative Proposal Footprint was subjected to the detailed fauna habitat assessment (**Appendix G**), in which a total of 109 trees met the suitable or potential nest tree criteria of DBH greater than 500 mm. Of these 109 trees assessed, no trees with active or historical evidence of nesting were found (Rank 1 or 2 trees), five Rank 3 trees containing potentially suitable hollows were identified, and the remaining trees did not have potentially suitable hollows (Rank 4 and 5). The remaining areas proposed for clearing will be subject to targeted survey and all Rank 1 or 2 trees will be avoided. No direct or indirect evidence of breeding was found within the Indicative Proposal Footprint during the targeted mapping for black-cockatoo species.

- There was no direct or indirect evidence (e.g. guano deposits or discarded feathers) of roosting found within the Indicative Proposal Footprint.

- The DBCA roosting sites dataset for black cockatoos holds no records of roosting sites for the Forest Red-tailed Black Cockatoo (DBCA, 2019). Records of the species in the DBCA, Atlas of Living Australia, and eBird databases occur to the east of the Project Development Envelope in the township of Narrogin, and to the north in the Dryandra Woodland National Park and Lol Gray State Forest conservation mosaic which are dated within the last 6 years. Habitat comprising of Marri, Flooded gum and York gum woodlands occur within the Project Development Envelope, providing potential areas of breeding, roosting and refuge; however, habitats within the broader region may be more suitable than habitats within the Project Development Envelope and the species is unlikely to be concentrated in the Project Development Envelope.

- The species are assessed as unlikely to occur in the Transport Development Envelope due to the very low suitability of habitat.

- Based on the assessment, the Forest Red-tailed Black-Cockatoo is a seasonal visitor however is unlikely to be concentrated in the Project Development Envelope. It likely to forage and/or roost and may breed in large tree hollows, however no evidence of roosting or breeding was recorded within the Indicative Proposal Footprint as noted above.

Summary of Findings for Baudin's Black Cockatoo

- The species was not recorded during any field surveys undertaken within the Project Development Envelope. The Project Development Envelope is also not within the known breeding range of the species (DAWE, 2022; Western Wildlife, 2024), but there is potential that it may offer potential foraging habitat during the non-breeding season. Based on this potential, and the presence of historical records within a 20 km radius of the Project Development Envelope in the DBCA, Atlas of Living Australia and eBird databases, with the most recent being in 2018, it has been ranked as a Moderate likelihood of occurring within the Project Development Envelope.

- Approximately 60% of the Indicative Proposal Footprint was subjected to the detailed fauna habitat assessment (**Appendix G**), with a total of 109 trees meeting the suitable or potential nest tree criteria of DBH greater than 500 mm. Of these 109 trees assessed, no trees with active or historical evidence of nesting were found (Rank 1 or 2 trees), five Rank 3 trees containing potentially suitable hollows were identified, and the remaining trees did not have potentially suitable hollows (Rank 4 and 5). The remaining areas proposed for clearing will be subject to targeted survey and all Rank 1 or 2 trees will be avoided. No direct or indirect evidence of breeding was found within the Indicative Proposal Footprint during the targeted mapping for black-cockatoo species. Additionally, as the Project Development Envelope is not within the known or predicted breeding range of the species, no trees are considered potential breeding habitat.

- There was no direct or indirect evidence (e.g. guano deposits or discarded feathers) of roosting found within the Indicative Proposal Footprint.

- The DBCA roosting sites dataset for black cockatoos holds no records of roosting sites for the Baudin's Black-Cockatoos (DBCA, 2019). Habitat comprising of Marri, Flooded gum and York gum woodlands occur within the Project Development Envelope, providing potential areas of breeding, roosting and refuge; however, habitats within the broader region may be more suitable than habitats within the

Project Development Envelope. The species is unlikely to be concentrated in the Project Development Envelope and may only occasionally occur when foraging.

- The recovery plan for Baudin's Black Cockatoo identifies critical habitat as all Marri, Karri and Jarrah forests, woodlands and remnants in the southwest of Western Australia receiving more than 600 mm of annual average rainfall, while annual average rainfall in Narrogin was approximately 442.3 mm between 1991-2020 (BOM, 2024b).

- The species are assessed as unlikely to occur in the Transport Development Envelope due to the very low suitability of habitat.

- Based on the assessment, the Baudin's Black-Cockatoo may potentially be a seasonal visitor that is unlikely to be concentrated in the Project Development Envelope. It may only occasionally occur when foraging that forages and/or roosts in the Project Development Envelope during the non-breeding season, however no evidence of either was recorded during field surveys.

Summary of Findings for Carnaby's Black Cockatoo

- The Carnaby's Black-Cockatoo was recorded within the Additional Survey Area, West of the Project Development Envelope, flying through eucalypt woodland habitat with a flock of three individuals flying at a height between 20 and 40 m AGL. The Carnaby's Black-Cockatoo was also recorded during the fauna survey conducted by Western Wildlife through secondary evidence and once via calls, with the records of secondary evidence being recorded within the Project Development Envelope and the remainder being within the Additional Survey Area. All records were also within eucalypt woodland habitat. Therefore the Carnaby's Black-Cockatoo is conservatively considered as known to occur within the Project Development Envelope. The Additional Survey Area has been removed from the Project to avoid potential impacts to the area where this species was most recorded.

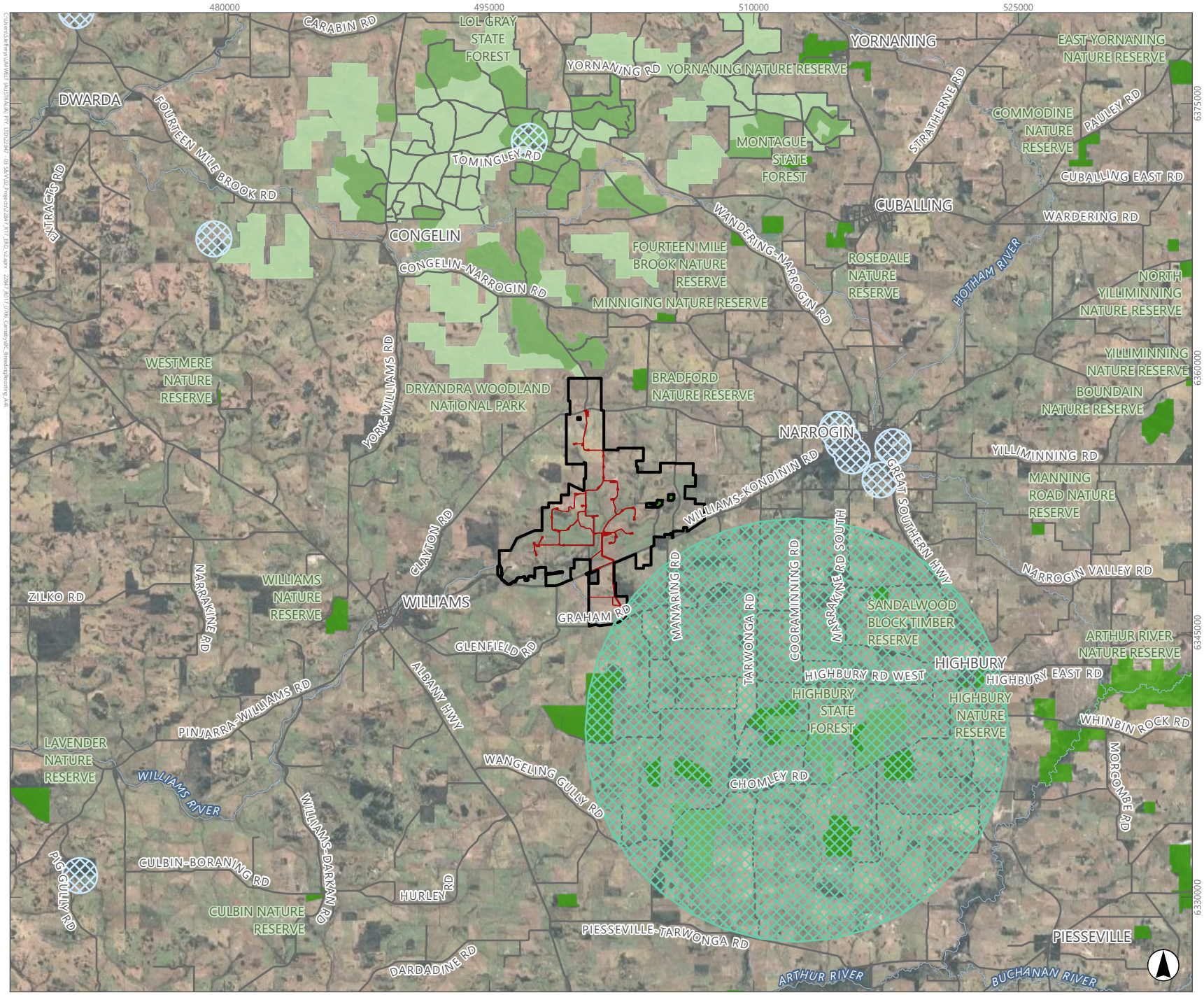
- Approximately 60% of the Indicative Proposal Footprint was subjected to the detailed fauna habitat assessment (**Appendix G**), with a total of 109 trees meeting the suitable or potential nest tree criteria of DBH greater than 500 mm. Of these 109 trees assessed, no trees with active or historical evidence of nesting were found (Rank 1 or 2 trees), five Rank 3 trees containing potentially suitable hollows were identified, and the remaining trees did not have potentially suitable hollows (Rank 4 and 5). The remaining areas proposed for clearing will be subject to targeted survey and all Rank 1 or 2 trees will be avoided. No direct or indirect evidence of breeding was found within the Indicative Proposal Footprint during the targeted mapping for black-cockatoo species.

- A review of DBCA dataset for black cockatoo roosting sites identified that a roosting site for Carnaby's Black-Cockatoo exists approximately 8 km east of the Project Development Envelope in Narrogin and another 12.6 km north of the Project Development Envelope in Lol Gray State Forest (DBCA, 2019) as shown in **Figure 7.6**. The DBCA dataset for confirmed breeding sites has also identified a breeding site approximately 12 km southeast of the Project Development Envelope likely within the Highbury State Forest (DBCA, 2018a). Recent records of the species in the DBCA, Atlas of Living Australia, and eBird databases are also numerous in the region surrounding the Project Development Envelope, particularly to the north in the Dryandra Woodland National Park and Lol Gray State Forest conservation mosaic. Habitat comprising of Marri, Flooded gum and York gum woodlands occur within the Project Development Envelope, providing potential areas of breeding, roosting and refuge; however, habitats within the broader region may be more suitable than habitats within the Project Development Envelope and the species is unlikely to be concentrated in the Project Development Envelope.

- The species are assessed as unlikely to occur in the Transport Development Envelope due to the very low suitability of habitat.
- Based on the assessment, the Carnaby's Black-Cockatoo is a seasonal visitor however is unlikely to be concentrated in the Project Development Envelope. It likely to forage and/or roost in the Project Development Envelope and may breed in large tree hollows, however no evidence of roosting or breeding was recorded within the Indicative Proposal Footprint as noted above.

FIGURE 7.6

Carnaby's Black-Cockatoo Breeding and Roosting Sites



Legend

- Project Development Envelope
- Indicative Proposal Footprint
- Road
- Major Watercourse
- Nature Reserve
- National Park
- State Forest
- Black Cockatoo Roosting Sites - Buffered (DBCA-064)
- Carnabys Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054)

0 6 12

Kilometres

Scale 1:300,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2023), Umwelt (2023), DBCA (2018, 2019, 2023)

7.3.4.2 Chuditch

The Chuditch is listed as Vulnerable under the BC Act. The presence of suitable den and refuge sites, predators, and sufficient prey biomass are the important considerations in assessing potential impacts to the Chuditch. The following sections describe the distribution and habitat requirements, threats, and occurrence and potential habitat in the Project Development Envelope and broader region.

7.3.4.3 Distribution and Habitat Requirements

The Chuditch is a nocturnal, terrestrial carnivore, feeding mainly on smaller vertebrates (e.g., reptiles, birds and mammals) and large invertebrates (Burbidge, 2004; Van Dyck & Strahan, 2008). During the day, Chuditch shelter in dens; predominantly hollow logs and earth burrows (Van Dyck & Strahan, 2008).

The Chuditch is a wide-ranging resident in Marri-Jarrah forest of south-west Western Australia and also in heaths and eucalypt woodlands of the eastern wheatbelt and goldfields (Van Dyck & Strahan, 2008). This species was formerly distributed throughout much of western and inland Australia, but its range has contracted to the region approximately south-west of a line between Shark Bay and Esperance.

Chuditch use a range of habitats including forest, mallee shrublands, woodland and desert. The densest populations have been found in riparian jarrah forest. Chuditch require adequate numbers of suitable den and refuge sites (horizontal hollow logs or earth burrows) and sufficient prey biomass (large invertebrates, reptiles, and small mammals) to survive (DEC, 2012). Chuditch have a large home range, with females in the deeper south-west occupying 55–120 ha and males ranging over 400 ha or more (Van Dyck & Strahan, 2008). Further east, Rayner et al., (2012) found that Chuditch in the Forrestania area occurred at an average density of 0.039 individuals/km^2, with home ranges as small as 189 ha (a female) and as large as 2,125 ha (a male).

They are capable of travelling long distances in a short amount of time and even at their most abundant, Chuditch are generally present in low numbers. For this reason, they require habitats that are of a suitable size and not excessively fragmented (DEC, 2012).

7.3.4.4 Threats

DEC (DEC, 2012) identified the following as being the major threats to Chuditch:

- Land clearing, particularly of riparian vegetation, and the removal of suitable den logs and den sites from Chuditch habitat.
- Predation by, and competition from, foxes and feral cats.
- Deliberate and accidental mortality from poisoning, trapping, illegal shooting, and road kills.

Factors contributing to Chuditch mortality include being hit by motor vehicles, illegal shooting near roads, predation by foxes, raptors and feral cats, injury in rabbit traps, natural accidents, and disease (DEC, 2012).

Actions that remove native vegetation (e.g., increased fire frequency, clearing for development, mineral exploration and extraction, and forestry) can result in a significant impact on the Chuditch, particularly if these actions remove habitat critical for survival, or occur within 15 km of habitat critical to survival (DEC, 2012).

7.3.4.5 Occurrence and Potential Habitat in the Broader Region and Project Development Envelope

The species is a known resident of Dryandra Woodland National Park north of the Project Development Envelope. The Project Development Envelope has been considered as potential dispersal habitat due to the highly mobile nature of Chuditch and a single record captured via camera trap in the Eucalypt woodland habitat, however the species is unlikely to breed in the Project Development Envelope.

It is considered unlikely that the Chuditch breed within the Project Development Envelope given the lack of existing records and the presence of more extensive and likely suitable breeding habitat with greater connectivity to the north and west of the Project Development Envelope. Despite survey effort totalling 1,276 camera nights, only a single individual was recorded in the Eucalypt woodland habitat (**Figure 7.3**). This is indicative of dispersal rather than residency.

The Project Development Envelope is unlikely to regularly support a population of Chuditch due to the majority of habitat patches being too small and fragmented. Also, the species is susceptible to predation by foxes which were recorded across 12 of the 21 camera traps established (Western Wildlife, 2024). It is likely that individuals from the population in Dryandra Woodland National Park disperse through the Project Development Envelope, taking daytime shelter in hollow logs, rock crevices and possibly tree hollows.

Chuditch may use any habitat in the Project Development Envelope to disperse which potentially allows gene-flow between the population in Dryandra Woodland and forests to the west. Although some individuals may be lost to fox predation, the Chuditch is still likely to be able to successfully move between populations using the network of small habitat patches across the Project Development Envelope as an ecological linkage. This is due to their highly mobile nature and capability of dispersing long distances in a short span of time. However, habitat patches within the Project Development Envelope are only likely to provide dispersal habitat where the species may occasionally take daytime shelter in hollow logs, rock crevices and possibly tree hollows.

The species has a moderate likelihood of occurrence in the Transport Development Envelope.

7.3.5 Other Listed Species Occurrence and Potential Habitat

Occurrence and potential habitat for Conservation Dependent, Other Specially Protected, Priority, or Migratory fauna with a moderate or greater likelihood of occurrence in the Project Development Envelope is summarised in **Table 7.16**.

Table 7.16 Occurrence and Potential Habitat of Other Listed Species

Species	BC Act Status	Occurrence and potential habitat
Known		
Peregrine Falcon (Falco peregrinus)	Other Specially Protected	The Peregrine Falcon has been recorded within 40 km on DBCA's Threatened and Priority Fauna Database, with the majority of records at the Dryandra Woodland National Park. As part of the Spring and Summer BBUS, the Peregrine Falcon was recorded on two occasions at vantage points within the Project Development Envelope, and once incidentally. The incidental observation was of a breeding pair at a nest made in a large jarrah tree. The pair exhibited territorial behaviour.

