Yathroo Wind Farm

Assessment of Impacts to Matters of National Environmental Significance

Final

December 2025

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Assessment of Impacts to Matters of National Environmental Significance

Final

Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Neoen Australia Pty Ltd

Project Director:	Cormac Collins
Project Manager:	Thomas de Silva
Technical Director:	Rob Karelse
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Executive Summary

Neoen Australia Pty Ltd (Neoen) is proposing the construction and operation of up to 65 wind turbines, a battery energy storage system (BESS), transmission network connection, and associated infrastructure approximately 120 kilometres (km) north of Perth, in the Central Coast subregion of the Wheatbelt, in Western Australia. The Yathroo Wind Farm (the Project), is being referred under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), and this report is intended to support this submission by:

- detailing the proposed action which has been referred to the Department of Climate Change, Energy, the Environment, and Water
- identifying Matters of National Environmental Significance (MNES) which may be impacted by the proposed action
- providing information on the survey effort undertaken to date to verify the presence and extent of MNES
- summarising the proposed mitigation and management actions to address potential impacts to MNES
- undertaking an assessment of significant impacts, in accordance with EPBC Act guidelines, for those MNES that have a potential to be impacted.

Neoen has completed extensive surveys and assessments in accordance with relevant guidance to characterise MNES values of the Project Area. Field surveys have recorded the following MNES in the Project Area:

- Carnaby's Black-Cockatoo (*Zanda latirostris*) – Endangered
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) – Vulnerable
- Banksia Woodlands of the Swan Coastal Plain ecological community – Endangered
- *Grevillea curviloba* – Endangered
- Black-tailed Godwit (*Limosa limosa*) – Endangered and Migratory
- Common Greenshank (*Tringa nebularia*) – Endangered and Migratory
- Sharp-tailed Sandpiper (*Calidris acuminata*) – Vulnerable and Migratory
- Wood Sandpiper (*Tringa glareola*) – Migratory
- Red-necked Stint (*Calidris ruficollis*) – Migratory
- Ruff (*Calidris pugnax*) – Migratory.

An additional six EPBC listed threatened or migratory fauna species were not recorded in the Project Area however were assessed as having a moderate or higher likelihood of occurrence:

- Curlew Sandpiper (*Calidris ferruginea*) – Critically Endangered and Migratory
- Common Sandpiper (*Actitis hypoleucos*) – Migratory
- Glossy Ibis (*Plegadis falcinellus*) – Migratory
- Pacific Golden Plover (*Pluvialis fulva*) – Migratory

- Long-toed Stint (*Calidris subminuta*) – Migratory
- Fork-tailed Swift (*Apus pacificus*) – Migratory.

Considering baseline data from the surveys and assessments, Neoen has undertaken an iterative design review process to apply avoidance and mitigation measures to reduce potential impacts to MNES as far as practicable. This has resulted in a total proposed clearing area of 10.28 hectares (ha) of remnant native vegetation, 5.45 ha of isolated remnant trees and shrubs, 5.05 ha of planted native vegetation, and 2.28 ha of planted non-native trees and shrubs.

Key avoidance and mitigation measures to minimise impacts to MNES include:

- Early identification and avoidance of some key blocks of native remnant vegetation (300 ha) presumed to be in 'Good' condition or better.
- Setting turbines back from Lake Guraga by 5 km (which is outside the Project Area) and wetlands in the western part of the Project Area by 3.5 km.
- Locating 97% of Project infrastructure on cleared agricultural land, thereby minimizing native vegetation clearing and direct impacts to Black-Cockatoo habitat.
- Avoiding areas with the highest Black-Cockatoo habitat value, including:
    - All areas assessed as having high-quality foraging habitat (Site condition score of 6) have been avoided.
    - Approximately 466.85 ha (or 99.86%) of the highest quality foraging habitat in the Project Area has been avoided.
    - Of the 467.5 ha of habitat mapped with a foraging condition score of moderate to high or high (Site condition score of 5–6) in the Project Area, only 0.65 ha of vegetation with moderate to high quality foraging value (Site condition score of 5) for Carnaby's Black-Cockatoo is proposed to be cleared.
    - For Forest Red-tailed Black-Cockatoo, the proposed clearing of vegetation with moderate to high quality foraging value is 0.03 ha.
    - The remaining proposed vegetation clearing has moderate or lower Black-Cockatoo foraging value (Site condition 4 or lower).
    - All Rank 1 (trees with activity at hollow observed) and Rank 2 (trees with hollows of suitable size with chew marks visible) potential Black-Cockatoo nest-trees have been avoided.
    - Known Black-Cockatoo roosting sites are avoided with turbines set back 4 km from the main observed roosting site.
- Avoiding permanent clearing of wetland habitat likely to support Threatened and Migratory shorebirds. One hectare (1 ha) of wetland habitat likely to support Threatened and Migratory shorebirds will be temporarily cleared and then rehabilitated at the end of construction, The area to be cleared is degraded fringeline vegetation on the edge of one wetlands and is unlikely to contain foraging habitat.
- Providing a minimum turbine tip height of 59 m, which is above the recorded and typical flight height of Black-Cockatoos, will reduce the potential for Black-Cockatoo collision with turbines.

- Avoiding all TEC in 'Good' condition or better. The access route from Brand Highway to the proposed BESS site was relocated from its original planned location within a patch of TEC in 'Good' condition, to a location comprising existing cleared tracks and 'Degraded' vegetation. As a result of the relocation, the clearing of the TEC has reduced from 0.25 ha (which included 'Good' condition TEC), to 0.11 of solely Degraded TEC.
- Avoiding all native vegetation mapped as 'Very Good' condition or better.
- Minimising clearing of native vegetation mapped as 'Good' condition. The Project sought to avoid clearing native vegetation in 'Good' condition, however 'Good' condition vegetation has been found in many of the road reserves that infrastructure will need to traverse. At these locations, clearing widths have been minimised and infrastructure will seek to cross in a perpendicular fashion where practicable. As such, the total unavoidable area of 'Good' condition vegetation proposed to be cleared is 2.23 ha.
- Avoiding larger areas of intact native vegetation, with proposed clearing mostly comprised of the edges of patches of 'Degraded' or 'Completely Degraded' vegetation.
- Avoiding the area where *Grevillea curviloba* was recorded.

The Project will also implement a Construction Environmental Management Plan (CEMP) to manage potential indirect impacts during construction and a Bird and Bat Adaptive Management Plan (BBAMP) with specific measures to mitigate potential operational impacts to birds and bats. These measures include monitoring during potentially higher activity periods, using modelling for mortality estimates, and responding to any incidents of mortality including consultation with the Department of Biodiversity, Conservation and Attractions.

The Yathroo Wind Farm project has been designed and assessed in accordance with the relevant EPBC Act guidelines, with a strong emphasis on avoidance and minimization of impacts to MNES. While it is acknowledged that there will be some residual impacts to MNES as a result of the Project, an assessment against *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (Department of the Environment, 2013b) guidelines indicates that these impacts are not likely to be significant.

Abbreviations

Abbreviation	Definition
AGL	Above Ground Level
AHD	Australian Height Datum
AVW	Avon-Wheatbelt Bioregion
BAM Act	*Biosecurity and Agriculture Management Act 2007* (WA)
BBUS	Bird and Bat Utilisation Survey
BC Act	*Biodiversity Conservation Act 2016* (WA)
BCE	Bamford Consulting Ecologists (2020)
BESS	Battery Energy Storage System
CAMBA	China-Australia Migratory Bird Agreement
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
JAMBA	Japan-Australia Migratory Bird Agreement
kV	Kilovolt
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)
PMST	Protected Matters Search Tool
ROKAMBA	Republic of Korea-Australia Migratory Bird Agreement
RSA	Rotor Swept Area
SIA	Significant Impact Assessment
SM4	Songmeter 4
SWIS	Southwest Interconnected System
TEC	Threatened Ecological Community
VSA	Vegetation System Association
VT	Vegetation Type
WAPC	Western Australian Planning Commission

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Appendix I Significant Impact Assessments

1.0 Introduction

The Yathroo Wind Farm Project (the Project) will involve the construction and operation of up to 65 wind turbines with a maximum production capacity of up to 500 MW, a Battery Energy Storage System (BESS) with a capacity of 400 MW/3,200 MWh, and associated infrastructure.

Umwelt has been commissioned by Neoen Australia Pty Ltd (Neoen) to undertake ecological surveys and an impact assessment for the Project, with particular focus on Matters of National Environmental Significance (MNES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act).

The Project received development approval in October 2025 under the Western Australia *Planning and Development Act 2025*.

1.1 Project Locality

The Project is located within the Shire of Dandaragan and is within the Central Coast subregion of the Wheatbelt. It is approximately 5 km south of the town of Dandaragan, 6.3 km north of Regans Ford, and 120 km north of Perth, WA.

The Project is proposed to connect to an existing Western Power transmission line in the south-west and west of the Project Site that provides suitable network access with sufficient capacity to accommodate the Project. The required capacity will be provided by Western Power's Clean Energy Link North, a major transmission upgrade project designed to support the integration and transfer of renewable energy from the northern parts of the network. The Clean Energy Link North project is scheduled for completion in 2027.

1.2 Existing Land Uses and Tenures

The region in and around the Project Area is sparsely populated and many of the surrounding properties are large landholdings that are made up of many lots. These lots are primarily Freehold Land owned by private landholders, with some extents of public land comprised of road reserves managed by state and local government.

The Project Area covers 15,618 ha and predominantly consists of land cleared for agriculture and livestock grazing, with remnant native vegetation mainly limited to waterways, road corridors and scattered trees within rural properties. Land within the Project Area is characterised by gently undulating slopes over an open landscape with terrain that ranges between approximately 100–270 m Australian Height Datum (AHD) associated with Stockyard Hill and Walyer Walyer Hill.

Key environmental features in proximity to the Project Area are illustrated in **Figure 1.1** and include:

- Namming Nature Reserve, approximately 2 km west of the Project Area. This is protected for the purposes of flora and fauna conservation and is managed by Department of Biodiversity, Conservation and Attractions (DBCA).
- Moore River National Park situated approximately 10 km south of the Project Site.

- Bundarra, Eneminga, Jam Hill, Moochamulla and Quinns Hill Nature Reserves all located within 10 km of the Project Site.
- Guraga Lake, which is located approximately 1 km west of the Project Site.
- Badgingarra National Park located approximately 29 km northwest of the Project Site.

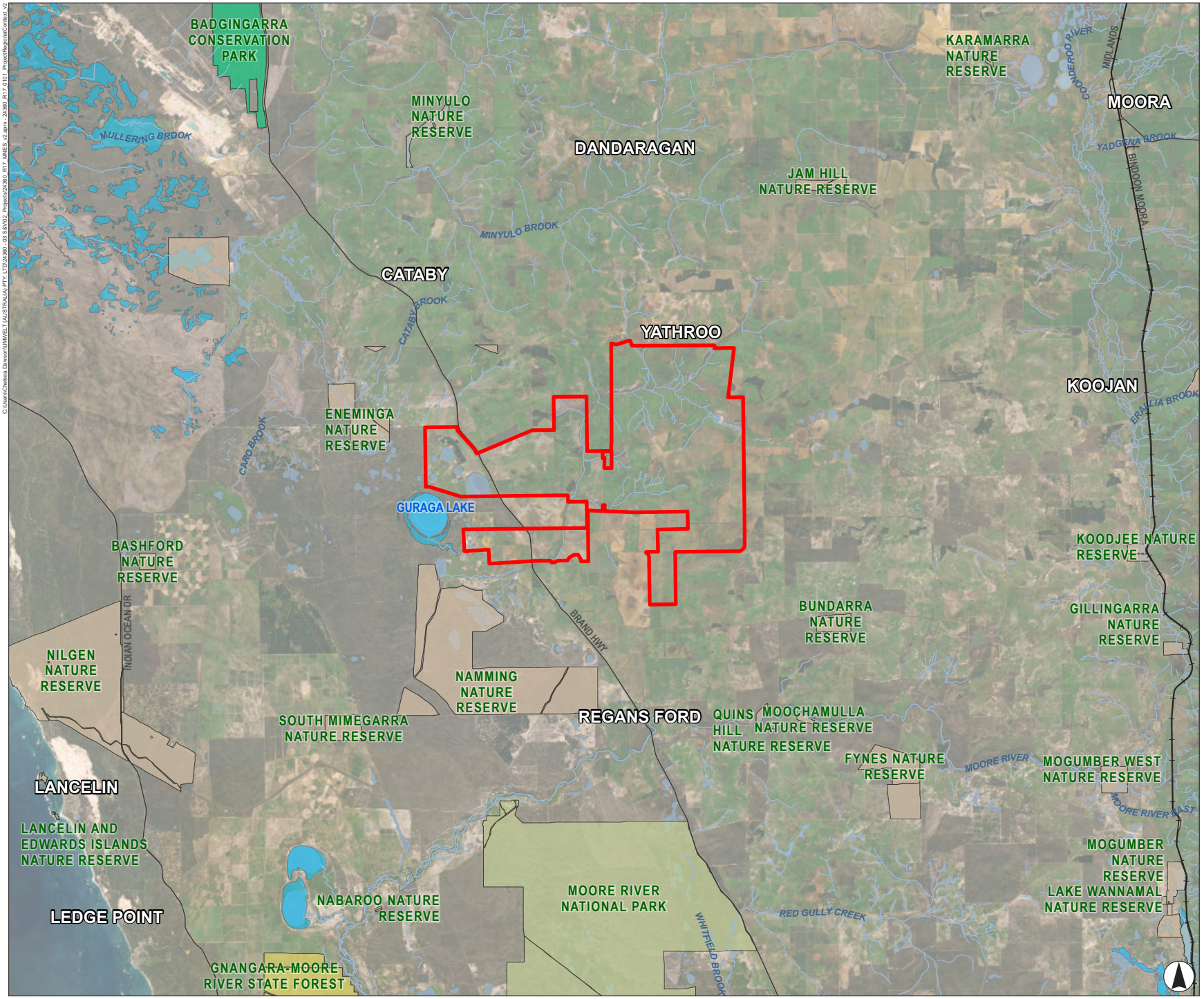


FIGURE 1.1

Project Regional Context

Legend

- Project Area
- Railway
- Road
- Watercourse
- Waterbody

DBCA - Legislated Lands and Waters

- National Park
- Nature Reserve
- Conservation Park
- Section 5(1)(g) Reserve
- Section 5(1)(h) Reserve
- State Forest
- Directory of Nationally Important Wetlands

0 2 4

Kilometres

Scale 1:320,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

1.3 Justification, Site Selection and Alternatives

1.3.1 Justification

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 Project aims to contribute to the National and State renewable energy targets by supplying green energy to the South West Interconnected System (SWIS) via the committed Clean Energy Link – North, to an existing 330 kV transmission line located within the Project Area. The Project will support an equivalent of over 360,000 households with green energy and will also create local employment and economic opportunities, and support the regional development and diversification of the Dandaragan area.

Climate change is a key threat to a number of environmental factors in Western Australia. With increased temperatures and declining rainfall identified as a threatening process for iconic threatened fauna species such as Carnaby's Black-Cockatoo. Renewable energy projects such as the Yathroo Wind Farm are vital to reduce carbon emissions and to contribute to mitigating impacts of climate change

1.3.2 Site Selection

The Project Area was selected for development for the following reasons:

- **Minimal additional transmission infrastructure required** - The presence of an existing Western Power transmission line in the south-west and west of the Project Area provides suitable network access with sufficient capacity to accommodate the Project, and as such the Project does not need new long-distance transmission corridors and lines. The required capacity will be provided by Western Power's Clean Energy Link North, a major transmission upgrade project designed to support the integration and transfer of renewable energy from the northern parts of the network. The Clean Energy Link North project is scheduled for completion in 2027. The cost of minimal amount of infrastructure required can therefore be borne by the proponent and does not rely on government funding to be able to connect, and does not require significant additional transmission infrastructure with associated impacts.
- **Minimal clearing required** - The Project Area contains 12,975 ha (83%) of cleared land which provides options for the siting of Project infrastructure in areas that minimise the clearing and disturbance of native vegetation.
- **Existing road network access** - The Project Area provides good access to existing road networks, including major roads and highways allowing Project infrastructure, plant and equipment to be transported to site with no significant upgrades outside of the existing road network.
- **Compatible land use** - The Project Area is primarily used for agricultural activities such as cropping which can be continued without significant loss of suitable land to Project infrastructure due to its relatively minor footprint, making both land uses compatible and maximising use of existing disturbed areas for economic activities.

- **Minimal amenity impacts** - There is a sufficiently large area of land to host a financially viable wind farm in an area with relatively low density of dwellings, allowing for adequate setbacks between turbines and existing neighbouring dwellings to meet noise compliance criteria.
- **Strong wind** - The Project Area is located in an area with a good wind resource.
- **Favourable construction conditions** - The topology and geology of the Project Area means that the amount of fill material to be imported and cut material to be exported is minimal. There is sand and aggregate material on site and nearby reducing the vehicle movements required to deliver the construction material to site and associated carbon emissions.

1.3.3 Alternatives

Alternatives considered for the Project included a larger Project Area, constructing an earlier iteration of the design with a larger number of turbines, or a "do nothing" alternative.

The Wheatbelt region of Western Australia, and particularly the location where the Project is located, is well suited to wind farms for the following reasons:

- Consistent and high wind speeds.
- Low vegetation coverage and minimal need for native vegetation clearing.
- A rural setting (minimal existing dwellings within close proximity to the Project).
- Access to a suitable transmission line within the Project Area.
- 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 or committed transmission infrastructure that does not require significant upgrades or long-distance transmission corridors to provide network access. These additional requirements may delay potential renewable projects 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 (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 132/330 kV transmission line in the west of the Project Area will enable the Project to connect to the SWIS with minimal additional infrastructure. The Project has been awarded critical project status with Western Power to enable a timely connection.

The "do nothing" alternative for the Project 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; DWER, 2020; Energy Transformation Taskforce, 2020; WAPC, 2021). A key threat for many ecosystems and species, but particularly the listed MNES species considered as part of this assessment, is climate change. Changes to rainfall, temperature extremes, and bushfires may accelerate the decline of these MNES 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.

1.4 Report Purpose

The purpose of this report is to:

- detail the proposed action which has been referred to DCCEEW
- identify MNES which may be impacted by the proposed action
- provide information on the survey effort undertaken to date to verify the presence and extent of MNES
- summarise the proposed mitigation and management actions to address potential impacts to MNES
- undertake an assessment of significant impacts, in accordance with EPBC guidelines, for those MNES that have a potential to be impacted.

1.5 Ecological Assessment Boundaries

For the purposes of this report and ecological assessment, the following distinct boundaries are discussed throughout the assessment and are illustrated in **Figure 1.2**:

- **Project Area**: refers to the boundaries of all involved land parcels where consent has been granted for development of the Project. The Project Area is 15,618 ha.
- **Indicative Project Footprint**: refers to the maximum area of land that will be cleared for installation of all Project infrastructure. It is based on the largest possible conceptual layout and has been used to calculate the maximum area of native vegetation clearing (10.28 ha of remnant native vegetation, 5.45 ha of isolated remnant trees and shrubs in cleared agricultural land, and 5.05 ha of planted native vegetation). Impact assessments within this document are based on the entire Indicative Project Footprint being cleared. The Indicative Project Footprint is 729 ha.
- **Development Corridor**: refers to the area within which all Project works and infrastructure will be confined. It encompasses the entire Indicative Project Footprint with buffers applied to provide the Project with a reasonable level of flexibility as it progresses into the detailed design phase. The Development Corridor is 3,443 ha.

The Development Corridor has been defined through an iterative design process, informed by a range of ecological, heritage, noise, landscape and visual, hydrological, aviation, and wind generation optimisation modelling studies. These studies have informed avoidance and mitigation of impacts to key ecological values through the iterative design process.

The Project will undergo a detailed design phase following a competitive tender and contract award for equipment supply and construction. The detailed design process will rely on future technical assessments, including geotechnical investigations, on-ground cultural heritage surveys, and additional targeted ecological surveys. This process will define the final positioning of Project infrastructure as well as the Final Project Footprint.

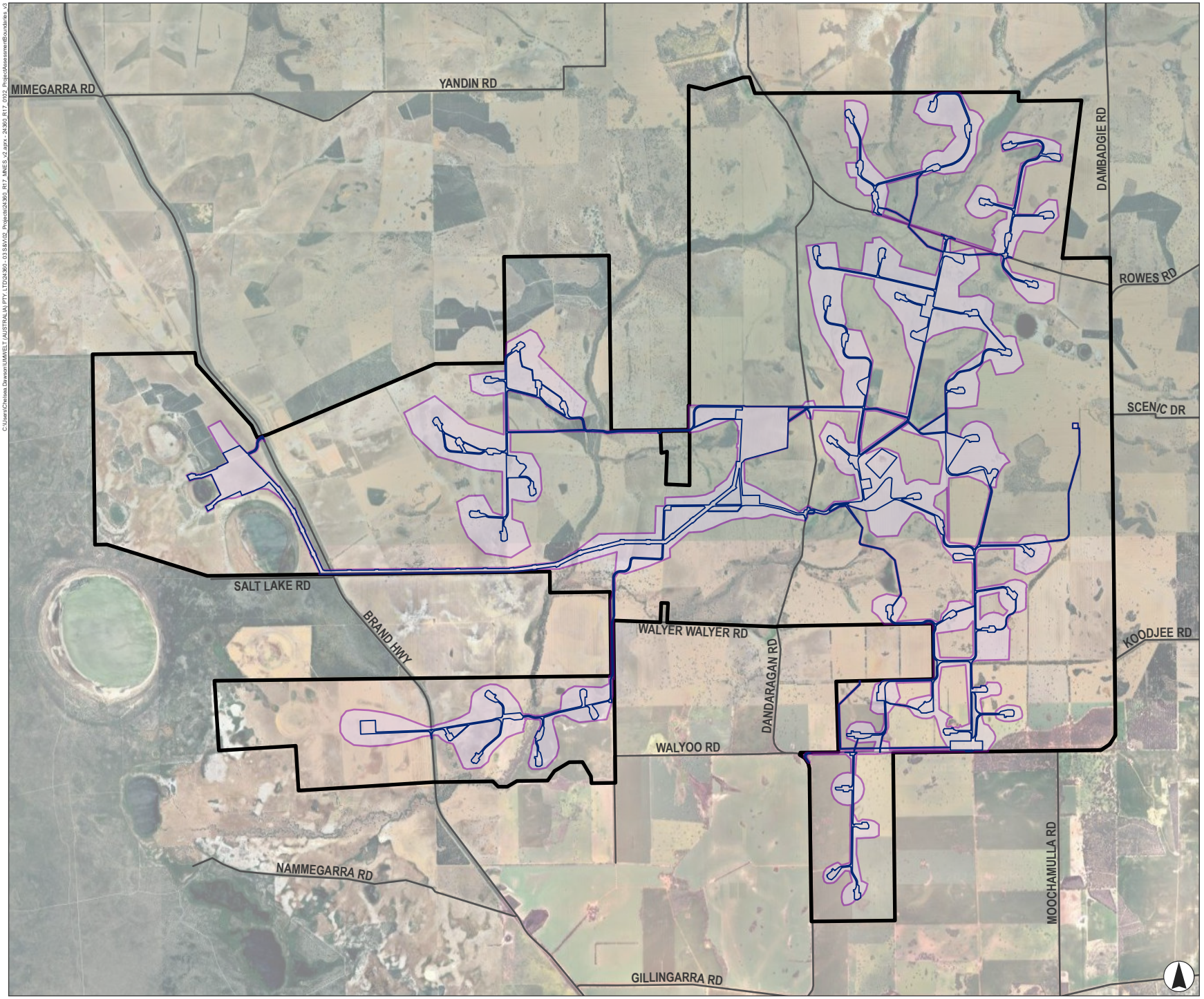


FIGURE 1.2

Project Assessment Boundaries

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

1.6 Report Contents

The structure and content of this report which has been designed to address the purpose outlined above is summarised in **Table 1.1**.

Table 1.1 Report Structure and Content

Report Section	Information/Description
Section 1.0	Provides an introduction and background to the Project.
Section 2.0	Provides a description of the Project (proposed action) and those components relevant to the EPBC referral.
Section 3.0	Summarises the legislative frameworks relevant to the EPBC referral and assessment of Project impacts.
Section 4.0	Summarises the results of desktop searches undertaken using the DCCEEW Protected Matters Search Tool database.
Section 5.0	Provides a description of the methodology used to identify and characterise MNES that may be potentially impacted by the Project, and the methodology used to assess the extent and significance of these impacts.
Section 6.0	Describes the ecological values of the Project Area and broader region as determined through Project specific studies, particularly those relevant to MNES.
Section 7.0	Details the potential impacts from the Project to MNES, including both at the construction and operational phases.
Section 8.0	Provides a description of the avoidance, mitigation, and management measures proposed to address any potential impacts to MNES from the Project.
Section 9.0	Summarises the results of significant impact assessments undertaken for MNES within the Project Area in accordance with the EPBC Significant Impact Guidelines 1.1.
Section 10.0	Discusses assessment of offset requirements and potential requirements.
Section 11.0	Provides references for all citations included in this report.
Appendix A	Provides the Detailed and Targeted Flora and Vegetation Assessment for the Project.
Appendix B	Provides the Basic and Targeted Vertebrate Fauna Assessment for the Project.
Appendix C	Provides the Targeted Fauna Habitat Assessment for the Project.
Appendix D	Provides the Preliminary Bird and Bat Adaptive Management Plan for the Project.
Appendix E	Provides the Protected Matters Search Tool results for the Study Area including a 20 km buffer
Appendix F	Details the likelihood of occurrence assessment results for all conservation significant species and communities that may occur within the Project Area
Appendix G	Provides the Preliminary Construction Environmental Management Plan for the Project

Report Section	Information/Description
Appendix H	Provides Bird and Bat Utilisation Summary Report for the Project
Appendix I	Provides the Significant Impact Assessments for MNES species and communities relevant to the Project

2.0 Project Description

This section describes the key infrastructure elements that will make up the Project. The Project has been developed through an iterative design process which was informed by a combination of wind resource, economic, constructability, environmental, heritage, social, landowner, and network capacity considerations. The Project will include the following key infrastructure elements:

- turbines
- turbine foundations and hardstands
- electrical connections, substations, terminal and grid connection
- underground cabling
- Battery Energy Storage System (BESS)
- operational and maintenance facility
- construction compound, concrete batching plants and laydown areas
- borrow pits/quarries
- permanent meteorological masts
- communication towers
- external site access
- internal access roads
- firewater tanks
- utilities.

The total area of ground disturbance for the above infrastructure is expected to be approximately 729 ha, within the Development Corridor of 3,443 ha.