Species	BC Act Status	Occurrence and potential habitat
		This species was also observed by Western Wildlife (2024) during field surveys within the Project Development Envelope. Peregrine Falcons have a large home range (c. 20–30 km^2) and may, therefore, contemporarily utilise the Project Development Envelope and surrounds. The Project Development Envelope likely provides foraging habitat for this species and if breeding occurs within the Project Development Envelope, it is likely to be confined to vegetation remnants that contain tall trees (Umwelt, 2024c). The species forages in cleared areas which are common in the region, and its population is large and increasing (BirdLife International, 2024). It is unlikely that the habitats of the Project Development Envelope are of particular importance to the species (Western Wildlife, 2024).
Red-tailed Phascogale	Conservation Dependent	There are many records of this species within 20 km on DBCA's Threatened and Priority Fauna Database, including several in native vegetation immediately adjacent to the Project Development Envelope. The Project Development Envelope is within the core range of this species, and it is known to survive in relatively small habitat patches. The Red-tailed Phascogale was recorded on one camera trap in the Project Development Envelope and two camera traps in the Additional Survey Area over a total of 1,276 camera trap nights, all in the Eucalypt woodland on laterite rise habitat. The Eucalypt – Sheoak woodland with granites and Eucalypt woodland on laterite rise habitats are likely to provide habitat for this species, and it may also disperse through creekline or planted habitats. Cleared areas and isolated paddock trees are not likely to be used by this species.
Western Rosella (inland)	Priority 4	The Spring and Summer BBUS recorded the Western Rosella (inland subspecies) in the Project Development Envelope on one occasion. It also recorded the species in the Additional Survey Area and twice more incidentally. The species was detected in eucalypt woodland and creek-line habitats. This species was also observed during field surveys within the Project Development Envelope by Western Wildlife (2024). It is likely to occur in the Transport Development Envelope. In the Narrogin–Katanning area, this taxon usually inhabits *Acacia–Allocasuarina* scrubland. The species breed in tree hollows and show a preference for marri, wandoo, York gum, flooded gum, and salmon gums for nesting (Johnstone & Storr, 2004); almost all of which are present within the Project Development Envelope.
Western False Pipistrelle	Priority 4	The Western False Pipistrelle was recorded during the BBUS at numerous vantage points representing all habitats within the Project Development Envelope and Additional Survey Area. The species has a moderate likelihood of occurrence in the Transport Development Envelope. The detection rate of this species was unexpected. The results potentially indicate that there is a seasonal presence in the area attracted by flowering vegetation (Bat Call WA, 2024). This species is considered likely to utilise the Project Development Envelope for foraging and may also utilise tree hollows within Jarrah/Marri woodland habitats for roosting (Umwelt, 2024c).

Species	BC Act Status	Occurrence and potential habitat
High		
Central Long Eared Bat	Priority 3	The Central Long-eared bat occurs in eucalypt woodlands with a tall shrub understorey and around granite outcrops, roosting beneath bark, in tree crevices or in the foliage of trees (Van Dyck & Strahan, 2008). There are three records of this species within 40 km of the Project Development Envelope on DBCA's Threatened and Priority Fauna Database, all from individuals trapped at Dryandra Woodland National Park in 2007. The nearest record is 5.5 km north-west of the Project Development Envelope and is dated recently. There are also two records 13 km north of the Project Development Envelope in Lol Gray State Forest dated recently. The Central Long-eared Bat was not detected during Proposal surveys, but potentially occurs in the Project Development Envelope. If present, it is likely to favour Eucalypt-Sheoak woodlands with granites and may also occur in Eucalypt woodland on laterite rises, roosting in tree hollows (Western Wildlife, 2024).
Moderate		
Barking Owl (southwest subpop.) **(Ninox connivens connivens)**	Priority 3	There are three records of this species within 40 km on DBCA's Threatened and Priority Fauna Database, all from Dryandra Woodland National Park in 2005. The status of the species in the local area is uncertain due to the paucity of records, however, this species may occur in the Project Development Envelope, although it was not recorded at passive acoustic detector sites on this survey. If present, this species may nest in large hollows in Eucalypt woodland on laterite rises and Eucalypt-Sheoak woodlands on granites, foraging in woodlands and on woodland edges (Western Wildlife, 2024).
Fork-tailed Swift	Migratory	There are no records of this species within a 20 km radius of the Project Development Envelope in the DBCA's Threatened and Priority Fauna Database (DBCA, 2023d). The species is considered to potentially occur on occasion given the modelled distribution by (DCCEEW, 2015) and its wide-ranging nature. The Fork-tailed Swift is only likely to forage above the Project Development Envelope and surrounding region given its typical flight behaviours during the non-breeding season when it may occur.
Masked Owl (southern subspecies) **(Tyto novaehollandiae novaehollandiae)**	Priority 3	This species inhabits forested areas, breeding in large tree hollows (Johnstone & Storr, 1998). It is suggested that this species prefers open forests and forest edges for hunting (Liddelow et al., 2002). There are two records of this species within 40 km of the Project Development Envelope on DBCA's Threatened and Priority Fauna Database, from Dryandra Woodland National Park 2001 and 2003. The Masked Owl was not recorded at passive acoustic detector sites on this survey but may occur in the Project Development Envelope. If present, this species may nest in large hollows in Eucalypt woodland on laterite rises and Eucalypt-Sheoak woodlands on granites, foraging in woodlands and on woodland edges (Western Wildlife, 2024).

7.4 Potential Environmental Impacts

The Proposal has the potential to impact on fauna habitats within the Development Envelopes, namely the Project Development Envelope. Potential impacts to fauna and fauna habitat in the Transport Development Envelope will be minimal as the area is currently disturbed and used as a gravel pit and is subject to regular traffic movements and associated disturbance. Potential direct and indirect impacts are discussed below.

7.4.1 Potential Direct Impacts

Implementation of the Proposal may result in potential direct impacts to fauna as listed in **Table 7.17**.

Table 7.17 Potential Direct Impacts to Fauna

Proposal Activity	Potential Direct Impact
Clearing of native vegetation and earthworks	Fauna habitat loss
	Loss of fauna individuals
Wind turbine operation	Loss of fauna individuals through turbine strike or barotrauma
Vehicle movements during construction and operation	Loss of fauna individuals
Open water bodies and trenches	Loss of fauna individuals

7.4.2 Potential Indirect Impacts

Implementation of the Proposal may result in potential indirect impacts to terrestrial fauna as listed in **Table 7.18**.

Table 7.18 Potential Indirect Impacts to Fauna

Proposal Activity	Potential Indirect Impact
Wind turbine operations	Barrier effects resulting in restrictions to regional movement.
Establishment of linear infrastructure (access tracks)	Edge effects leading to interruptions to fauna behaviours (foraging, hunting, breeding, nesting etc.). Fragmentation of habitat and reduced dispersal. Loss in fauna habitat connectivity.
Hot works	Loss of fauna habitat or individuals in the event of a fire.
Generation of food waste	Introduction or increased spread of pest fauna.

7.5 Mitigation

The mitigation hierarchy has been applied in accordance with the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021b). Avoiding impacts has been applied rigorously as the primary mitigation through the design process to date on the Proposal, and will continue during detailed design, construction, and operations, to mitigate the Proposal's impact on terrestrial fauna.

These principles and the order in which they have been applied are as follows.

- **Avoid**: reducing the Project Development Envelope and locating activities to avoid direct and indirect impacts on significant fauna habitat.

- **Minimise**: minimising direct and indirect impacts where they cannot be completely avoided.
- **Rehabilitate**: actively repairing, rehabilitating or restoring temporary impacted areas as soon as possible to promote long-term recovery.
- **Offset** (where necessary): providing suitable offsets for activities that result in significant adverse environmental impacts.

7.5.1 Avoid

Numerous Proposal design iterations were undertaken with consideration of terrestrial fauna values identified and mapped during the field survey program. Design iterations incorporated avoidance mapping for potential fauna habitat considered to be of importance, particularly for conservation significant species. An early design required over 40 ha of fauna habitat removal, however, through an iterative design process the total fauna habitat removal has been reduced to 8.39 ha.

The following measures have been implemented to **avoid** potential impacts to significant terrestrial fauna:

- Avoiding Rank 1 (trees with activity at hollow observed) and Rank 2 (trees with hollows of suitable size with chew marks visible) black-cockatoo breeding trees.
- Avoiding all confirmed PEC within the Project Development Envelope.
- Avoiding clearing of native vegetation in Good condition or better.
- Removing the Additional Survey Area (2,830 ha) from the Project Development Envelope. This allowed avoidance of the largest and most intact remnant habitat patch consisting of Good to Very Good condition native vegetation, with the highest quality fauna habitat.
- Avoiding areas with higher foraging value for black-cockatoos to reduce likelihood of turbine collision. This includes removing turbines from the Additional Survey Area and from the eastern part of the Project Development Envelope where there are larger areas of higher foraging habitat value. This minimises the potential that turbines in this area might reduce utilisation of this foraging habitat by black cockatoos. It also further reduces the already low likelihood of turbine strike risk in this area.
- Avoiding areas where direct observations of black-cockatoo individuals were recorded.
- Avoiding clearing areas along the transport route where there is evidence of conservation significant species.

7.5.2 Minimise

The following measures have been applied through the Proposal design to minimise impacts to terrestrial fauna in the Indicative Proposal Footprint:

- Clearing will be limited to 7.41 ha of remnant native vegetation (excluding isolated paddock trees) and 0.98 ha of planted native vegetation. Vegetation that is proposed to be cleared comprises the degraded edges of multiple small patches of remnant vegetation, with larger patches with greater habitat value avoided. This is a conservative estimate of clearing based on the Indicative Proposal Footprint, and the area is expected to decrease as detailed design progresses.

- Clearing of black-Cockatoo foraging habitat has been minimised, with a maximum of 3.32 ha of high-quality habitat and 5.07 ha of low-quality foraging habitat proposed to be cleared. These clearing areas are spread over 20 separate fragmented and degraded remnant vegetation patches. Detailed design will aim to further minimise clearing of foraging habitat, with a focus on minimising clearing on high-quality habitat.

- Minimising the number of creek crossings, and where crossings are necessary utilising existing crossings so that clearing of riparian vegetation is reduced as far as possible. Where creek crossing upgrades are required, the extent of clearing and impacts will be minimised and works will be undertaken in accordance with the Part V NVCP and Bed and Banks permit that will be sought from DWER under the RIWI Act.

- Minimising the bisecting of existing patches of native vegetation as far as practicable, thereby minimising impacts on fauna dispersal. In the majority of cases, native vegetation clearing is along the edges of patches of degraded native vegetation.

- Adopting a minimum blade tip height of 49 m AGL, which is above the typical flight height for black-cockatoos thereby minimising collision risk.

To achieve the above commitments for minimising impacts on terrestrial fauna, a range of mitigation measures will be employed as part of the Construction Environmental Management Plan (CEMP) to limit and reduce the potential direct and indirect impacts identified. These are presented below.

- The following measures to minimise habitat loss and fauna mortality will be implemented:

    - Vegetation clearance areas will be clearly demarcated to avoid over-clearing within mapped fauna habitat.

    - No-go zones within the Development Envelopes will be clearly documented.

    - Measures to protect and recover fauna encountered during vegetation clearing will be outlined, including the presence of qualified fauna spotters.

    - Preclearance searches of habitat will be undertaken prior to clearing by a qualified fauna spotter, with habitat features/trees clearly identified and searched for fauna.

    - Clearing will be undertaken in a slow, progressive manner towards adjacent native vegetation to allow fauna to move into adjacent native vegetation ahead of the clearing activity.

    - Micro-siting of Proposal infrastructure will aim to retain habitat trees where possible.

    - Habitat trees within the clearing footprint that can be safely retained will be marked with flagging tape and avoided.

    - Fauna welfare procedures will be outlined, including operational and compliance reporting procedures for injured and/or dead wildlife.

    - Measures to replace/relocate habitat and resources that will be unavoidably lost will be outlined, including rehabilitation procedures for the decommissioning of temporary construction areas if those areas are not otherwise useful to the ongoing land use.

- Training/information requirements will be in place for all personnel working on the Proposal, including but not limited to inductions, daily toolbox talks and/or site walk overs which discuss the management measures or risks of a particular locations.

- The following measures will be implemented to minimise impacts on listed fauna species:
  - Preclearance searches will be undertaken by a licenced fauna spotter prior to and during clearing activities within remnant vegetation types and should include denning habitat for the Chuditch and Red-tailed Phascogale.
  - Where Chuditch or Red-tailed Phascogale are found during pre-clearance surveys, a no-go zone will be established and the area avoided until the individuals have naturally dispersed or have been relocated.
  - Where habitat features such as existing hollow logs cannot be retained in-situ during land clearing, they will be relocated to adjacent areas of suitable habitat if safe and practicable.
  - Fauna spotters will be present during all native vegetation clearing to ensure that no trees being removed are housing listed species, in particular, black-cockatoos, Peregrine Falcon, Inland Western Rosella, Western False Pipistrelle, Barking Owl and Masked Owl, including their chicks or eggs.
  - A targeted assessment of all unassessed potential breeding trees for black cockatoos will be undertaken within the clearing footprint as part of finalising of the Proposal design.
  - No Rank 1 (trees with activity at hollow observed) and Rank 2 (trees with hollows of suitable size with chew marks visible) black cockatoo breeding trees will be removed, and these trees will have a no-go zone established around their perimeter if identified.
  - Minimising clearing of Rank 3 (Potentially suitable hollow visible but no chew marks present at entrance; or potentially suitable hollow suspected to be present) black-cockatoo breeding trees through micro-siting. Where it is discovered that a Rank 3 tree has been used or is in active use for nesting by black-cockatoos, a no-go zone will be established around the tree and the tree will not be cleared until the chick has naturally fledged and the breeding pair vacated.
  - Vegetation clearing will be halted in areas where listed species are located, and clearing will not resume until the species leaves the location on its own accord.
  - Construction and operation personnel will be educated on the potential presence for fauna, in particular black-cockatoos, Chuditch, Red-tailed Phascogale, Peregrine Falcon, Fork-tailed Swift, Inland Western Rosella, Western False Pipistrelle, Central Long-eared Bat, Barking Owl and Masked Owl.
  - Independent third-party audits and inspections will be regularly undertaken to assess CEMP compliance.

- The following general measures to limit and reduce the potential for introduction or spread of invasive pest species will be implemented:
  - All waste storage containing food waste will have closeable lids that can be secured shut to avoid attracting fauna

- A carrion removal program will be implemented to minimise the attraction of scavenging fauna should any turbine collision with a bird or bat occur
- Site induction training will highlight the importance of pest management
- The site will be kept in a general tidy and clean condition during construction
- A biosecurity management plan will be developed for the Proposal to manage the potential for the introduction and/or spread of pest species.

- The following additional mitigation measures will be implemented to minimise indirect impacts (noise, dust, light emissions and traffic) to fauna:
  - Restriction of construction hours to daylight periods where possible
  - Consideration of plant and equipment types, including muffler design and the use of alarms
  - Dust suppression techniques to minimise generation of dust (e.g., watering access roads)
  - Speed limits on access roads, informed by appropriate signage as required
  - The inclusion of points of egress in any excavation areas that are left open for more than one night
  - Progressive clearing, limiting exposed areas to the immediate work zones
  - Consideration to the type and use of lighting (e.g., shielded lights on buildings, directing lighting away from habitat)
  - Installation of signage which includes information such as wildlife presence in avoidance areas where a threatened species is identified
  - Where encountered, personnel shall keep a distance from fauna and not harm or trap them
  - Where injured fauna is encountered, the Wildcare Helpline (08 9474 9055) will be immediately contacted, and the Work Area Supervisor notified.
- Clearing of the potential PEC on the western side of Clayton Road will utilise the existing cleared stockpile area, areas of highly degraded vegetation, Sheoak and non-native understorey, and will minimise clearing of native Eucalyptus tree species as far as possible.

In addition to undertaking works in accordance with the Project CEMP, a Project Bird and Bat Adaptive Management Plan (BBAMP) will be developed and implemented. Implementation of the BBAMP will mitigate the potential impacts of turbine strike on birds and bats via trigger based, adaptive management. Pre- and post-commissioning monitoring of bird and bat activity (including flight behaviours) is a key requirement of the plan, to inform a risk profile for each turbine. This strategy leads to direct and tailored management actions, applied at the appropriate locations and times.

Further detail on this plan is provided in the Preliminary BBAMP (**Appendix F**) which will be finalised into a Project BBAMP prior to commissioning of the Proposal. It is anticipated that finalising and implementing the BBAMP will be a condition of the development approval under the *Planning and Development Act 2005.*

7.5.3 Rehabilitate

All proposed fauna habitat clearing in the Project Development Envelope is required to support permanent infrastructure. This limits the potential for rehabilitation of fauna habitat clearing areas until Project de-commissioning. Areas cleared for temporary infrastructure will be confined to previously disturbed areas. These areas will be rehabilitated to their pre-disturbance conditions when no longer required.

The 0.2 ha of proposed clearing in the Transport Development Envelope will be rehabilitated to a similar or better condition to what is currently present.

7.5.4 Offsets

Offsets are expected to be required via a Part V EP Act Native Vegetation Clearing Permit (**Section 9.0**).

7.6 Assessment and Significance of Residual Impacts

This section assesses the potential direct and indirect residual impacts of the Proposal on fauna habitats and conservation significant fauna with a moderate or higher likelihood of occurrence in the Project Development Envelope. The assessment assumes that the mitigation measures detailed above are implemented.

7.6.1 Fauna Habitat Types

7.6.1.1 Direct Residual Impact on Fauna Habitat Types

Five broad fauna habitat types have been mapped within the Project Development Envelope, with 'Cleared' being the dominant habitat type (81%).

The Proposal has sought to utilise the cleared areas as much as possible noting it provides the least fauna habitat value. As a result, 96% of the Indicative Proposal Footprint is within cleared areas.

To minimise impacts on the remaining fauna habitat types in Project Development Envelope, the Proposal will not clear more than:

- 3.27 ha of 'Eucalypt woodland on laterite rise' habitat
- 0.36 ha of 'Eucalypt-Sheoak woodland with granites' habitat
- 3.78 ha of 'Creekline' habitat
- 0.98 ha of 'Planted' habitat.

Direct impacts on fauna habitat types as a result of the Proposal are presented in **Table 7.19.** This demonstrates the minor portions of current fauna habitat types that will be removed as a result of the Proposal. The proposed clearing is comprised of multiple edges of small remnant habitat patches with relatively low habitat values due to degraded understorey and the presence of feral animals (cats and foxes). Detailed design will aim to further minimise clearing of habitat.