These elements are detailed in the sections below, with the indicative Project layout illustrated in **Figure 2.1.**

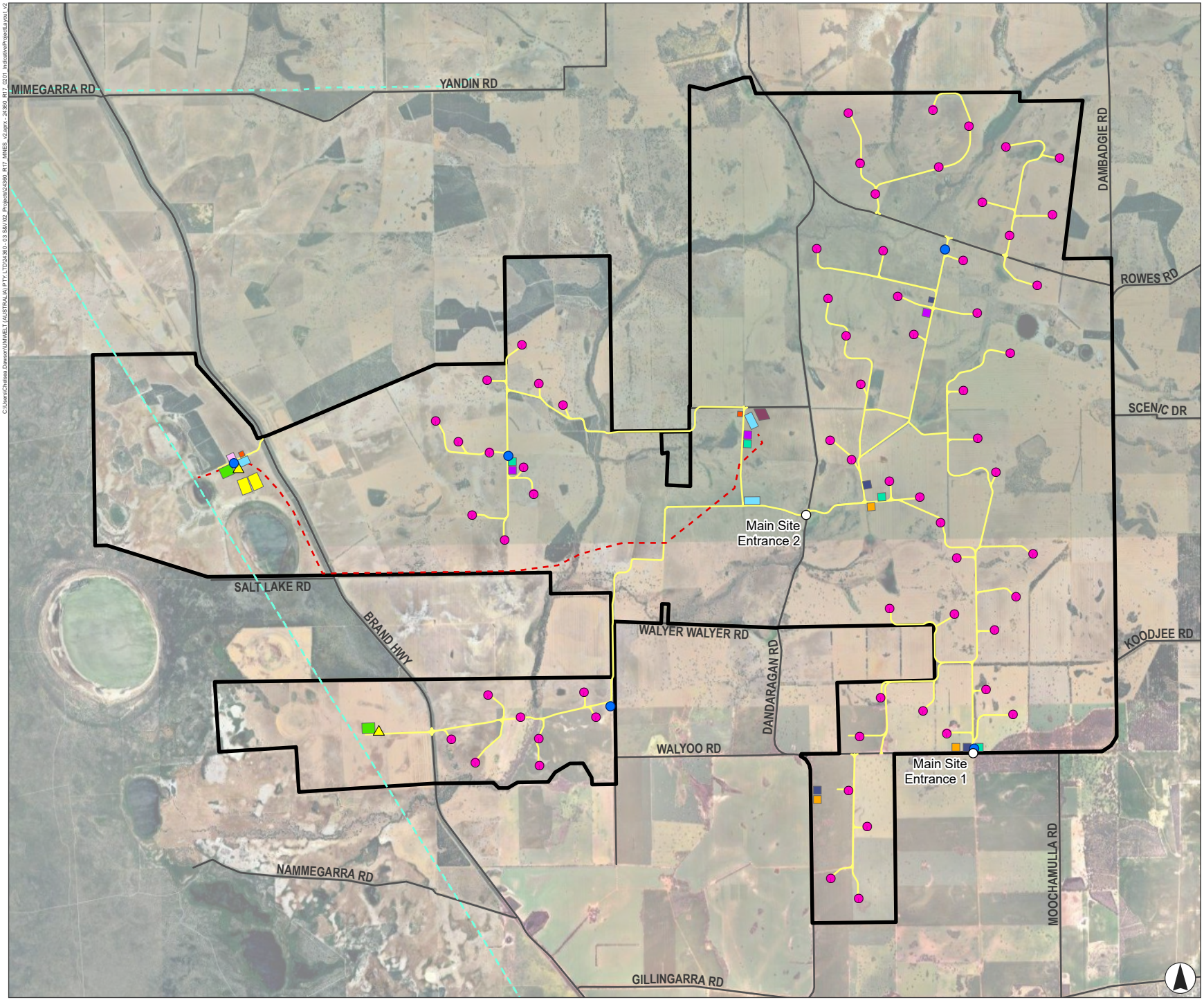


FIGURE 2.1

Indicative Project Layout

Legend

- Road
- Existing 132/330kv Transmission Line
- Project Area

Preliminary Layout

- Wind Turbine Generator (WTG)
- Firewater Tanks
- Communication Towers
- Site Access
- Internal Roads and underground Cabling (Permanent)
- Proposed 330kV transmission route - 13.21km
- BESS
- O&M Facility
- Substation
- Western Power Terminal
- Batch
- Batch Plant
- Main Compound
- Laydown
- Overhead Transmission Line Compound
- Satellite Compound

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

2.1 Turbines

Up to 65 wind turbines are proposed to be constructed. Each wind turbine will have a maximum hub height of 170 m above ground level (AGL), a maximum tip height of to up to 261 m and a minimum blade clearance from ground level of 59 m AGL. The maximum blade length will be 91 m with a maximum rotor diameter of 182 m. Each wind turbine will have a matte white, non-reflective finish.

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 59 m AGL to 261 m AGL was considered to account for turbine models with hub heights as low as 150 m.

The mean distance between turbines is 757 m, with the shortest distance between turbines being 508 m.

The exact dimensions will be determined during detailed design of the Project depending upon selection of the turbine Original Equipment Manufacturer (OEM) and model.

These maximum specifications are summarised in **Table 2.1**.

Table 2.1 Turbine Specifications

Feature	Maximum Specifications
Project generation capacity	Up to 500 MW
Maximum number of turbines	65
Hub Height	Up to 170 m
Maximum Tip Height	Up to 261 m
Minimum Tip Height	59 m
Blade Length	Up to 91 m

* The specifications listed in the table 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.

2.2 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 Development Corridor. Concrete batching material may be sourced off-site.

2.3 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.

2.4 Electrical Connections, Substations and Grid Connection

The Proposal includes two substations and two operations and maintenance (O&M) facilities – one for the wind farm and one for the BESS. The proposed area for the substations and O&M facilities will also include vehicle parking spaces, septic ablutions and wash down areas as appropriate and with alignment to the considerations for the Special Control Area 1 – Bassendean Sand (SCA1) with the Project Area.

Power and communication cables will be installed underground between the turbines and will connect back to the substations and the O&M facilities.

Up to 12 km of overhead line will connect to one of two substations and then cut into the existing Western Power 132 / 320 kV double circuit transmission line located in the west of the Project Site. The overhead line will be supported on either lattice and/or pole tower structures up to 60 m tall at 250 m to 500 m intervals. Reduced spans between towers may be required near crossings of rivers and roads, or where there is a change in direction. A 60–70 m wide corridor with no vegetation exceeding 3 m height will be required.

2.5 Underground Cabling

Power and communication cables will be installed underground (up to 1,500 mm) between the turbines and will connect back to the substation in cable trenches to allow for continued agricultural activities. The total length of cable reticulation required is estimated to be 710 km but will depend on the final layout of the substation, turbines and O&M facilities. Once the trenched areas have been backfilled, the disturbed area will be reinstated.

2.6 Battery Energy Storage System (BESS)

The BESS will be adjacent to the proposed substation in that 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 400 MW / 3,200 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. Lightning protection masts and security fencing will also be installed. All the equipment in the BESS area will be installed on a permanent hardstand with appropriate drainage and stormwater management and occupy an area of up to 24 ha. Underground cables will connect the BESS to the substation and export power to the South-West Interconnected System (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.

2.7 Operational and Maintenance Facility

A wind farm O&M facility area will be constructed near the Stockyard Road substation. The size of the facility area will be dependent on the connection voltage as determined by the final design of the Project. However, the facility area will be approximately 24 m x 9 m and include offices, IT servers, first aid room and facilities.

A BESS O&M facility will also be constructed for the Project. The facility will be approximately 50 m x 18 m and will be a mixed-use building will house spare equipment, workshop, showers, offices, locker room and facilities.

2.8 Construction Compound, Concrete Batching Plant 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.

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

2.9 Borrow Pits/Quarries

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

2.10 Meteorological Masts

Up to three Meteorological Masts may be installed to monitor the climatic conditions and wind speed throughout the life of the Project. The masts would be of triangular steel lattice construction, approximately 170 m in height and will be guy wired in three equilateral directions. The masts 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 Project Footprint and will not require clearing of any native vegetation.

2.11 Communication Towers

Up to two communication towers may be required for the Project. These towers will provide a secure and robust high-speed microwave radio link extending the existing Telco services. These towers will be up to 85 m tall, with microwave dishes and radio transmitter/receivers installed between 15 m and 85 m above ground level. Power for the towers will be supplied primarily from the adjacent facility, however, may also include a tower mounted solar panel and battery system as back-up.

2.12 External Site Access

The main site access points to the Project Area are proposed from Brand Highway, Dandaragan Road, Rowes Road, Bidgerabbie Road and Stockyard Road.

Existing property entrances will be utilised where possible to minimise the need for new site entrances and impact to native vegetation. However, some public roads and intersections will need to be created or upgraded to facilitate delivery of Over Size Over Mass (OSOM) Project components.

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

2.13 Internal Access Roads

Internal access roads will be required, and design criteria and mitigation measures were applied to the access track layout to mitigate potential impacts, such as:

- Access tracks will be typically 6.5 m wide and up to 10 m wide (widths will vary depending on various construction requirements [e.g. reinforcement batters] topography and cabling requirements).
- Tracks will not be sealed but will be constructed from gravel sourced primarily from on-site borrow locations to be determined in subsequent stages of the Project.

- Regular passing places and turning areas will be provided to assist in vehicle circulation on-site. The access tracks will only link to the identified site access and road crossing points, with no other connections to adjacent external roads provided.
- Regular passing places and turning areas will be instated.
- Watercourse crossings have been minimised as informed by hydraulic modelling and flood study.
- 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.

2.14 Firewater Tanks

Firewater tanks providing readily available water supply for fire suppression will comprise of up to nine tanks with a height up to 4.5 m, diameter up to 13.0 m and each tank sizing will be determined as part of final design to ensure compliance with all applicable laws and guidelines.

2.15 Utilities

The utilities comprise of earth walled turkey nest dam with lining, created to provide onsite inventory and ensure security of supply with a capacity of up to 1,000 m^3 of water.

The turkey nest dam will be primarily used during the construction stage however may be left in place should a permanent beneficial use be identified for it.

2.16 Workforce

2.16.1 Construction Workforce

The Project is expected to generate multiple employment opportunities. However, it is estimated that the maximum (peak) workforce will comprise of up to 450 staff, throughout the 33 months construction period, with 15 permanent staff to be employed during operations.

It is expected that some of the workforce will commute from the wider local areas such as Moora, Dandaragan and Cataby, and will not require additional accommodation. Neoen is working with the Shire of Dandaragan on the accommodation options including temporary and permanent accommodation. The Project is not expected to construct permanent or temporary accommodation within the Project Area.

2.16.2 Operational Workforce

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

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

- maintenance of turbines and associated infrastructure
- safety management
- implementation of environmental conditions
- community liaison.

2.17 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 Project start up and towards the end of the operational period as the end of the design life is reached.

2.18 Decommissioning and Rehabilitation

The proposed technology is expected to have an economic life up to 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 Project permanently; or
- Remove the old turbines and seek to replace them with new, upgraded models.

In the event that the Project 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 and disconnecting plant and equipment from the Projects internal network.
- 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 300 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.

3.0 Legislative and Regulatory Context

3.1 Commonwealth

3.1.1 Environment Protection and Biodiversity Conservation Act 1999

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. The EPBC Act identifies nine MNES:

- world heritage properties
- national heritage places
- Ramsar Wetlands of International Significance
- threatened species and ecological communities
- migratory species
- Commonwealth marine areas
- the Great Barrier Reef Marine Park
- nuclear actions (including uranium mining)
- water resources (in relation to coal seam gas development and large coal mining development).

Under the EPBC Act, any action that is likely to have a significant impact on these matters may be deemed a controlled action.

3.1.1.1 Significant Impact Guidelines 1.1 – Matters of National Environmental Significance

The MNES Guidelines (Department of the Environment, 2013b) provide overarching guidance on determining whether an action is likely to have a significant impact on a matter protected under the EPBC Act.

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.

3.1.1.2 Referral Guidelines for 3 WA Threatened Black-Cockatoo Species

The Guidelines for 3 WA Threatened Black-Cockatoo Species (DCCEEW, 2022) adheres to the EPBC Act and is regulated by DCCEEW. The referral guidelines provide guidance to proponents on the need to refer an action that has the potential to affect any of the three species:

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

This document distinguishes what actions are deemed likely (or unlikely) to require a referral to the Minister based on whether the action will have a significant impact on the species. Information on habitat quality, survey expectations, mitigation standards, as well as the aspects needing to be considered to determine whether referral is necessary, are also detailed in this document.

3.1.1.3 EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species. Commonwealth of Australia.

EPBC Act Policy Statement 3.21: Industry Guidelines for Avoiding, Assessing and Mitigating Impacts on EPBC Act Listed Migratory Shorebird Species (Commonwealth of Australia, 2017) adheres to the EPBC Act and provides guidance to proponents on when an action that may affect listed migratory shorebird species requires referral to the Minister. These guidelines apply to all migratory shorebirds listed as MNES under the Act, including those protected under international agreements such as JAMBA, CAMBA, ROKAMBA, and the Bonn Convention.

The guidelines outline the criteria for identifying important habitat for migratory shorebirds. Habitat is considered nationally important if it regularly supports:

- 0.1% of the East Asian-Australasian Flyway population, or
- > 2,000 migratory shorebirds, or
- > 15 migratory shorebird species.

This document distinguishes what types of actions are likely (or unlikely) to require referral, based on whether the action may result in a significant impact, such as reducing habitat availability, altering hydrological regimes, disturbing roosting/foraging behaviour, or interrupting migration patterns. Information on survey expectations (e.g., seasonal counts and habitat usage), habitat value assessment, and impact mitigation measures such as temporal avoidance, buffers, and habitat protection is also provided.

3.1.1.4 EPBC Act Biodiversity Offsets Policy

The EPBC Act Environmental Offsets Policy (EPBC Offset Policy) (Australian Government, 2012) outlines the approach for the use of environmental offsets under the EPBC Act.

Offsets are measures that compensate for the significant residual impacts of an action on the environment, after avoidance and mitigation measures are taken. Where appropriate, offsets are considered during the assessment phase of an environmental impact assessment under the EPBC Act. The suitability of a proposed offset is considered as part of the decision to approve or not approve a proposed action.

The EPBC Offset Policy provides guidance on how suitable offsets are determined while the quantum of impact and quantum of offset required to counterbalance this impact are calculated using the Commonwealth Offset Assessment Guide and corresponding guidance.

3.1.1.5 Weeds of National Significance

Under the Australian Weeds Strategy 2017–2027 (IPAC, 2017) 32 introduced plants are identified as Weeds of National Significance (WoNS). This list of species was developed with reference to several key criteria: invasive tendencies, impacts, potential for spread, and socioeconomic and environmental values. National management strategies and manuals have been published for all these species. The strategies aim to:

- improve prevention, detection and early intervention
- minimise the impact of established weeds
- enhance capacity and commitment to weed management.

3.2 Relevant WA Legislation

3.2.1 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (WA) (BC Act) seeks to 'conserve and protect biodiversity and biodiversity components in the State' and 'to promote the ecologically sustainable use of biodiversity components in the State'.

It not only provides for the formal listing of native flora, fauna, and ecological communities that are under threat and in need of protection but also regulates the taking, disturbing, supplying, possessing, dealing, importing, and exporting of all native flora and fauna.

Activities that involve the taking, disturbing, supplying, possessing, dealing, importing, or exporting of any native flora and fauna will require an appropriate licence issued by DBCA under the BC Act.

3.2.2 Environmental Protection Act 1986

The *Environmental Protection Act 1986* (WA) (EP Act) provides the legal framework to prevent, control and abate pollution and environmental harm in WA, as well as the legal basis to conserve, preserve, protect, enhance, and manage the environment. The Environmental Protection Authority (EPA), the Department of Water and Environmental Regulation (DWER), and the Office of the Appeals Convenor are the government agencies that administer and have responsibilities under the EP Act.

Part IV of the EP Act requires projects that are likely to have a significant effect on the environment to be referred to the EPA to decide if an environmental impact assessment is required. The EPA considers significant impacts to fourteen environmental factors grouped under five themes. The commonly understood, everyday meaning of 'significant' impact or effect apply as these terms are not defined in the legislation. The EPA list the range of matters that may be included when considering the significance of proposed activities.

Part V of the EP Act regulates emissions and discharges to the environment through a works approval and licensing process and regulates the clearing of native vegetation through clearing permit applications. DWER is responsible for administering Part V of the EP Act. Applications to clear native vegetation are assessed and decided in accordance with the EP Act, in particular the Clearing Principles (under Schedule 5 of the EP Act).

The Project is being referred to the EPA under Part IV of the EP Act to determine whether formal assessment is required. Should the Project not require formal assessment under Part IV, a native vegetation clearing permit will be applied for under Part V of the EP Act.

3.2.3 Environmental Offset Policy (2011) and Guidelines (2014)

The 2011 Environmental Offset Policy and 2014 Guidelines provide the overarching framework for offset design, quantification, and implementation in Western Australia. Offsets are required to address residual significant impacts to protected State matters and may be implemented under the BC Act, or Part IV or V of the EP Act. Depending on the legislation under which the offsets are implemented, the regulating agency may be the EPA, DWER or DBCA. It is expected that offsets will be required to be implemented under the EP Act.

3.2.4 Planning and Development Act 2005

The WA *Planning and Development Act 2005* (PD Act) is the primary legislation under which development in WA is regulated. Under this Act, any development requires approval unless a range of exemptions apply. Decision makers for development applications under the PD Act are required to consider a range of factors, including potential environmental impacts.

Development approval was granted for the Project in October 2025. Development approval conditions include:

- Develop and implement a Surface Water Management Plan in consultation with the Department of Water and Environmental Regulation (Condition 21).
- Develop and implement a Bird and Bat Adaptive Management Plan in consultation with the Department of Biodiversity, Conservation and Attractions (Condition 22).

3.2.5 Biosecurity and Agriculture Management Act 2007

The *Biosecurity and Agriculture Management Act 2007* (WA) (BAM Act) provides the legal framework to:

- Address invasive, weeds and diseases (‘biosecurity’).
- Ensure agricultural and veterinary chemicals are used safely.
- Establish standards for safe and quality agricultural products.
- Raise funds for biosecurity-related purposes.

The BAM Act also supports biosecurity activities to detect, contain, manage or eradicate prohibited organisms/declared pests that enter the state. This can include the reporting of declared pests, restrictions on the rights to keep or breed pests, register the movement of pests, or assisting in efforts to aid in the containment, management, or eradication of pests.

4.0 Protected Matters Search Tool Results

A search of the Protected Matters Search Tool (PMST) for the Desktop Study Area was initially run on 10 April 2024 to inform ecological surveys and the likelihood of occurrence assessment. The Desktop Study Area comprises the Project Area plus a 20 km buffer. A search of the PMST was then re-run on 5 November 2025 to identify any changes to MNES that may occur in the Desktop Study Area.

There were some changes to the species returned from the two PMST searches. The reason for this may be due to the Project Area being reduced in size between the April 2024 search and the November 2025 search.

The following species were initially returned in the 10 April 2024 PMST results but were not returned in the 5 November 2025 results:

- Ghost Bat (*Macroderma gigas*)
- Northern Serrate Dryandra (*Banksia cirratulids'* subsp. *perissa*)
- Fine-leaved Darwinia (*Darwinia acerosa*)
- Mogumber Bell, Narrogin Bell (*Darwinia carnea*)
- Midlands Gum, Jingymia Gum (*Eucalyptus pruiniramis*)
- Christine's Grevillea (*Grevillea christineae*).

Conversely, the following species was returned in the 5 November 2025 PMST results, but was not returned in the 10 April 2024 results:

- Cadda Road Mallee, Cadda Mallee (*Eucalyptus* x *balanites*).

Results from the PMST database search run on 5 November 2025 are provided in **Appendix E**.
As identified in the PMST results, 65 MNES have the potential to occur within a Desktop Study Area as per the information presented in **Table 4.1**.

Table 4.1 PMST Database Results in the Desktop Study Area

Matter of National Environmental Significance	Potential Presence in Desktop Study Area
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Importance	None
Great Barrier Reef Marine Park	None
Commonwealth Marine Area	None
Listed Threatened Ecological Communities	5
Listed Threatened Species	49
Listed Migratory Species	11

The results of the PMST database interrogation as they related to these MNES are discussed in **Section 4.1** to **Section 4.3**.

4.1 Threatened Ecological Communities

Five Threatened Ecological Communities (TEC) were identified in the PMST results as 'likely to occur' in the Desktop Study Area. These TEC's are detailed in **Table 4.2**.

Table 4.2 Threatened Ecological Communities Returned from the PMST Database

Threatened Ecological Community	EPBC Act Status (Cth)
Clay Pans of the Swan Coastal Plain	Critically Endangered
Honeymyrtle shrubland on limestone ridges of the Swan Coastal Plain Bioregion	Critically Endangered
Banksia Woodlands of the Swan Coastal Plain ecological community	Endangered
Empodisma peatlands of southwestern Australia	Endangered
Tuart (*Eucalyptus gomphocephala*) Woodlands and Forests of the Swan Coastal Plain ecological community	Critically Endangered

4.2 Threatened Species

A total of 31 Threatened flora species and 18 Threatened fauna species were identified in the PMST results as "likely", "may", or "known" to occur within the Desktop Study Area. These species are detailed in **Table 4.3**. These species were subsequently assessed for their Likelihood of Occurrence within the Project Area based on the assessments as described in **Section 5.0**, with results provided in **Appendix F**.

Table 4.3 Threatened Species Returned from the PMST Database

Scientific Name	Common Name	Threatened category (Cth)
Flora		
Acacia forrestiana	Forest's Wattle	Vulnerable
Acacia splendens	Splendid Wattle, Dandaragan Wattle	Endangered
Andersonia gracilis	Slender Andersonia	Endangered
Anigozanthos viridis subsp. *Terraspectans*	Dwarf Green Kangaroo Paw	Vulnerable
Asterolasia nivea	Bindoon Starbush	Vulnerable (listed as *Asterolasia grandiflora*)
Banksia fuscobractea	Dark-bract Banksia	Critically Endangered
Banksia mimica	Summer Honeypot	Endangered
Banksia serratuloides subsp. *serratuloides*	Southern Serrate Dryandra	Vulnerable
Caleana dixonii	Sandplain Duck Orchid	Endangered (listed as *Paracaleana dixonii*)

Scientific Name	Common Name	Threatened category (Cth)
Chamelaucium lullfitzii	Gingin Wax	Endangered (listed as *Chamelaucium sp. Gingin (N.G.Marchant 6)*)
Chamelaucium sp. Cataby (G.J.Keighery 11009)	Griffin's Waxflower	Vulnerable
Conospermum densiflorum subsp. *unicephalatum*	One-headed Smokebush	Endangered
Daviesia dielsii	Diels' Daviesia	Endangered
Drakaea elastica	Glossy-leafed Hammer Orchid, Glossy-leaved Hammer Orchid, Warty Hammer Orchid	Endangered
Eleocharis keigheryi	Keighery's Eleocharis	Vulnerable
Eremophila scaberula	Rough Emu Bush	Endangered
Eucalyptus absita	Badgingarra Box	Endangered
Eucalyptus dolorosa	Dandaragan Mallee, Mount Misery Mallee	Endangered
Eucalyptus leprophloia	Scaly Butt Mallee	Endangered
Eucalyptus x *balanites*	Cadda Road Mallee, Cadda Mallee	Endangered
Goodenia arthrotricha	[12488]	Endangered
Grevillea calliantha	Foote's Grevillea, Cataby Grevillea, Black Magic Grevillea	Endangered
Grevillea curviloba subsp. *incurve*	Narrow curved-leaf Grevillea	Endangered
Hakea megalosperma	Lesueur Hakea	Vulnerable
Hemiandra gardneri	Red Snakebush	Endangered
Leucopogon obtectus	Hidden Beard-heath	Endangered (listed as *Styphelia obtecta)*
Macarthuria keigheryi	Keighery's Macarthuria	Endangered
Ptychosema pusillum	Dwarf Pea	Vulnerable
Spirogardnera rubescens	Spiral Bush	Endangered
Thelymitra dedmaniarum	Cinnamon Sun Orchid	Endangered
Thelymitra stellata	Star Sun-orchid	Endangered
Fauna		
Birds		
Aphelocephala leucopsis	Southern Whiteface	Vulnerable
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable
Calidris canutus	Red Knot, Knot	Vulnerable
Calidris ferruginea	Curlew Sandpiper	Critically Endangered
Falco hypoleucos	Grey Falcon	Vulnerable
Leipoa ocellata	Malleefowl	Vulnerable
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered
Rostratula australis	Australian Painted Snipe	Endangered

Scientific Name	Common Name	Threatened category (Cth)
Sternula nereis nereis	Australian Fairy Tern	Vulnerable
Tringa nebularia	Common Greenshank, Greenshank	Endangered
Zanda latirostris	Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo	Endangered (listed as *Calyptorhynchus latirostris*)
Nannatherina balstoni	Balston's Pygmy Perch	Vulnerable
Mammals		
Dasyurus geoffroii	Chuditch, Western Quoll	Vulnerable
Parantechinus apicalis	Dibbler	Endangered
Reptiles		
Egernia stokesii badia	Western Spiny-tailed Skink, Baudin Island Spiny-tailed Skink	Endangered
Pseudemydura umbrina	Western Swamp Tortoise	Critically Endangered
Sharks		
Pristis pristis	Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	Endangered
Invertebrates		
Idiosoma nigrum	Shield-backed Trapdoor Spider, Black Rugose Trapdoor Spider	Vulnerable

4.3 Migratory Species

A total of 11 Migratory species were identified in the PMST results as “may” or “likely” to occur within the Desktop Study Area. These species are detailed in **Table 4.4,** and it should be noted that six of these species are threatened and also included in **Table 4.3.**

Table 4.4 Migratory Species Returned from the PMST Database

Scientific Name	Common Name	Threatened Category (Cth)	Migratory Category
Apus pacificus	Fork-tailed Swift		Migratory Marine Birds
Motacilla cinera	Grey Wagtail		Migratory Terrestrial Species
Actitis hypoleucos	Common Sandpiper		Migratory Wetlands Species
Calidris acuminata	Sharp-tailed Sandpiper	Vulnerable	Migratory Wetlands Species
Calidris canutus	Red Knot, Knot	Vulnerable	Migratory Wetlands Species
Calidris ferruginea	Curlew Sandpiper	Critically Endangered	Migratory Wetlands Species
Calidris melanotos	Pectoral Sandpiper		Migratory Wetlands Species

Scientific Name	Common Name	Threatened Category (Cth)	Migratory Category
Numenius madagascariensis	Eastern Curlew, Far Eastern Curlew	Critically Endangered	Migratory Wetlands Species
Pandion haliaetus	Osprey		Migratory Wetlands Species
Tringa nebularia	Common Greenshank, Greenshank	Endangered and Migratory	Migratory Wetlands Species
Pristis pristis	Freshwater Sawfish, Largetooth Sawfish, River Sawfish, Leichhardt's Sawfish, Northern Sawfish	Endangered	Migratory Marine Species

5.0 Methods to Assess Impacts to MNES

5.1 Desktop Assessment

A review of available ecological data and literature within the Desktop Study Area was first undertaken to characterise the ecological values and identify the potential presence of threatened species and vegetation communities within the Project Area.

The objectives of this desktop assessment included:

- a review of relevant biodiversity databases, government publications and published literature relevant to the Desktop Study Area
- an assessment of the broad conservation values of vegetation communities and habitat present in the Desktop Study Area
- identification of the potential presence of conservation significant species and habitat in the Desktop Study Area.

The desktop assessment included searches of the following databases:

- DCCEEW EPBC Protected Matters Search Tool (PMST) database (DCCEEW, 2025)
- DBCA Threatened and Priority Flora Database (DBCA, 2024b)
- DBCA Threatened and Priority Ecological Communities Database (DBCA, 2024b)
- DBCA Threatened and Priority Fauna Database (DBCA, 2024c)
- Dandjoo Database (DBCA, 2024a)
- DBCA NatureMap (DBCA, 2024e)
- DWER IBSA Database (DWER, 2024).

Desktop assessments are described in detail in the following reports:

- Reconnaissance and Targeted Flora and Vegetation Assessment (Umwelt, 2025b)
- Basic and Targeted Fauna Survey (Umwelt, 2025a)
- Bird and Bat Utilisation Survey (BBUS) Summary Report (Umwelt, 2025e)
- Bird and Bat Utilisation Assessment (BBUA) Report (Umwelt, 2025e).

5.2 Field Surveys

5.2.1 Terrestrial Flora and Vegetation

This section provides an overview of the survey effort and methodology employed for characterising terrestrial flora and vegetation values of the Project Area. A more detailed description of this methodology is presented in **Appendix A**.

In the context of flora and vegetation, the following survey areas are defined:

- The **F&V Survey Area** is 15,835 ha and refers to the area subject to flora and vegetation surveys. It is based on a previous larger Project Area. Approximately 1,167 ha of the Project Area were not included in the F&V Survey Area. These areas have been avoided and are not included in the Indicative Project Footprint.
- The **D&T Survey Area** is a subset of the F&V Survey Area within which detailed and targeted flora and vegetation surveys were undertaken. This was developed to encompass intact remnant vegetation that may be impacted by the Project. The D&T Survey Area is 130.5 ha.

These survey areas are presented in **Figure 5.1**.

All assessments and discussion of flora and vegetation values in this report in **Section 6.0** to **Section 9.0** are based on results from these survey areas that have been clipped to the Project Area.