Potential impacts to fauna and fauna habitat in the Transport Development Envelope will be minimal as the area is currently disturbed and used as a gravel pit and is subject to regular traffic movements and associated disturbance.

The Proposal is not expected to have a significant impact on fauna habitat types within the Project Development Envelope.

Further information on residual impacts to habitat for conservation significant fauna species is provided in **Section 7.6.2**.

Table 7.19 Direct Impacts on Fauna Habitats within Project Development Envelope

Fauna Habitat	Total Mapped in Project Development Envelope (ha)	Direct Proposal Impact (ha) based on Indicative Proposal Footprint	Proposal Impact as % of habitat in the Project Development Envelope
Eucalypt woodland on laterite rise	404.5	3.27	0.79%
Eucalypt-Sheoak woodland with granites	181	0.36	0.22%
Creekline	563	3.78	0.66%
Planted	96.7	0.98	1.03%
Cleared	5,098.9	183.53	3.6%
TOTAL	**6,344.1**	**191.92**	

7.6.1.2 Indirect Residual Impacts on Fauna Habitat Types

Edge Effects

The Proposal includes development of linear infrastructure primarily in the form of access tracks. Linear infrastructure has the potential to impact on fauna habitat through the introduction of edge effects, which could include the invasion of weeds and feral predators.

The majority of fauna habitat patches within the Project Development Envelope are small and fragmented. As the majority of habitat patches are unfenced, they are also heavily impacted by grazing livestock (Western Wildlife, 2024). The 8.39 ha of potential fauna habitat that is proposed to be cleared is currently degraded, of relatively small size, unfenced, and has feral predators present. The larger more intact areas of habitat have been avoided as part of the Proposal design, and bisecting of existing patches has been minimised.

Proposed clearing in Transport Development Corridor is minor and restricted the edge of a degraded vegetation patches. Measures implemented as part of this Proposal will minimise the potential for edge effects in the Transport Development Corridor.

Based on the above, impacts to terrestrial fauna from edge effects associated with the installation of linear infrastructure will not be significant.

Habitat fragmentation and loss of connectivity

Given the highly cleared and degraded nature of the Study Area, remnant vegetation patches may provide connectivity for the movement and dispersal of fauna between larger remnant areas. Internal dispersal opportunities are likely afforded by creekline habitats and the mosaic-like nature of smaller remnant patches throughout the Project Development Envelope.

Vegetation clearing is predominantly restricted to minor vegetation clearing at the perimeter of remnant patches, and no clearing is proposed where larger remnant patches would be bisected by Project infrastructure. All infrastructure that does bisect habitats, such as creekline habitats, has been primarily restricted to existing access tracks where vegetation is already degraded and there is little canopy connectivity or understorey present.

Given the linear nature of the Project, generally narrow width of access tracks (approx. 10 m), general lack of fauna proof fencing (most likely just around the BESS) and the nature of vegetation clearing proposed, faunal dispersal throughout the Project Development Envelope is unlikely to be materially impacted.

Proposed clearing in the Transport Development Envelope is at the intersection of two roads and will not lead to further fragmentation of habitat.

Fire

Activities such as vegetation clearing, hot works and BESS operations have the potential to start fires. Uncontrolled fires can significantly impact fauna habitat.

A BMP will be developed for the Proposal and construction and operational works will be undertaken in accordance with the BMP. Additionally, the Project CEMP will include mitigation measures to reduce the risk for fires to start and spread. Based on this, and noting the fragmented nature of fauna habitat within the Project Development Envelope and Transport Development Envelope, impacts to fauna habitat as a result of fire are unlikely to be significant.

Introduction or Increased Spread of Pest Fauna

Fauna surveys have shown that the Project Development Envelope supports several introduced fauna species including European red fox (*Vulpes vulpes*) and ferals cats (*Felis catus*). Given the presence of these species within the Project Development Envelope, and through implementation of the Project CEMP and Biosecurity Management Plan, the residual impact on fauna habitat types as a result further introductions or spread of feral vertebrate fauna is considered to be low.

7.6.2 Conservation Significant Fauna Species

Terrestrial fauna and the habitats upon which they depend may be directly and indirectly impacted by the Proposal.

The subsequent sections present the assessment of impacts for each conservation significant vertebrate fauna species identified as having a moderate or higher likelihood of occurrence within the Project Development Envelope as presented in **Table 7.11**. A more detailed significant impacts assessment for the EPBC listed species is provided in Section 9 of **Appendix H.**

7.6.2.1 Black-Cockatoos (Threatened)

The three species of black-cockatoo are listed under the BC Act as follows:

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

Direct Residual Impacts to Threatened Black-Cockatoos

Habitat loss

The Proposal will avoid all trees containing hollows with active or historical evidence of black-cockatoos (Rank 1 and 2), and avoid clearing of high-quality foraging habitat as much as possible.

For the purposes of this assessment, Rank 1 and Rank 2 black-cockatoo breeding trees are considered critical breeding habitat. No critical breeding habitat was identified in the portion of the Indicative Proposal Footprint surveyed as part of the targeted fauna habitat assessment (**Appendix G**), and the Proposal commits to not clearing any critical black cockatoo breeding habitat. Five Rank 3, one Rank 4 and 103 Rank 5 trees were identified within the extent of the Indicative Proposal Footprint surveyed.

All remnant and planted native vegetation within the Project Development Envelope is considered likely to provide foraging habitat value to Carnaby's Black-Cockatoos. The maximum extent of foraging habitat that may be removed as a result of the Proposal is presented in **Table 7.20.** At the worst case, this removal of foraging habitat results in 1.21% of all suitable Carnaby's Black-Cockatoo foraging habitat within the Project Development Envelope. This area is less for Forest Red-Tailed and Baudin's Black-Cockatoos based on the quality of foraging habitat for these species (as per **Table 7.20**). Pasture and cropped areas may have some opportunistic foraging value; however, the food source is available for a short period of time due to pasture being impacted by livestock and cropping being cut when ripe.

There was no direct or indirect evidence (e.g. guano deposits, discarded feathers) of black-cockatoo roosting within the assessed areas of the Project Development Envelope.

Habitats within the broader region such as Lol Gray State Forest and Dryandra Woodland National Park located to the north of the Project Development Envelope are likely more suitable than the fragmented and degraded vegetation found within the Project Development Envelope.

In summary, although the Project will result in the removal of foraging and potential breeding habitat for the species, residual impacts to the species are unlikely to be significant due to:

- No Rank 1 or 2 trees to be disturbed by the Project, and disturbance of Rank 3 trees will be minimised.
- Avoidance of larger, higher-quality patches of foraging and potential breeding habitat.
- The quantum of habitat that will be retained in the Project Development Envelope.
- Habitat in adjacent conservation areas that is anticipated to be preferred.
- The area of clearing being conservative and being expected to decrease through detailed design.

- Active management of indirect impacts via the Bird and Bat Adaptive Management Plan (**Appendix F**) and Project CEMP.

Table 7.20 Potential Habitat Loss Impacts to Black-Cockatoos

Common Name	Habitat Utilisation	Within Project Development Envelope	Maximum removal (ha)	% Loss in Project Development Envelope
Forest Red-tailed Black-Cockatoo	Critical Breeding Habitat	Unable to assess extent of critical breeding habitat due to size of Project Development Envelope	No removal of critical breeding habitat	0%
	Foraging Habitat	692.2 ha	3.32 ha (High-quality: Score >=5) 3.38 ha (Low-quality: Score <5)	0.97%
Baudin's Black-Cockatoo	Foraging Habitat	692.2 ha	3.32 ha (High-quality: Score >=5) 3.41 ha (Low-quality: Score <5)	0.97%
Carnaby's Black-Cockatoo	Critical Breeding Habitat	Unable to assess number of breeding trees due to size of Study Area	No removal of critical breeding habitat	0%
	Foraging Habitat	692.2 ha	3.32 ha (High-quality: Score >=5) 5.07 ha (Low-quality: Score <5)*	1.21%

Note. *This habitat includes planted areas.

Turbine Collision

Turbine collision impacts as a result of the Proposal are unlikely to be significant.

The likelihood of turbine collision is considered to be low for black-cockatoos based on the available information on flight behaviours for the species, the lack of observations of black-cockatoo species within the Project Development Envelope, and the results of mortality monitoring at other wind farms. Further information on risk of turbine collision for black-cockatoos is provided in **Appendix F**, with key points summarised below:

- Based on the site surveys and assessments completed to date, black-cockatoos are unlikely to be concentrated in the Project Development Envelope.
- Black-cockatoos typically fly at or below canopy height (i.e. tree- or shrub-height, where applicable) when foraging, and at or just above canopy height when in longer-distance transit such as between foraging, roosting and watering areas. It is considered rare that these species fly more than c. 10 m above canopy height in these instances (Umwelt, 2024c).
- EPA (2019) also noted that the Carnaby's Black-Cockatoo tends to follow vegetation corridors, actively avoiding cleared and open areas, which is likely applicable to all black-cockatoo species found in southwest WA.

- Carnaby's Black-Cockatoo tend to frequent low-lying areas of the landscape with flight movements following valleys with woodland vegetation, or vegetation corridors, actively avoiding cleared and open areas, which is likely applicable to all black-cockatoo species found in southwest WA.
- In circumstances where birds are passing across less-expansive cleared areas between patches of remnant trees or isolated individual trees they usually maintain a 'canopy height' flight path (Umwelt, 2024b).
- Instances where black-cockatoos may otherwise exceed 50 m AGL in flight height are likely restricted to evading large predatory raptors such as eagles or when congregating in large numbers.
- RPS (2010) found during field surveys that Carnaby's Black-Cockatoo tend to frequent low-lying areas of the landscape with flight movements following valleys with woodland vegetation, with 88% of species observed as flying below 40 m (n=100 observations), while Ecoscape (2019) found 80% of flocks flying <20 m AGL (n=25 observations).
- Post-commissioning monitoring for the Carnaby's Black-Cockatoo at Badgingarra wind farm in 2019 recorded no collisions with turbines (Ecoscape, 2019), and none were reported at the Warradarge Wind Farm Perth during monitoring from 2020 to 2022 (Bright Energy Investments, n.d.). For both projects the minimum tip height was lower than the proposed Narrogin Wind Farm so the risk of impacts from this Proposal is relatively lower.

Indirect Residual Impacts to Threatened Black-Cockatoos

Restrictions in Regional Movement

Turbines and associated infrastructure in the Project Development Envelope are unlikely to significantly interrupt regional movement of the species.

The Project Development Envelope and number of turbines have been reduced to avoid areas with larger patches of remnant native vegetation with black-cockatoo habitat value, as a precautionary measure to minimise potential impacts to regional movement of black-cockatoos. Turbines are approximately 6 km in distance from their easternmost to westernmost points, as well as from their northernmost to southernmost points. The distribution of native vegetation in the areas surrounding the Indicative Proposal Footprint will continue to provide foraging opportunities for the species if flocks were to move through the landscape between known roosting or breeding sites to the north, east, or south to suitable foraging areas and exhibit macro-avoidance of turbines. The locations of wind turbines range between 540-1,050 m in distance from their nearest neighbouring turbine which is likely to provide sufficient space for black-cockatoo species to exhibit meso-avoidance of operating turbines and continue to utilise open areas for movement where necessary.

Additionally, the height of the RSA range is at least 49 m AGL and available information indicates these species generally fly below the minimum RSA height of 49 m AGL in the landscapes present within the Project Development Envelope. Almost all electrical cabling associated with the Project has been located underground, with overhead cabling only proposed in the southernmost section of the Project Development Envelope over Williams-Narrogin Highway to the existing 220 kV transmission line.

Mitigation measures outlined in the Preliminary Bird and Bat Adaptive Management Plan specific to the Project (**Appendix F**), include pre-and post-commissioning monitoring which will further reduce the potential for a significant impact to regional movements of black-cockatoos.

7.6.2.2 Chuditch (Threatened)

The Chuditch is listed as Vulnerable under the BC Act. The presence of suitable den and refuge sites, predators, and sufficient prey biomass are the important considerations in assessing potential impacts to the Chuditch.

Direct Residual Impacts to Chuditch

Habitat Clearing

The Proposal has avoided clearing remnant native vegetation dispersal habitat as much as possible.

The Project Development Envelope is unlikely to regularly support a breeding population of Chuditch due to the majority of habitat patches being too small and fragmented and the species being susceptible to predation by foxes which were recorded across 12 of the 21 camera traps established.

Native remnant vegetation in the Project Development Envelope is however likely to provide dispersal habitat due to the highly mobile nature of Chuditch and a single record captured via camera trap in the Eucalypt woodland habitat.

The Proposal has avoided much of the remnant native vegetation within the Project Development Envelope with a total of 8.39 ha of habitat suitable for dispersal proposed for clearing. This represents 0.67% of the total suitable habitat within the Project Development Envelope. The majority of proposed clearing comprises of vegetation at the perimeter of small remnant patches or within heavily degraded areas, thus not materially diminishing its dispersal capacity for individuals that may use the area for dispersal.

Potential impacts to fauna habitat in the Transport Development Envelope will be minimal as the area is currently disturbed and used as a gravel pit and is subject to regular traffic movements and associated disturbance.

Impacts on the dispersal opportunities provided by remnant native vegetation have also been reduced by:

- Avoiding larger patches of native vegetation
- Minimising the number of creek crossings and utilising existing creek crossings where practical, noting the creekline habitat is likely to be a key dispersal habitat.
- Avoiding bisecting patches of native vegetation where possible.

Given the amount of potentially suitable habitat retained across the broader Project Development Envelope and present in the surrounding region, and the mobile nature of these species, the permanent removal of native vegetation dispersal habitat within the Project Development Envelope is unlikely to have a material effect on the Chuditch. Additionally, preclearance searches will be undertaken by a licenced fauna spotter prior to and during clearing activities within potential fauna habitat, include denning habitat for the Chuditch and Red-tailed Phascogale. Where these species are found during pre-clearance surveys, a no-go zone will be established and the area avoided until the individuals have naturally dispersed.

Following the completion of the construction phase, existing populations are likely to continue to disperse and access resources within and beyond the Project Development Envelope.

Vehicle Strikes

The Proposal will result in increased traffic, most notably during the construction phase. Through the implementation of posted speed limits, education of staff, and pre-clearance surveys, the potential for vehicle strikes of Chuditch will be reduced and is not deemed to be a significant impact.

Indirect Residual Impacts to Chuditch

The primary potential indirect impacts to Chuditch as a result of the Proposal are barrier effects, edge effects, fauna entrapment and fire.

Barrier effects

Project infrastructure, including access tracks, BESS and substation has the potential to impact on Chuditch dispersal between remnant habitat patches.

Noting the already fragmented nature of fauna habitat, the avoidance of bisecting large patches of remnant vegetation where possible, and design measures to limit introduction of permanent barriers to movement, impacts to dispersal habitat for Chuditch are not expected to be significant.

Linear and Edge Effects

The majority of habitat patches in the Project Development Envelope are currently impacted by edge effects as they are unfenced and are heavily impacted by grazing livestock. Implementation of the Proposal will not increase the impact to the species from edge effects.

Fauna entrapment

Open water bodies and trenches have the potential to trap fauna individuals resulting in fatalities. Through the installation of best practice fauna egress and barriers as outlined in the Project CEMP, impacts to Chuditch as a result of entrapment are not deemed to be significant.

Fire

The risk of fire will be managed through the BMP and Project CEMP. Through implementation of these management plans and noting the fragmented nature of fauna habitat with the Project Development Envelope, impacts to Chuditch as a result of fire are unlikely to be significant.

Introduction or Increased Spread of Pest Fauna

Given the known presence of introduced fauna within the Project Development Envelope such as the European red fox (*Vulpes vulpes*) and ferals cats (*Felis catus*), and through implementation of the Project CEMP, it is unlikely that the Proposal will result in further introductions or spread of feral vertebrate fauna that will significantly impact Chuditch.

7.6.2.3 Priority and Other Listed Fauna Species

A summary of direct and indirect residual impacts to priority and other listed fauna species with a moderate or greater likelihood of occurrence in the Project Development Envelope is presented in **Table 7.21**.

Table 7.21 Direct and Indirect Impacts to Priority and Other Listed Fauna with a Moderate or Greater Likelihood of Occurrence in the Project Development Envelope

Species	Suitable Habitat Types in Project Development	Assessment of Impacts from the Proposal
Known		
Red-tailed Phascogale (*Phascogale calura*) **Conservation Dependent**	Creekline Eucalypt – Sheoak woodland with granites Eucalypt woodland on laterite rise Planted	The Eucalypt – Sheoak woodland with granites and Eucalypt woodland on laterite rise habitats are likely to provide critical habitat for this species. The Proposal may clear up to 0.22% and 0.79% respectively of these habitat types currently present in the Project Development Envelope. The species may also disperse through creekline or planted habitats. The Proposal may clear up to 8.39 ha of potential habitat suitable for the Red-tailed Phascogale, which represents 0.67% of these habitats within the Project Development Envelope. This habitat is currently degraded, of relatively small size, unfenced, and has feral predators present. The larger more intact areas of habitat have been avoided as part of the Proposal design. Considering the mitigation measures applied, implementation of the Proposal is unlikely to have a significant residual impact to this species.
Peregrine Falcon (*Falco peregrinus*) **Other Specially Protected**	All	Peregrine Falcons have a large home range (c. 20–30 km^2) and may, therefore, contemporarily utilise the Project Development Envelope and surrounds. The Project Development Envelope likely provides foraging habitat for this species and if breeding occurs within the Project Development Envelope, it is likely to be confined to vegetation remnants that contain tall trees (Umwelt, 2024b). The species forages in cleared areas which are common in the region, and its population is large and increasing (BirdLife International, 2024). It is unlikely that the habitats of the Project Development Envelope are of particular importance to the species (Western Wildlife, 2024). The collision risk assessment for the Proposal attributed an overall risk rating of Moderate for this species. The BBAMP (**Appendix F**) provides measures to manage potential turbine collision risk to the Peregrine Falcon. With the mitigation measures applied, the Proposal is unlikely to have a significant residual impact to this species.
Western Rosella (inland) **Priority 4**	Eucalypt-Sheoak woodlands with granites Eucalypt woodland on laterite rises	The Inland Western Rosella is likely to occur in Eucalypt-Sheoak woodlands on granites and Eucalypt woodland on laterite rises, breeding in eucalypt hollows (Western Wildlife, 2024). The Proposal may clear up to 0.22% and 0.79% respectively of these habitat types currently present in the Project Development Envelope. The collision risk assessment for the Proposal attributed an overall risk rating of Moderate for this species. The BBAMP (**Appendix F**) provides measures to manage potential turbine collision risk. With the mitigation measures applied, the Proposal is unlikely to have a significant residual impact to this species.