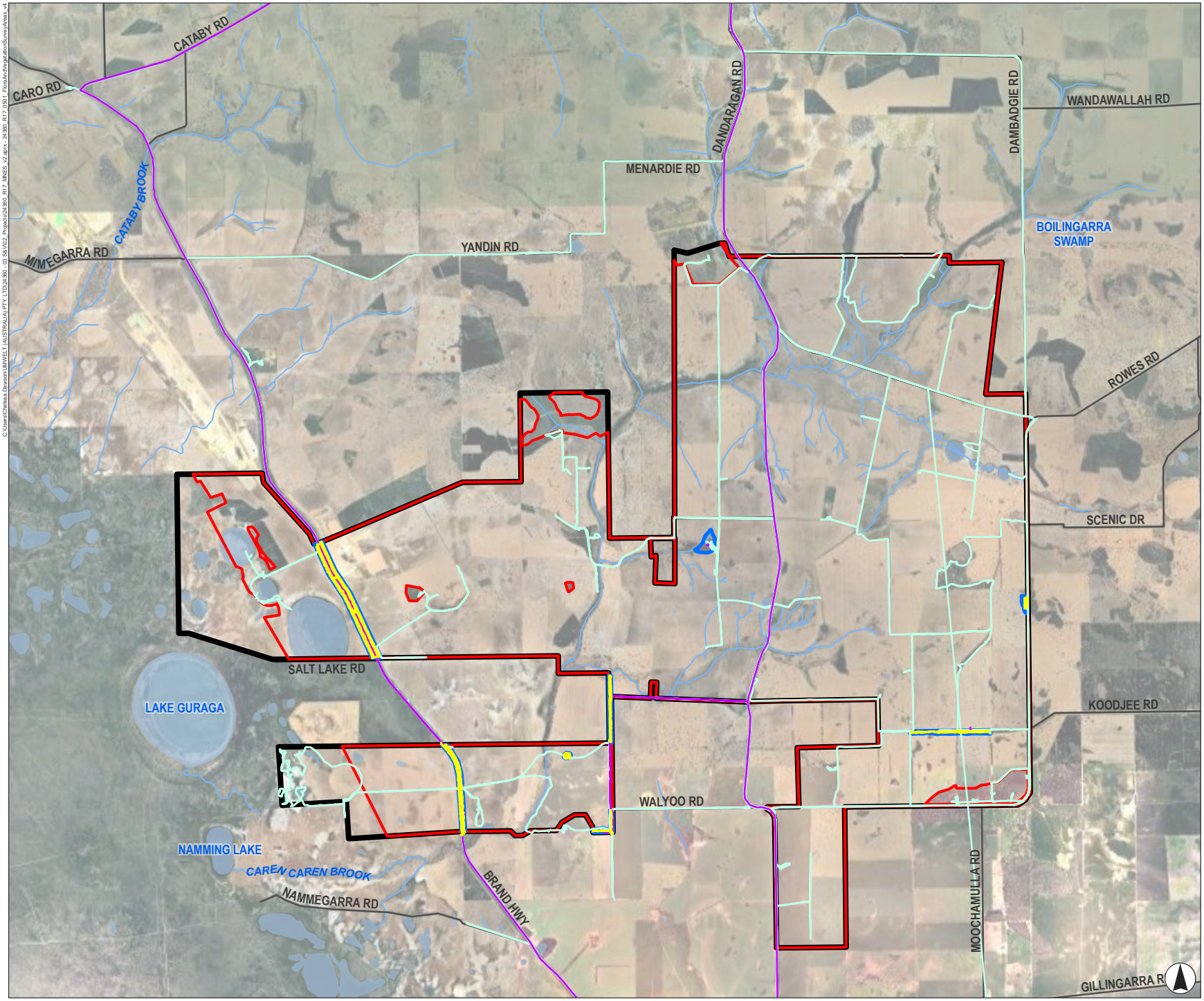
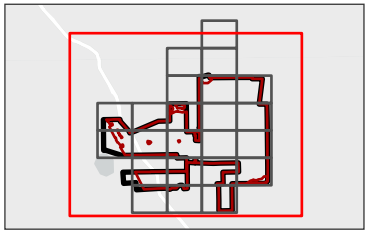


FIGURE 5.1

Flora and Vegetation Survey Areas

Legend

- Reconnaissance track logs
- Quadrat track logs
- Targeted Searching track logs
- Road
- Watercourse
- Waterbody
- F&V Survey Area within Project Area
- D&T Survey Area
- Project Area



0 2 4

Kilometres

Scale 1:120,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

5.2.1.1 Survey Guidelines

Flora and vegetation surveys were undertaken in accordance with:

- Technical Guidance—Flora and Vegetation Surveys for Environmental Impact Assessment (EPA, 2016a).
- Methods for survey and identification of Western Australian threatened ecological communities (DBCA (2024d)).
- Department of the Environment (2013) Survey Guidelines for Australia's Threatened Orchids (DoE, 2013).
- Relevant referral guidelines or conservation and listing advice for threatened ecological communities.

5.2.1.2 Surveys Completed

Several surveys have been undertaken to determine the flora and vegetation values in the Project Area. The surveys have been used to inform Project design and provide suitable information for an environmental impact assessment. Details of surveys timings, effort and methodology are presented in **Table 5.1**.

Table 5.1 Terrestrial Flora and Vegetation Surveys

Field Survey	Survey Area	Survey Timing	Survey Methods and Effort
Flora and Vegetation Reconnaissance Survey (Umwelt, 2025b) (**Appendix A**)	F & V Survey Area (15,835 ha)	2–4 July 2024	Literature review and database searches 2 botanists over 3 days 6 relevés 143 vegetation mapping notes
Flora and Vegetation Detailed and Targeted Survey (Umwelt, 2025b) (**Appendix A**)	D&T Survey Area (130.5 ha)	24–27 September 2024	2 botanists over 4 days 3 relevés 3 quadrats 99 vegetation mapping notes
Flora and Vegetation Detailed Survey (Umwelt, 2025b) **(Appendix A)**	D&T Survey Area (130.5 ha)	1–4 October 2024	2 botanists over 4 days 1 relevé 14 quadrats 19 vegetation mapping notes
Flora and Vegetation Reconnaissance Survey (Umwelt, 2025b) (**Appendix A**)	North eastern area of F&V Survey Area (3,758 ha)	11 December 2024	1 botanist over 1 day No relevés 21 vegetation mapping notes

5.2.1.3 Vegetation Type

To characterise vegetation types (VTs) of the Project Area, floristic agglomerative hierarchical clustering analysis of data from the quadrats was performed to inform groupings. Following this process, floristic and structural data recorded at relevés was examined to determine whether vegetation sampled by such relevés, as in the case where vegetation condition may not support classification analysis, was analogous to any of the VTs defined by floristic composition classification. Any such vegetation that was not considered to be analogous with any of the VTs defined by floristic classification was considered to represent a discrete VT.

VT descriptions were adapted from the National Vegetation Information System (NVIS) Australian Vegetation Attribute Manual (NVIS Technical Working Group, 2017), with some modifications as considered appropriate (Umwelt, 2025b).

Locations of quadrats and/or relevés within each VT were used in conjunction with aerial photograph interpretation and vegetation mapping notes to develop VT mapping polygon boundaries. Mapping boundaries were then developed using aerial Light Detection and Ranging (LiDAR) imagery. Detections of vegetation were extracted from the LiDAR and converted into polygons using Geographic Information System (GIS) software.

Further details on the vegetation mapping methodology are presented in **Appendix A**.

5.2.1.4 Vegetation Condition

Vegetation condition was described using the vegetation condition scale presented for the South West and Interzone Botanical Provinces (as per Table 3.5 of (EPA, 2016a). Notes on vegetation condition were taken during the survey at all data point locations. Vegetation condition category polygon boundaries were developed using this information in conjunction with introduced flora taxa location data and were digitised using GIS software as for VT polygon boundaries.

5.2.1.5 Threatened Ecological Communities

All TECs identified by the desktop assessment were considered to be identifiable irrespective of time of survey and were targeted during field surveys.

The vegetation of the F&V Survey Area was manually compared to TEC descriptions, to determine whether any vegetation may represent a TEC. Specifically, comparisons of dominant taxa, soils, topography and geographical distribution of VTs were made to those of any TECs potentially occurring in the F&V Survey Area.

Determination of EPBC Act listed TECs was undertaken by review of the survey and comparisons made to the appropriate listing and conservation advice for any TECs potentially occurring in the Survey Area.

5.2.1.6 Threatened Flora

The majority of threatened flora taxa identified by the desktop assessment were considered to be theoretically identifiable during the detailed and targeted field surveys and were targeted during these surveys.

Systematic targeted survey was undertaken within the entirety of the D&T Survey Area, with the exception of the swamp vegetation located south of Stockyard Road. The D&T Survey Area was subjected to a targeted survey as it encompasses intact remnant vegetation that may be impacted by the Project.

Areas of Degraded or Completely Degraded condition vegetation were regarded as having low likelihood of presence of significant flora taxa due to the disturbed nature of the vegetation, as observed during the July 2024 field survey.

Targeted searching was generally conducted in a grid pattern at 20 m spacing which was considered appropriate based on vegetation density and taxa expected to occur (EPA, 2016b). Searching was also undertaken opportunistically while traversing the broader F&V Survey Area and information recorded at such locations was the same as that recorded during targeted searching.

All traverses made during the 2024 targeted survey are mapped as track logs in Figure 3.1 of **Appendix A**.

5.2.2 Terrestrial Fauna

This section provides an overview of the survey effort and methodology employed for characterising terrestrial fauna values of the Project Area. A more detailed description of the survey methodology is presented in **Appendix B** and **Appendix C**.

In the context of terrestrial fauna surveys, the following survey areas are defined:

- The **Fauna Survey Area** refers to the area subject to fauna surveys. It is based on a previous larger Project Area of 17,213 ha.
- The **Targeted Fauna Habitat Survey Area** refers to the area subject to targeted fauna surveys. This area is analogous to the Development Corridor and is 3,443 ha.
- The **Targeted Shorebird Survey Area** refers to the four wetlands subject to monthly surveys for the presence and use by shorebird species.

These survey areas are depicted in **Figure 5.2**.

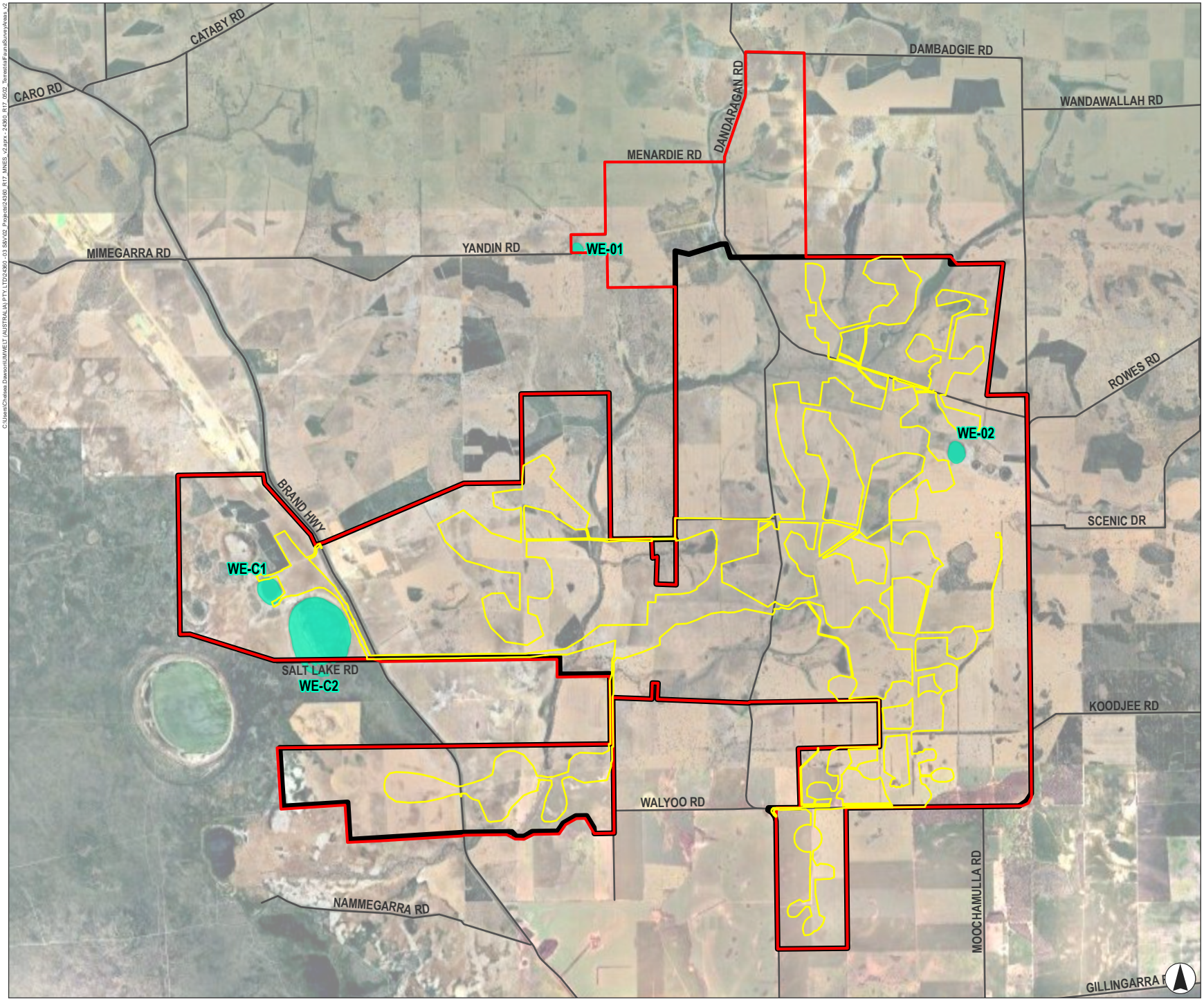


FIGURE 5.2

Terrestrial Fauna Survey Areas

Legend

- Road
- Project Area
- Fauna Survey Area
- Tageted Fauna Habitat Survey Area
- Targeted Shorebird Survey Area

0 2 4

Kilometres

Scale 1:120,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

5.2.2.1 Survey Guidelines

Fauna surveys were conducted within representative locations of all fauna habitat types. Terrestrial fauna survey methods were developed and undertaken in accordance with:

- Technical Guidance—Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment (2020).
- Survey guidelines for Australia's threatened birds: Guidelines for detecting birds listed as threatened under the EPBC Act (DEWHA, 2010).
- Survey guidelines for Australia's threatened mammals: Guidelines for detecting mammals listed as threatened under the EPBC Act (DEWHA, 2011).
- Survey guidelines for Australia's threatened bats: Guidelines for detecting bats listed as threatened under the EPBC Act (DEWHA, 2010).
- Referral Guideline for 3 WA Threatened Black-Cockatoo Species (2022).
- Bamford Consulting Ecologists (BCE) (Bamford, 2020) method for mapping and characterising foraging and breeding habitat.
- Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (2017).
- Referral Guideline for 14 Birds Listed as Migratory Species under the EPBC Act (2015).

5.2.2.2 Surveys Completed

Several surveys have been undertaken to determine the terrestrial fauna values in the Project Area. These surveys have been used to inform Project design and provide suitable information for an environmental impact assessment. Details of these surveys are presented in **Table 5.1**.

Table 5.2 Terrestrial Fauna Surveys

Field Survey Type	Survey Dates
BBUS01 (Spring)	9–15 Sep 2024
BBUS02 (Summer)	13–17 Feb 2025
BBUS03 (Autumn)	4–8 May 2025
BBUS04 (Winter)	21–25 July 2025
BBUS05 (Spring)	13–17 Oct 2025
Basic Fauna Survey	2–3 July 2024
Targeted Fauna Survey	29 Oct – 5 Nov 2024
Basic and Targeted Fauna Survey	10 Dec 2024
Targeted Fauna Habitat Assessment	23–27 June 2025 21 July 2025 13–17 Oct 2025
Targeted Shorebird Surveys (September 2025)	23 Sep 2025
Targeted Shorebird Surveys (October 2025)	17 Oct 2025
Targeted Shorebird Surveys (November 2025)	2 Dec 2025

5.2.2.3 Sampling Method and Effort

Table 5.3 documents the sampling methodology and effort that was employed for the BBUS and terrestrial fauna surveys undertaken to support the Project referral.

Details of the sampling methodology and effort applied for conservation listed terrestrial fauna species is presented separately in **Section 5.2.2.4**.

Table 5.3 Fauna Survey Techniques and Effort

Survey	Survey Area	Timings	Survey Methods and Effort
Basic and targeted vertebrate fauna assessment (reference) (**Appendix B**)	Fauna Survey Area (17,213 ha)	Basic: 2–3 July 2024. Basic and targeted: 29 October – 5 November 2024 Supplementary Survey: 10 December 2024	A basic and targeted vertebrate fauna assessment, including desktop study, was undertaken to characterise fauna habitats and identify occurrence of terrestrial vertebrate fauna species. Survey methods and effort included: • 16 person days of survey • Habitat assessments (92 locations) and mapping • Camera trapping (54 trap nights) • Ultrasonic bat recorders; 3 nights at five sites (total 15 nights) • Incidental observations. Fauna habitat assessments were undertaken at selected sample points to delineate vertebrate fauna habitats. The information recorded at each sample point included: • Site information, photos and GPS location • Vegetation: dominant upper, mid and lower strata species and percentage cover • Substrate • Surface water presence • Habitat components (leaf litter, rocky outcrops, tree hollows etc.) • Disturbance signs • General habitat condition. Locations of habitat assessment points were used in conjunction with aerial imagery, digital elevation models, and soil mapping units to generate fauna habitat mapping across the Project Area. Further information on the survey methodology and effort applied for the Basic and Targeted Vertebrate Fauna Assessment is presented in Section 3.4 of **Appendix B**. Fauna survey locations are illustrated in **Figure 5.3**.

Survey	Survey Area	Timings	Survey Methods and Effort
Bird and Bat Utilisation Surveys (BBUS) (reference) (**Appendix I**)	Fauna Survey Area (17,213 ha)	BBUS01: 9–15 Sep 2024 (spring) BBUS02: 13–17 Feb 2025 (summer) BBUS03: 4–8 May 2025 (autumn) BBUS04: 21–25 July 2025 (winter) BBUS05: 13–17 October (spring)	The assessment was undertaken to determine utilisation of the Project Area by birds and bats, involving: • Desktop site characterisation and species likelihood of occurrence assessment. • BBUS comprising sampling at sites representative of habitat types in the Project Area. The number of sampling sites varied during each BBUS due to adjustments made to sampling design to accommodate Project Area changes and to ensure appropriate spatial distribution. Fifteen (15) sites were surveyed in BBUS01, and between 23 and 29 sites were surveyed during the remaining BBUS. All surveys involved sampling of fixed vantage points at each site for a 30-minute duration, three times a day. Methods were updated for BBUS02-05 to also include a timed 20-minute, 400 m transect survey, three times a day at each site. The total survey effort across all surveys was 1,068 hours. Survey methods also included: • Ultrasonic bat recorders, 2 - 5 nights at between 9 and 12 sites during each BBUS (total 170 nights). • Incidental observations. • Wetland census. Further information on the survey methodology and effort applied is presented in Section 2.2 of **Appendix I**. BBUS locations are illustrated in **Figure 5.4**.

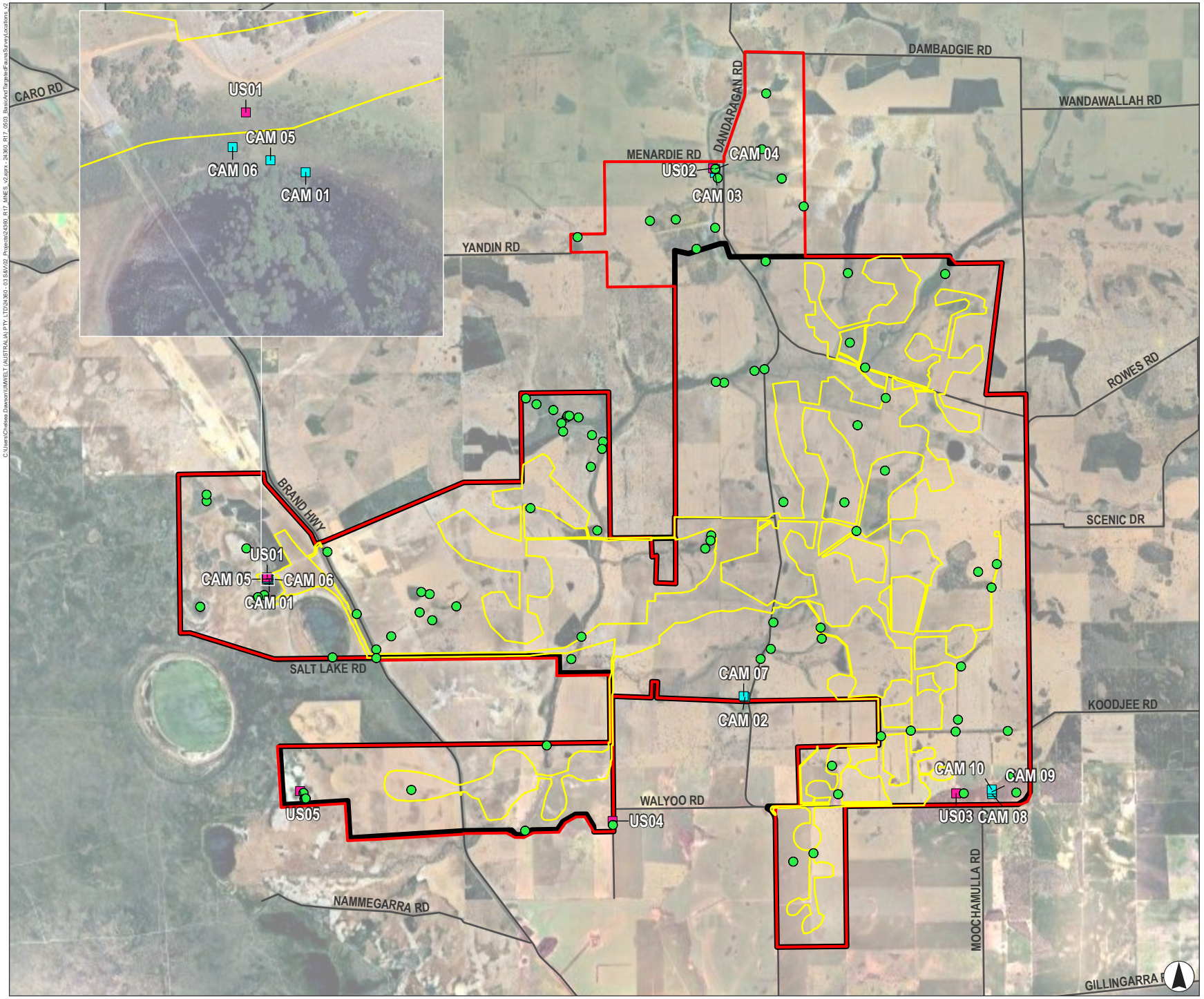


FIGURE 5.3

Basic and Targeted Fauna Survey Locations

Legend

- Fauna Habitat Points
- Camera location
- Ultrasonic location
- Road
- Project Area
- Fauna Survey Area
- Tageted Fauna Habitat Assessment Area

0 2 4

Kilometres

Scale 1:120,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

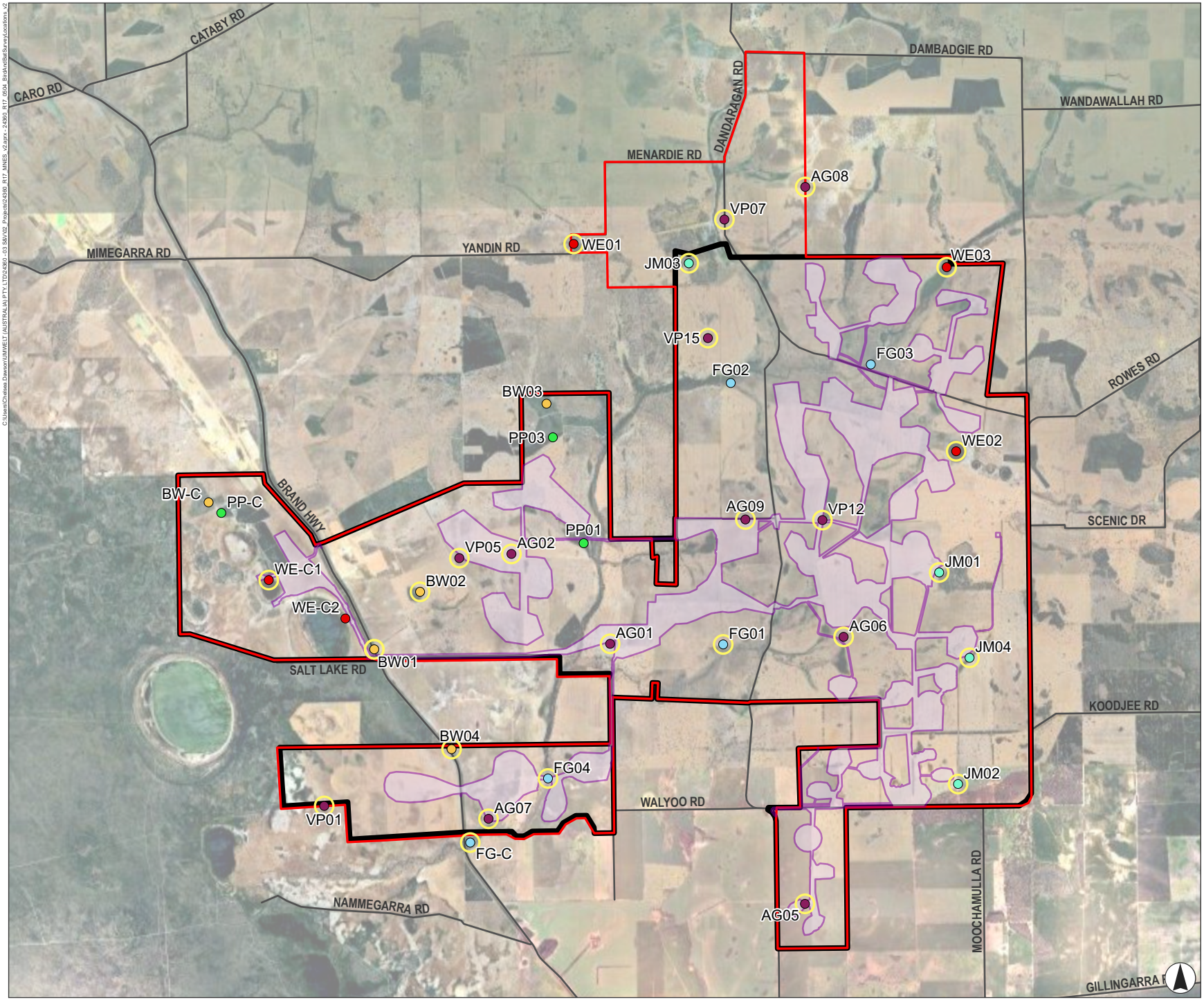


FIGURE 5.4

Bird and Bat Survey locations

Legend

- Ultrasonic Recording Sites
- Road
- Project Area
- Fauna Survey Area
- Development Corridor

Bird and Bat Utilisation Survey Locations

- Agriculture
- Flooded Gum Floodplain
- Jarrah Marri Forest
- Pine Plantation
- Banksia Woodland
- Wetland

0 2 4

Kilometres

Scale 1:120,000 at A4
GDA2020 MGA Zone 50

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

5.2.2.4 Threatened and Migratory Fauna

Based on the desktop assessments and findings from the basic and targeted vertebrate fauna assessment and earlier BBUS (Spring 2024 and Summer 2025), it was determined that the following EPBC listed fauna species are known or have a moderate to high likelihood of occurrence in the Project Area:

- Carnaby's Black-Cockatoo (*Zanda latirostris*)
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*)
- Migratory Shorebirds (including those with threatened status).

Black-Cockatoo

Targeted breeding, foraging and roosting habitat assessments for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo were undertaken across the Development Corridor.

The survey and assessments were conducted with strong reference to both the existing DCCEEW (2022) and

for the referral of actions that may result in impact to Black-Cockatoos. Survey methodology also followed the recommendations listed on the DCCEEW's Species Profile and Threats Database (DCCEEW, 2025e, 2025f; 2024a).

DBCA has indicated that the methodology developed and applied previously by Bamford (Bamford, 2020) is an acceptable approach to score breeding value and foraging habitat and, therefore, these methods were adopted.

Field investigations were undertaken across three survey events from June to October 2025. Survey details are summarised in **Table 5.4** and **Table 5.5** below with a detailed description provided in Section 2.3.2 of **Appendix C**.

Table 5.4 Black-Cockatoo Survey Methodology

Survey	Survey Area	Timings	Survey Methods and Effort
Targeted Fauna Habitat Assessment (Umwelt, 2025a) (**Appendix C**)	Development Corridor	23–27 June 2025 21 July 2025 13–17 October 2025	Targeted breeding, foraging and roosting habitat assessments were undertaken for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo. During these assessments, species presence was also recorded. **Breeding Habitat** The Bamford Consulting methodology (Bancroft & Bamford, 2023) was used to rank tree suitability for Black-Cockatoo breeding within the Development Corridor. The ranking applied and how they correlate to DCCEEW (2022) categories are presented below in **Table 5.5**: 'Comprehensive' potential Black-Cockatoo nest-trees surveys were conducted across approximately 2,597 ha (75%) of the Development Corridor, with a 'partial' survey (comprehensively for the highest ranking trees, Rank 1 to 3 but only opportunistically surveyed for Rank 4 and 5 trees) conducted across 762 ha (22%), with the remaining 84 ha (3%) unassessed. Almost the entire Indicative Project Footprint was comprehensively surveyed for potential Black-Cockatoo nest-trees (698 ha) with the exception of 26.0 ha (3.6%) that was partially surveyed and 5.1 ha (0.7%) that remains unassessed. Figure 2.2 of **Appendix C** illustrates the extent of coverage. **Foraging Habitat** Foraging habitat values within the Project Area were assessed using the (Bamford, 2020) rationale for each vegetation patch within the Development Corridor. Mapping of foraging habitat quality within the Development Corridor was ranked and mapped using the following categories, which aligns with the site condition scoring as set out by (Bamford, 2020): • No foraging value (corresponding to a site condition score of 0) • Negligible to Low foraging value (1) • Low foraging value (2) • Low to Moderate foraging value (3) • Moderate foraging value (4) • Moderate to High foraging value (5) • High foraging value (6)

Survey	Survey Area	Timings	Survey Methods and Effort
			A score out of 10 which considers context and species density was also calculated for the purposes of aiding offset calculations should they be required. **Foraging Evidence** Black-Cockatoo foraging signs were also recorded opportunistically as part of the field survey. When observed, the following was recorded: • Location • Black-Cockatoo species • Forage plant species • Approximate age of the foraging evidence • Roosting Habitat. A survey for Black-Cockatoo night-roost locations was undertaken by attempting to locate flocks of Black-Cockatoos in the late afternoon and, where practicable, following them to their roost site(s). This survey was conducted on the afternoon and evening of the 23 June 2025. As per the guidance of DCCEEW (2022), areas likely to be used as night-roosting sites were noted based on the topographical, physical and vegetation characteristics present (such as sites adjacent to watercourses with large trees) and/or indirect evidence of roosting (e.g. guano deposits, discarded feathers, tree clippings).

Table 5.5 Bamford (2020) Black-Cockatoo Nest-tree Ranks

DCCEEW (2022) Category	Bamford (2020) Rank	Description of Tree and Hollows/Activity
Known nesting tree	**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.
Suitable nesting tree	**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.
Potential nesting tree	**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.

Migratory Shorebirds

The Project Area contains a number of waterbodies and wetlands that may provide suitable habitat for migratory shorebirds listed under the EPBC Act.

Using the geomorphic wetlands of the Swan Coastal Plain (DBCA, (2025) mapping, in conjunction with in-field assessments (of wetland features and bird presence) and existing data (i.e. database searches), four wetlands within and adjacent to the Project Area were identified as being the most likely to support migratory shorebirds (**Figure 5.5**).

Monthly targeted migratory shorebird surveys are being undertaken from September 2025 to March 2026 (non-breeding season) at the four wetlands illustrated in **Figure 5.5** when shorebird species are expected to occur within the Project region.

Details of the targeted migratory shorebird surveys are summarised in **Table 5.6**, with additional information provided in Section 2.3.3 of **Appendix C**.

It should be noted that migratory shorebird observations are also being captured as part of the quarterly BBUS as described in **Section 5.2.2.2**.

Table 5.6 Migratory Shorebird Survey Methods

Survey	Survey Area	Timings	Survey Methods and Effort
Targeted Shorebird Surveys	Selected wetlands (**Figure 5.5**)	Monthly from September 2025 to March 2026. Shorebird information was also gathered as part of other terrestrial fauna surveys.	• These four wetlands are being surveyed using binoculars and a telescope to gather information on species presence, abundance, behaviour, and site utilisation. • Surveys are being undertaken monthly from September 2025 to March 2026 and comprise one day for two personnel each month (seven survey events total). Three monthly surveys have been undertaken to date. These were undertaken on 23 September 2025, 17 October 2025 and 2 December 2025 . • Flight height data is also gathered on species of interest, whenever possible, to supplement analysis of flight behaviours.

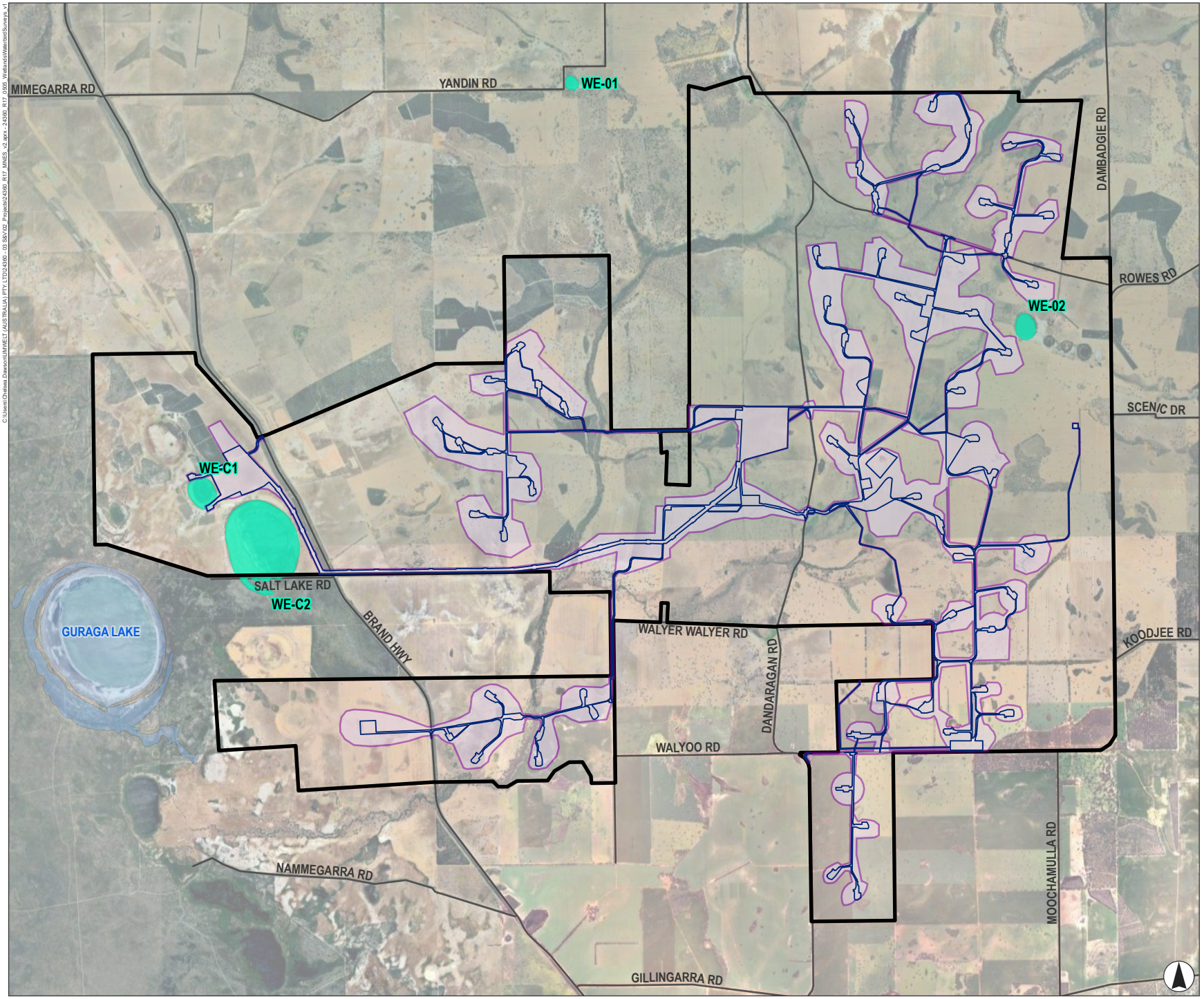


FIGURE 5.5

Wetlands Subject to Waterbird Surveys

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint
- Directory of Nationally Important Wetlands
- Survey Wetlands

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

5.2.3 Survey Limitations

5.2.3.1 Flora and Vegetation

Table 5.7 presents an assessment of the potential limitations of the flora and vegetation field survey program.

Table 5.7 Flora and Vegetation Survey Limitations

Limitation	Comment	Outcome
Effort and Extent	A Reconnaissance, Detailed and Targeted survey was undertaken across the Survey Area over a combined 12 days. A Detailed and Targeted survey was undertaken across the D&T Survey Area. Seventeen quadrats and fifteen relevés were recorded within the broader Survey Area. Mapping of vegetation boundaries was undertaken within the broader Survey Area using a combination of aerial photography and information collected at relevés and vegetation observation points. No constraints prevented appropriate sampling techniques (quadrat and relevé establishment, foot traverses) being employed. All areas were easy to access using roads and tracks. Data reliability is therefore considered to be relatively high.	Not a limitation
Competency/experience of the team carrying out the survey	The field team leader for the Reconnaissance field survey has >18 years' experience conducting flora and vegetation surveys in the region and the field team leader of the Detailed and Targeted field survey has >3 years' experience in conducting flora and vegetation surveys in the region. Senior personnel provided guidance to less experienced botanists throughout the survey where necessary. Information relating to identifying characteristics of both significant flora taxa and vegetation identified by the desktop assessment as potentially occurring in the Survey Area was provided to all field team members prior to undertaking the field survey. The plant identifications were undertaken by Principal Botanists with >15 years' experience in plant identification for flora of the region.	Not a limitation
Proportion of flora identified, recorded and/or collected	All vascular groups that were present in the sample sites (quadrats, relevés and vegetation mapping notes) within the Survey Area were sampled. A high proportion of perennial vascular taxa were recorded based on the intensity and method of survey. The majority of annual vascular taxa that were sampled were identifiable, as the survey was conducted in Spring; it is considered likely that the majority of annual flora taxa that would be present in the Survey Area were recorded by the survey. Any unknown vascular taxa were collected and identified by a Principal Botanist.	Not a limitation

Limitation	Comment	Outcome
Sources of information e.g. previously available information (whether historic or recent) as distinct from new data	Good contextual information for the Survey Area was available prior to the survey. Sources of information used included government databases (DBCA, DCCEEW), flora and vegetation surveys previously conducted in the Desktop Study Area, as well as numerous general sources pertaining to the climate, geomorphology, flora and vegetation of the region.	Not a limitation
Timing/weather/ season/cycle	The Detailed and Targeted field survey was conducted in September and early October 2024. This corresponds with the optimum time to undertake a Primary survey in the Swan Coastal Plain (SCP) bioregion (Spring), and the flowering period of most taxa in the region. The total rainfall received in the year of survey (2024) was below average overall (473.6 mm in comparison to long-term average of 517.7 mm); however, the total rainfall received from January–August 2024 (the months prior to the Detailed and Targeted survey) was higher than average (417.7 mm in comparison to average of 403.0 mm).	Not a limitation
Disturbances (e.g. fire, flood, accidental human intervention etc.), which affected results of survey	There was evidence of significant impacts to vegetation composition and structure in the majority of the Survey Area as a result of human activities, including clearing for agriculture and very high levels of introduced (weed) taxa. However, this is a reflection of the land use history in the region and is not specific to the Survey Area; consequently, this is not considered to be a limitation of the survey. These disturbances did not affect the results of the survey, with the vegetation able to be confidently described and mapped, and flora taxa mature enough to be easily identified or collected. No areas impacted by recent fire were observed.	Not a limitation
Remoteness and/or access problems	The Survey Area was accessed either via publicly accessible roads or farm tracks, and on foot. Appropriate landowner permissions were obtained prior to survey, and there were no access issues. This allowed high intensity of sampling across the Survey Area. Therefore, this is not a limitation of this assessment.	Not a limitation

5.2.3.2 Terrestrial Fauna

Table 5.8 presents an assessment of the potential limitations of the terrestrial fauna field survey program.

Table 5.8 Terrestrial Fauna Survey Limitations

Limitation	Comment	Outcome
Availability of data and information	Good contextual information for the Survey Area was available prior to the survey. Sources of information used included government databases (DBCA, DCCEEW), as well as numerous general sources pertaining to the climate, geomorphology, vegetation and fauna of the region, and fauna surveys previously conducted in the Desktop Study Area.	Not a limitation
Competency/experience of team carrying out the survey	The fauna field team was led by Senior Zoologist Dr. Jeremy Ringma who has >16 years fauna survey experience with >5 years' experience surveying for Black-Cockatoo. Technical personnel with relevant expertise assisted with analysis of ultrasonic recordings (Robert Bullen).	Not a limitation
Scope of the survey, e.g. where fauna groups were excluded from the survey	The scope was a basic level vertebrate fauna survey with targeted sampling components. This was conducted within the EPA framework and relevant species-specific survey guidelines (EPA, 2020).	Not a limitation
Timing/weather/season cycle	The field survey was conducted in October/November and December 2024. This is considered optimal timing to survey reptiles, amphibians, birds and mammals in the Southern Climatic Region (EPA, 2020). The October/November survey is within recommended survey timing for Carnaby's Black-Cockatoo breeding habitat (DCCEEW, 2022). Rainfall within the year proceeding survey was 52 mm lower than the long-term average which resulted in dryer than usual conditions. However, this is not considered to be a limitation. Shorebird surveys are being conducted monthly during the period where migratory shorebirds may occur within the Project Area (October to March).	Not a limitation
Disturbances (e.g. fire, flood etc.), which may have affected results	There was evidence of impact to vegetation composition and structure throughout the Survey Area as a result of human activities, including clearing and moderate levels of introduced (weed) taxa. However, the fauna investigations were unimpacted by disturbance.	Not a limitation
Proportion of fauna identified, recorded and/or collected	The basic fauna survey was undertaken to identify broad fauna and fauna habitat information. As such, the Survey Area was sampled opportunistically and via low-intensity sampling using cameras and remote recording devices. The survey likely detected a representative proportion of the vertebrate fauna assemblage, particularly birds, mammals, and reptiles based on habitat suitability and survey techniques. Targeted species were actively searched for using species-specific methods as part of the targeted component of the survey, increasing detection probability for those of conservation interest. All fauna recorded via incidental observations were identified in the field at the time of the survey.	Not a limitation

Limitation	Comment	Outcome
Adequacy of survey intensity and proportion of survey achieved	A basic and targeted survey was undertaken across the Survey Area to assist with decisions on future environmental approvals. The sampling methods and survey intensity was considered adequate for the level of survey and focused on the significant species.	Not a limitation
Access problems	The Survey Area was accessed either via roads or on foot. Most areas of the Survey Area were able to be accessed, however due to cropping, some habitat assessments were completed using binoculars from the closest access point.	Not a limitation
Problems with data and analysis, including sampling bias	Limited access to properties resulted in one camera being left on site for 4 months. However, this did not impact the data collection and is not considered a limitation. No other constraints were encountered during data collection in the field or during subsequent analysis.	Not a limitation

5.3 Likelihood of Occurrence Assessment

5.3.1 Flora and Vegetation

The likelihood of occurrence for significant flora taxa and significant vegetation in the Project Area was classified based on the categories presented in **Table 5.9**.

Table 5.9 Flora: Likelihood of Occurrence Categories

Category	Description
Known	Species or community known to occur in the Project Area, either through historical records or through the findings of this survey.
Possible	Suitable habitat present in the Survey Area; known locations in close proximity to Project Area (< 10 km); not recorded during the Survey, however survey intensity not sufficient to reduce likelihood of occurrence to Unlikely.
Potential	Suitable habitat present in the Survey Area; no known locations in proximity to Project Area (> 10 km); not recorded during the Survey, however survey intensity not sufficient to reduce likelihood of occurrence to Unlikely.
Unlikely	Species or community unlikely to occur in the Project Area due to lack of suitable preferred habitat; or combination of survey undertaken during correct survey period for identification, adequate survey intensity and/or vegetation condition deemed insufficient for species or community to occur.

5.3.2 Fauna

The likelihood of occurrence for threatened and migratory fauna in the Project Area was classified based on the categories presented in **Table 5.10**.

Table 5.10 Fauna: Likelihood of Occurrence Categories

Category	Description
Known	The species has been recorded during the field survey or from recent, reliable records within the Project Area.
High	The Project Area contains suitable habitat and there are recent records of the species occurring in close proximity to the Project Area. OR Species known distribution overlaps the Project Area which contains suitable habitat.
Moderate	The species is known from the Desktop Study Area and some preferred habitat is present within the Project Area. Aerial foragers and other migratory birds that may overfly the survey area are also included in this category.
Low	The species has been recorded within the Desktop Study Area however, there is limited habitat (i.e. quantity, type and quality) within the Project Area. This may include marginal and isolated habitat with limited ability for the species to access. The species may disperse through the Project Area infrequently and is unlikely to depend on the habitat for survival.
Very Low	The Project Area offers limited to no potential habitat for the species, is outside its known range, and/or is lacking broader habitat requirements.

5.4 Significant Impact Assessment

The potential impacts associated with MNES were assessed with reference to the Significant Impact Guidelines – MNES (Department of the Environment, 2013b). Specifically, the significant impact criteria were used to assess the significance of potential impacts according to each MNES' conservation status (Vulnerable, Endangered, Critically Endangered, and Migratory).

Threatened flora species and ecological communities recorded within the Project Area were assessed.

Threatened fauna species with a likelihood of occurrence of Moderate, High or Known were assessed.

Commonwealth or State government guidelines, recovery plans, conservation advice, and species profiles were utilised wherever relevant when undertaking these assessments and are summarised in **Table 5.11**. This information was supplemented with publicly available literature where suitable, with citations provided where utilised.

Table 5.11 Government Guidelines, Recovery Plans, Conservation Advice, and Species Profiles

Matter of National Environmental Significance	Guidelines, recovery plans, conservation advice or species profile
Banksia Woodlands of the Swan Coastal Plain ecological community	• Referral Guideline for the Banksia Woodlands of the Swan Coastal Plain ecological community (DoEE, 2016a) • Approved Conservation Advice (incorporating listing advice) for the Banksia Woodlands of the Swan Coastal Plain ecological community (TSSC, 2016)

Matter of National Environmental Significance	Guidelines, recovery plans, conservation advice or species profile
Forest Red-tailed Black-Cockatoo	• Referral Guideline for 3 WA Threatened Black-Cockatoo Species (DCCEEW, 2022) • Approved Conservation Advice for *Calyptorhynchus banksii naso* (Forest Red-tailed Black-Cockatoo) (DEWHA, 2009) • Forest Black-Cockatoo (Baudin's Cockatoo *Calyptorhynchus baudinii* and Forest Red-tailed Black-Cockatoo *Calyptorhynchus banksii naso*) Recovery Plan (DEC, 2008) • *Calyptorhynchus banksii naso* — Forest Red-tailed Black-Cockatoo, Karrak SPRAT Profile (DCCEEW, 2024a)
Carnaby's Black-Cockatoo	• Referral Guideline for 3 WA Threatened Black-Cockatoo Species (DCCEEW, 2022) • Carnaby's Black-Cockatoo (*Calyptorhynchus latirostris*) Recovery Plan (DPAW, 2013) • EPA Advice: Carnaby's Black-Cockatoo in Environmental Impact Assessment in the Perth and Peel Region (EPA, 2019) • *Zanda latirostris* — Carnaby's Black-Cockatoo, Short-billed Black-Cockatoo SPRAT Profile (DCCEEW, 2024b)
Migratory Shorebirds	• Draft Referral Guideline for 14 Birds Listed as Migratory Species Under the EPBC Act (Department of the Environment, 2015) • Department of the Environment Referral Guideline for 14 Birds Listed as Migratory Species under the EPBC Act • Australian National Directory of Important Migratory Shorebird Habitat (Driessen et al, 2025)
Fork-tailed Swift	• *Apus pacificus* — Fork-tailed Swift SPRAT Profile (DCCEEW, 2015)
Black-tailed Godwit	• *Limosa limosa* — Black-tailed Godwit SPRAT Profile (DCCEEW, 2015) • *Conservation Advice for Limosa limosa (black-tailed godwit) (DCCEEW, 2024)*.
Common Greenshank	• *Tringa nebularia* — Common Greenshank SPRAT Profile (DCCEEW, 2015) • *Conservation Advice for Tringa nebularia (common greenshank)* (DCCEEW, 2024)
Red-necked Stint	• *Calidris ruficollis* — Red-necked Stint SPRAT Profile (DCCEEW, 2015)
Ruff	• *Calidris pugnax* — Ruff SPRAT Profile (DCCEEW, 2015)
Sharp-tailed Sandpiper	• *Calidris acuminata* — Sharp-tailed Sandpiper SPRAT Profile (DCCEEW, 2015) • *Conservation Advice for Calidris acuminata (sharp-tailed sandpiper)* (DCCEEW, 2024)
Wood Sandpiper	• *Tringa glareola* — Wood Sandpiper SPRAT Profile (DCCEEW, 2015)
Common Sandpiper	• *Actitis hypoleucos* — Common Sandpiper SPRAT Profile (DCCEEW, 2015)

Matter of National Environmental Significance	Guidelines, recovery plans, conservation advice or species profile
Curlew Sandpiper	• *Calidris ferruginea* — Curlew Sandpiper SPRAT Profile (DCCEEW, 2015) • *Conservation Advice for Calidris ferruginea (curlew sandpiper)* (DCCEEW, 2023)
Glossy Ibis	• *Plegadis falcinellus* — Glossy Ibis SPRAT Profile (DCCEEW, 2015)
Pacific Golden Plover	• *Pluvialis fulva* — Pacific Golden Plover SPRAT Profile (DCCEEW, 2015)
Long-toed Stint	• *Calidris subminuta* — Long-toed Stint SPRAT Profile (DCCEEW, 2015)

6.0 Description of Ecological Values

6.1 Biogeographic Description

6.1.1 Bioregion

The Project Area is bisected by the boundary of two Interim Biogeographic Regionalisation of Australia (IBRA) bioregions and three subregions as summarised in **Table 6.1.**

Table 6.1 Biogeographic Subregions of the Project Area (DCCEEW, 2023a)

Bioregion	Subregion	Summary	Area and % within the Project Area
Swan Coastal Plain (SWA)	Dandaragan Plateau (SWA01)	The plateau is bordered by Derby and Dandaragan Faults. Cretaceous marine sediments are mantled by sands and laterites. Characterised by Banksia low woodland, Jarrah - Marri woodland, Marri woodland, and by scrub-heaths on laterite pavement and on gravelly sandplains.	3,996 ha comprising the eastern portion (25.59%)
	Perth (SWA02)	The Perth subregion is composed of colluvial and aeolian sands, alluvial river flats, coastal limestone. Heath and/or Tuart woodlands on limestone, Banksia and Jarrah-Banksia woodlands on Quaternary marine dunes of various ages, Marri on colluvial and alluvials. Includes a complex series of seasonal wetlands and also includes Rottnest, Carnac and Garden Islands etc.	11,511 ha comprising the western portion (73.71%)
Geraldton Sandplains (GS)	Lesueur Sandplain (GS2)	The Lesueur Sandplain (GS3) comprises coastal Aeolian and limestones, Jurassic siltstones and sandstones (often heavily lateritised) of central Perth Basin. Alluvials are associated with drainage systems. There are extensive yellow sandplains in south-eastern parts, especially where the subregions overlaps the western edge of the Pilbara Craton. Shrub-heaths rich in endemics occur on a mosaic of lateritic mesas, sandplains, coastal sands and limestones. Heath on lateritised sandplains along the subregions north-eastern margins.	109 ha comprising the northwest portion (0.70%))

6.1.2 Climate

The Bureau of Meteorology (BoM) monitors precipitation and temperature at the Badgingarra station (station number 9037) (BOM, 2024) which is located approximately 46 km northwest of the Project Area. **Figure 6.1** resents the monthly precipitation totals and monthly maximum temperature statistics for 2024, as well as long-term average monthly precipitation and maximum temperature data recorded at this station

Throughout 2024, when ecological studies were undertaken to support this referral, the maximum temperatures were slightly higher than the average maximum temperature for each month (**Figure 6.1**). The total rainfall of 2024 of 473.6 mm was below the long-term average of 517.7 mm. However, the total rainfall in the months before the Detailed and Targeted surveys (January–August 2024) was 417.7 mm, slightly above the long-term average (for this period of 403.0 mm). Thus, the spring months (September - December) were drier than average having received 53 mm, which is 30 mm less than the long-term average (83mm).

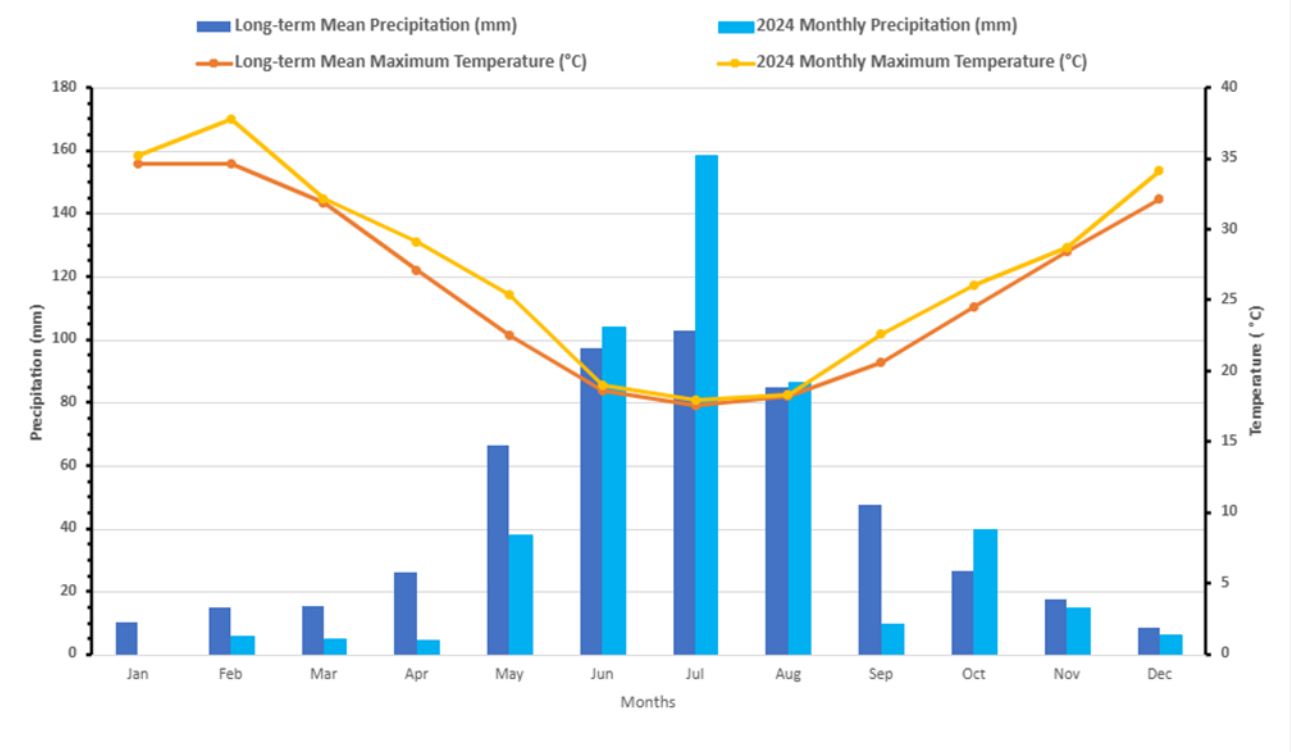


Figure 6.1 Climate Statistics for Badgingarra Research Station (9037) (BOM, 2024)

6.1.3 Surface Water

The Project Area is located within the Moore–Hill Rivers Basin and the Minyulo–Caren Caren catchment.

The Minyulo-Caren Caren catchment comprises Lake Guraga, a large saline/brackish lake, and a second saline lake, Namming Lake is located 1.5 km south of Lake Guraga. Water recharge occurs through direct precipitation, ongoing waterflow from the Caren Caren Brook system, originating 25 km north-east of Lake Guraga and, connecting streams, also passing through Crackers Swamp.

The Moore River catchment of the basin flows southward from Perenjari, Carnamah and Dalwllinu shires through to the Coorow, Dandaragan and Moora Shires, meeting the Gingin Brook where the catchment flows out to the Indian Ocean via Guilderton (Moore River Catchment Council, 2020).

The Caren Caren Brook traverses the central portion of the Project Area in a north–south direction. It is a non-perennial drainage line and is classified as a minor river.

There are no Ramsar sites located within the Desktop Study Area (DBCA, 2017).

Guraga Lake, which is listed on the Directory of Important Wetlands (DBCA-045) (DBCA, 2018), is located approximately 700 m west of the Project Area. Guraga Lake, and numerous other wetlands present on the Lesueur Sandplains, may provide suitable habitat for migratory shorebirds and other waterbirds that occur within the region. The Project Area includes Lake Yangy, which lies within the Dandaragan Plateau and feeds into the Caren Caren Brook.

6.1.4 Groundwater

The Project Area is located within the Gingin Proclaimed Groundwater Area, and the majority intersects the Moore River and Certain Tributaries Proclaimed Surface Water Area.

There are a number of bores, wells and other groundwater sampling sites within a 10 km radius of the Project Area (DPIRD, 2024a), which were installed for water sampling or water supply purposes (Department of Water and Environmental Regulation 2024a). These include bores identified as potential water supply for the Project and which connect to the Leederville aquifer which is a confined aquifer and sits below the Parmelia aquifer.

6.1.5 Land Systems

Land systems are broad descriptions of landform, geology and soils. The Project Area intersects five land systems which are characterised as follows (DPIRD, 2024b):

- Dandaragan System: subdued dissected lateritic plateau, undulating low hills and rises with narrow alluvial plains. Variable deep sands and sandy gravels plus minor earths, duplexes and clays. Marri Woodlands and shrublands. This system intersects approximately 65% of the Project Area.
- Rowes System: Plateau residuals, hillcrests and very gently to gently inclined hillslopes; sandy gravels, gravelly pale deep sand, some duricrust. This system intersects approximately 19% of the Project Area.
- Bassendean System: Low to very low relief Pleistocene sand dunes, intervening swamps and gently undulating sand plain. Within the dunes, deep grey sands may become pale yellow with depth (usually < 1.5 m). In the low lying areas adjacent to swamps the water table is relatively shallow in winter being between only one to two m of the surface. Drainage here is often restricted by an iron/organic hardpan. The scattered rounded shallow lakes and swamps contain water, coloured brown by organic material, of low salinity and high acidity.(DPIRD, 1986). This system intersects approximately 11% of the Project Area.
- Capitella System: Subdued stripped lateritic plateau, undulating to gently undulating low rises with gently undulating plain including dunes; pale and yellow deep sands, sandy gravels, some duplex; from sandstones plus alluvial and Aeolian deposits (DPIRD, 2024b). This system intersects less than 3% of the Project Area.
- Boothendarra System: Subdued, stripped lateritic plateau with undulating rises to gently undulating plains on laterite, siltstone and sandstone in the west Midlands area. Sandy duplexes, Pale deep sand, sandy and loamy gravels and minor clays. Vegetation is wandoo woodland, *Eucalyptus todtiana* and banksia low open woodland, scrub heath and some mallee (DPIRD, 2024b). This system intersects approximately 2% of the Project Area.