Species	Suitable Habitat Types in Project Development	Assessment of Impacts from the Proposal
Western False Pipistrelle (*Falsistrellus mackenziei*) Priority 4	Eucalypt woodland on laterite rises Eucalypt-Sheoak woodlands on granites	This species is considered likely to utilise the Project Development Envelope for foraging and may also utilise tree hollows within Jarrah/Marri woodland habitats for roosting (Umwelt, 2024b). Suitable habitat types comprise of Eucalypt-Sheoak woodlands on granites and Eucalypt woodland on laterite rises. The Proposal may clear up to 0.22% and 0.79% respectively of these habitat types currently present in the Project Development Envelope. The collision risk assessment for the Proposal attributed an overall risk rating of Moderate for this species. The BBAMP provides measures to manage potential turbine collision risk. With the mitigation measures applied, the Proposal is unlikely to have a significant residual impact to this species.
High		
Central Long Eared Bat (*Nyctophilus major tor*) Priority 3	Eucalypt-Sheoak woodlands with granites Eucalypt woodland on laterite rises	Eucalypt-Sheoak woodlands on granites and Eucalypt woodland on laterite rises were considered to be a suitable habitat type for the Central Long-eared Bat. The Proposal may clear up to 0.22% and 0.79% respectively of these habitat types currently present in the Project Development Envelope. The collision risk assessment for the Proposal attributed an overall risk rating of Moderate for this species. The BBAMP provides measures to manage potential turbine collision risk. With the mitigation measures applied, the Proposal is unlikely to have a significant residual impact to this species.
Moderate		
Barking Owl (southwest subpop.) (*Ninox connivens connivens*) Priority 3	Eucalypt woodland on laterite rises Eucalypt-Sheoak woodlands on granites	Although not recorded during the surveys, if present, this species may nest in large hollows in Eucalypt-Sheoak woodlands on granites and Eucalypt woodland on laterite rises, foraging in woodlands and on woodland edges (Western Wildlife, 2024). The Proposal may clear up to 0.22% and 0.79% respectively of these habitat types currently present in the Project Development Envelope. The collision risk assessment for the Proposal attributed an overall risk rating of Minor for this species. The BBAMP provides measures to manage potential turbine collision risk. With the mitigation measures applied, the Proposal is unlikely to have a significant residual impact to this species.
Fork-tailed Swift (*Apus pacificus*) Migratory	N/a	The Fork-tailed Swift is only likely to forage above the Project Development Envelope and surrounding region given its typical flight behaviours during the non-breeding season when it may occur. The species is highly mobile and agile when in-flight and is likely able to avoid turbines through macro- or meso-avoidance when it may transit through the area or forage in the surrounding region. The collision risk assessment for the Proposal attributed an overall risk rating of Moderate for this species.

Species	Suitable Habitat Types in Project Development	Assessment of Impacts from the Proposal
		With the mitigation measures applied, the Proposal is unlikely to have a significant residual impact to this species.
Masked Owl (southern subspecies) (*Tyto novaehollandiae novaehollandiae*) **Priority 3**	Eucalypt woodland on laterite rises Eucalypt-Sheoak woodlands on granites	The Masked Owl was not recorded at passive acoustic detector sites on this survey but may occur in the Project Development Envelope. If present, this species may nest in large hollows in Eucalypt-Sheoak woodlands on granites and Eucalypt woodland on laterite rises, foraging in woodlands and on woodland edges (Western Wildlife, 2024). The Proposal may clear up to 0.22% and 0.79% respectively of these habitat types currently present in the Project Development Envelope. The collision risk assessment for the Proposal attributed an overall risk rating of Minor for this species. The BBAMP provides measures to manage potential turbine collision risk. With the mitigation measures applied, the Proposal is unlikely to have a significant residual impact to this species.

7.6.3 Significance of Residual Impact

The residual impact of the Proposal to conservation significant fauna and fauna habitats in the region is not expected to be significant. **Table 7.22** provides an assessment of the significance of residual impact with reference to the "*consideration of significance" matters listed in the Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021b).

Table 7.22 Significance of Residual Impact to Listed Fauna

Significance matters	Significance of residual impact of the Proposal in the regional context
Object and principles of the Act	Specialist surveys and assessments have been undertaken to inform appropriate mitigations and reduce scientific uncertainty. The studies have been undertaken by suitably qualified consultants and include reconnaissance and targeted terrestrial fauna and fauna habitat surveys of the Project Development Envelope in accordance with relevant EPA guidelines. Results of the terrestrial fauna and habitat surveys have informed avoidance of impacts. Avoiding impacts to the point of the lowest possible impact is a precautionary approach which limits reliance on minimise, rehabilitate, and offset impacts. Specifically, the precautionary principle has been applied through avoidance by: • Reducing the Project Development Envelope to avoid over 200 ha of the *Eucalypt Woodlands of the WA Wheatbelt* PEC, and avoiding the clearing of any PEC within the Project Development Envelope. • As regional movement of black-cockatoos is not well known, the Proposal has taken a precautionary approach of reducing the size of the Project Development Envelope, reducing the number of turbines, and having a minimum blade tip height above the typical flight height for black-cockatoos. Turbines have been removed from around the areas that would be most likely to provide regional movement corridors for black-cockatoos, including the 340 ha patch of vegetation within the Additional Survey Area, and around the larger patches of habitat under conservation in the eastern part of the Project Development Envelope.

Significance matters	Significance of residual impact of the Proposal in the regional context
	• Developing a Preliminary BBAMP (**Appendix F**) which will be finalised into a Project BBAMP prior to commissioning of the Proposal. • Completing surveys along the indicative transport route and avoiding clearing at locations with known or likely threatened species. • Although no black-cockatoo species have been directly observed on site over a total of 18 survey days (four surveys, including 2 BBUS, a terrestrial fauna survey, and a targeted fauna survey), two additional BBUS are proposed over Spring 2024 and Summer 2025.
Values, sensitivity, and quality of the environment that is likely to be impacted	Seven listed terrestrial fauna species were recorded in the Project Development Envelope, though records for several species is based on secondary evidence. The primary fauna habitats in the Project Development Envelope comprise of Eucalypt woodland on laterite rise, Eucalypt-Sheoak woodland with granites and Creekline. Up to 7.41 ha of these habitats will be cleared in the Project Development Envelope part of the Proposal, however the areas of these fauna habitats to be cleared are patchy and degraded noting the primary land use is for agriculture. Clearing of larger patches of remnant vegetation with greater fauna habitat value has been minimised, and proposed clearing has minimised any further fragmentation of intact habitat patches. Up to 0.98 ha of planted native vegetation which also has some fauna habitat value will be cleared. Based on the site surveys and assessments completed to date, black-cockatoos are unlikely to be concentrated in the Project Development Envelope despite there being suitable foraging and breeding habitat. Fauna habitat in the Transport Development Envelope is of low value as the area is currently disturbed and used as a gravel pit and is subject to regular traffic movements and associated disturbance.
All stages and components of the proposal	The impact assessment considers all components of the Proposal that might directly and indirectly impact terrestrial fauna.
Extent (intensity, duration, magnitude, and footprint) of likely impacts	A maximum of 7.41 ha of native remnant vegetation and 0.98 ha of native planted vegetation will be cleared in the Project Development Envelope. This results in 0.67% of current native remnant vegetation in the Project Development Envelope being cleared and 1% of the current planted native vegetation present being cleared. Clearing of larger patches of remnant vegetation with greater fauna habitat value has been minimised, and proposed clearing has minimised any further fragmentation of intact habitat patches. Habitat impacts due to clearing in the Transport Development Envelope will be temporary as the area will be rehabilitated. Habitat removal will be undertaken progressively over a 24 month period, and will be done so in accordance with the Project's land disturbance clearing procedure to avoid unnecessary or over clearing.
Resilience of the environment to cope with the impacts, including pressures such as climate change	The majority of the Project Development Envelope has already been cleared for agricultural purposes. Climate change is predicted to lead to increased drought and extreme weather events in the region, which would increase pressure on native vegetation. The Proposal seeks to generate renewable energy, thereby seeking to address climate change pressures.

Significance matters	Significance of residual impact of the Proposal in the regional context
Application of the mitigation hierarchy	The Indicative Proposal Footprint has minimised the clearing of fauna habitat as much as reasonably practicable, with only 0.67% of current native remnant vegetation in the Project Development Envelope being cleared and 1% of the current planted native vegetation present being cleared. The 8.39 ha of fauna habitat loss (native and planted vegetation) is distributed across over 20 patches of vegetation in the Project Development Envelope and consists of degraded and highly fragmented vegetation at the perimeter of existing patches, with approximately 85% of clearing areas being less than 0.5 ha. The Proposal has avoided the most intact remnant habitat patch with the highest quality fauna habitat in the Project Development Envelope and along the transport route. The Proposal has reduced the number of turbines, and will have a minimum blade tip height above the typical flight height for black-cockatoos. Turbines have been removed from around the areas that would be most likely to provide regional movement corridors for black-cockatoos. The Proposal will not clear any Rank 1 or Rank 2 black-cockatoo nesting trees. Detailed design will further reduce proposed clearing where possible, with a focus on reducing impacts to higher quality habitat. An offset is expected to be implemented via a Part V EP Act NVCP. Preliminary scoping of required offsets indicates that direct impacts to biodiversity values as a result of the Proposal will be counterbalanced.
Consequence of the likely impacts	The impact assessment considers both direct and indirect impacts. Indirect impacts are not expected to extend beyond the Development Envelopes.
Likely environmental outcomes, and whether they are consistent with the EPA environmental factor objectives	Likely environmental outcomes are presented in **Section 7.7**
Cumulative effects	Cumulative effects are assessed in Section **12.0**
Holistic impacts	Holistic impacts are assessed in Section **11.0**
Level of confidence in the predicted residual impacts and success of the proposed mitigation	Impact assessments were based on assessing the maximum area of fauna habitat that will be cleared for installation of all Proposal infrastructure. Actual disturbance is likely to be lower, therefore the predicted residual impacts over-estimate the likely impact to terrestrial fauna. Additionally, the BBUA assessed the risk of impacts to birds and bats based on the maximum RSA associated with a number of turbine height and options. The final RSA will be less than that assessed. The proposed mitigation measures are intended to reduce the impact to terrestrial fauna as low as practicable. Even if the mitigation measures are imperfectly applied, the residual impacts to significant fauna are predicted to be low.
Public interest about the likely effect on the environment	The Proposal is in the wider public interest, as it will: • be consistent with the WA Government's vision for a secure, reliable, affordable and clean energy future for the state • assist in meeting Australia's renewable energy targets as well as future electricity demands without the production of additional greenhouse gases • facilitate direct employment for up to 250 personnel during construction and 15 personnel during operation.

7.7 Environmental Outcomes

Implementation of the Proposal will achieve the environmental outcomes listed in **Table 7.23** to protect significant terrestrial fauna environmental values.

Table 7.23 Proposed Environmental Outcomes for Terrestrial Fauna

Proposed environmental outcomes	Consistent with EPA objective	How environmental outcomes can be measured and assured	Manageable under Other Statutory Mechanism
Fauna habitat removal will be limited to the clearing limits specified in the Proposal Content Document, which will not result in significant impacts to terrestrial fauna.	Yes	Proposal Content Document defines extent of Development Envelopes. Internal land disturbance procedures and record keeping. Regular environmental compliance reporting.	Yes, under Part V NVCP
No Clearing of Rank 1 and Rank 2 black-cockatoo nesting trees	Yes	Proposal Content Document defines no clearing of Rank 1 and Rank 2 black-cockatoo nesting trees. Pre-clearance fauna surveys. Internal land disturbance procedures and record keeping. Regular environmental compliance reporting.	Yes, under Part V NVCP and via CEMP under Planning and Development Act approval condition
No significant impacts to birds and bats as a result of wind farm operations	Yes	The approved BBAMP will define the monitoring, management and investigative triggers to be implemented.	Yes, under BBAMP expected to be implemented under PD Act approval condition

The proposed environmental outcomes are consistent with the EPA objective "To protect terrestrial fauna so that biological diversity and ecological integrity are maintained". Further, implementation of the Proposal may contribute to enhanced outcomes for some threatened species for which climate change is a key threatening process.

8.0 Other Environmental Factors or Matters

The Other Environmental Factor deemed relevant to the Proposal is Social Surroundings.

Details on the receiving environment, potential environmental factors, proposed mitigation, significance of residual impacts and the environmental outcomes for Social Surroundings are presented in **Table 8.1** below**.**

Table 8.1 Assessment of Social Surroundings

EPA Objective	To protect social surroundings from significant harm
Policy and Guidance	Environmental Factor Guideline - Social Surroundings (Environmental Protection Authority (EPA), 2023)
Receiving Environment	<u>Aboriginal Cultural Heritage</u> • A desktop Aboriginal and historical heritage due diligence assessment of the Project Development Envelope was undertaken by Archae-aus (2024) and a copy is provided in **Appendix I.** • A search of the DPLH Aboriginal Cultural Heritage Inquiry System (ACHIS) found three Registered Aboriginal cultural heritage sites within the Project Development Envelope: *Manaring Road* (DPLH ID 5826), *Geeralying, Narrogin* (DPLH ID 5888), and *Geeralying* (DPLH ID 15139) (Archae-aus, 2024). These areas have been avoided by the Proposal. • Due to the size of the Project Development Envelope, diversity of landscape features often associated with Aboriginal Cultural Heritage (ACH), presence of Aboriginal Registered Sites, lack of previous heritage assessments and historical and ethnographic context of the area, there is a high potential for ACH to be present in certain sections of the Project Development Envelope. These areas are those that show signs of minimal disturbance, with minimal impact to subsurface soils. These are more likely to occur where there is undisturbed bedrock and rock formations, along undisturbed watercourses and where there is remnant vegetation. • Neoen has commenced engagement with SWALSC, GKB Aboriginal Corporation and Willman Aboriginal Corporation and KEEDAC. <u>Natural and historical heritage</u> • A search of the Heritage Council's InHerit database revealed three places of historical heritage significance that intersect the Project Development Envelope (Archae-aus, 2024). These locations have been avoided by the Proposal. <u>Landscape and Visual Amenity</u> • A Landscape and Visual Impact Assessment (LVIA) was undertaken by LatStudios Pty Ltd, (2024) to provide an assessment of the anticipated landscape and visual effects of the Proposal on the Project Development Envelope and its wider landscape context. The assessment was based on the maximum tip height of 291 m AGL and maximum hub height of 200 m AGL. A copy of the LVIA is provided as **Appendix J.** • The LVIA has been completed with reference to *Visual Landscape Planning in WA: A Manual for Evaluation, Assessment, Siting and Design* (WAPC, 2007). • The Project Development Envelope lies in a predominantly rural area comprising isolated farmsteads, forested and natural landscapes. • The landform within the Project Development Envelope and wider landscape is largely defined by undulating rises and low hills with elevations up to around 430 m AHD divided by a series of gently inclined plains associated with waterways.

	• Six Landscape Character Types (LCTs) have been identified within the wider Proposal Area:
	  ○ LCT A: Rural and Forested Uplands
	  ○ LCT B: Major Watercourses
	  ○ LCT C: Broad alluvial plains
	  ○ LCT D: Rural settlements
	  ○ LCT E: Reserves and Forests
	  ○ LCT F: Granite Outcrops
	• Potential visual receptors in the broader area have been identified, including residents, farmers, Narrogin Aerodrome, Downderry Wines, recreational users of the landscape, and motorists.
	<u>Noise</u>
	• The Project Development Envelope and surrounding areas are relatively sparsely populated with existing noise-sensitive premises (e.g. dwellings), and the primary use of the area is agricultural operations.
	• A detailed acoustic assessment and period of background noise monitoring was undertaken by Marshall Day Acoustics (MDA) to support Proposal design and approvals. This work was undertaken in reference to the South Australian Environmental Protection Authority – *Wind Farms Environmental Noise Guidelines*, issued July 2009 and revised November 2021 (EPA, 2021c) and the Environmental Protection (Noise) Regulations 1997, with a copy of the detailed acoustic assessment provided as **Appendix K.**
	• The noise environment in the Project Development Envelope comprises a range of noise sources, including natural sources typical of a rural environment (e.g. wind disturbed vegetation, fauna, rain, etc.) and anthropogenic sources such as road traffic and agricultural activity (Marshall Day Acoustic, 2024).
	• Background noise monitoring was undertaken over a six-week period at seven locations to inform the detailed acoustic assessment.
	• The survey results at some locations indicate higher background noise levels at low wind speeds than is typically observed in rural environments. Listening checks for selected audio recordings identified road traffic noise as a significant contributor to the measured noise levels at receivers along the Williams-Narrogin Road.
	<u>EMI and Shadow Flicker</u>
	• An EMI assessment (**Appendix L**) and shadow flicker assessment (**Appendix M**) were undertaken by DNV to support the Proposal design and approvals. These were undertaken with reference to the Draft National Windfarm Development Guidelines (EPHC, 2010)**.**

Potential Environmental Impacts	<u>Aboriginal and historical heritage values</u>
	• Ground disturbance activities associated with the Proposal have the potential to impact on ACH, namely within areas of higher ACH potential.
	<u>Landscape and visual amenity</u>
	• The LVIA assessed the potential impact on the landscape and visual amenity of the following receptors:
	  ○ Residents living on rural properties in the farmland on and surrounding the Project Development Envelope
	  ○ Farmers and other people working in the rural landscape around the Project Development Envelope
	  ○ Visitors and workers at Narrogin Aerodrome, including recreational 'gliders', and to a lesser extent visitors and staff at Downderry Wines
	  ○ Recreational users of the landscape, including those visiting Dryandra Woodland National Park, Foxes Lair, Contine Hill Lookout and Picnic Area, Lions Lookout and Yilliminning Rock.

	○ Motorists (including tourists) using roads within the Study Area including the Albany Highway, Williams-Kondinin Road, Clayton Road, Cowcher Road and Curnows Road. • Only one LCT is anticipated to be directly impacted by the Proposal, that being LCT A: Rural and forested uplands (LCA A1: Dryandra – Narrogin Rural and Forested Uplands). <u>Noise</u> • Operation of the Proposal will result in noise emissions, which have the potential to adversely affect the health and quality of life of receptors exposed to prolonged increased noise levels. <u>EMI Shadow Flicker</u> • Operation of the Proposal will result in shadow flicker, which has the potential to adversely affect the health and quality of life of nearby sensitive receivers. There is the potential for EMI impacts to services in the area, noting that mobile phone signal is limited in the area at present.
Proposed Mitigation	<u>Aboriginal and historical heritage</u> • The proponent has undertaken engagement with SWALSC, GKB Aboriginal Corporation, Willman Aboriginal Corporation and KEEDAC, and commits to completing surveys and implementing appropriate Aboriginal cultural heritage controls in consultation with these stakeholders. • The Project Development Envelope has avoided all known Aboriginal and historical sites. • The Project Indicative Footprint has minimised overlap with areas mapped as having a high ACH potential. • An archaeological and ethnographic heritage survey will be undertaken of proposed disturbance areas in zones with a high potential of encountering ACH. The survey will also sample survey areas outside of these zones. • Should Aboriginal or historical values be identified during surveys, they will be avoided where possible. Although unlikely, in the event they are unable to be avoided, the appropriate approvals for their removal will be obtained. • The Proponent has executed a Noongar Standard Heritage Agreement (NSHA) with SWALSC. • The Proponent has submitted an Activity Notice to SWALSC so that the appropriate knowledge holders and consultants can be nominated for the heritage surveys. <u>Landscape and visual amenity</u> • Turbines have been setback a minimum 325 m from adjacent property boundaries. • A number of turbines have been removed and relocated to reduce visual impact to the town of Williams and adjoining rural residential zoned land, considering potential landscape and visual impacts. • Existing vegetation has been retained where possible to act as visual barriers. <u>Noise</u> • Turbines have been setback a minimum of 1.5 km from existing non-involved sensitive receivers. • Background noise monitoring has been undertaken to understand the existing noise environment. • Noise modelling has been undertaken to inform turbine layout, with turbines located so that the Proposal will not result in exceedance of 35 dB at existing non-involved sensitive receivers. • The noise modelling has been using a criteria of 45 dB for involved dwellings in the absence of WA based criteria. However, based on the NIA, the recommended noise limit of 40dB can be achieved at all involved dwellings that will be occupied while the Project is under operation. • An operational noise management plan will be developed that identifies how compliance with the Proposal's operational noise limits will be demonstrated, including details of

	testing procedures and reporting time frames following commencing of operation of the Proposal. • Following construction, compliance monitoring will be conducted in accordance with the procedure outlined in the operational noise management plan including sound power testing of selected turbines and evaluation of tonality. <u>Shadow Flicker and EMI</u> • Turbines have been setback a minimum of 1.5 km from existing non-involved sensitive receivers. • Shadow flicker modelling has been undertaken to inform turbine layout, with turbines located so that the Proposal will not result in exceedance of 30 hours per year at existing non-involved sensitive receivers. • Turbine locations have been amended through the design process to mitigate EMI impacts.
Residual Impacts	<u>Aboriginal and historical heritage</u> • Residual impacts are considered to be low noting all known sites will be avoided and proposed disturbance in high potential ACH areas will be surveyed in advance to inform mitigation of impacts. Should new ACH be identified, the Proposal will first aim to avoid the ACH. In the very unlikely circumstance where newly identified ACH cannot be avoided, the required approvals will be sought in consultation with Traditional Owners. <u>Landscape and visual amenity</u> • The LVIA determined there to be no significant impacts to identified receivers with the exception of passing motorists on Williams-Narrogin Road where close views toward turbines are possible (although existing roadside shelterbelts contribute significantly to reducing the availability of these close open views toward the infrastructure). • Turbines will be visible against the backdrop of rolling hills and introduce new, dominant visual elements into what is currently a relatively undeveloped and typical rural landscape (Lat Studios, 2024). <u>Noise</u> • Noise modelling results demonstrate that the Proposal can be developed to meet 35 dB at all existing non-involved receptors. <u>Shadow Flicker and EMI</u> • Shadow flicker modelling results demonstrate that the Proposal can be developed so that shadow flicker duration is less than 30 hrs per year at all existing non-involved sensitive receivers. • Potential EMI impacts related to the project are minor.
Environmental Outcome	• No disturbance of known Aboriginal and historical heritage values. • No significant impacts on the landscape character of the Site. • No significant visual impacts with the exception of passing motorists on Williams-Narrogin Road where close views toward turbines are possible. This view will be screened by roadside vegetation in many locations. • No exceedance of the noise limits specified by the WA Noise Regulations at existing non-involved sensitive receivers. • No exceedance of the shadow flicker limits specified by the Draft National Wind Farm Development Guidelines at existing non-involved sensitive receivers.

All other EPA factors (i.e., Benthic communities and habitats, Coastal Processes, Marine Environmental Quality, Marine Fauna, Landforms, Subterranean Fauna, Terrestrial Environmental Quality, Air Quality, Greenhouse gas emissions, and Human Health) are not considered to be relevant to the Proposal as outlined in **Table 5.1**.

9.0 Residual Impact and Offsets

Under the WA Environmental Offsets Policy (Government of Western Australia, 2011) environmental offsets are required to counterbalance significant residual impacts generated through the implementation of a Proposal. Residual impacts are unavoidable impacts that remain after avoidance, minimisation and rehabilitation were pursued.

Implementation of the Proposal is likely to result in the following residual impacts following application of the mitigation hierarchy:

- Clearing of up to 7.41 ha of remnant native vegetation and 0.98 ha of planted native vegetation in the Project Development Envelope. This will result in 0.67% of current remnant native vegetation and 1% of current planted native vegetation present in the Project Development Envelope being cleared.
- Clearing of up to 0.2 ha of native vegetation within the Transport Development Envelope. The vegetation patch may meet the criteria of a PEC, however the area is degraded, is currently used as a gravel pit, and may not meet the size threshold.
- Removal of up to 8.39 ha (remnant and planted native vegetation) of potential fauna habitat within the Project Development Envelope, including habitat for conservation significant species.
- Clearing of the following proportions of current VSA extents:
    - Dryandra_1023: 0.177% (2.67 ha)
    - Dryandra_5: 0.001% (0.13 ha)
    - Narrogin_1023: 0.009% (2.85 ha)
    - Narrogin_1073: 0.324 (1.36 ha)
    - Narrogin_352: 0.023% (0.40 ha).
- Potential for fauna mortalities through turbine strikes, vehicle strikes and fauna entrapment.
- Potential for impacts to regional movement of black-cockatoos due to the presence of turbines.

Impact assessments were based on assessing the maximum area of clearing for installation of all Proposal infrastructure. Actual disturbance is likely to be lower, therefore the predicted residual impacts are likely an over-estimate.

The significance of these residual impacts has been assessed with reference to the "*consideration of significance*" matters listed in the *Statement of environmental principles, factors, objectives and aims of EIA* (EPA, 2021b). Considering this framework, residual impacts are unlikely to be significant as:

- Higher-quality vegetation and fauna habitat has been avoided through reduction of the Project Development Envelope and design of the Indicative Proposal Footprint
- Clearing is restricted to the edges of small, fragmented and degraded native vegetation and fauna habitat, with larger remnant habitat patches avoided as far as possible

- No Rank 1 or 2 black-cockatoo trees will be disturbed by the Project, and disturbance of Rank 3 trees will be minimised.
- Larger, higher-quality patches of foraging and potential black-cockatoo breeding habitat have been avoided.
- A large proportion of habitat is being retained in the Project Development Envelope, with over 99% of remnant native vegetation being retained.
- Habitat in adjacent conservation areas is expected to be preferred by most conservation significant fauna species.
- Minimum turbine tip height is above the typical flight height of black-cockatoos, and they are unlikely to be concentrated in the area.
- Impacts will be actively managed through a CEMP (**Appendix D**) and BBAMP (**Appendix F**).

An environmental offset is still likely to be required under a Part V EP Act Native Vegetation Clearing Permit process and will be prepared in accordance with *the WA Environmental Offset Policy 2011* and *Environment Offset Guidelines 2014*. Further to the Part V offset, Neoen is investigating the potential to contribute funds to initiatives to further improve conservation outcomes for black-cockatoos under their "above and beyond" initiative. A prior example of where this initiative has gone beyond regulatory requirements to achieve conservation outcomes is the purchase and donation of land as part of the Goyder Wind Farm in South Australia.

10.0 Matters of National Environmental Significance

A separate assessment of impacts to MNES (refer to **Appendix H**) has been developed to support referral of the Proposal under the EPBC Act. The assessment was undertaken for the Project Development Envelope against the MNES *Significant Impact Guidelines 1.1* (Department of the Environment, 2013) and involved an assessment of:

- EPBC Act listed Threatened flora and fauna species
- EPBC Act listed Migratory fauna species.

Desktop and field assessments of the Project Development Envelope identified several MNES as being known to occur or expected to occur. A total of four MNES Threatened fauna species were confirmed as present within the Project Development Envelope:

- Carnaby's Black-Cockatoo
- Forest Red-tailed Black-Cockatoo
- Chuditch
- Red-tailed Phascogale.

One Threatened Ecological Community (TEC) was confirmed to be present in the Project Development Envelope. This was also recorded as potentially being present in a portion of the Transport Development Envelope where clearing will be required:

- Eucalypt Woodlands of the Western Australian Wheatbelt.

An additional one MNES Threatened fauna species and one MNES Migratory fauna species were identified as having a moderate potential to occur in the Project Development Envelope:

- Baudin's Black-Cockatoo
- Fork-tailed Swift.

The MNES assessment identified sources of potential impacts on MNES, most notably the clearing of native vegetation comprising species' habitat and potential for turbine collision.

With consideration of the mitigation measures detailed in **Section 6.0 and 7.0** of this document, significant impact assessments were conducted for the residual impacts to relevant MNES in accordance with the MNES *Significant Impact Guidelines 1.1* (Department of the Environment, 2013).

The assessment identified that while the Project will have residual impacts to these MNES, the impacts are unlikely to be considered as significant. The permanent removal of native vegetation and associated fauna habitat is distributed across the Project Development Envelope and consists of degraded and fragmented vegetation at the perimeter of existing patches. It will amount to the total removal of less than 1% of these

habitats across the entire Project Development Envelope, with extensive, better-quality habitat of similar suitability present in the region immediately surrounding the Project Development Envelope, including areas protected for conservation.

While the residual impacts are not considered to be significant, they will be offset under the State approvals process for native vegetation clearing as presented in **Section 9.0** of this document.

11.0 Holistic Impact Assessment

The previous sections evaluated the potential impacts on environmental values separately. However, it is acknowledged that environmental factors are inherently interconnected. This section explores the relationships and interactions between these factors and examines how the activities proposed might affect multiple environmental aspects simultaneously. The environmental factors discussed in this section are:

- Flora and vegetation
- Terrestrial fauna
- Social surroundings
- Greenhouse gas emissions.

The Proposal activities of land clearing, infrastructure establishment and wind turbine operation have the potential to impact on flora and vegetation, fauna and social surroundings. The proposed clearing of remnant vegetation and planted native vegetation in the Development Envelopes is primarily located in small patches at the edges of degraded native vegetation that do not contain threatened flora. Vegetation clearing may result in loss of fauna individuals and will result in loss of fauna habitat. This includes some habitat for conservation significant species, noting that the clearing has been avoided as far as possible and limited to small patches of degraded vegetation. Loss of vegetation extent and condition directly impacts availability of foraging and shelter resources for terrestrial fauna, potentially displacing individuals.

Noise and the limited light emissions from construction, although temporary, may disturb fauna affecting their behaviour and breeding patterns. There is potential for loss of fauna individuals due to strike from vehicles or turbine blades, and potential for disruption of fauna behaviour due to noise of construction and turbine operation.

Possible introduction and/or spread of weeds due to Proposal activities has potential to indirectly impact vegetation condition, which reduces the quality of fauna habitat, and may impact on adjacent pastoral activities.

Wind turbines may also result in some visual amenity and noise impacts to the local community.

Possible impacts of the Proposal will be mitigated through avoiding vegetation of higher ecological significance for flora and fauna, confining vegetation clearing/development to areas in degraded condition and implementing management actions to minimise impacts such as weed introduction, noise, light, dust and traffic. In this way the Proposal aims to be consistent with the mitigation hierarchy by avoiding confirmed PECs, native vegetation in Good condition or better, and Rank 1 and 2 black-cockatoo breeding trees, and minimising impacts to the surrounding environment as far as possible. Potential impacts are also proposed to be managed through a CEMP and BBAMP.

The loss of vegetation will result in greenhouse gas emissions through loss of carbon storage, however due to the relatively small area of vegetation clearing the levels will be low. The Proposal aims to ultimately reduce greenhouse gas emissions in the long term by providing renewable energy, and short-term emissions from construction will be significantly outweighed by long-term benefits from renewable energy production.

The holistic effects have been evaluated, and no new significant impacts have been identified from the combined environmental effects. The proposed environmental outcomes effectively address these combined impacts and have been included in the most relevant environmental factor section. The holistic impact of the Proposal is not expected to be any larger or different than the impacts predicted for each environmental factor, and there will be a net environmental benefit in terms of renewable energy production and reduction in greenhouse gas emissions.

Table 11.1 on the following page summarises the Proposal activities and how each activity might impact on a range of key environmental factors. This facilitated identification of any combined effects across multiple environmental factors.

Table 11.1 Holistic Consideration of Impacts to Environmental Factors

Proposal activities	Impacts to environmental factors				Combined Environmental Effects Across Environmental Factors
	Flora and Vegetation	Terrestrial Fauna	Social Surroundings	Greenhouse Emissions	
Land clearing and establishment of Proposal infrastructure	Direct loss of native flora and vegetation. Potential introduction of Weeds of National Significance or Declared Pests. Possible indirect degradation of native vegetation condition.	Direct habitat loss and potential loss of terrestrial fauna individuals. Possible indirect degradation of terrestrial fauna habitat.	Potential loss of amenity (noise and visual). Potential for introduction or spread of weeds to affect agricultural activities.	Loss of carbon storage capacity. Greenhouse gas emissions from turbine manufacture, transport and construction.	Land clearing will result in loss of vegetation, terrestrial fauna habitat, and carbon storage capacity. Introduction of weeds could adversely impact adjacent flora and vegetation (condition), terrestrial fauna habitat quality and social surroundings (pastoral land use).
Proposal operations: turbine operation, vehicle movement, dust emission, fire	Possible indirect degradation of native vegetation condition. Potential introduction of Weeds of National Significance or Declared Pests.	Potential loss of terrestrial fauna individuals. Possible indirect degradation of terrestrial fauna habitat.	Potential loss of amenity (noise, visual and shadow flicker). Potential for introduction of weeds to affect pastoral activities.	Greenhouse gas emissions from turbine maintenance.	Operational activities may result in direct loss or impact on fauna individuals. Operations may impact social surroundings through potential weed introduction to pastoral lands, reduction of visual amenity, increase in noise levels and shadow flicker. Turbine operations help address climate change which is one of the threats to conservation significant species, including black-cockatoos, through reducing greenhouse gas emissions.

12.0 Cumulative Environmental Impact Assessment

Cumulative environmental impacts are the successive, incremental, and interactive impacts on the environment of a proposal with one or more past, present and reasonably foreseeable future activities (EPA, 2024). The EPA (Environmental Protection Authority (EPA), 2021a) defines reasonably foreseeable future activities as “Third party (or Proponent) activities which are already approved, are in a government approvals process, or are otherwise reasonably likely to proceed or be ongoing”.

This section presents the potential cumulative impacts associated with known past, present and reasonably foreseeable projects in the general vicinity of the Proposal that may impact on the same environmental values; namely flora and vegetation, terrestrial fauna and social surrounds.

The Proposal is located in the Wheatbelt region of Western Australia, where the land has been historically extensively cleared and is now primarily utilised for agricultural activities. The area has more recently been identified as a suitable location for renewable energy generation projects, although none are yet known to be constructed with 50 km of the Proposal. The nearest wind farm project that is operational is the Flat Rocks Wind Farm approximately 100 km south of the Project Development Footprint.

A desktop review did not identify any recently constructed projects within 50 km of the Proposal that have identified significant impacts to flora and vegetation, terrestrial fauna and social surrounds.