6.1.6 National Parks, State Forests and Reserves

The Project Area predominantly comprises land cleared for agriculture and livestock grazing, with interspersed patches of remnant woodland. Key environmental features in proximity to the Project Area are shown in **Figure 1.1**, and include:

- Namming Nature Reserve, approximately 2 km west of the Project Area. This is protected for the purposes of flora and fauna conservation and is managed by DBCA.
- Moore River National Park situated approximately 10 km south of the Project Area.
- Bundarra, Eneminga, Jam Hill, Moochamulla and Quinns Hill Nature Reserves all located within 10 km of the Project Area.
- Guraga Lake, which is located approximately 1 km west of the Project Area within Namming Nature Reserve.
- Badgingarra National Park located approximately 29 km northwest of the Project Area.

6.2 Flora and Vegetation

The following sections summarise the flora and vegetation recorded in the Project Area from the desktop assessment and field surveys.

For the purposes of this report, likelihood of occurrence results discussed in this section are presented for ecological communities “Known” and flora species with “Potential” to occur in the Project Area. The complete likelihood of occurrence assessment is presented in **Appendix F.**

6.2.1 Regional Vegetation

The Project Area occurs across seven vegetation system associations (VSAs), with Dandaragan_999 being the most prominent. Details of the VSA’s mapped within Project Area, and their extents remaining regionally are presented in **Table 6.2** and illustrated in **Figure 6.2**.

Table 6.2 Vegetation System Associations of the Project Area

IBRA Subregion	VSA	Description	Area and Proportion of VSA Mapped in Project Area (ha/%)	Current Extent (ha)	Pre-European Extent Remaining (%)	Current Extent Protected for Conservation (%)
Swan Coastal Plain	BASSENDEAN_1030	Low woodland; *Banksia attenuata* & *Banksia menziesii*	1,862.3 (11.9%)	79,560.9	69.7	13.9
	BASSENDEAN_1031	Mosaic: Shrublands; hakea scrub-heath / Shrublands; dryandra heath	1,876.3 (12%)	3,94.9	8.6	0
	BASSENDEAN_125	Bare areas; salt lakes	257.3 (1.6%)	355.3	23.1	5.0
Dandaragan Plateau	DANDARAGAN_1030	Low woodland; *Banksia attenuata* & *Banksia menziesii*	130.5 (0.8%)	570.5	41.2	0
	DANDARAGAN_1035	Mosaic: Medium open woodland; marri / Shrublands; dryandra heath	19 (0.1%)	339.8	10.1	0
	DANDARAGAN_999	Medium woodland; marri	11,362.5 (72.8%)	8,477.4	9.4	1.2
Lesueur Sandplains	LESUEUR_1031	Mosaic: Shrublands; hakea scrub-heath / Shrublands; dryandra heath	109.7 (0.7%)	73,457.3	32.7	37.8

Note: Current extent protected for conservation is considered to be any areas within International Union for Conservation of Nature (IUCN) categories I to IV (DPIRD, 2019)

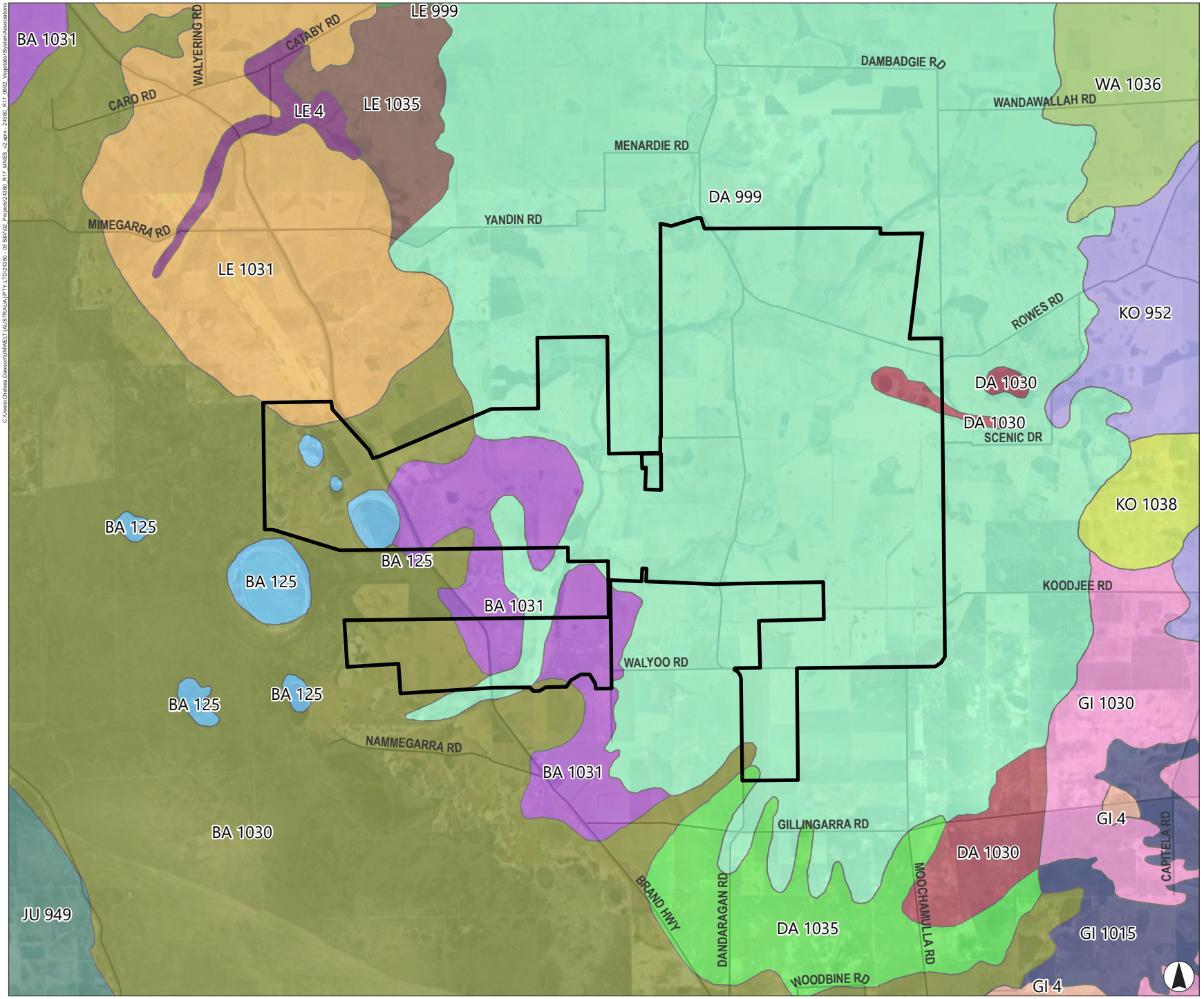


FIGURE 6.2

Vegetation System Associations of the Project Area

Legend

- Road
- Project Area

Pre-European Vegetation (DPIRD 2019)

- BASSENDEAN_1030
- BASSENDEAN_1031
- BASSENDEAN_125
- DANDARAGAN_1030
- DANDARAGAN_1035
- DANDARAGAN_999
- GINGIN_1015
- GINGIN_1030
- GINGIN_4
- JURIEN_949
- KOOJAN_1038
- KOOJAN_952
- LE SUEUR_1031
- LE SUEUR_1035
- LE SUEUR_4
- LE SUEUR_999
- WARRO_1036

0 2 4

Kilometres

Scale 1:150,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

6.2.2 Vegetation Types

Eight native vegetation types (VT) were identified and mapped within the F&V Survey Area through floristic composition classification. Several Highly Modified Areas (HMAs) were also mapped, being areas where natural vegetation has been almost or entirely removed, cleared, or replaced with introduced or non-endemic taxa. These VTs and HMAs are all present in the Project Area.

Blocks of native vegetation likely to be in good condition or better that the Project will avoid were not surveyed. This area totalled 1,167.9 ha of the Project Area. It also includes the western portion of the Project Area (likely to be in 'Completely Degraded' and 'Degraded' condition) that will be avoided. The full extent of the Development Corridor and Indicative Project Footprint have been surveyed.

Further details on the VTs and HMAs identified within the Project Area are presented in **Table 6.3** and illustrated in **Figure 6.3**. More detailed mapping is presented in Figures 5.4.1 to 5.4.23 of **Appendix A**. Representative photos of the various vegetation types are also provided in **Appendix A**.

Table 6.3 Vegetation Types of the Project Area

Code	Brief Description	Area (ha/%) in Project Area
VT1	Low isolated trees to open woodland of *Corymbia calophylla*, occasionally with *Eucalyptus todtiana*, occasionally with a tall shrubland of *Banksia hewardiana* over mid open shrubland of *Hakea trifurcata*, *Xanthorrhoea preissii*, *Allocasuarina humilis*, and *Calothamnus sanguineus*	218.67 (1.40%)
VT2	Occasional low woodland of *Banksia prionotes*, sometimes with *Eucalyptus todtiana*, over tall open shrubland to shrubland of *Acacia blakelyi* over mid sparse shrubland of *Allocasuarina humilis*, *Calothamnus quadrifidus* subsp. *quadrifidus* and *Xanthorrhoea preissii* over low sparse shrubland of *Dianella revoluta* and *Conostylis aculeata* subsp. *aculeata*	15.97 (0.10%)
VT3	Occasional low open woodland of *Eucalyptus todtiana*, *Banksia attenuata* and *Banksia menziesii*, sometimes with *Banksia prionotes*, occasionally with a mid-shrubland of *Leptospermopsis erubescens*, over mid sparse shrubland of *Xanthorrhoea preissii* and *Jacksonia floribunda*	79.26 (0.51%)
VT4	Low open woodland of *Eucalyptus rudis* subsp. *rudis* over tall open shrubland of *Melaleuca rhaphiophylla* over mid closed rushland of *Lepidosperma longitudinale* and *Machaerina preissii*, on drainage lines and open depressions with brown loam.	418.79 (2.68%)
VT5	Low woodland of *Melaleuca preissiana* and/or *Melaleuca rhaphiophylla* occasionally over low isolated sedges of *Schoenus subfascularis* over low closed grassland of pasture weeds, on open depressions, sometimes with standing water, with brown loam.	26.42 (0.17%)
VT6	Low isolated trees to low open woodland of *Eucalyptus loxophleba* subsp. *loxophleba* over low closed grassland of pasture weeds, on plains or slopes with grey/brown loam.	5.35 (0.03%)
VT7	Isolated low trees to low open woodland of *Eucalyptus todtiana* over low closed grassland of pasture weeds, on plains and slopes or grey/brown sand or loam.	3.60 (0.02%)
VT8	Isolated mid shrubland of *Xanthorrhoea ?drummondii* over low open shrubland of *Acacia pulchella* and *Hibbertia hypericoides* subsp. *hypericoides* over low open sedgeland of *Mesomelaena pseudostygia*, *Schoenus brevisetis*, *Schoenus clandestinus* and *Morelotia octandra*, over isolated low tussock grasses of *Amphipogon turbinatus*, on slopes of yellow-grey sand or red-brown clay loam with laterite.	0.26 (<0.01%)
IT	Isolated remnant trees, largely consisting of native remnant paddock and road verge trees and shrubs	166.38 (1.07%)
PD	Paddocks and Infrastructure; areas where natural vegetation has been completely and apparently permanently removed, with either no or very scattered native taxa (trees) remaining, such as paddocks, infrastructure, tracks and firebreaks.	12,975.02 (83.08%)
JD	Mid to tall sedgeland to open sedgeland of **Juncus acutus* over low closed grasslands of pasture weeds, on drainage lines and sump areas.	179.95 (1.15%)
PP	Planted vegetation, where the natural vegetation has been cleared and replaced by plantations of **Pinus* sp.	167.96 (1.08%)
PE	Planted vegetation, where the natural vegetation has been cleared and replaced by plantations of native or exotic *Eucalyptus* spp.	44.32 (0.28%)
TP	Planted vegetation, where the natural vegetation has been cleared and replaced by plantations of **Chamaecytisus palmensis* or **Vitis vinifera* (Tagasaste).	51.82 (0.33%)
WB	Artificial dams and natural or artificial lakes and pooling water (water bodies).	96.00 (0.61%)
Unassessed	*Areas unassessed and will be avoided*	1,167.86 (7.48%)
	Total	**15,617.63**

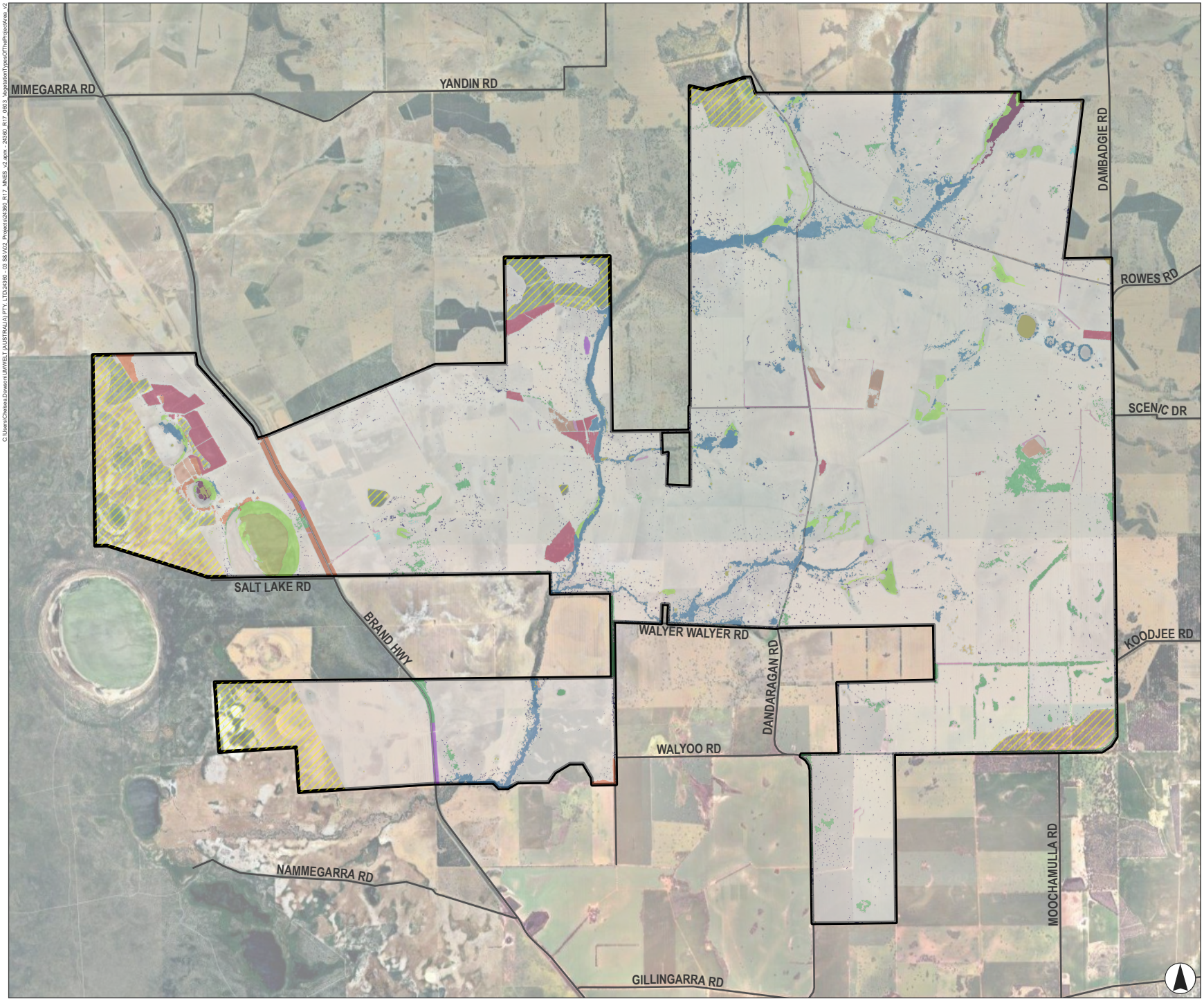


FIGURE 6.3

Vegetation Types of the Project Area

Legend

- Road
- Project Area

Vegetation Types

- VT1
- VT2
- VT3
- VT4
- VT5
- VT6
- VT7
- VT8

Highly Modified Areas

- IT
- PP
- PE
- TP
- JD
- PD
- WB
- Unsurveyed

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

C:\Users\Chelsea.Dawson\UMWELT (AUSTRALIA) PTY. LTD\2430 - 03 SkV02_Projects\2430_R17_MNES_v2.aprx - 2430_R17_0603_VegetationTypesOfTheProjectArea_Legend_V2

Legend

Vegetation Types

- VT1 — Low isolated trees to open woodland of *Corymbia calophylla*, occasionally with *Eucalyptus todtiana*, occasionally with a tall shrubland of *Banksia hewardiana* over mid open shrubland of *Hakea trifurcata*, *Xanthorrhoea preissii*, *Allocasuarina humilis*, and *Calothamnus sanguineus* over low isolated shrubs of *Babingtonia grandiflora* and *Hibbertia hypericoides* subsp. *hypericoides* over low isolated tussock grasses of *Austrostipa elegantissima* and occasionally *Neurachne alophecuroidea* over low isolated sedges of *Morelotia octandra* occasionally over low open rushland of *Lepidosperma* cf. *pubisquameum* or *Lepidosperma apricola* and/or *Desmocladus asper* over low isolated clumps of forbs of *Opercularia vaginata*, occasionally with *Chamaescilla corymbosa*, *Trachymene pilosa* and *Podotheca gnaphaloides*; on undulating plains with grey/yellow/white sand-sandy loam or on slopes with red/brown clay loam and laterite pebbles.
- VT2 — Occasional low woodland of *Banksia prionotes*, sometimes with *Eucalyptus todtiana*, over tall open shrubland to shrubland of *Acacia blakelyi* over mid sparse shrubland of *Allocasuarina humilis*, *Calothamnus quadrifidus* subsp. *quadrifidus* and *Xanthorrhoea preissii* over low sparse shrubland of *Dianella revoluta* and *Conostylis aculeata* subsp. *aculeata* over low isolated grasses of *Austrostipa macalpinei* over low clumps of sedges of *Mesomelaena pseudostygia* over low isolated forbs of *Calandrinia corriguloides*, *Centrolepis drummondiana*, *Drosera erythrorhiza*, *Poranthera microphylla* and *Trachymene pilosa*; on sand plains with grey/yellow/brown sand.
- VT3 — Occasional low open woodland of *Eucalyptus todtiana*, *Banksia attenuata* and *Banksia menziesii*, sometimes with *Banksia prionotes*, occasionally with a mid shrubland of *Leptospermopsis erubescens*, over mid sparse shrubland of *Xanthorrhoea preissii* and *Jacksonia floribunda* over low sparse shrubland of *Banksia dallanneyi* subsp. *dallanneyi* var. *dallanneyi*, *Hibbertia hypericoides* subsp. *hypericoides*, *Melaleuca ciliosa* and *Petrophile macrostachya* over low isolated clumps of grasses of *Austrostipa elgantissima* and *Austrostipa macalpinei* over low sparse sedgeland to isolated clumps of sedges of *Mesomelaena pseudostygia*, *Schoenus clandestinus* and *Schoenus nanus* over isolated clumps of rushes of *Lepidobolus preissianus* subsp. *preissianus* and *Caustis dioica* over low isolated clumps of forbs of *Burchardia congesta*, *Drosera erythrorhiza*, *Phyllangium divergens*, *Podotheca gnaphaloides* and *Trachymene pilosa*, on sand plains with white/grey/yellow sand.
- VT4 — Low open woodland of *Eucalyptus rudis* subsp. *rudis* over tall open shrubland of *Melaleuca rhaphiophylla* over mid closed rushland of *Lepidosperma longitudinale* and *Machaerina preissii*, on drainage lines and open depressions with brown loam.
- VT5 — Low woodland of *Melaleuca preissiana* and/or *Melaleuca rhaphiophylla* occasionally over low isolated sedges of *Schoenus subfascularis* over low closed grassland of pasture weeds, on open depressions, sometimes with standing water, with brown loam.
- VT6 — Low isolated trees to low open woodland of *Eucalyptus loxophleba* subsp. *loxophleba* over low closed grassland of pasture weeds, on plains or slopes with grey/brown loam.
- VT7 — Isolated low trees to low open woodland of *Eucalyptus todtiana* over low closed grassland of pasture weeds, on plains and slopes or grey/brown sand or loam.
- VT8 — Isolated mid shrubland of *Xanthorrhoea* ?*drummondii* over low open shrubland of *Acacia pulchella* and *Hibbertia hypericoides* subsp. *hypericoides* over low open sedgeland of *Mesomelaena pseudostygia*, *Schoenus brevisetis*, *Schoenus clandestinus* and *Morelotia octandra*, over isolated low tussock grasses of *Amphipogon turbinatus*, on slopes of yellow-grey sand or red-brown clay loam with laterite.

Highly Modified Areas

- IT — Isolated remnant trees and shrubs, sometimes low open woodlands, typically *Corymbia calophylla*, *Eucalyptus rudis* subsp. *rudis*, *Eucalyptus todtiana*, *Jacksonia sternbergiana* and *Acacia saligna*.
- PP — Plantations of *Pinus* sp.
- PE — Planted trees of *Eucalyptus*, of either native or exotic taxa.
- TP — Plantations of **Chamaecytisus palmensis* or **Vitis vinifera*.
- JD — Mid to tall sedgeland to open sedgeland of **Juncus acutus* over low closed grasslands of pasture weeds, on drainage lines and sump areas.
- PD — Paddocks and Infrastructure, cleared land.
- WB — Water Bodies and Artificial Dams.
- Unsurveyed

FIGURE 6.3

Vegetation Types of the Project Area

umwelt

6.2.3 Vegetation Condition

The majority of the Project Area subject to the flora and vegetation assessment has been mapped as 'Completely Degraded' (13,585 ha, 87%). This largely consists of HMAs mapped as PD, PE, PP, TP, IT and JD, where the land has been cleared for pasture or cropping. Little to no native vegetation remains in these areas, although isolated remnant trees may occur. A total of 4.3% of the assessed Project Area was mapped as being in 'Degraded' condition (677.61 ha); these areas predominately consisted of native trees over no or very little understorey taxa, and high levels of introduced (weed) taxa.

A small portion of the assessed Project Area was mapped as being in 'Good' condition (63.7 ha, 0.4%). This comprised the majority of the D&T Survey Area, along Brand Highway, Walyer Walyer Road and Walyoo Road, with some small portions occurring within the remnant vegetation within the Project Area. A smaller portion of the assessed Project Area was mapped as being in 'Very Good' condition (26.9 ha, 0.2%). This condition rating was given to portions of the Brand Highway road verge in the northern section, as well as a small portion of VT4, located south of Stockyard Road.

No vegetation was mapped in 'Pristine' or 'Excellent' condition.

The area of each VT and corresponding condition rating (as per EPA (EPA, 2016b)) mapped in the Project Area is presented in **Table 6.4**. Vegetation condition mapping is provided in **Figure 6.4**.

Table 6.4 Vegetation Condition of the Project Area

VT / HMA	Vegetation Condition					Total
	Completely Degraded	Degraded	Good	Very Good	Not Applicable	
VT1		197.75	19.35	1.57		218.67
VT2		6.59	7.87	1.52		15.97
VT3		33.11	36.27	9.87		79.26
VT4		404.79		14.00		418.79
VT5		26.42				26.42
VT6		5.35				5.35
VT7		3.60				3.60
VT8			0.26			0.26
IT	166.38					166.38
JD	179.95					179.95
PD	12975.02					12,975.02
PE	44.32					44.32
PP	167.96					167.96
TP	51.82					51.82
WB					96.00	96.00
Unsurveyed						1,167.86
Total	**13,585.46**	**677.61**	**63.75**	**26.95**	**96.00**	**15,617.63**

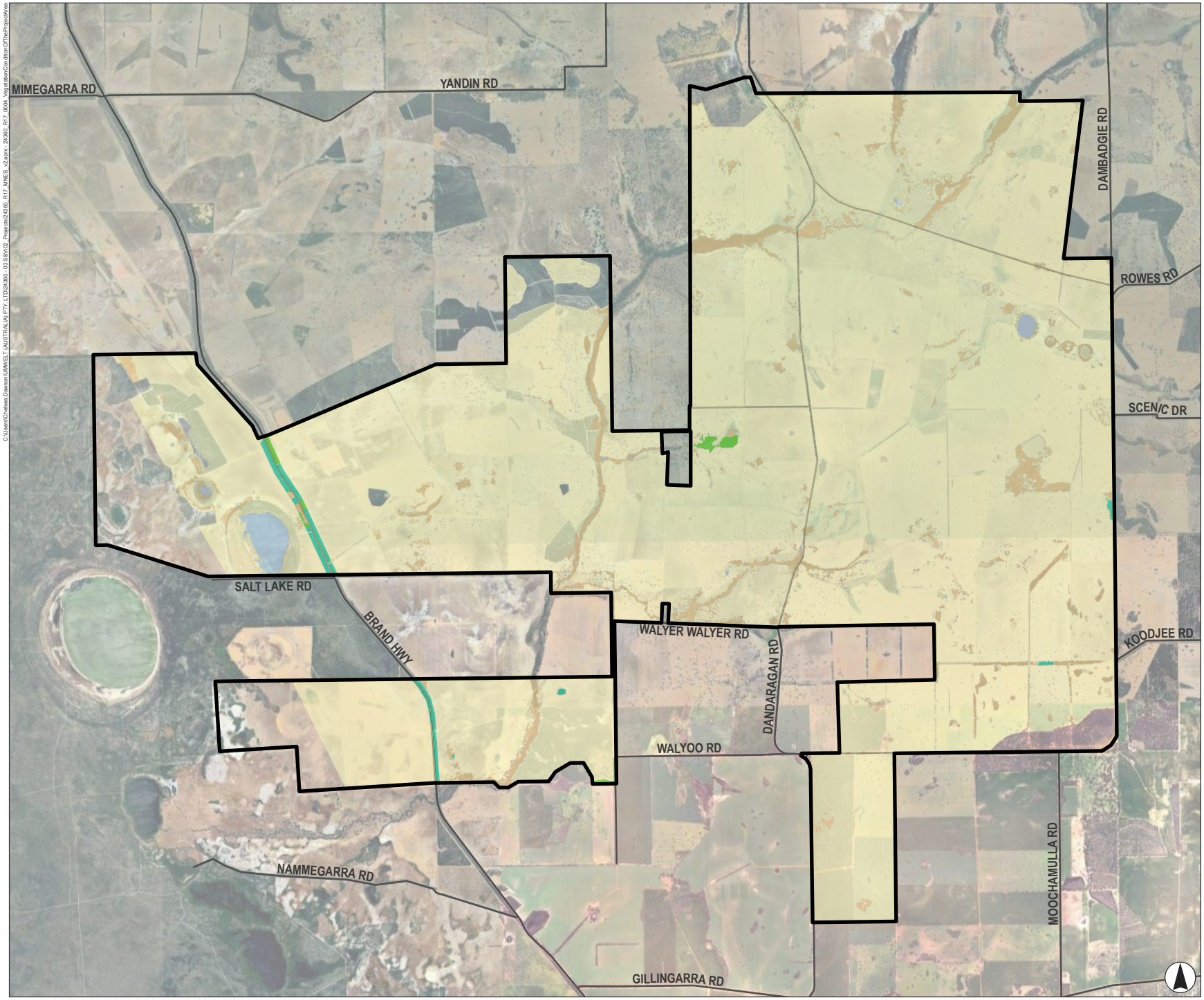


FIGURE 6.4

Vegetation Condition of the Project Area

Legend

- Road
- Project Area

Vegetation Condition

- Very Good
- Good
- Degraded
- Completely Degraded
- NA

0 2 4

Kilometres

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

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

6.2.4 Threatened Ecological Communities

The desktop assessment identified five listed significant vegetation communities that have records (or could potentially occur) within the Desktop Study Area. Of these, the 'Banksia Woodlands of the Swan Coastal Plain' TEC is considered to occur within the Project Area. Identifying the occurrence of the TEC was undertaken in accordance with the stepwise process outlined in the Approved Conservation Advice for this community (DoEE, 2016b). This process is outlined in Section 5.2.9.1 of **Appendix A.**

None of the remaining significant ecological communities were recorded or are considered to occur in the Project Area, as described in **Appendix A**.