A review of the EPA and EPBC referral portals did not identify any Proposals under assessment within the broader Narrogin and Williams areas, that would result in potential significant impacts to flora and vegetation, terrestrial fauna and social surrounds.

While no renewable energy proposals located within 50 km of the Project Development Envelope have been referred to date, a desktop review was undertaken to identify potential projects to be considered in the context of potential cumulative impacts. Details of the potential proposals identified are provided in **Table 12.1**.

Table 12.1 Other Projects with Potential Cumulative Impacts

Project Title	Distance from Project Development Envelope	Project Description	Status of Project	Timing for construction	Potential Cumulative Flora and Vegetation Impacts	Potential Cumulative Terrestrial Fauna Impacts	Potential Cumulative Social Surrounds Impacts
Bellwether Wind Farm	Investigation area is 1 km South	Proposed 3 GW wind farm development with up to approximately 400 turbines. The investigation area extends over approximately 100,000 ha.	Preliminary assessments and community consultation	Commence construction in 2028	Project Development Envelope and extent of native vegetation clearing not defined. Landscape of the area is primarily cleared for agriculture with some larger patches of remnant vegetation however some clearing would be anticipated considering the scale of the Bellwether Wind Farm.	Extent of or type of fauna habitat removal not defined. There may be an increased bird collision risk due to a greater number of turbines. Due to proximity of the site and similar landscape setting, similar species would be expected to occur. However, noting the larger project area, there is the potential for additional species to be recorded.	Noise impacts typically do not extend beyond 1.5 km from wind turbines and 1 km from BESS facilities. It is unlikely wind turbines will be constructed on the boundary of the investigation area, therefore no cumulative noise impact anticipated. Cumulative landscape and visual impacts were assessed in the LVIA (refer Section 12 of **Appendix J**). There is the potential for significant combined cumulative impacts associated with these projects, however this would be limited to highly localised impacts on parts of Williams-Kondinin Road in locations where close views toward both Projects may be possible. The potential for significant combined cumulative impacts would need to be confirmed once the layout for the Bellwether Wind Farm has been defined.

Project Title	Distance from Project Development Envelope	Project Description	Status of Project	Timing for construction	Potential Cumulative Flora and Vegetation Impacts	Potential Cumulative Terrestrial Fauna Impacts	Potential Cumulative Social Surrounds Impacts
Narrogin Solar Farm	Project site is 10 km East	Proposed 200 MW solar farm and a 4-hour 200 MW battery energy storage system (BESS).	Preliminary assessments and community consultation	Unknown	Extent of native vegetation clearing not defined. Majority of site appears to be previously cleared for agricultural purposes. If existing vegetation is avoided, clearing impacts will be low.	Extent of fauna habitat removal not defined. Majority of site appears to be previously cleared for agricultural purposes. If fauna habitat is avoided, impacts will be low. No risk of turbine strikes.	Noise impacts typically do not extend beyond 1 km from BESS facilities, therefore no cumulative noise impact anticipated. Solar farms are generally lower in the landscape and less visible that wind turbines, therefore no cumulative visual impact anticipated.
Dardadine Wind Farm	Project site is 30 km Southwest	Construction and operation of up to 168 turbines, BESS and associated infrastructure. The proposed site extends over approximately 19,000 ha of rural land predominantly used for grazing and conservation.	Planning and technical studies in progress.	2027 to 2030	Project Development Envelope and extent of native vegetation clearing not defined. Landscape of the area is primarily cleared for agriculture. Dardadine Wind Farm proposes five times more turbines than this Proposal and native vegetation clearing would be expected.	Extent of fauna habitat removal not defined. There may be an increased turbine collision risk due to a greater number of turbines. Due to proximity of the site and similar landscape setting, similar species would be expected to occur. However noting the larger project area, there is the potential for additional species to be recorded.	Noise impacts typically do not extend beyond 1.5 km from wind turbines and 1 km from BESS facilities, therefore no cumulative noise impact anticipated. Cumulative landscape and visual impacts were assessed in the LVIA (refer Section 12 of **Appendix J**) and it was determined that no significant combined cumulative impacts are anticipated as a result of the Dardadine Wind Farm.

Project Title	Distance from Project Development Envelope	Project Description	Status of Project	Timing for construction	Potential Cumulative Flora and Vegetation Impacts	Potential Cumulative Terrestrial Fauna Impacts	Potential Cumulative Social Surrounds Impacts
Ambrosia Wind Farm	Investigation area is 65 km southwest	Construction and operation of up to 100 wind turbines and associated infrastructure.	Early development	Post 2030	Project Development Envelope and extent of native vegetation clearing not defined. Landscape of the area is primarily cleared for agriculture with some larger patches of remnant vegetation. Ambrosia Wind Farm proposes 3 times more turbines than this Proposal and clearing of vegetation would be expected.	Extent of fauna habitat removal not defined. There may be an increased turbine collision risk due to a greater number of turbines.	Due to the distance between both projects (65 km), no cumulative social surrounds impacts are anticipated.

The broader region surrounding the Proposal has historically been extensively cleared for agricultural purposes. The region does however contain patches of remnant vegetation that offer valuable fauna habitats for residence and dispersal. Future projects have the potential to further clear these remaining habitat areas.

Whilst the future potential projects identified in **Table 12.1** may result in cumulative impacts to flora and vegetation, terrestrial fauna and social surrounds, these are unlikely to be significant primarily as a result of the design flexibility permitted by renewable energy projects, particularly wind farms. It is anticipated that, similar to this Proposal, native vegetation clearing and fauna habitat removal might primarily be along the edges of fragmented patches of degraded vegetation. Proponents of these Projects, as Neoen has, should seek to avoid values that offer greater environmental significance such as known black-cockatoo breeding trees.

As noted in the LVIA (**Appendix J**), the Bellwether Wind Farm Project has the potential to create a significant combined cumulative visual impact, however this would be limited to highly localised parts of Williams-Kondinin Road in locations where close views toward both Projects may be possible. The potential for significant combined cumulative visual impacts would need to be confirmed once the layout for the Bellwether Wind Farm has been defined.

It should be further noted that the Projects presented in **Table 12.1** are all in the early planning stages, will potentially be reduced in scale as studies are completed and mitigations applied, and may not all reach the construction stage.

Projects that do proceed will need to offset significant residual environmental impacts in accordance with the relevant guidelines at the time. With a greater emphasis being placed on nature positive gain, there is the potential for multiple projects to provide a net gain in the environmental values of a region which has historically been cleared and has degraded remnant vegetation. Furthermore, these renewable energy projects are vital in reducing carbon emissions and contributing to mitigating impacts of climate change.

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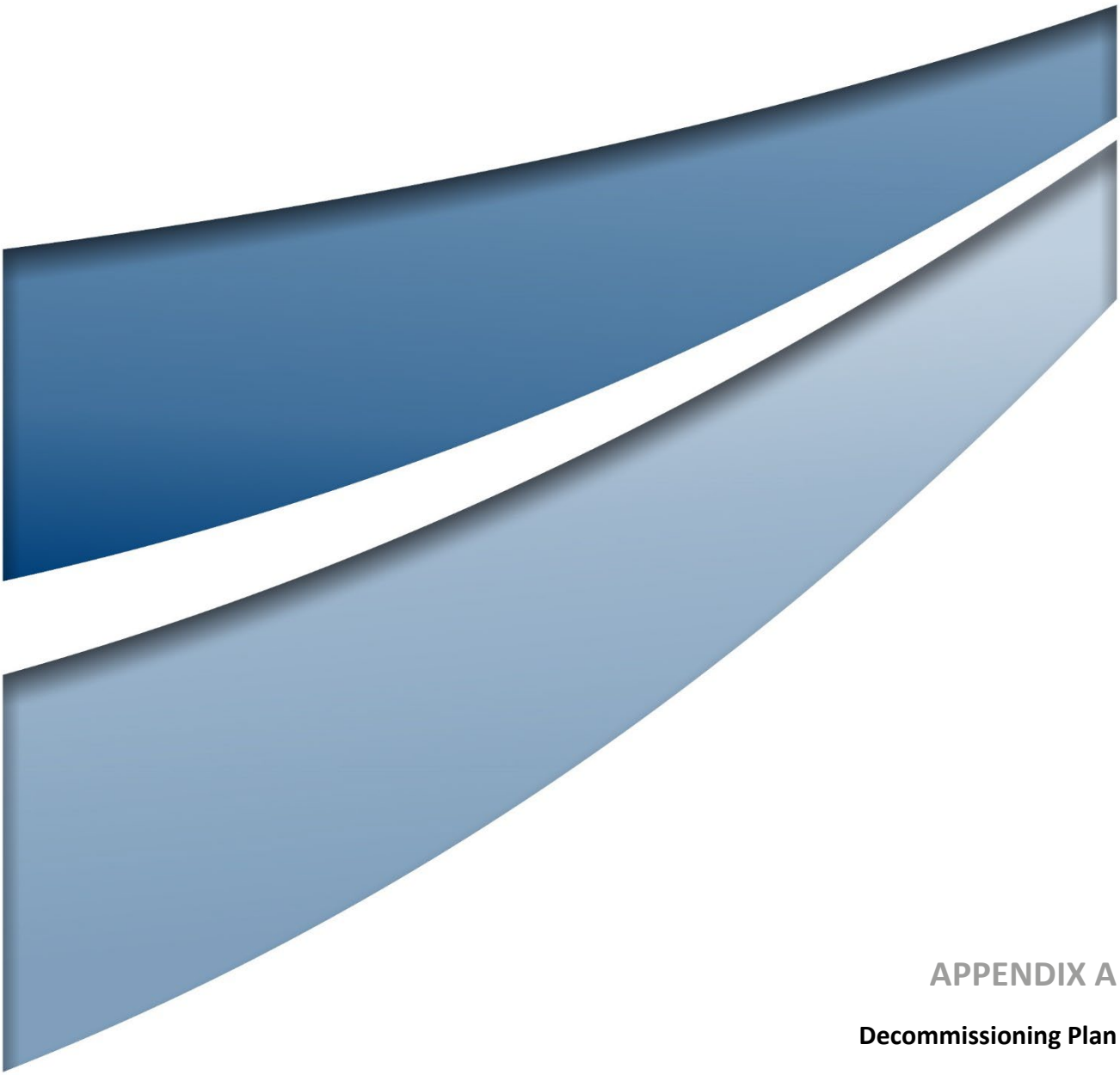
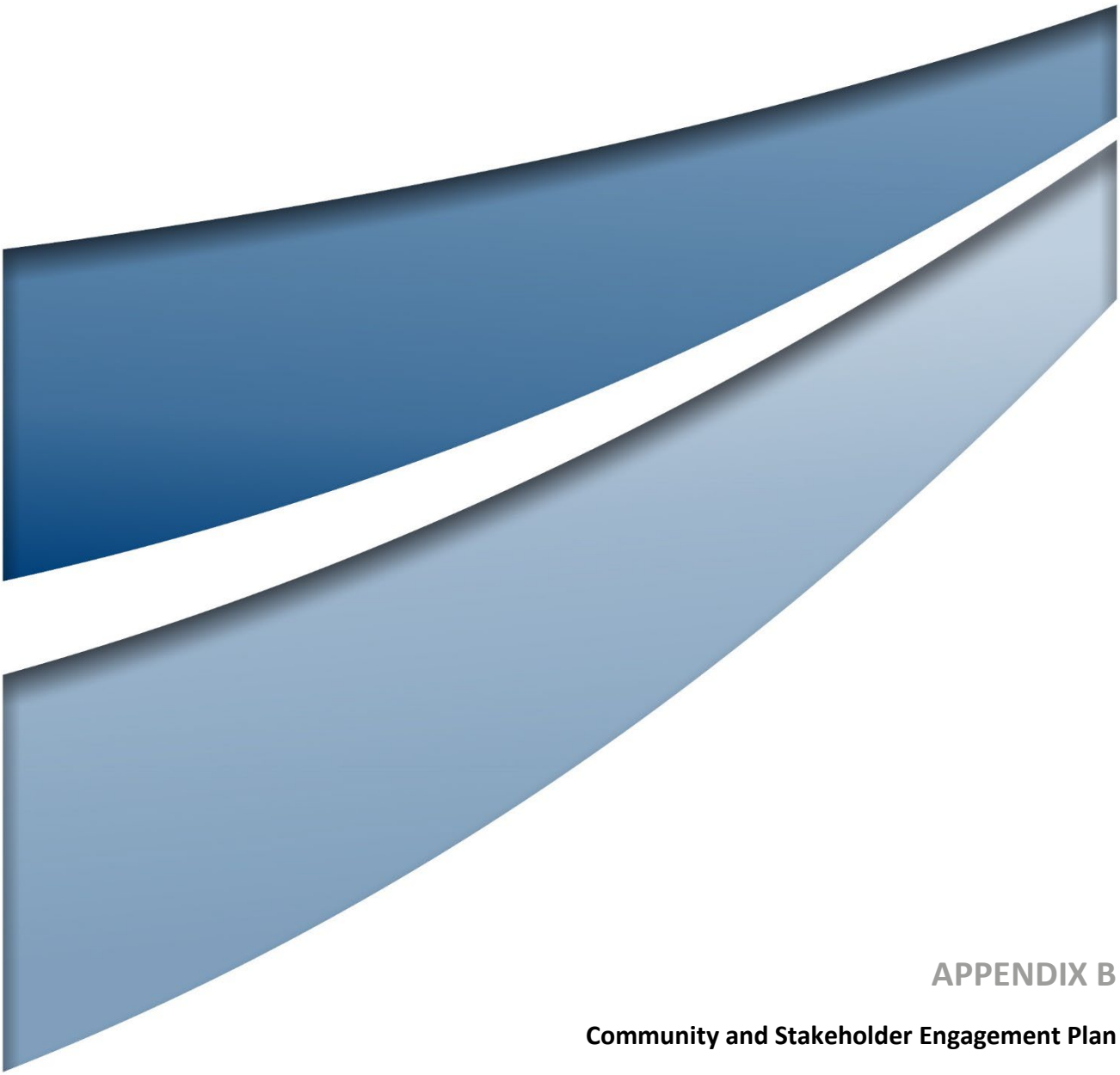