6.2.4.1 Banksia Woodlands of the Swan Coastal Plain

The 'Banksia Woodland of the Swan Coastal Plain' TEC is an ecological community largely confined to the Perth and Dandaragan Plateau IBRA subregions of the SCP IBRA region. The TEC is mainly located on the deep Bassendean and Spearwood sands, and occasionally Quindalup sands (typically on the eastern edge), on shallow sands overlying more complex stratigraphic sequences on the foothills of the Ridge Hill Shelf, Whicher Scarp and Gingin/Dandaragan Scarp. This TEC occurs within an annual rainfall band of approximately 535 to 900 mm, often with summer droughts and high temperatures. This strong seasonal variation in climate, results in the TEC being a fire-prone environment, and therefore supports species with a range of life history traits that allow them to persist in fire-prone environments (DoEE, 2016a).

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

Twenty-seven (27) potential patches of the Banksia Woodlands of the Swan Coastal Plain TEC in the F&V Survey Area were assessed by Umwelt (2025b) against the key diagnostic characteristics (DBCA, 2024b) and in accordance with the process outlined in the Approved Conservation Advice for the TEC (DoEE, 2016a). Detailed results from this assessment can be found in **Appendix A**. The assessment determined that 14 patches do not meet the patch size criteria, and are not considered to contribute significantly to the overall function of the ecological community; they are therefore not considered to be patches of the TEC.

Three patches located inside the F&V Survey Area met both the patch size and vegetation condition criteria of Good or better. Ten patches did not meet the patch size criteria and/or the vegetation condition criteria for their mapped extents in the F&V Survey Area, but they represent vegetation that is contiguous with the occurrence of the TEC immediately outside the F&V Survey Area, which in some cases are unsurveyed blocks of native vegetation within the Project Area. These 13 patches of the TEC comprise a total area of 41.3 ha within the F&V Survey Area and are illustrated in **Figure 6.5**. No patches (either wholly or partially) of the TEC were in 'Pristine' or 'Excellent' condition.

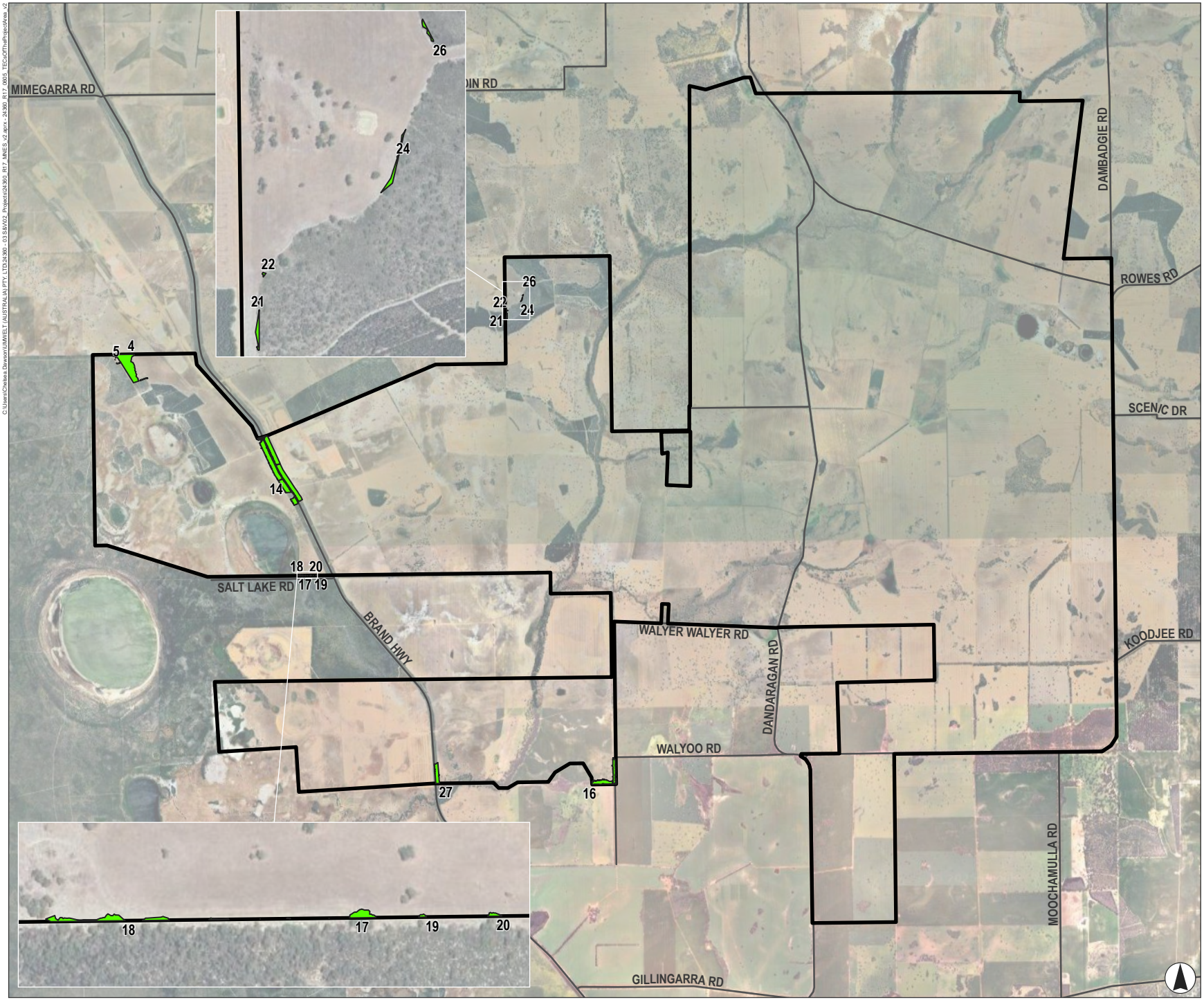


FIGURE 6.5

Threatened Ecological Communities of the Project Area

Legend

- Road
- Project Area
- Banksia Woodlands of the Swan Coastal Plain ecological community (TEC – Endangered)

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

6.2.5 Flora Diversity

A total of 248 discrete flora taxa, including 45 introduced taxa were recorded in the F&V Survey Area as part of the Project specific flora and vegetation surveys. The 248 flora taxa represent a total of 53 families and 146 genera. The most well-represented families were Myrtaceae (36 taxa), Fabaceae (24 taxa), Proteaceae (23 taxa), Poaceae (17 taxa) and Asteraceae (16 taxa). A full list of vascular flora taxa recorded in the F&V Survey Area is presented in **Appendix A**.

6.2.6 Threatened Flora

Ten (10) individuals of one Threatened taxon listed under the EPBC Act (*Grevillea curviloba*) were recorded in an area of planted vegetation outside its natural range. *Grevillea curviloba* (T) has a restricted distribution, with the northernmost records located along the entrance road to RAAF Gingin (located over 60km to the south of the Project Area), and the southernmost records located in Ellenbrook (located over 95km to the south of the Project Area). It has a very narrow east-west distribution, occurring in a line between Gingin and Ellenbrook (Western Australian Herbarium, 1998). This taxon is a common cultivar and is often planted outside of its range throughout Perth and the southwest. It is likely that the 10 individuals recorded were either planted or are a garden escape. All recorded individuals are located outside the Development Corridor and Indicative Project Footprint.

No other listed flora species under the EPBC Act were recorded.

Further information on threatened flora can be found in Section 5.1.2 of **Appendix A**.

6.2.7 Introduced Flora

Forty-five introduced taxa (18.1% of all taxa recorded) were recorded in the F&V Survey Area during Project specific flora and vegetation surveys. Nine of these are taxa are native to Australia, but planted outside their natural range, and thus are classified as introduced in this context.

One Declared Pest listed under the BAM Act (Arum lily (*Zantedeschia aethiopica*)) was recorded in the F&V Survey Area. No Weeds of National Significance were recorded.

6.3 Fauna

6.3.1 Fauna Habitat Types

Twelve broad fauna habitat types were identified within the Project Area, with the majority (11,014.3 ha, 70.5%) being categorised as 'Cleared', mainly consisting of paddocks and areas of infrastructure. The second largest habitat type extent in the Project Area is 'Scattered Trees' (2,281.9 ha, 14.6%), noting that a large proportion of this mapped habitat type comprises bare paddock in between isolated trees.

Table 6.7 summarises the broad fauna habitat types in the Project Area, and their suitability for conservation significant fauna. Detailed fauna habitat type descriptions are provided in the Basic and Targeted Fauna Survey Report (Umwelt, 2025a) (**Appendix B**). Fauna habitat types across the Fauna Survey Area are shown in **Figure 6.6.**

The habitat types of Marri Jarrah Forest, Banksia Woodland, Low Shrubland and Flooded Gum Forest are of the highest value to Black-Cockatoos, while Wetlands and Water Bodies are of the most value for Migratory Shorebirds.

Table 6.5 Terrestrial Fauna Habitat Types within the Project Area

Fauna Habitat Type	Suitability for Conservation Significant Terrestrial Fauna	Area (ha) and Proportion (%) of Project Area
Wetlands (WET)	Suitable habitat for migratory shorebirds and waterbirds. Important watering points with some associated vegetation that may provide some foraging value.	404.5 ha (2.6%)
Water Bodies (WB)	Suitable habitat for migratory shorebirds and waterbirds. Important watering point for Black-Cockatoos.	93.7 ha (0.6%)
Paperbark Dampland (MEL)	Important watering points and some foraging value for Black-Cockatoos.	39.8 ha (0.3%)
Flooded Gum Forest (FG)	May provide some nesting and roosting habitat for Black-Cockatoo species if present.	356.3 ha (2.3%)
Marri Jarrah Forest (MJ)	Foraging habitat for Black-Cockatoo species if present.	114.9 ha (0.7%)
Disturbed Woodland (DW)	Potentially some foraging habitat for Black-Cockatoos depending on flora species presence.	766.9 ha (4.9%)
Scattered Trees (ST)	Potential foraging and breeding habitat for Black-Cockatoo species.	2,281.9 ha (14.6%)
Banksia Woodland (BW)	Foraging habitat for Black-Cockatoo species.	165.8 ha (1.1%)
Low Shrubland (LS)	Potential foraging habitat for Black-Cockatoo species.	186.8 ha (1.2%)
Pine Plantation (PP)	May provide suitable foraging and/or roosting (where near a water source) habitat for Black-Cockatoos.	169.4 ha (1.1%)
Other (OTHER)	Mostly regrowth comprising weeds, with little habitat value.	23.3 ha (0.1%)
Cleared (CL)	Occasional paddock trees may provide some foraging habitat for Black-Cockatoos.	11.014.3 ha (70.5%)
	Total	**15,618 ha**

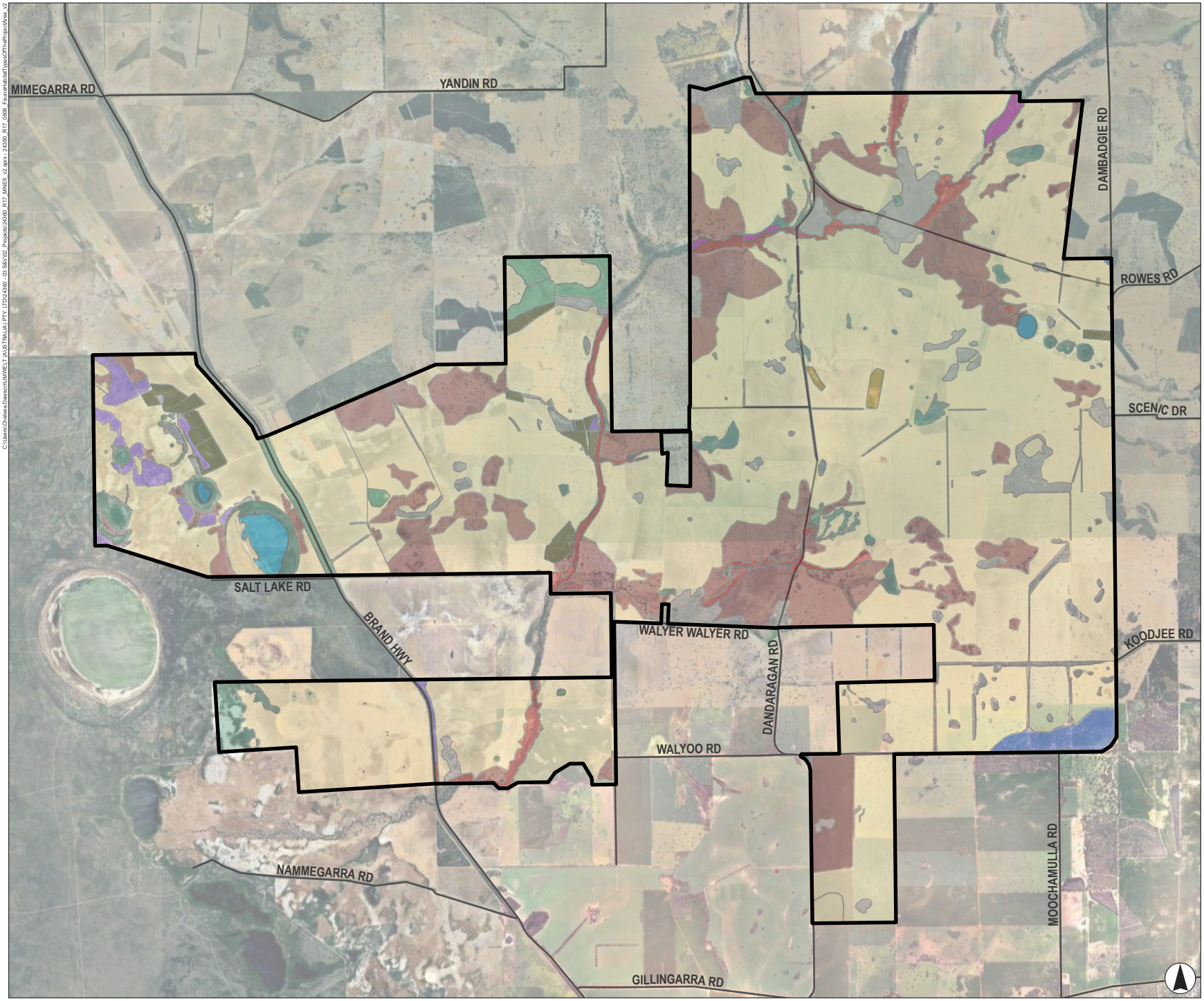


FIGURE 6.6

Fauna Habitat Types of the Project Area

Legend

- Road
- Project Area

Fauna Habitat

- Banksia Woodland
- Flooded Gum Forest
- Low Shrubland
- Paperbark Dampland
- Marri Jarrah Forest
- Disturbed Woodland
- Scattered Trees
- Other
- Pine Plantation
- Cleared
- Water Bodies
- Wetlands

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

C:\Users\Chelsea.Dawson\UMWELT (AUSTRALIA) PTY LTD\24360 - 03 S&V\02_Projects\24360_R17_MINES_v2.aprx - 24360_R17_0606_FaunaHabitatTypesOfTheProjectArea_Legend

Legend

Fauna Habitat

- Banksia Woodland: Open Proteaceae woodland with shrubby understorey. High species diversity of Banksia, Hakea, Grevillea and other native shrubs, Sandy soils.
- Flooded Gum Forest: Stands of Eucalyptus rudis. Grassy and weedy understory with grazing from cattle. Old, mature forest contains hollows suitable for nesting birds, Associated with drainages and low-lying plains, Small, ephemeral pools creating habitat for native frogs and
- Low Shrubland : Dense Proteaceae shrubland with high species diversity of Banksia, Hakea, Grevillea and other native shrubs. Occurs on sandy soils and laterite jump ups.
- Paperbark Dampland: Dense stands of tall *Melaleuca* associated with drainages and damplands. Understory of grass sedges and non-native *Juncus acutus*. Often adjacent to *Eucalyptus rudis* forest , Fallen timber, Small, ephemeral pools creating h
- Marri Jarrah Forest: Marri (*Corymbia calophylla*) Jarrah (*Eucalyptus marginata*) forest.Mature forest with hollows, Largely intact understorey providing dense cover, Proteaceae species in understorey provides high value foraging habitat for Carnaby's Bl
- Disturbed Woodland: Eucalyptus woodland with high grazing pressure resulting in little to no understorey species. Includes planted avenue trees and wind breaks.Grassy understory containing few native species of shrubs, Fallen logs and coarse woody debris, Lower quality fora
- Scattered Trees: Cleared pasture and crop with scattered paddock trees. Paddock trees mostly *E. rudis* and *C. calophylla* provide low level foraging value to Carnaby's Black-Cockatoo and potential nest hollows, Lacks logs and coarse woody debris.
- Other: Highly disturbed, weedy regrowth and cultivated shrubs.
- Pine plantation: Understorey consisting of grass and pine needles.
- Cleared: Cleared, open paddocks with very few remaining paddock trees. Highly disturbed, Combination of grain and canola crops, Open pasture for sheep and cattle grazing.
- Waterbodies: Large, permanent/semi-permanent water bodies.
- Wetlands, damplands and farm dams. Often integrated with other habitat types such as Waterbodies, Paperbark Dampland and Flooded Gum. May be ephemeral in nature, often degraded, weedy and heavily browsed by cattle. Natural, remnant wetlands contain nativ

FIGURE 6.6

Fauna Habitat Types of the Project Area

6.3.2 Black-Cockatoo Habitat

The Basic and Target Fauna Assessment (**Appendix B**) broadly assessed the potential value of habitat types for Black-Cockatoos across the Project Area. Habitat values and suitability was then later refined and mapped within the Development Corridor with the outcomes from the more detailed assessment provided in **Appendix C**.

6.3.2.1 Summary of Black-Cockatoo Habitat at Different Scales

Table 6.6 below provides a summary of Black-Cockatoo foraging, breeding and roosting habitat values in the Indicative Project Footprint, the Development Corridor, the Project Area, and within 12 km of the Project Area.

Table 6.6 Black-Cockatoo Habitat Values at Different Scales

Habitat Type	Indicative Project Footprint*	Development Corridor	Project Area	Within 12 km of the Project Area
Foraging	Foraging habitat assessment for vegetation within Indicative Project Footprint based on targeted assessment (see **Section 5.2.2.4**). <u>Carnaby's Black-Cockatoo:</u> • 2.68 ha provides moderate value • 0.65 ha provides moderate to high value • Remaining disturbance areas have negligible to low value • No high value habitat within Indicative Project Footprint. <u>Forest Red-Tailed Cockatoo:</u> • 3.27 ha provides moderate value • 0.03 provides moderate to high value • Remaining disturbance areas have negligible to low value • No high value habitat within Indicative Project Footprint.	Foraging habitat assessment for vegetation within Development Corridor based on targeted assessment (see **Section 5.2.2.4**). <u>Carnaby's Black-Cockatoo:</u> • 3.08 ha No value • 20.70 ha Negligible • 19.34 ha Low • 26.64 ha Low to moderate • 10.44 ha Moderate • 6.35 ha Moderate to high • 0 ha High value. <u>Forest Red-Tailed Cockatoo:</u> • 34.40 ha No value • 1.26 ha Negligible • 14.21 ha Low • 20.03 ha Low to moderate • 15.74 ha Moderate • 0.91 ha Moderate to high • 0 ha High[1]	Foraging habitat assessment for Project Area based on broad-scale assessment (see **Appendix B**). Moderate to high or high value: • 114.9 ha Marri Jarrah Forest • 165.8 ha Banksia Woodland • 186.8 ha Low Shrubland Low, Low to moderate, and moderate value: • 457 ha Wetlands • 47 ha Paperbark Dampland • 383 ha Flooded Gum Forest • 124 ha Disturbed Woodland • 2,508 ha Scattered Trees • 169 ha Pine Plantation. Remaining Project Area assessed as predominantly No or Negligible value There is ~1,169 ha of potentially suitable foraging habitat in the Project Area based on Vegetation Associations (DPIRD-005) and Native Vegetation Extent (DPIRD-006) mapping.	There is ~40,010 ha of potentially suitable foraging habitat within 12km of the Project Area based on Vegetation Associations (DPIRD-005) and Native Vegetation Extent (DPIRD-006) mapping. Vegetation associations with potentially suitable foraging habitat include 4, 949, 952, 999, 1009, 1015, 1030, 1031, 1035, 1036, and 1038. Of these areas, approximately 12,592 ha is within conservation estate. Proposed clearing of remnant vegetation and planted trees in the Indicative Project Footprint represents approximately 0.05% of potentially suitable foraging habitat within 12km of the Project Area.
Breeding	A total of 112 potential Black-Cockatoo nest-trees (DBH>500 mm) were recorded within the Indicative Project Footprint. This includes: • 0 rank 1 trees • 0 rank 2 trees • 5 rank 3 trees • 7 rank 4 trees • 100 rank 5 trees Made up of the following species: • Marri (79.5%), • Flooded Gum (9.8%), • Coastal Blackbutt (8%) • Wandoo (2.7%).	A total of 560 potential Black-Cockatoo nest-trees (DBH>500 mm) were recorded within the Development Corridor. This includes: • 0 rank 1 trees • 6 rank 2 trees • 19 rank 3 trees • 25 rank 4 trees • 510 rank 5 trees.	Opportunistic sampling identified a total of 610 potential nest-trees in the Project Area (including those in the Development Corridor), as part of a broad-scale assessment rather than a full census of trees. There is likely a significantly larger number of potential nest-trees in the Project Area. The highest suitability breeding habitat in the Survey Area occurs in tracts of mature Flooded Gum habitat and the single 124 ha tract of Marri Jarrah Forest in the south-east of the Survey Area. There is ~832 ha of potentially suitable breeding habitat in the Project Area based on Vegetation Associations (DPIRD-005) and Native Vegetation Extent (DPIRD-006) mapping. Vegetation associations with potentially suitable breeding habitat include 4, 999, 1009, 1035 and 1038.	• There is ~5,698 ha of potentially suitable breeding habitat within 12km of the Project Area based on Vegetation Associations (DPIRD-005) and Native Vegetation Extent (DPIRD-006) mapping. Vegetation associations with potentially suitable breeding habitat include 4, 999, 1009, 1035, and 1038. Of these areas, ~348 ha is within conservation estate.

[1] Note this only includes areas of native vegetation and does not include cleared or pasture areas.

Habitat Type	Indicative Project Footprint*	Development Corridor	Project Area	Within 12 km of the Project Area
Roosting	There are no roost sites in the Indicative Project Footprint.	There are no roost sites in the Development Corridor.	There are two confirmed night-roost sites within the Project Area: • Roost A: Used by up to 8 birds on 1 and 2 November 2024. • Roost B: Used by up to 110 birds on 6–7 May 2025, and up to 200 birds on 23 June 2025.	There is one confirmed roost site within 12 km of the Project Area, approximately 7km to the south. There is ~5,205 ha of potentially suitable roosting habitat within 12 km of the Project Area based on Vegetation Associations (DPIRD-005) and Native Vegetation Extent (DPIRD-006) mapping. Vegetation associations with potentially suitable breeding habitat include 4, 999, 1009, and 1038. Of these areas, approximately 348 ha is within conservation estate.

**1.05 ha of vegetation within the Indicative Project Footprint has not been assessed. This is adjacent to one of the western wetlands. It is noted that similar vegetation at the opposite side of the wetland was assessed as having low to moderate foraging value.*

6.3.2.2 Foraging Habitat

Local and Regional Context

An assessment of government-mapped Native Vegetation Extent (DPIRD-005) intersected with Vegetation Associations (DPIRD-006) (DBCA, 2019) provides a general indication of suitable foraging habitat for Black-Cockatoos across the broader regional area. While vegetation association mapping and native vegetation data suggest potential foraging habitats based on likely presence of plant species with preferred food resources, these areas have not been specifically surveyed for foraging values.

Table 6.7 summarises the vegetation associations that provide potentially suitable foraging habitat for Black-Cockatoos and the remaining native vegetation extent of each vegetation association within 12 km of the Project Area.

Table 6.7 Potentially suitable foraging habitat within 12 km of the Project Area

Vegetation Association	Description (DBCA, 2019)	Potential Foraging Suitability		Area within 12km of Project Area (ha)
		Carnaby's	Forest Red-Tail	
4	Medium woodland; marri & wandoo	High	High	537
949	Low woodland; banksia	High	Low	1,047
952	Shrublands; dryandra heath	High	Low	883
999	Medium woodland; marri	High	High	3,930
1009	Medium woodland; marri & river gum	High	High	363
1015	Mosaic: Mixed scrub-heath / Shrublands; dryandra thicket	High	Low	963
1030	Low woodland; Banksia attenuata & B. menziesii	High	Low	30,245
1031	Mosaic: Shrublands; hakea scrub-heath / Shrublands; dryandra heath	High	Low	866
1035	Mosaic: Medium open woodland; marri / Shrublands; dryandra heath	High	Low	493
1036	Low woodland; Banksia prionotes	High	Low	308
1038	Medium open woodland; eucalypts (e2), with low woodland; Banksia attenuata & B. menziesii	High	Low	375
			Total Area	**40,010**

There is approximately 40,010 ha of government mapped Native Vegetation Extent (DPIRD-005) intersected by Vegetation Associations 4, 949, 952, 999, 1009, 1015, 1030, 1031, 1035, 1036, and 1038 (DPIRD-006) within 12 km of the Project Area. Most of the vegetation associations provides higher potential foraging habitat for Carnaby's Black-Cockatoo relative to Forest Red-Tailed Cockatoo.

There is approximately 12,592 ha of potential Black-Cockatoo foraging habitat within Nature Reserves identified within 12 km of the Project Area, including Namming (~10,366 ha), Eneminga (~1,401ha), Bundarra (~419ha), Jam Hill (~306 ha), Moochamulla (~82 ha), Quins Hill Nature Reserve (~17 ha), and South Mimegarra (~1 ha) Nature Reserves. Other significant Nature Reserves slightly beyond 12 km from the Project Area include Moore River National Park and Fynes Nature Reserve.

Project Area

As part of the basic and targeted terrestrial fauna assessment (**Appendix B**), Black-Cockatoo foraging habitat values were assessed at a high level using the BCE (Bamford, 2020) methodology for the various fauna habitats mapped within the Fauna Survey Area. Marri Jarrah Forest, Banksia Woodland and Low Shrubland habitat types were the highest ranked. Habitat mapped as Other, Cleared and Water Bodies were the lowest ranked. The areas of different habitats are shown in **Table 6.8**, with further detail provided in **Appendix B**.

Table 6.8 Foraging Habitats in the Fauna Survey Area

Foraging Value Score out of 6 based on Site Condition (BCE, 2020)	Habitat descriptions	Area* (ha)
1	Other	67
1-2	Water Bodies	99
1-2	Cleared	12,007
1-3	Scattered Trees	2,508
2-3	Wetlands	457
2-3	Paperbark Dampland	47
2-3	Flooded Gum Forest	383
2-4	Disturbed Woodland	124
3-4	Pine Plantation	169
5-6	Marri Jarrah Forest	124
5-6	Banksia Woodland	166
5-6	Low Shrubland	201

* Areas based on Fauna Survey Area of 17,213 ha as described in **Section 5.2.2**

Following on from the above high level assessment, a refined targeted Black-Cockatoo foraging habitat assessment was undertaken across the Development Corridor utilising the BCE (Bamford, 2020) methodology with the resultant mapping presented in **Appendix C**. A small part of the Development Corridor (3.5 ha, 0.1 %) has not been assessed. The BCE scores are provided for impact assessment purposes and context/density for reference in case there is need for offsets.

Almost 93% of the Development Corridor was assessed as having Low, Negligible or No foraging value for Black-Cockatoos. Areas of Moderate or better foraging value were isolated and mostly occurred in the south-east of the Development Corridor. There were also narrow areas of higher-quality foraging along Walyer Walyer Road in the central-south area of the Development Corridor.

The site condition, site context, density and overall foraging habitat quality scores within the Development Corridor for the Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo and are presented in **Table 6.9** and further details provided in **Appendix C**.

Table 6.9 Site Condition, Site Context, Density and overall Foraging Habitat Quality Scores for Forest Red-tailed Black-Cockatoo Carnaby's Black-Cockatoo within the Development Corridor

	Forest Red-tailed Black-Cockatoo		Carnaby's Black-Cockatoo	
Vegetation Score	**Area (ha)**	**%**	**Area (ha)**	**%**
6: High	0	0	0	0
5: Moderate to High	1.44	0	8.93	0.3
4: Moderate	34.96	1.0	27.68	0.8
3: Low to Moderate	202.85	5.9	211.18	6.1
2: Low	821.41	23.9	848.61	24.6
1: Negligible	77.49	2.3	2314.32	67.2
0: Nil	2301.25	66.8	28.67	0.8
Unassessed	3.49	0.1	3.49	0.1
Total	**3442.89**	**100**	**3442.88**	**100**
Context Score	0 (where VS ≤ 2)		0 (where VS ≤ 2)	
	1 (where VS ≥ 3)		1 (where VS ≥ 3)	
Species Density Score	0 (where VS ≤ 2)		0 (where VS ≤ 2)	
	1 (where VS ≥ 3)		1 (where VS ≥ 3)	
Foraging Score	**Area (ha)**	**%**	**Area (ha)**	**%**
10: Pristine	0	0	0	0
9: Very high	0	0	0	0
8: High	0	0	0	0
7: Moderate to High	1.44	0	8.93	0.3
6: Moderate	34.96	1.0	27.68	0.8
5: Moderate	202.85	5.9	211.18	6.1
4: Low to Moderate	0	0	0	0
3: Low	0	0	0	0
2: Very low	821.41	23.9	848.61	24.6
1: Negligible	77.49	2.3	2314.32	67.2
0: Nil	2301.25	66.8	28.67	0.8
Unassessed	3.49	0.1	3.49	0.1
Total	**3442.89**	**100**	**3442.89**	**100**

6.3.2.3 Breeding Habitat

Local and Regional Context

Black-Cockatoo breeding habitat can comprise any eucalypt species (dead or alive) supporting suitable hollows and is most often Wandoo (*Eucalyptus wandoo*), Salmon Gum (*Eucalyptus salmonophila*), and Marri (*Corymbia calophylla*); however, breeding has been recorded in a range of other species.

The following publicly available spatial datasets of Black-Cockatoo breeding sites are available:

- Carnaby's Black-Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054). This dataset shows the confirmed breeding areas where chicks or eggs of CBC have been observed of the Carnaby's Black Cockatoo (CBC) within the Swan Coastal Plain and the Jarrah Forest IBRA regions (DBCA, (2018). The sites are buffered by 6 km, and the Project Area intersects the buffers for two confirmed breeding areas shown in this dataset as illustrated in **Figure 6.7**. The nearest Carnaby's Black-Cockatoo confirmed breeding areas mapped by DBCA are located approximately six km northeast of the Project Area in Cataby and six kilometres southeast of the Project Area.
- Black-Cockatoo breeding sites (buffered) (DBCA-063), provides sites where breeding is inferred based on surveys that have recorded either birds entering/leaving the next or the inside of the next has been viewed with eggs or chicks. These records represent breeding attempts rather than confirmed fledging success, and have been collected intermittently since 2003, mainly during the peak breeding season (September-January). Breeding sites are buffered to 2 km, and there is one confirmed breeding site located approximately six kilometres southeast of the Project Area. This confirmed breeding site is shown on **Figure 6.8** along with roosting sites.

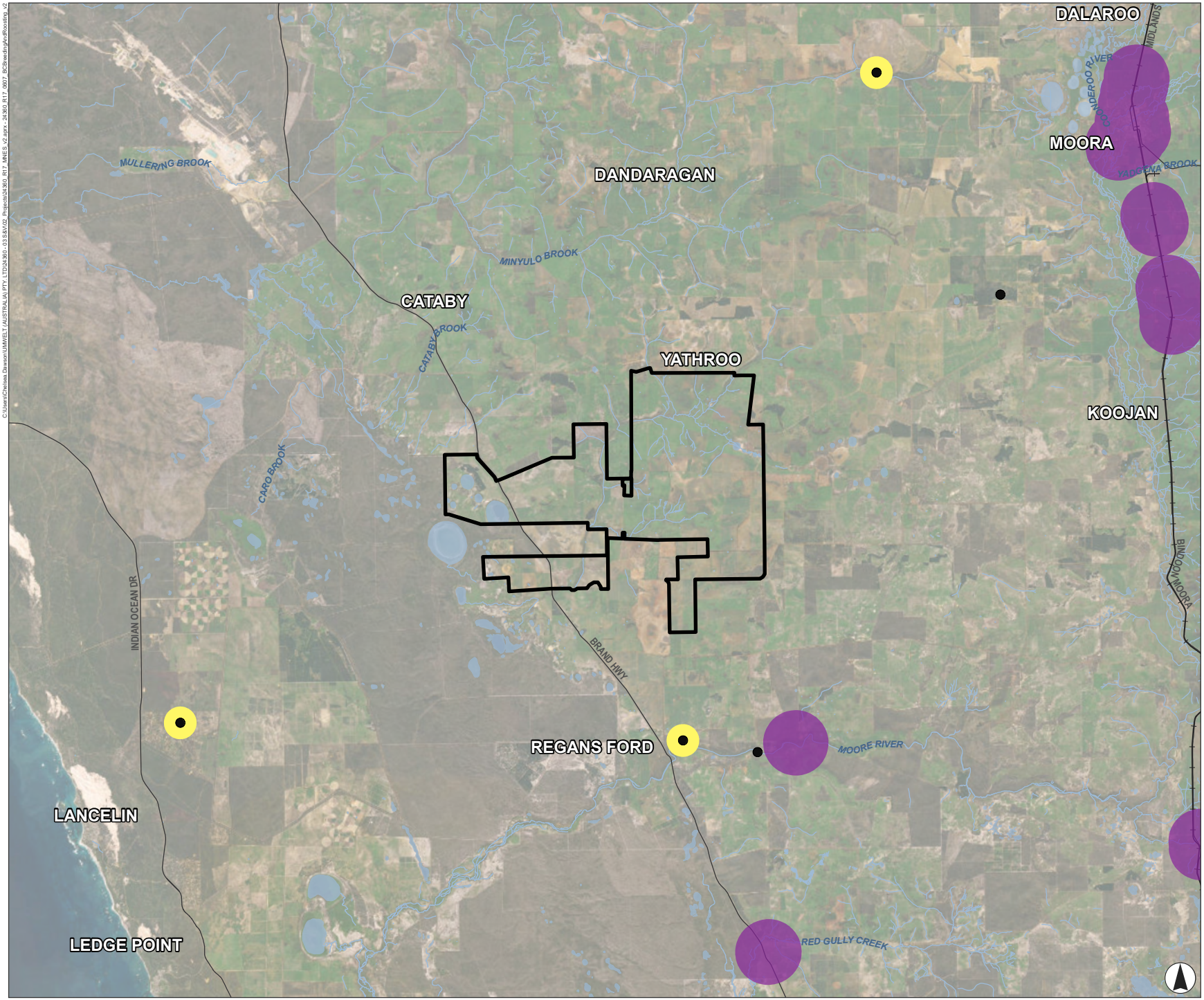


FIGURE 6.7

DBCA Black-Cockatoo Breeding and Roosting Sites

Legend

- Great Cocky Count
- Road
- Railway
- Watercourse
- Waterbody
- Project Area
- Roosting Sites
- Breeding Sites

0 5 10

Kilometres

Scale 1:320,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

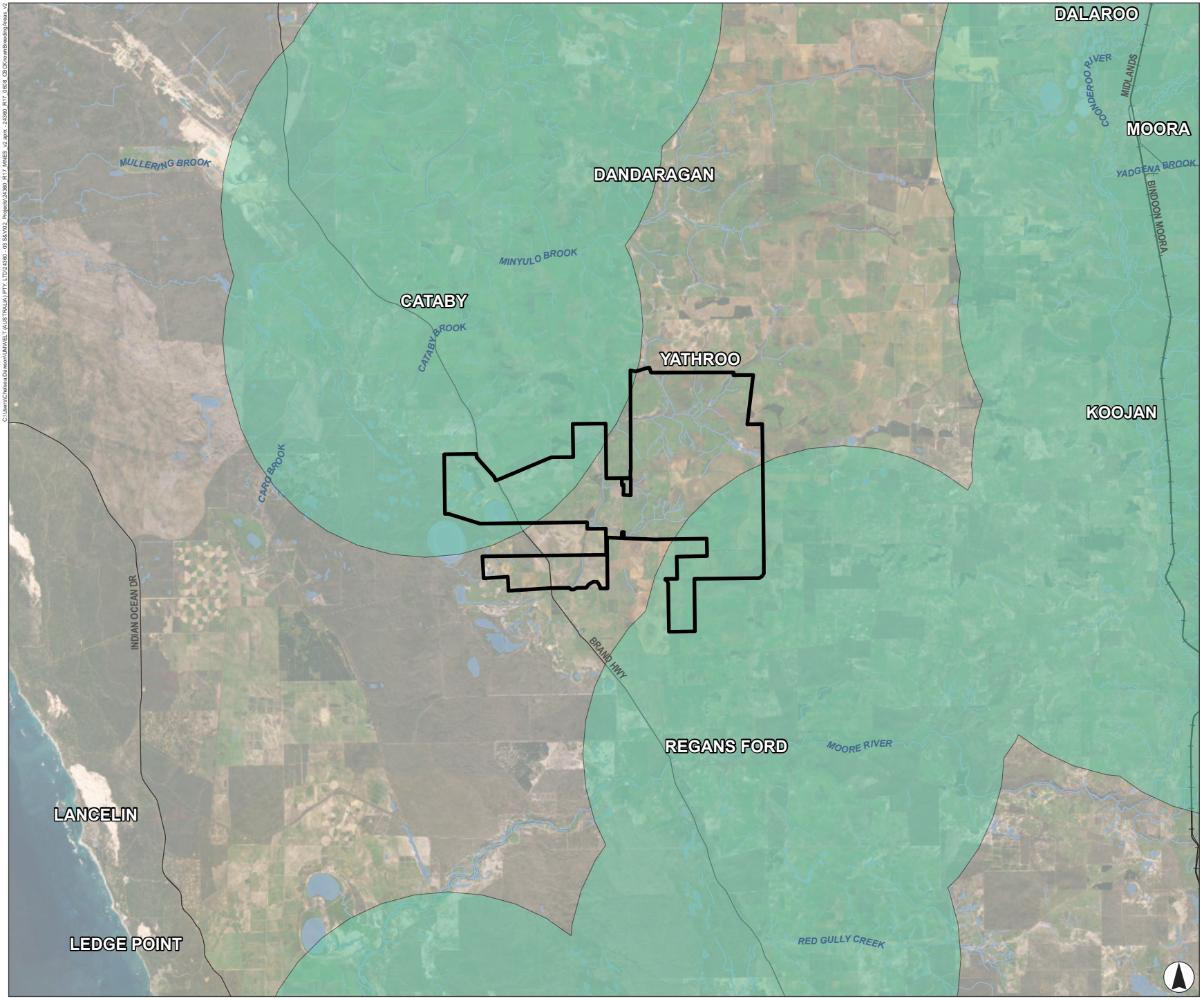


FIGURE 6.8

Carnaby's Black-Cockatoo Known Breeding Areas

Legend

- Road
- Railway
- Watercourse
- Waterbody
- Project Area
- Carnabys Cockatoo Confirmed Breeding Areas within the Swan Coastal Plain and Jarrah Forest IBRA Regions (DBCA-054)

0 2 4

Kilometres

Scale 1:320,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

An assessment of government-mapped Native Vegetation Extent (DPIRD-005) intersected with Vegetation Associations (DPIRD-006) (DBCA, 2019) provides a general indication of suitable breeding habitat for Black-Cockatoos across the broader area.

Table 6.10 summarises the vegetation associations that provide potentially suitable breeding habitat for Black-Cockatoos and the remaining native vegetation extent of each vegetation association within 12 km of the Project Area.

Table 6.10 Potentially Suitable Breeding Habitat within 12 km of the Project Area

Vegetation Association	Description (DBCA, 2019)	Area within 12km of Project Area (ha)
4	Medium woodland; marri & wandoo	537
999	Medium woodland; marri	3,930
1009	Medium woodland; marri & river gum	363
1035	Mosaic: Medium open woodland; marri / Shrublands; dryandra heath	493
1038	Medium open woodland; eucalypts (e2), with low woodland; Banksia attenuata & B. menziesii	375
	Total Area (ha)	**5,698**

This indicates that there is approximately 5,698 ha of remnant vegetation within 12 km of the Project Area which is likely to contain vegetation that can support Black-Cockatoo breeding trees. Breeding potential within these vegetation associations is likely to be similar for both species of Black-Cockatoo that are known to occur in the Project Area. Of these areas, approximately 348 ha is within conservation estate.

Project Area

Black-Cockatoo breeding habitat was assessed at a broad-scale and potential nest-trees were recorded opportunistically in the Fauna Survey Area as part of the Basic and Targeted vertebrate fauna assessment. Potential breeding habitat was identified to potentially be present within older stands of *Eucalyptus rudis* in Flooded Gum Forest and mature *C. calophylla* in woodland habitats and as isolated paddock trees. The highest suitability breeding habitat in the Project Area occurs in tracts of mature Flooded Gum habitat and the single ~115 ha tract of Marri Jarrah Forest in the south-east of the Project Area.

A total of 66 potential nest-trees with a DBH above 500 mm were recorded in the Fauna Survey Area during the initial Basic and Targeted survey. This was based on opportunistic sampling rather than a full census and there is likely to be a significantly larger number of potential nest-trees in the Project Area.

There is 832 ha of potentially suitable breeding habitat in the Project Area based on Vegetation Associations (DPIRD-005) and Native Vegetation Extent (DPIRD-006) mapping. Vegetation associations with potentially suitable breeding habitat include 4, 999, 1009, 1035 and 1038.

A full census survey of potential Black-Cockatoo nest-trees (Rank 1 – 5) was conducted across 697.9 ha (95.7%) of the Indicative Project Footprint utilising the BCE (Bamford, 2020) methodology. A 'partial' survey (all Rank 1 – 3 trees, but only opportunistically surveyed for Rank 4 and 5 trees) was

undertaken across 26 ha (3.6) of the Indicative Project Footprint, with the remaining 5.1 ha (0.7%) not assessed. The unassessed areas are primarily cleared land devoid of trees, however any trees with a DBH in excess of 500 mm within the Indicative Project Footprint will be assessed prior to clearing.

A complete assessment of Rank 1–5 trees was completed over 2,596.6 ha (75.4%) of the Development Corridor, with 762.3 ha (22.1%) subject to a 'partial' survey. Eight-four (84) ha (2.5%) of the Development Corridor has not been assessed.

Opportunistic inspection of trees outside the Development Corridor was also completed.

In total, 560 potential Black-Cockatoo nest-trees were assessed in the Development Corridor and 112 in the Indicative Project Footprint, with the results presented in **Table 6.11**. A series of maps showing the locations of all trees assessed is provided in **Appendix C**.

No active nest-trees (Rank 1) were recorded in the Development Corridor.

Table 6.11 Number and Rank of Potential Black-Cockatoo Nest-trees Recorded

Rank (BCE, 2020)	Number of Potential Black-Cockatoo Nest-trees	
	Development Corridor	Indicative Project Footprint
1	0	0
2	6	0
3	19	5
4	25	7
5	510	100
Total	**560**	**112**

6.3.2.4 Roosting Habitat

Local and Regional Context

Within 12 km of the Project Area there is one confirmed roost site, approximately 7 km south of the Project Area near Regans Ford (see **Figure 6.8**).

An assessment of government-mapped Native Vegetation Extent (DPIRD-005) intersected with Vegetation Associations (DPIRD-006) (DBCA, 2019) provides a general indication of suitable roosting habitat for Black-Cockatoos across the broader area.

Table 6.12 summarises the vegetation associations that potentially provide suitable roosting habitat for Black-Cockatoos and the remaining native vegetation extent of each vegetation association within 12 km of the Project Area.

Table 6.12 Potentially Suitable Roosting Habitat within 12 Km of the Project Area

Vegetation Association	Description (DBCA, 2019)	Area within 12km of Project Area (ha)
4	Medium woodland; marri & wandoo	537
999	Medium woodland; marri	3,930
1009	Medium woodland; marri & river gum	363

Vegetation Association	Description (DBCA, 2019)	Area within 12km of Project Area (ha)
1038	Medium open woodland; eucalypts (e2), with low woodland; Banksia attenuata & B. menziesii	375
	Total Area (ha)	5,205

This indicates that there is approximately 5,205 ha of remnant vegetation within 12 km of the Project Area which is likely to contain vegetation that can support Black-Cockatoo roosting trees. Roosting potential within these vegetation associations is likely to be similar for both species of Black-Cockatoo that are known to occur in the Project Area. Of these areas, approximately 348 ha is within conservation estate.

Project Area

Suitable roosting habitat for Black-Cockatoos includes tall trees in proximity to water sources. Within the Project Area, this includes Flooded Gum Forest, Jarrah-Marri Forest and Pine Plantation Fauna habitat types

Roost watches were undertaken as part of the basic and targeted survey in November 2024, the Autumn 2025 BBUS and the targeted fauna habitat assessment in June 2025.

[redacted]

Table 6.13 Carnaby's Black-Cockatoo Night Roost Observations (23 June 2025)

[redacted]

[redacted]

FIGURE 6.9

Known Carnaby's Black-Cockatoo Night Roost Locations in the Project Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint
- Known Night Roost Locations

0 2 4

Kilometres

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

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

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FIGURE 6.10

Carnaby's Black-Cockatoo Night Roost Observation Locations (23 June 2025)

Legend

- Carnaby's Black-Cockatoo Night Roost Observation Location
- Road
- Project Area
- Development Corridor
- Disturbance Footprint

0 2 4

Kilometres

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

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

6.3.3 Migratory Shorebird Habitat

6.3.3.1 Local and Regional Context

The most important sites for migratory shorebirds in Western Australia are located along the north-west coast. Eighty Mile Beach and Roebuck Bay are internationally significant for 16 and 18 species respectively and regularly support some of the highest shorebird numbers recorded in the country (Driessen et al, 2025).

In the south-west of Western Australia, regionally important habitat occurs at Peel-Harvey Estuary, Wilson Inlet, and Albany Harbour, with shorebirds also using coastal lakes and estuaries as seasonal water levels recede (Driessen et al, 2025). The closest of these to the Project Area is Peel-Harvey, which is 180 km south of the Project Area.

Lancelin is the closest nationally important site for migratory shorebirds as identified by Driessen et al (2025) and is located 30km west of the Project Area. In the area surrounding the Project Area, wetlands to the west that are located within the Lesueur sandplain are likely to provide more suitable habitat.

Closer to the Project Area, Lake Guraga and Namming Lake also offer suitable habitat for migratory shorebirds.

6.3.3.2 Project Area

A total of 76 wetlands that have been recognised by DBCA (2025) occur within the Project Area and these fall into the following Semeniuk and Semeniuk (1995) geomorphic wetland categories: three lakes, 43 sumplands, 21 damplands, one floodplain, four palusplains and four paluslopes. A map of the wetlands within the Project Area is provided in **Figure 6.11**, and includes one additional wetland adjacent to lake Yangy that was not captured by the DBCA mapping.

Field observations (of wetland features and waterbird presence), database searches and the wetland characteristics provided by DBCA (2025) were used in conjunction with the group- or taxon-specific information to assess the likelihood of each of the 77 wetlands within the Project Area to support one or more of the migratory shorebird taxa likely to occur within the Project Area.

Migratory shorebirds are known or considered likely to occur at four of the Project Area wetlands (two lakes and two sumplands), as summarised in **Table 6.14** and mapped in **Figure 6.12**. Three of these sites are located adjacent to one another in the west of the Project Area, with the remaining site, Lake Yangy, in the east. Whilst Lake Yangy was selected as a wetland where migratory shorebirds are likely to occur, due to its smaller size, higher pH[2], and lower habitat suitability in comparison to the other three wetlands, any presence of migratory shorebirds at this site would be expected to be of lower density and shorter durations.

Shorebirds are not reasonably expected at the vast majority of geomorphic wetlands (68 of the 77 were considered 'unlikely' to support these taxa) primarily due to a lack of suitable habitat (surface water, mudflats etc.). The remaining five wetlands ('possible') may occasionally provide suitable habitat for this group of taxa (as seasonal or interannual conditions change).

[2] In situ water quality results were taken on the 23rd of September 2025 for salinity and pH for the four wetlands described, with the three western wetlands recording pH values ranging from 8.38 to 8.74 and Lake Yangy recording a pH of 11.54.

Table 6.14 Expected Occurrence of Migratory Shorebirds/Waterbirds at Wetlands Within the Project Area

Geomorphic Wetland Type	Likelihood of Supporting Migrant Shorebirds				
	Known	Likely	Possible	Unlikely	Total
Lake	1	1		1	3
Sumpland	1	1	4	38	44
Dampland			1	20	21
Floodplain				1	1
Palusplain				4	4
Paluslope				4	4
Total	**2**	**2**	**5**	**68**	**77**

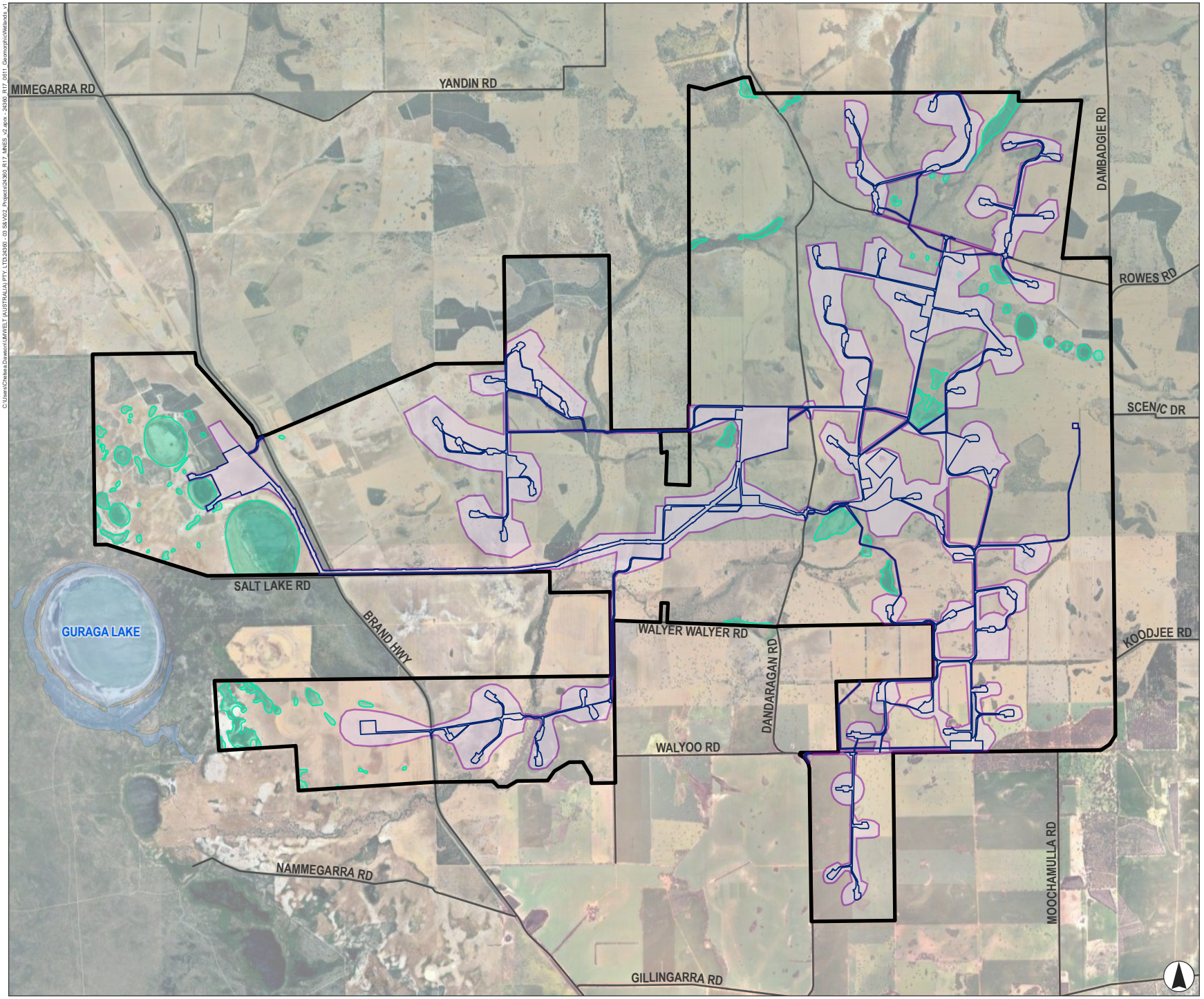

FIGURE 6.11

Geomorphic Wetlands Within the Project Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint
- Directory of Nationally Important Wetlands
- Nature Reserve
- Geomorphic Wetlands

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

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FIGURE 6.12

Expected Occurrence of Migratory Shorebirds/ Waterbirds at Wetlands Within the Project Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Migratory Shorebird Suitability

- Known
- Likely
- Possible
- Unlikely

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

6.3.4 Fauna Diversity

During the basic and targeted terrestrial fauna surveys (Umwelt, 2025a), a total of 94 vertebrate fauna species were recorded in the Fauna Survey Area across 46 families. This includes three species of amphibian, four reptiles, 75 birds and 12 mammals. The full species list is provided in **Appendix B**.

An additional 52 new bird and bat species were identified during the subsequent BBUS, resulting in an overall total of 127 bird and bat species being recorded.

6.3.5 Threatened Fauna

Five threatened fauna species (all birds) were recorded within the Project Area during the various BBUS and terrestrial fauna surveys completed to date. These are listed below in **Table 6.5** and locations of their records illustrated in **Figure 6.8**.

Table 6.15 Threatened Fauna Recorded within the Project Area

Common Name	Scientific Name	EPBC Act Status	Notes
Carnaby's Black-Cockatoo	*Zanda latirostris*	EN	Recorded on 66 occasions during all five BBUS with flocks of up to 200 individuals. Recorded on 14 occasions during the basic and targeted surveys. Recorded during targeted habitat survey in June 2025. Occurs in uncleared or remnant native eucalypt woodlands and remnant patches of native vegetation on land otherwise cleared for agriculture where it forages on eucalypt species and proteaceous shrubs. The species also forages seasonally in non-native pine plantations (*Pinus radiata* and *Pinus pinaster*) which provide a supplementary food source in areas where native vegetation has undergone extensive clearing.
Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	VU	Recorded on four occasions during the Winter 2025 BBUS. Recorded on one occasion during the targeted habitat survey in June 2025. The Project Area falls outside of the currently modelled distributions for both this and the next closest subspecies (Western Red-tailed Black-Cockatoo [*C. banksii escondidus*]); however, the Forest Red-tailed Black-Cockatoo formerly had a distribution extending to Dandaragan (Johnstone & Storr, 1998a). After a review of secondary evidence (foraging material), the records were determined to most likely be the Forest Red-tailed Black-Cockatoo.
Sharp-tailed Sandpiper	*Calidris acuminata*	VU, MI	Recorded on one occasion during Summer 2025 BBUS. Five individuals were recorded.

Common Name	Scientific Name	EPBC Act Status	Notes
Common Greenshank	*Tringa nebularia*	EN, MI	Recorded on one occasion during Summer 2025 BBUS. One individual was recorded.
Black-tailed Godwit	*Limosa limosa*	EN, MI	Recorded on one occasion during Summer 2025 BBUS. One individual was recorded.

6.3.6 Migratory Fauna

Six migratory species (all birds) were recorded within the Project Area during the various BBUS and terrestrial fauna surveys completed to date. These are listed below in **Table 6.16** and locations of their records illustrated in **Figure 6.13**.

Table 6.16 Migratory Fauna Recorded within the Project Area

Common Name	Scientific Name	EPBC Act Status	Notes
Ruff	*Calidris pugnax*	MI	Recorded on one occasion during Summer 2025 BBUS. Three individuals were recorded.
Red-necked Stint	*Calidris ruficollis*	MI	Recorded on one occasion during Summer 2025 BBUS. Three individuals were recorded.
Wood Sandpiper	*Tringa glareola*	MI	Recorded on two occasions during the basic and targeted fauna survey. Fifteen individuals were recorded.
Sharp-tailed Sandpiper*	*Calidris acuminata*	VU, MI	Recorded on one occasion during Summer 2025 BBUS. Five individuals were recorded.
Common Greenshank*	*Tringa nebularia*	EN, MI	Recorded on one occasion during Summer 2025 BBUS. One individual was recorded.
Black-tailed Godwit*	*Limosa limosa*	EN, MI	Recorded on one occasion during Summer 2025 BBUS. One individual was recorded.

* Also listed in **Table 6.5**

All migratory shorebirds recorded during the BBUS program were only detected during the Summer 2025 BBUS, with the exception of the Wood Sandpiper which was recorded opportunistically during the Basic and Targeted Fauna Survey in Spring of 2024. All observations were on the wetlands located on the Western boundary of the site, over 3.5 km away from the nearest turbines.

All migratory shorebirds listed in **Table 6.6** are non-breeding visitors to Australia. These species are only likely to occur within the Project Area from early spring to late summer with presence heavily influenced by the availability of suitable habitat. Their preferred foraging habitat in freshwater systems is large ephemeral or permanent water bodies which retract during summer, leaving an exposed, muddy bank. **Figure 6.12** illustrates the wetlands where migratory shorebirds have been known or are more likely to occur within the Project Area.

6.3.7 Bird and Bat Diversity

A total of 127 bird and bat species were recorded during the numerous field survey program. Of these, eight are listed under the EPBC Act (refer **Table 6.5** and **Table 6.6**).

The most frequently observed bird species across the BBUS program were Australian Ringneck (*Barnardius zonarius*), Galah (*Eolophus roseicapilla*), and Australian Raven (*Corvus coronoides*), none of which are recognised as threatened species.