APPENDIX A

Decommissioning Plan

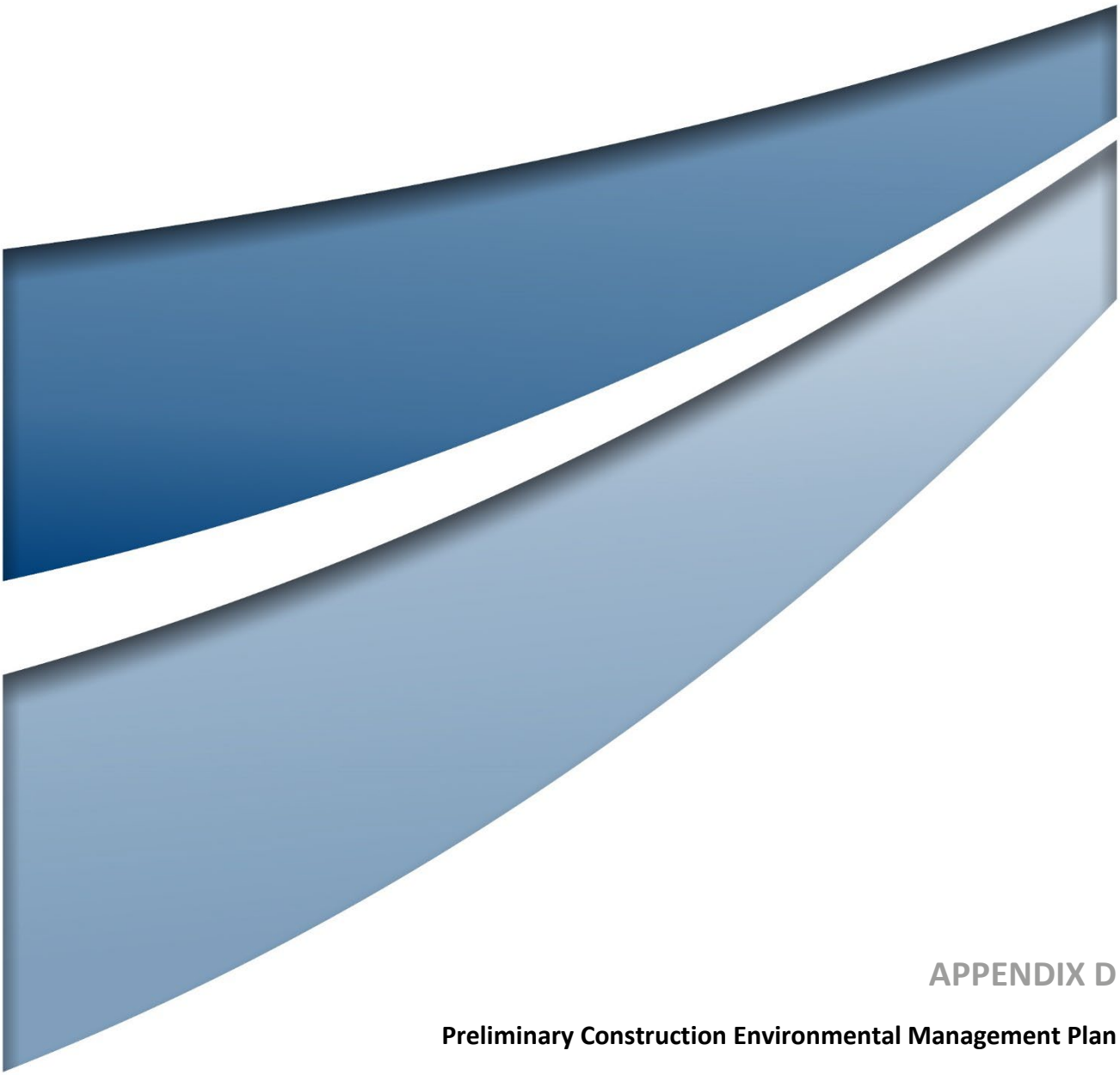


APPENDIX B

Community and Stakeholder Engagement Plan

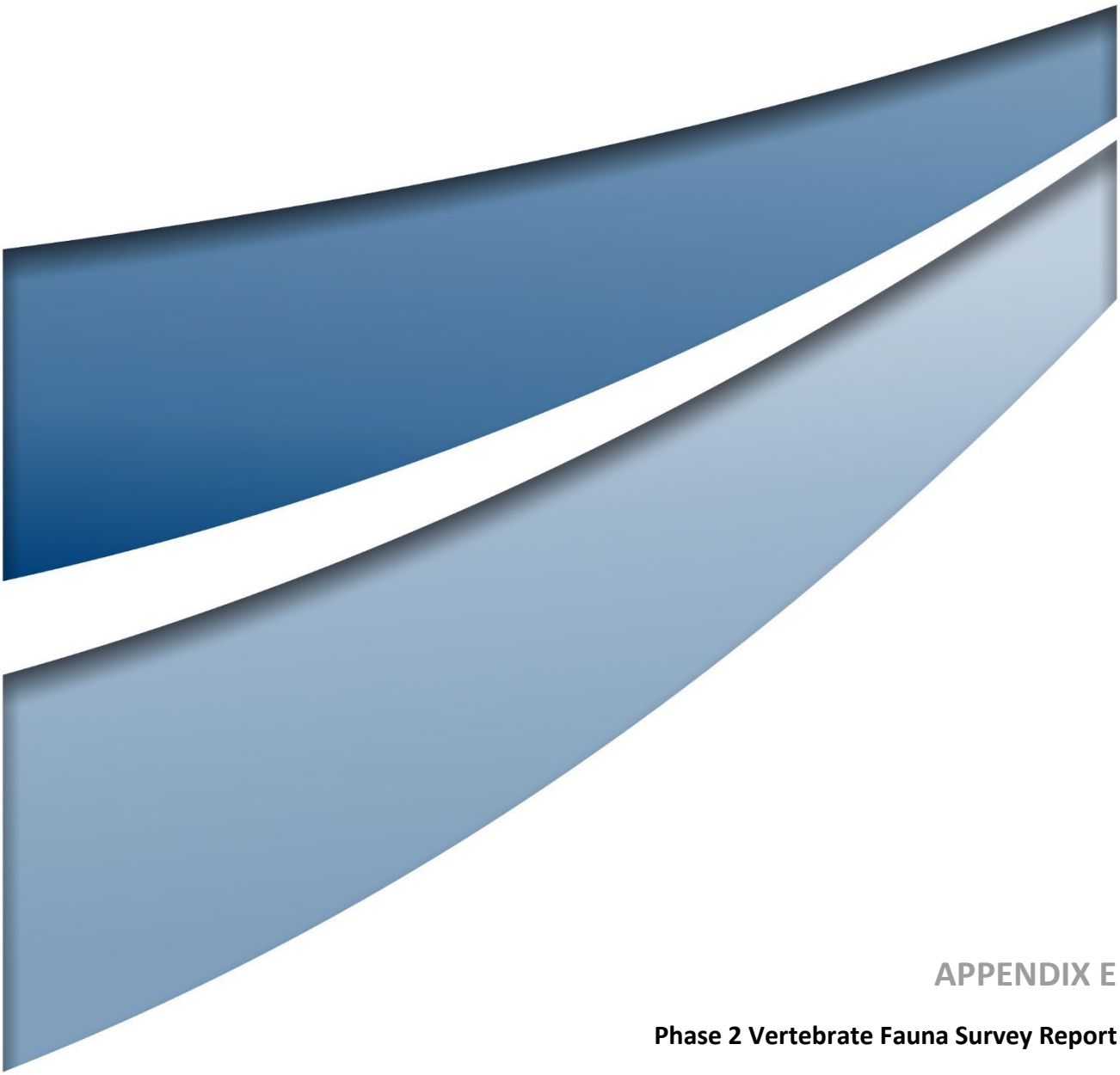
APPENDIX C

Phase 2 Reconnaissance and Targeted Flora and Vegetation Assessment



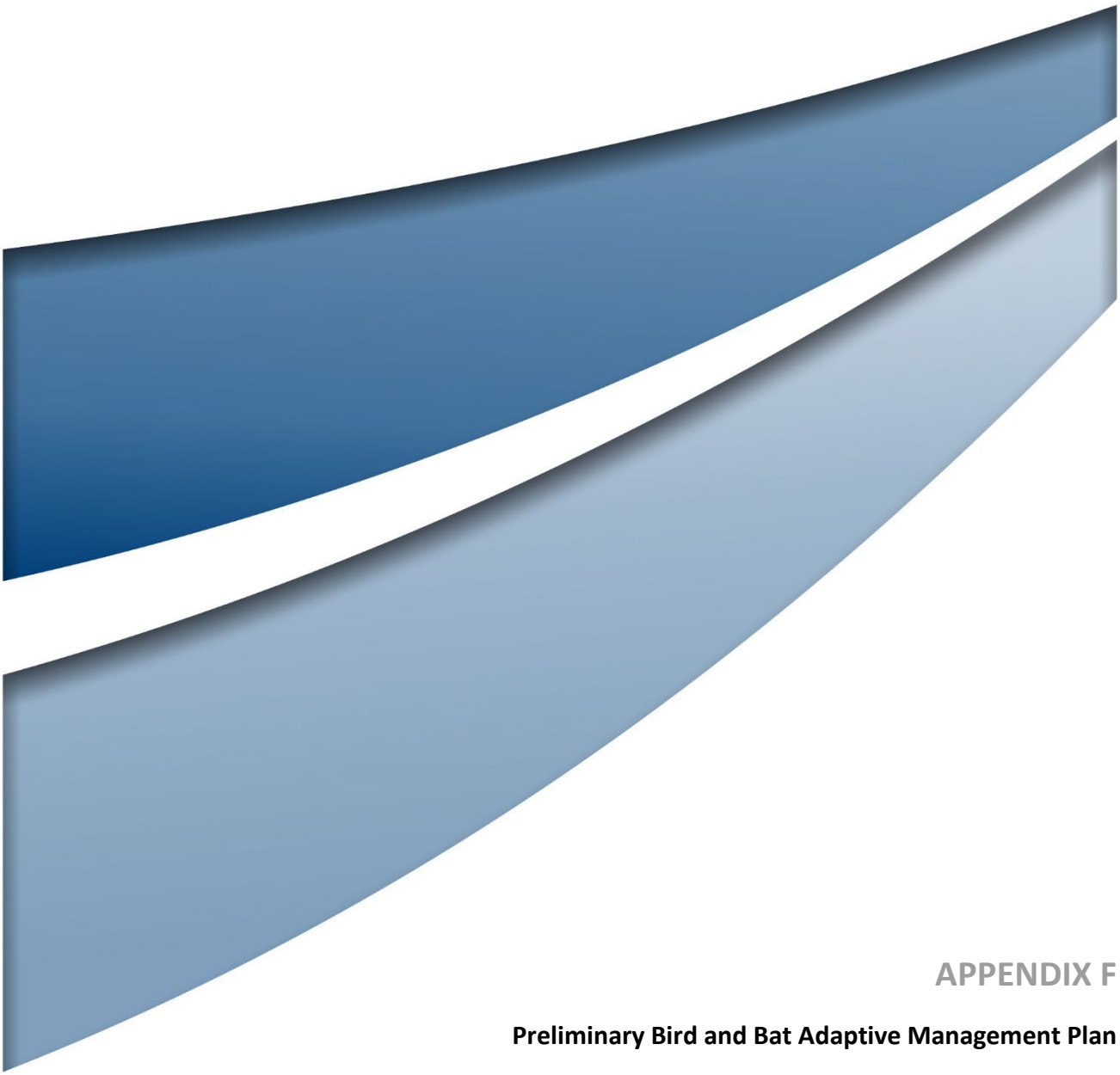
APPENDIX D

Preliminary Construction Environmental Management Plan



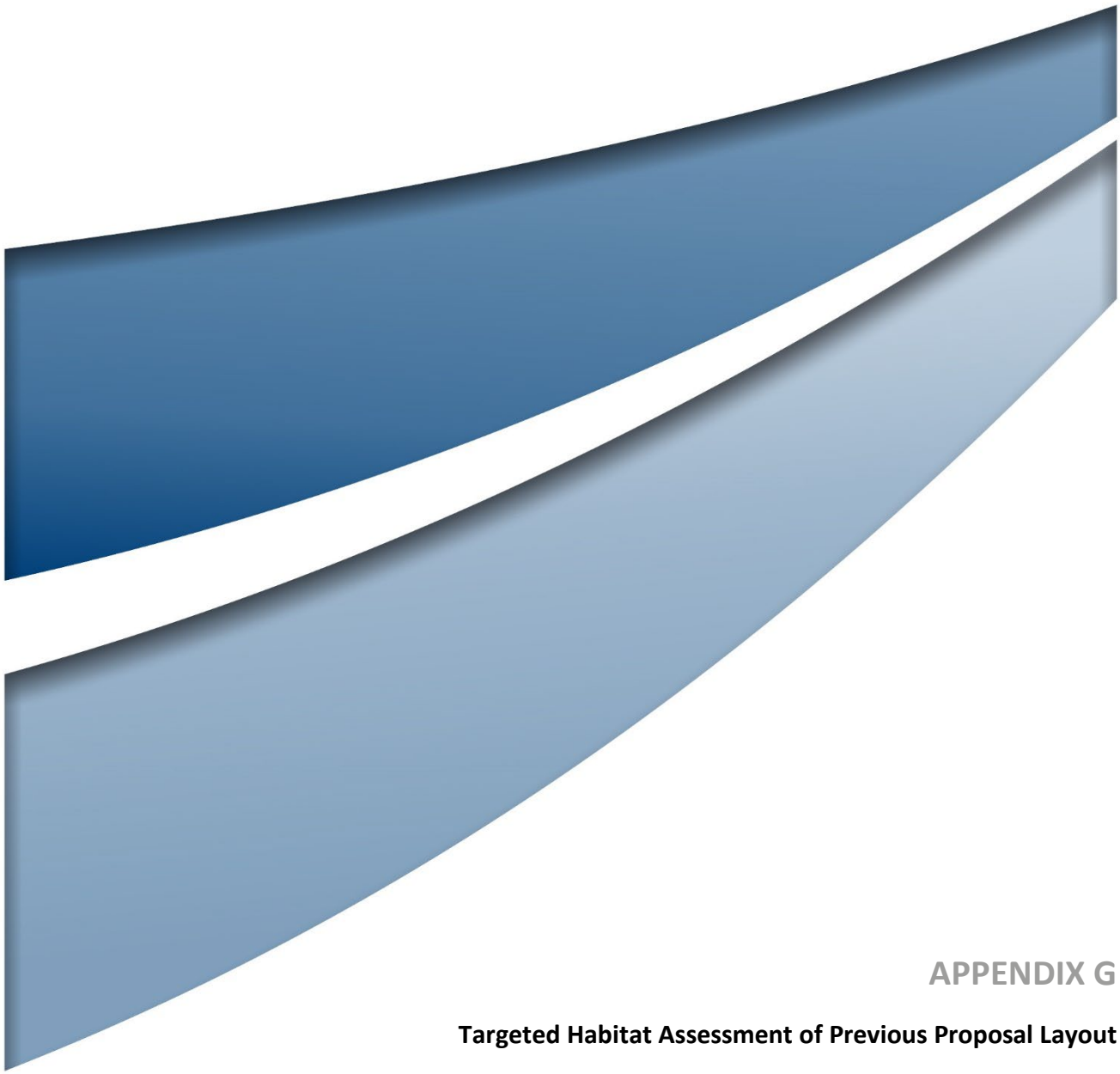
APPENDIX E

Phase 2 Vertebrate Fauna Survey Report



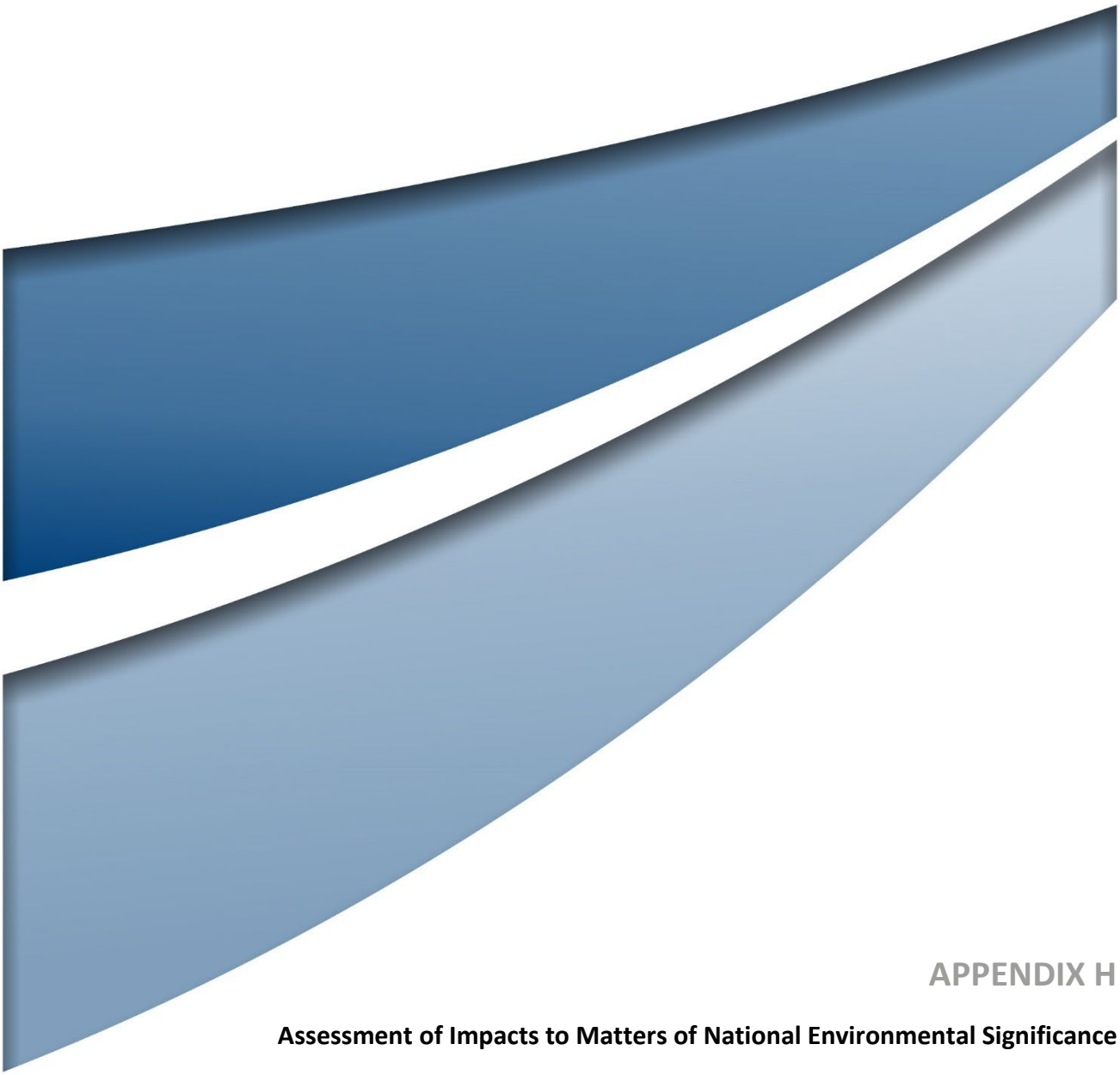
APPENDIX F

Preliminary Bird and Bat Adaptive Management Plan



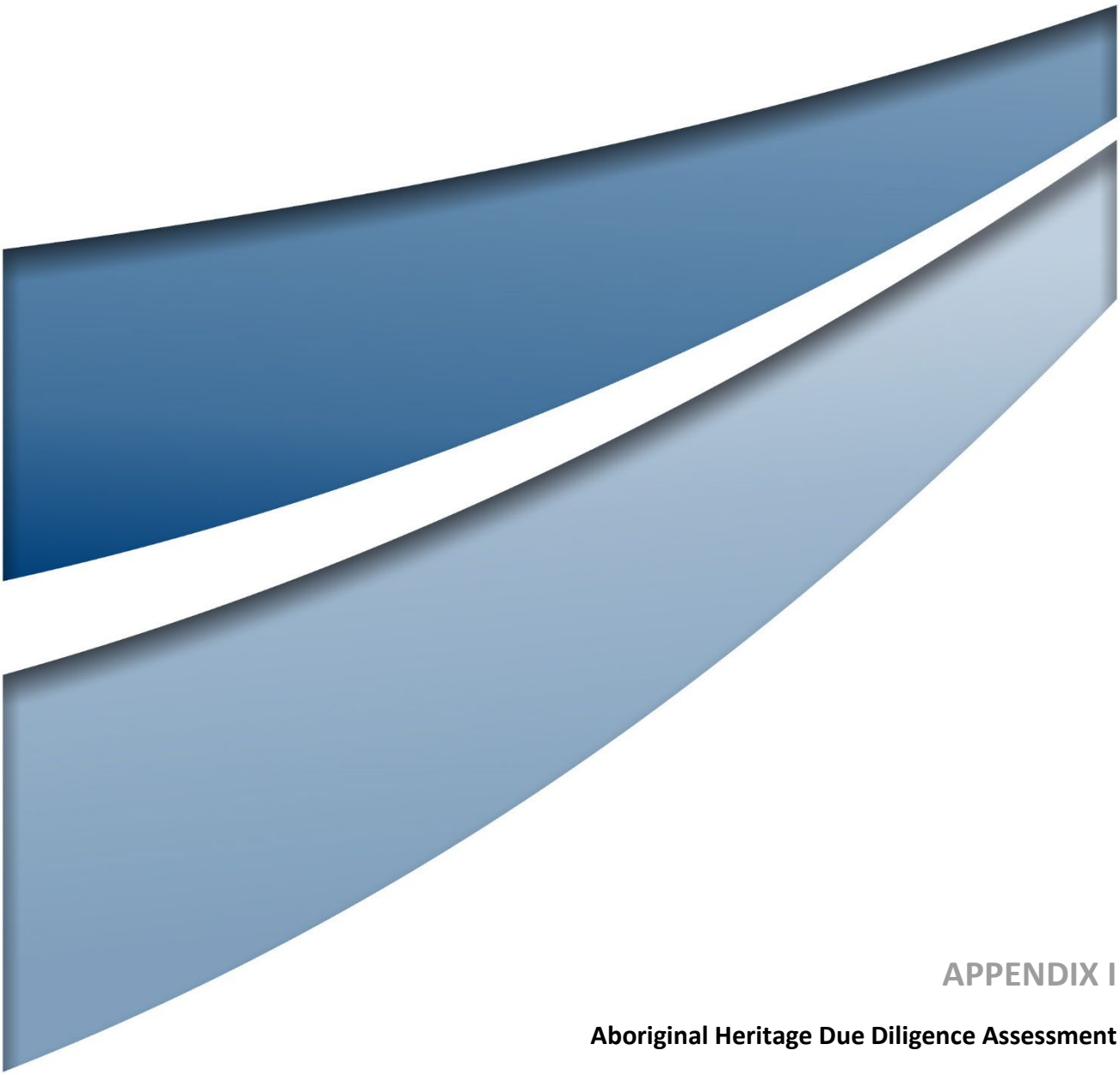
APPENDIX G

Targeted Habitat Assessment of Previous Proposal Layout



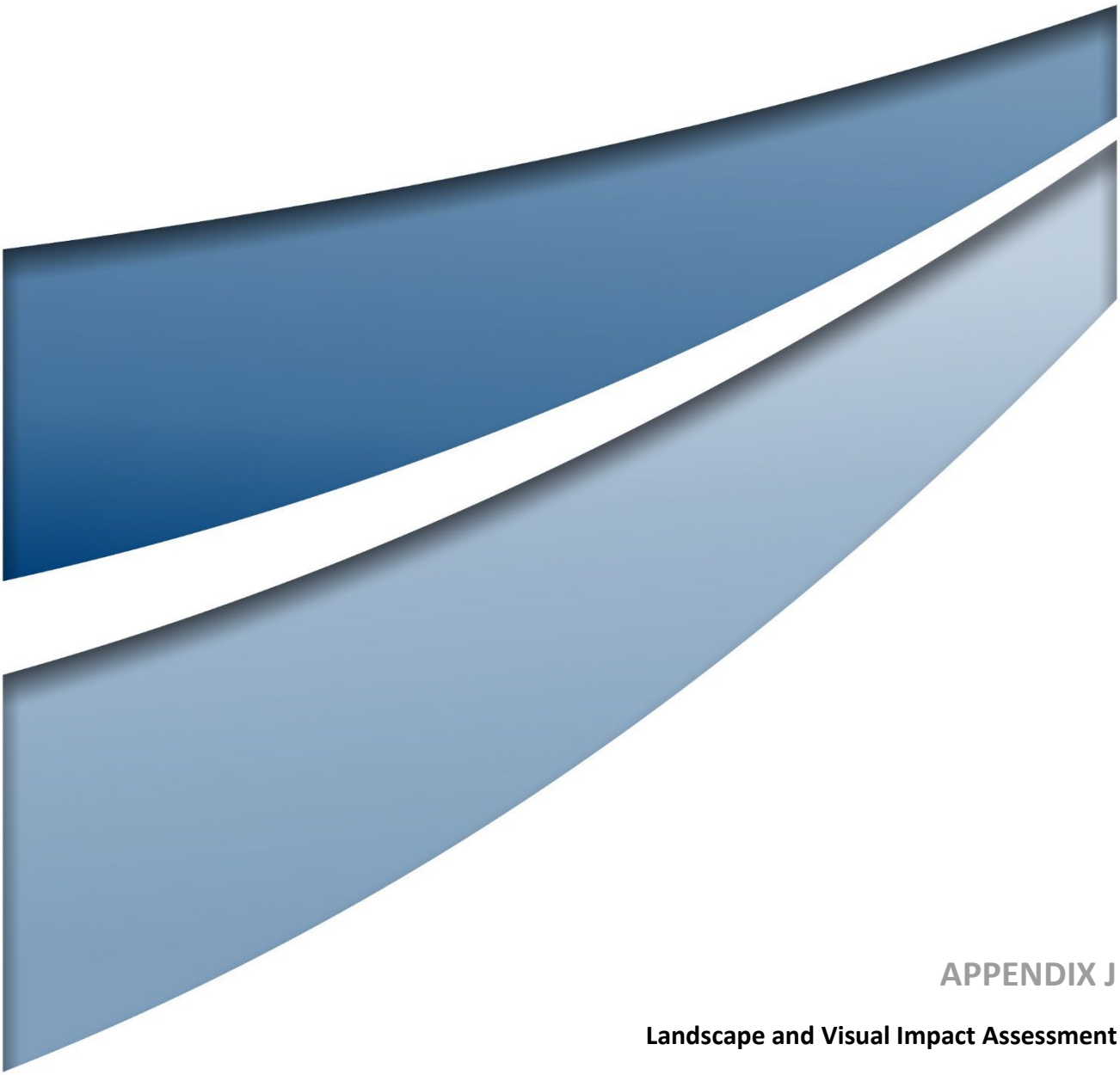
APPENDIX H

Assessment of Impacts to Matters of National Environmental Significance



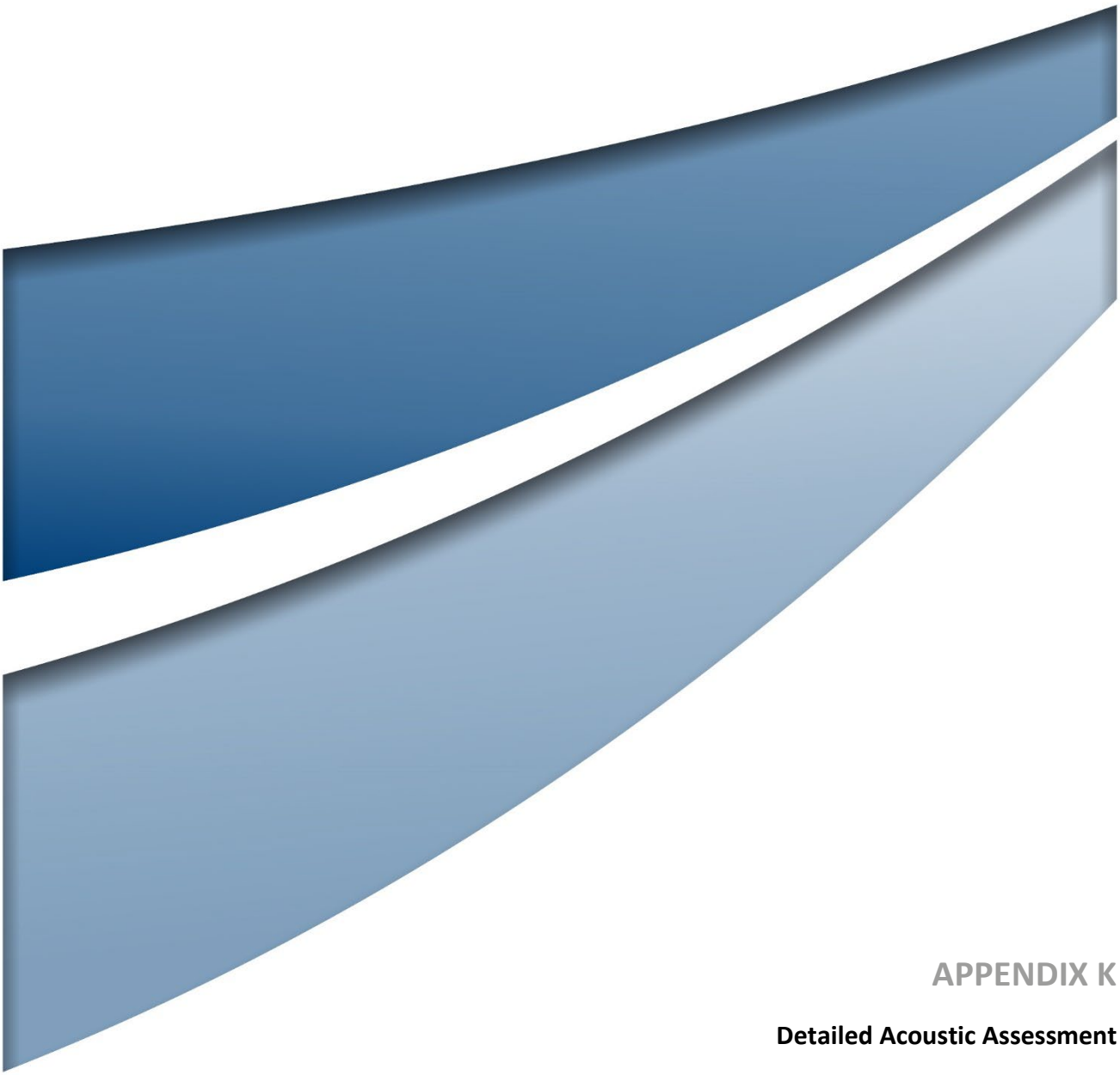
APPENDIX I

Aboriginal Heritage Due Diligence Assessment



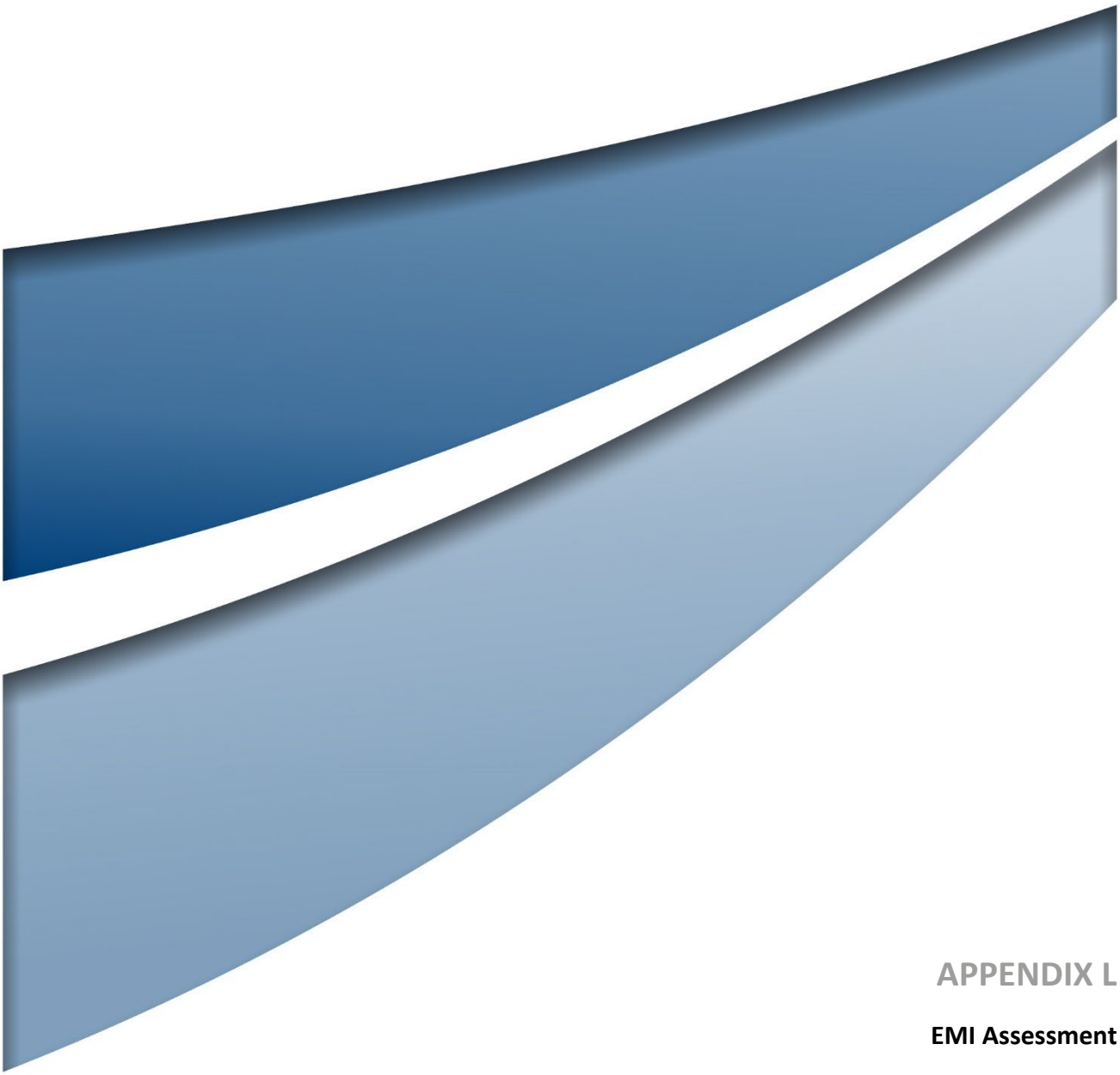
APPENDIX J

Landscape and Visual Impact Assessment



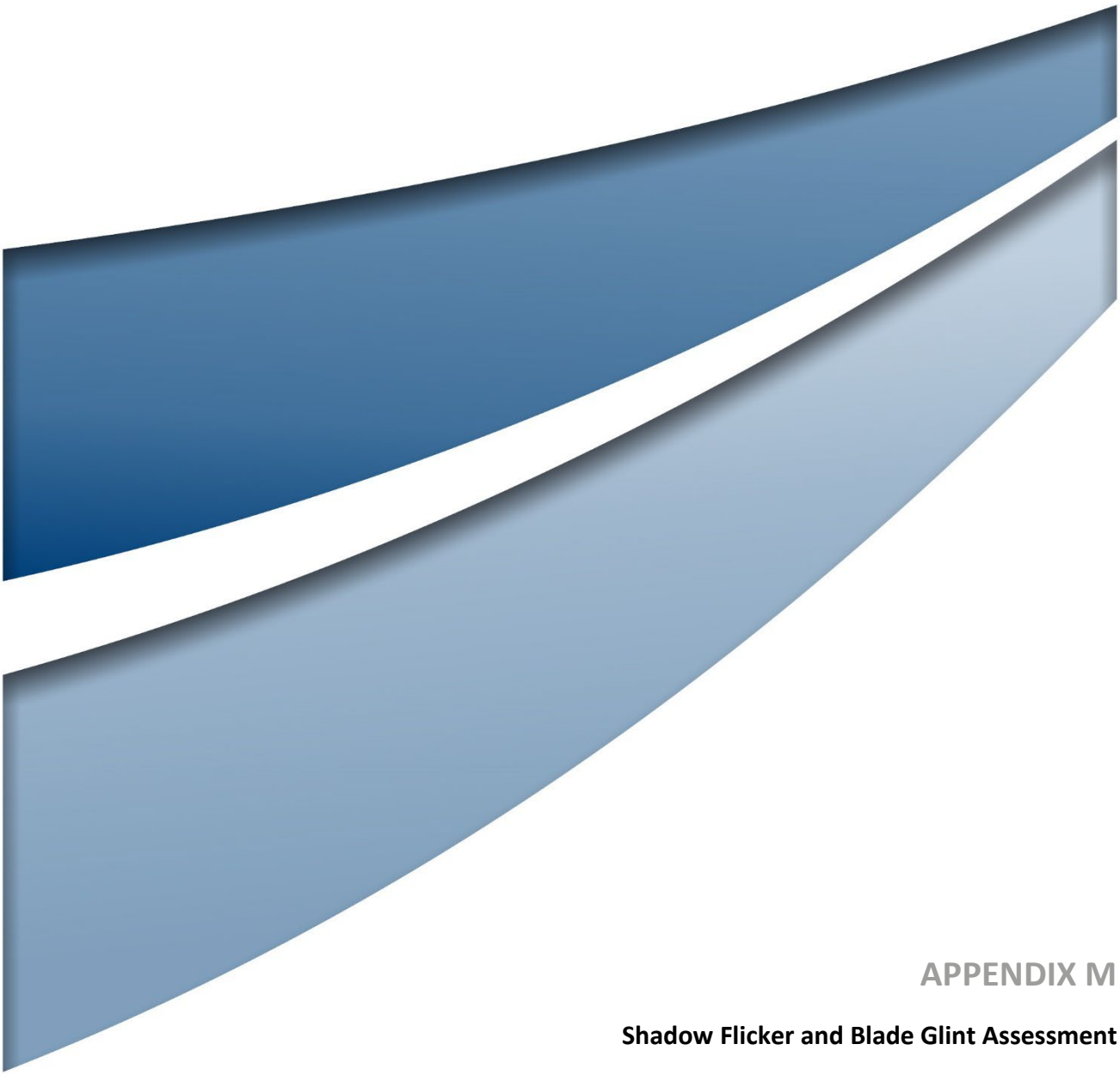
APPENDIX K

Detailed Acoustic Assessment



APPENDIX L

EMI Assessment



APPENDIX M

Shadow Flicker and Blade Glint Assessment

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