Carnaby's Black-Cockatoo was the most frequently recorded EPBC Act listed species (approximately 80 records) with flocks of up to 200 individuals recorded.

Seven (7) bat species were detected via passive ultrasonic recorders in the Project Area. No EPBC Act listed bat species were recorded.

The full list of bird and bat species identified during the field surveys are presented and discussed in detail in the Year 1 BBUS report, a copy of which is provided in **Appendix H**.

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FIGURE 6.13

Threatened and Migratory Fauna Recorded in the Project Area

Legend

- Road
- Project Area
- Development Corridor
- Disturbance Footprint

Conservation Significant Species' Records

- Black-tailed Godwit (*Limosa limosa*)
- Carnaby's Black-Cockatoo (*Zanda latirostris*)
- Common Greenshank (*Tringa nebularia*)
- Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*)
- Red-necked Stint (*Calidris ruficollis*)
- Ruff (*Calidris pugnax*)
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Wood Sandpiper (*Tringa glareola*)

0 2 4

Kilometres

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

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

6.3.8 Introduced fauna

Five introduced fauna species were recorded during the survey program:

- Red fox (*Vulpes vulpes*)
- Cattle (*Bos taurus*)
- Sheep (*Ovis aries*)
- House mouse (*Mus musculus*)
- Laughing kookaburra (*Dacelo novaeguineae*).

6.4 Connectivity

The Project Area comprises a complex mosaic of remnant native vegetation patches, plantations, planted windbreaks and agricultural lands. Some of the patches to the west are contiguous with larger, adjacent areas of native vegetation. The Project Area has been subject to considerable disturbance and development with many parts still subject to these pressures.

Connectivity of the remnant vegetation (for most terrestrial vertebrate fauna) is present, although tenuous in most places. The western parts of the Project Area directly abut other existing remnants, namely Eneminga and Namming Nature Reserves. There is very limited connectivity to the north, south and east of the Project Area, with surrounding lands largely consisting of agricultural lands. It is expected that there may be barriers to the movement of some fauna (especially the smaller, nonvolant taxa such as frogs and most reptiles) to and from the Project Area but that other, more mobile taxa (such as birds, bats and larger non-volant mammals) are unlikely to be significantly inhibited.

6.5 Likelihood of Occurrence

A likelihood of occurrence assessment was undertaken for threatened flora, TECs, threatened fauna and migratory species. The results of this assessment are presented below.

6.5.1 Threatened Flora

The flora and vegetation assessment included an assessment of the likelihood of threatened flora occurring in the F&V Survey Area. The assessment considered the threatened flora recorded from desktop assessments, whether suitable habitat is likely to be present, distance of closest record, and currency of records.

Thirty-one (31) threatened flora species were identified in the PMST report (**Appendix E**) as “likely”, “may”, or “known” to occur within the Desktop Study Area. Of these, one EPBC listed threatened flora species was recorded in the Project Area and as such is assigned a likelihood of occurrence as “known”. This is the *Grevillea curviloba* (T), which is considered to be planted outside of its range as described in **Section 6.2.6**. This species was recorded in the D&T area, however is considered unlikely to occur across the broader Project Area, and the Indicative Project Footprint has avoided the area these specimens were recorded.

The remaining 30 threatened flora species identified from the PMST report (**Appendix E**) were subject to a likelihood of occurrence assessment (**Appendix F**) and it was determined that all are 'Unlikely' to occur in the D&T Survey Area. Within the Project Area, 22 species are considered 'unlikely' to occur and eight species are considered 'possible' to occur (**Appendix A**). It should be noted however that the vegetation of the Indicative Project Footprint outside of the D&T Survey Area is Degraded or Completely Degraded, and there is a low likelihood of significant flora taxa being present in these areas due to the disturbed nature of the vegetation.

A detailed likelihood of occurrence for threatened EPBC listed flora species is provided in **Appendix F** and BC Act listed species provided in **Appendix A**.

6.5.2 Threatened Ecological Communities

A desktop assessment identified five threatened ecological communities (TECs) that have records (or could potentially occur) within the Desktop Study Area. Of these, the 'Banksia Woodlands of the Swan Coastal Plain' TEC was recorded within the Project Area as part of field surveys.

The Flora and Vegetation Assessment (**Appendix A**) assessed the potential for the remaining four TECs to occur in the in the F&V Survey Area. The assessment found that none of these are considered to occur in the F&V Survey Area, however, two communities were unable to be assessed for presence. Full details of the assessment can be found in Table 5.10 of **Appendix A**.

6.5.3 Threatened and Migratory Fauna

Based on field surveys, database searches and literature reviews, 14 threatened and migratory fauna species were determined to have a moderate or greater likelihood of occurrence in the Project Area. All species are birds with eight species having a known record in the Project Area, four having a high likelihood of occurrence and two having a moderate likelihood of occurrence. Details of these species and their assessed likelihood of occurrence are presented below in **Table 6.12**.

Table 6.17 Threatened and Migratory Fauna Likelihood of Occurrence

Common Name	Scientific Name	Cth Status	Likelihood of Occurrence
Black-tailed Godwit	*Limosa limosa*	EN & MI	Known
Carnaby's Black-Cockatoo	*Zanda latirostris*	EN	Known
Common Greenshank	*Tringa nebularia*	EN & MI	Known
Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	VU	Known
Red-necked Stint	*Calidris ruficollis*	MI	Known
Ruff	*Calidris pugnax*	MI	Known
Sharp-tailed Sandpiper	*Calidris acuminata*	VU & MI	Known
Wood Sandpiper	*Tringa glareola*	MI	Known
Common Sandpiper	*Actitis hypoleucos*	MI	High
Curlew Sandpiper	*Calidris ferruginea*	CR & MI	High
Glossy Ibis	*Plegadis falcinellus*	MI	High
Pacific Golden Plover	*Pluvialis fulva*	MI	High
Long-toed Stint	*Calidris subminuta*	MI	Moderate
Fork-tailed Swift	*Apus pacificus*	MI	Moderate

7.0 Potential Impacts

Potential impacts to MNES may occur during construction, operation and maintenance of the Project, including direct impacts (such as vegetation clearing, habitat removal or blade strike) and indirect effects (such as weed introduction or spread).

Impact assessments are based on the entire Indicative Project Footprint (729 ha) being cleared and assumes no more than 10.28 ha of remnant native vegetation, 5.45 ha of isolated remnant trees and 5.05 ha of planted native vegetation, as well as clearing of planted non-native vegetation. All ground disturbance will be within the Development Corridor which covers approximately 3,443 ha (**Figure 1.2**).

The following sections outline potential impacts to flora, vegetation, and fauna. Impact avoidance, mitigation, and management measures are described in **Section 8.0**. Detailed Significant Impact Assessments are presented in **Section 9.0** for ecological communities known in the Project Area and MNES fauna species with a Moderate or higher likelihood of occurrence in the Project Area.

7.1 Construction Phase

The construction phase of the Project will consist of installing wind turbines, BESS, substations, access tracks, underground and overhead cabling, and other ancillary infrastructure. The sections below outline potential direct and indirect impacts associated with construction. Many of these impacts are expected to be temporary and localised, occurring in specific areas as work progresses through the Development Corridor.

7.1.1 Direct Impacts

7.1.1.1 Native Vegetation Clearing

Based on the current Indicative Project Footprint within the Development Corridor, the Project may result in the disturbance of up to 10.28 ha of remnant native vegetation, 5.45 ha of isolated remnant trees in cleared agricultural land and 5.05 ha of planted native vegetation. This area of disturbance has been materially reduced through the iterative project design and has the potential to be further reduced as the Project progresses through detailed design stages.

Project infrastructure has sought to avoid where possible clearing of vegetation that meets the 'Banksia Woodland of the Swan Coastal Plain' TEC. However, to gain access and deliver infrastructure to the Project Area west of Brand Highway, a section of TEC is required to be cleared. The access point has been selected to avoid clearing of TEC in Good condition or better, and an area where the TEC has been mapped as Degraded has been selected as the access location. The access point has been minimised as far as possible resulting in the proposed overall disturbance of 0.11 ha of Degraded 'Banksia Woodland of the Swan Coastal Plain' TEC.

One Threatened flora species (*Grevillea curviloba*) was recorded during the survey. However, it was found to be planted outside of its natural range, in an area of disturbed, revegetated bushland along Brand Highway. This taxon is also a common cultivar and is often planted outside of its range throughout Perth and the southwest. Ten (10) individuals of the species were recorded and it is likely these were either planted or are a garden escape. The location of these species lies outside the Development Corridor and Indicative Project Footprint.

The likelihood of occurrence assessment determined that no threatened flora species are likely to occur in Indicative Project Footprint (**Section 6.5.1**) and therefore are not expected to be cleared.

Significant effort has been made to avoid and minimise native vegetation clearing within the Development Corridor, with most clearing involving fringe patches of degraded vegetation or isolated trees in areas with completely degraded vegetation. Clearing of Good condition vegetation has been minimised as far as practicable and there will be no clearing of vegetation in 'Very Good' condition or better. **Table 7.1** presents the condition of the vegetation in the Indicative Project Footprint. Clearing of 'Good' condition vegetation will be limited to 2.23 ha.

Table 7.1 Vegetation Condition of the Indicative Project Footprint

Vegetation Condition (EPA, 2016b)	Area (ha/%)
Completely Degraded	718.82
Degraded	8.05
Good	2.23
Very Good	-
Pristine	-
Total	**729.10**

Mitigation measures addressing the impacts of clearing will be included in the Construction Environmental Management Plan (CEMP) as outlined in **Section 8.2.1**. The Preliminary CEMP can be found in **Appendix G**.

7.1.1.2 Fauna Habitat Loss

Vegetation clearing during the construction phase presents potential impacts to fauna, such as:

- direct displacement of fauna within the Indicative Project Footprint
- fragmentation of populations
- reduced availability of important habitat and features (e.g. tree hollows or foraging habitat) for Threatened and Migratory species which rely on the availability of nesting, breeding, foraging, and shelter habitat for survival.

Following the completion of the construction phase, existing populations are likely to continue to disperse and access resources within and beyond the Project Area, due to the limited additional habitat loss and lack of fencing that could prohibit dispersal of identified MNES species.

Black-Cockatoo Habitat

Foraging

Table 7.2 and **Table 7.3** present the site condition foraging value scores of vegetation (remnant native vegetation and planted vegetation) proposed to be cleared within the Indicative Project Footprint for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo respectively. A score out of 10 is also presented for the purposes of aiding offset calculations should they be required.

Table 7.2 Carnaby's Black-Cockatoo Vegetation Foraging Value Scores

Foraging Value Score out of 6 based on Site Condition (BCE, 2020)	Foraging Value Score out of 10 (BCE, 2020)*	Native Vegetation (ha) within Indicative Project Footprint	Isolated Remnant Trees (ha) within Indicative Project Footprint	Planted Vegetation (ha) within Indicative Project Footprint	Total Vegetation (ha/%) within Indicative Project Footprint
0: No foraging value	0	0.29	0.13	1.00	1.42 (6%)
1: Negligible to low foraging value	1	1.28	1.63	3.38	6.30 (27%)
2: Low foraging value	2	1.83	1.72	0.78	4.32 (19%)
3: Low to moderate foraging value	5*	3.55	1.50	1.59	6.63 (29%)
4: Moderate foraging value	6*	2.01	0.44	0.23	2.68 (12%)
5: Moderate to high foraging value	7*	0.65			0.65 (3%)
6: High foraging value	8*				0.00 (0%)
Unassessed		0.68	0.02	0.35	1.05 (5%)
Total		**10.28**	**5.45**	**7.33**	**23.05**

*Context score = 1. Species density score = 1

Table 7.3 Forest Red-tailed Black-Cockatoo Vegetation Foraging Value Scores

Foraging Value (Site Condition)	Foraging Value Score out of 10 (BCE, 2020)*	Native Vegetation (ha) within Indicative Project Footprint	Isolated Remnant Trees (ha) within Indicative Project Footprint	Planted Vegetation (ha) within Indicative Project Footprint	Total Vegetation (ha/%) within Indicative Project Footprint
0: No foraging value	0	4.61	1.78	6.26	12.65 (55%)
1: Negligible to low foraging value	1	0.04	0.15	0.02	0.21 (1%)
2: Low foraging value	2	0.83	1.56	0.37	2.76 (12%)

Foraging Value (Site Condition)	Foraging Value Score out of 10 (BCE, 2020)*	Native Vegetation (ha) within Indicative Project Footprint	Isolated Remnant Trees (ha) within Indicative Project Footprint	Planted Vegetation (ha) within Indicative Project Footprint	Total Vegetation (ha/%) within Indicative Project Footprint
3: Low to moderate foraging value	5*	1.50	1.50	0.09	3.08 (13%)
4: Moderate foraging value	6*	2.60	0.44	0.23	3.27 (14%)
5: Moderate to high foraging value	7*	0.03			0.03 (<0%)
6: High foraging value	8*				0.00 (0%)
Unassessed		0.68	0.02	0.35	1.05 (5%)
Total		**10.28**	**5.45**	**7.33**	**23.05**

*Context score = 1. Species density score = 1

Breeding

As discussed in **Section 6.3.2.3**, the targeted fauna habitat assessment identified 112 potential Black-Cockatoo nest-trees within the Indicative Project Footprint, with the breakdown presented in **Table 6.11**. No Rank 1 (trees with activity at hollow observed) and Rank 2 (trees with hollows of suitable size with chew marks visible) trees are located within the Indicative Project Footprint, and only five Rank 3 (hollow-entrances that were of suitable size, height and orientation to support Black-Cockatoo breeding) trees were identified. Accordingly, the Project commits to avoiding clearing all Rank 1 and Rank 2 trees, and minimising clearing of Rank 3 trees.

Roosting

Two Black-Cockatoo roost sites were identified during field surveys and both are located outside the Indicative Project Footprint.

Migratory Shorebird Habitat

The most suitable and preferred migratory shorebird habitat within the Project Area is limited to four wetlands totalling 278 ha **(Figure 6.12**). Direct habitat loss will be limited to 1 ha of degraded vegetation on the edge of one of the wetlands to the west, that will be rehabilitated at the end of construction. Although this area is within the area mapped as wetlands based on DBCA geomorphic wetlands spatial data, it is fringing vegetation adjacent to the wetland and is unlikely to contain foraging habitat.

No breeding habitat is located within the Project Area as the migratory shorebirds do not breed in Australia.

7.1.1.3 Fauna Injury and Mortality

Activities during the construction phase of the Project that have the potential to directly injure or kill threatened fauna include:

- vegetation clearing
- vehicle and other construction equipment strike
- earthworks.

Proposed mitigation measures to address fauna injury and mortality during construction are presented in **Section 8.2.3**.

7.1.1.4 Impacts to Fauna Habitat Connectivity

Connectivity of remnant vegetation (for most terrestrial vertebrate fauna) is present, although tenuous in most places. The western parts of the Project Area directly abut an area of extensive remnant native vegetation and fauna habitat, however there is very limited connectivity to the north, south and east of the Project Area, with surrounding lands largely consisting of agricultural lands. Creekline vegetation appears to offer the greatest opportunity for habitat connectivity across the site.

Vegetation clearing is primarily limited to the removal of isolated remnant trees in cleared paddocks, and the fringes of degraded patches of native vegetation. Bisecting of larger vegetation patches has been avoided where possible. Noting the importance of creekline vegetation for habitat connectivity, existing creek crossings have been used where practicable and the number of new creekline crossings has been minimised.

Given the linear configuration of the Project, the typically narrow width of access tracks, the general absence of fauna-proof fencing (except potentially around the BESS), and the nature of the proposed vegetation clearing, it is unlikely that faunal dispersal within the Project Area will be significantly affected.

7.1.2 Indirect Impacts

7.1.2.1 Introduction and Spread of Weeds and Pest Fauna

The introduction and spread of weeds can indirectly impact remnant native vegetation, alter fire regimes, and impact threatened species utilisation of the site. Within the Project Area, weed species are prevalent, largely due to a long history of agricultural land use, with 45 introduced taxa recorded during the surveys. One Declared Pest listed under the BAM Act (Arum lily (*Zantedeschia aethiopica*)) was recorded in the F&V Survey Area. No Weeds of National Significance were recorded.

Several introduced fauna species were also identified in the Fauna Survey Area, including Laughing Kookaburra (*Dacelo novaeguineae*), House Mouse (*Mus musculus*), Red Fox (*Vulpes vulpes*), Cattle (*Bos taurus*) and Sheep (*Ovis aries*). Given the current distribution of pest fauna, it is unlikely that the proposed works will introduce new pest species. However, if not sufficiently managed, construction activities that modify or degrade fauna habitat values may enable populations of existing pest species to grow or move into higher quality habitats.

Management measures to address potential impacts from weeds and pest fauna are outlined in **Section 8.2.**

7.1.2.2 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 within the Indicative Project Footprint, which are also currently impacted by livestock and introduced flora, any edge effects that do occur are 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 G**).

7.1.2.3 Soil Erosion and Sedimentation

The removal of vegetation and disturbance of the soil profile as a result of native vegetation clearing and construction activities may contribute to soil erosion, subsequently increasing sediment load in watercourses and wetlands. Elevated sediment levels can cause siltation in watercourses and degrade the water quality of downstream creeks, rivers, wetlands, and other drainage systems. Erosion may also result in the loss of valuable topsoil, exposing subsoil layers that typically possess inferior physical and chemical characteristics.

The potential for soil erosion and sedimentation as a result of the Project will be managed through the implementation of the CEMP (refer **Appendix G**) and as outlined **in Section 8.2.4**.

7.1.2.4 Dust Impacts

Ground disturbance can result in elevated dust levels that can settle on adjacent vegetation. The impacts of this on the adjacent vegetation can vary depending on vegetation type, dust characteristics (such as chemical composition and grain size), and the overall quantity of dust deposition.

Dust impacts associated with the Project are anticipated to be limited to vegetation immediately adjacent to access tracks and areas near stockpiles where soil is exposed and susceptible to disturbance by vehicle movement and wind erosion. The dust generated will be chemically inert; therefore, any potential impacts will be physical, including blockage of plant stomata and reduced light penetration to leaf surfaces, which may decrease photosynthetic capacity. These factors could adversely impact the health of vegetation located directly alongside tracks, stockpiles and other unsealed areas.

To mitigate these impacts, dust will be managed during the construction phase through implementation of dust management measures, as outlined in the CEMP (refer **Appendix G**).

7.2 Operations and Maintenance Phase

7.2.1 Collisions

Fauna mortality and injury at wind farms can result from birds or bats colliding with wind turbine blades, towers, nacelles, guy cables, power lines and meteorological masts. There are a range of factors that influence risk of collisions with such infrastructure (Drewitt & Langston, 2008) including:

- Physical attributes of a wind turbine generator (i.e. turbine dimensions, lighting).
- Species-specific variables (i.e. abundance, flight behaviour, turbine avoidance capacity).
- Biophysical attributes (i.e. landscape position, topography, vegetation type).

A bird and bat utilisation (BBUA) was undertaken to assess the pre-mitigation collision risk for Threatened and Migratory bird and bat species that are present or that may occur in the vicinity of wind turbines in the Project Area based on occurrence and flight data gathered from completed surveys and published literature. This assists in identifying what species may require further consideration for impact assessment, mitigation and collision risk modelling. The BBUA also summarises potential impacts to bird and bat species documented in published literature and outlines potential mitigation and management measures to be considered as part of the Project. The methodology used for the risk assessment was adapted from Lumsden et al. (2019) and the full risk assessment is provided in Appendix A of the Preliminary Bird and Bat Adaptive Management Plan (refer **Appendix D**).

The BBUA assessed the pre-mitigation risk of collision for 50 species, which included 14 threatened and migratory birds. The risk assessment results for the threatened and migratory birds assessed are provided in **Table 7.4. Table 7.5** describes the assessed risk and required response actions.

Table 7.4 Threatened and Migratory Bird Risk Assessment Results

Common Name	Scientific Name	Likelihood of Collision	Consequence of Collision	Overall Risk Rating
Threatened				
Carnaby's Black-Cockatoo	*Zanda latirostris*	Unlikely	High	**Moderate**
Forest Red-tailed Black Cockatoo	*Calyptorhynchus banksii naso*	Unlikely	Moderate	**Minor**
Migratory				
Common Greenshank*	*Tringa nebularia*	Possible	Moderate	**Moderate**
Sharp-tailed Sandpiper*	*Calidris acuminata*	Possible	Moderate	**Moderate**
Black-tailed Godwit*	*Limosa limosa*	Possible	Moderate	**Moderate**
Curlew Sandpiper*	*Calidris ferruginea*	Possible	Moderate	**Moderate**
Red-necked Stint	*Calidris ruficollis*	Possible	Low	**Minor**
Wood Sandpiper	*Tringa glareola*	Possible	Low	**Minor**
Common Sandpiper	*Actitis hypoleucos*	Possible	Low	**Minor**
Long-toed Stint	*Calidris subminuta*	Possible	Low	**Minor**
Pacific Golden Plover	*Pluvialis fulva*	Possible	Low	**Minor**
Ruff	*Calidris pugnax*	Possible	Low	**Minor**
Fork tailed Swift	*Apus pacificus*	Likely	Low	**Moderate**
Glossy Ibis	*Plegadis falcinellus*	Possible	Low	**Minor**

* Listed as Threatened and Migratory.

Table 7.5 Risk Descriptors

Risk	Description	Response
Very High	• The species is **likely** to be involved in collisions within the Project Area, and a collision would have a **high consequence** for the species.	A Collision Risk Model (CRM) should be considered to be undertaken for the species if sufficient data is available. If data is insufficient, using a surrogate species may be appropriate if a suitable surrogate species is available. The species will require consideration for collision impacts as part of an impact assessment to identify suitable mitigation measures and will need to be addressed in the Project BBAMP.
High	• The species is **likely** to be involved in collisions within the Project Area, and a collision would have a **moderate consequence** for the species, **OR** • it is **possible** the species would be involved in collisions within the Project Area, and a collision would have a **high consequence** for the species.	The species will require consideration for collision impacts as part of an impact assessment to identify suitable mitigation measures and a CRM or alternative method to quantify collision risk may be required. The species may also need to be addressed in the Project BBAMP.
Moderate	• The species is **likely** to be involved in collisions within the Project Area, and a collision would have a **low consequence** for the species OR • It is **possible** the species would be involved in collisions within the Project Area, and a collision would have a **moderate consequence** to the species OR • The species is **unlikely** to be involved in collisions within the Project Area, but there would be a **high consequence** to the species.	Conservation significant species will require consideration for collision impacts as part of an impact assessment and may require mitigation measures.
Minor	• The species is **unlikely** to Project involved in collisions within the Project Area, and a collision would have a **moderate consequence** for the species OR • It is **possible** the species would be involved in collisions within the Project Area, but a collision would have a **low consequence** to the species.	Conservation significant species may require some considerations for collision impacts as part of an impact assessment.
Negligible	• The species is **unlikely** to be involved in collisions within the Project Area, and any collision would have a **low consequence** to the species.	The species is unlikely to require consideration for collision impacts as part of an impact assessment.

Per the response actions listed in **Table 7.5** collision impacts have been assessed and mitigation measures proposed (where required) for species assessed as moderate risk. For the remaining species assessed as minor risk, collision impacts have been considered. A summary of these assessments are provided below, with additional information provided in **Section 9.0** and in the preliminary BBAMP (**Appendix D**).

7.2.1.1 Black-Cockatoos

Although the BBUA conservatively assessed Carnaby's Black-Cockatoos as having a "moderate" potential for impacts due to turbine collision, the risk was highly influenced by the threatened status of the species, i.e. consequence of a collision rather than likelihood.

Flight heights for both Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo were recorded as part of the BBUS with the results presented in **Table 7.6**. Note that numbers represent records rather than individuals, i.e. 1 record might represent a flock of birds.

Neither of the species were recorded flying within the Rotor Swept Area (RSA), with one to two individuals of Carnaby's Black-Cockatoo being recorded at a maximum flight height of 50 m AGL on three occasions. The Forest Red-tailed Black-Cockatoo was recorded flying at a maximum height of 8 m AGL.

Table 7.6 Conservation Significant Species Maximum Flight Height Records

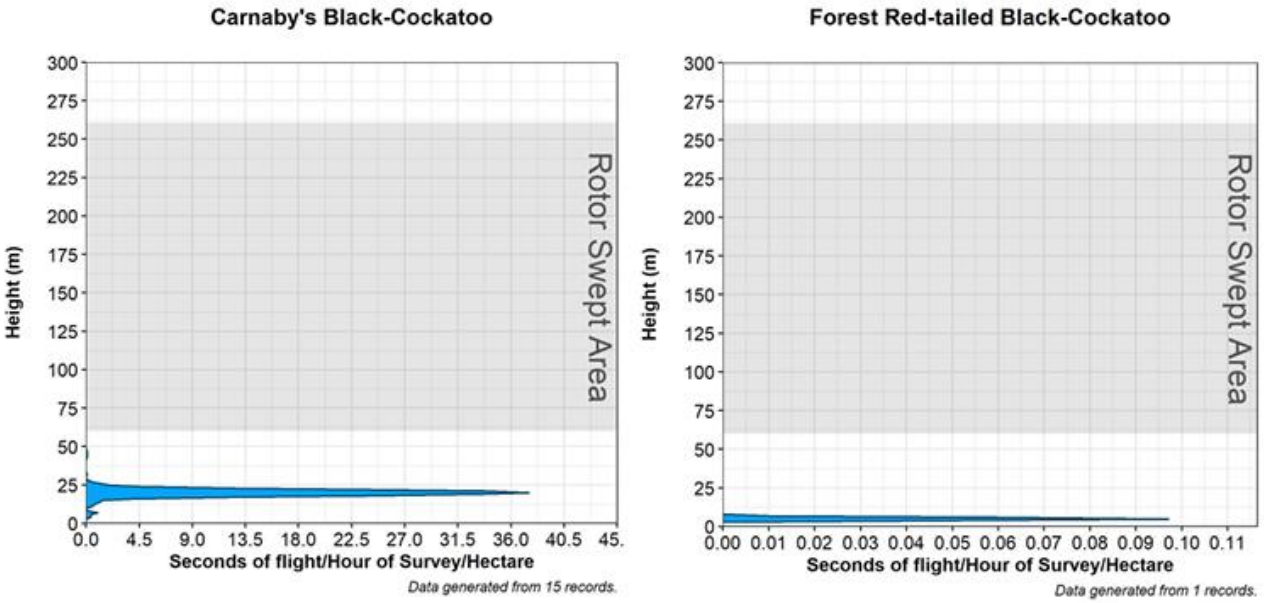
Common Name	Taxon	<50 m	50–59 m	>60 m	Total
Forest Red-tailed Black-Cockatoo	*Calyptorhynchus banksii naso*	1	-	-	**1**
Carnaby's Black-Cockatoo	*Zanda latirostris*	39	3	-	**42**

Note. Species without flight observations are excluded.

Exposure Risk Models (ERMs) based on data collected during the field survey program were generated for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo, with the outputs presented in **Figure 7.1**. As none of these species were observed flying within RSA during the BBUS program, 0 seconds of observed flight were within the RSA height range. Due to the small sample size of flight observations for the Forest Red-tailed Black-Cockatoo, conclusions that can be drawn for these species are limited. However, the Carnaby's Black-Cockatoo was observed on 42 instances, all of which were below RSA. A majority of this flight time occurred below 30 m AGL (99%) which is significantly below the RSA. The ERM (**Figure 7.1**a) for Carnaby's Black-Cockatoo was based on 15 records with a mean convergence of 0.93 meaning the flight behaviour for the species is approaching the significance threshold of 0.95. Based on similar flight behaviours, this generalisation can likely be applied to the Forest Red-tailed Black-Cockatoo as well.

It should be noted that 27 Carnaby's Black-Cockatoo flight heights were recorded in BBUS 01 but not in a manner that allowed the data to be used in the ERM. The methodology for capturing flight height was amended after BBUS 01 to ensure it could be used to inform ERMs.

Neoen is also collecting Black-Cockatoo flight height data for other potential wind farm projects in the Wheatbelt region. To date, flight data has been recorded for 80 Carnaby's Black-Cockatoo flights with the maximum height observed being 50 m AGL. For the Forest Red-tailed Black-Cockatoo, data has been recorded for 16 flight heights, with the maximum flight height recorded being 40 m AGL.



a) Exposure risk model for Carnaby's Black-cockatoo (*Zanda latirostris*, EN) built from 15 flight records. The mean convergence of new data is 0.93+/-SD0.19. This ERM is approaching the our significance threshold of 0.95-1, however, the high variance in flights indicates more records will need to be collected.

b) Exposure risk model for Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*, VU) built from a single flight record. This ERM should not be considered a complete, representative sampling of the species' flight behaviour.

Figure 7.1 Exposure Risk Models for Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo

Black-cockatoo studies or assessments have been completed for other wind farms in the Dandaragan region with relevant information as related to potential collision risk for these species, summarised below:

- Between August 2024 and March 2025, Bamford Consulting Ecologists (BCE) conducted BBUS across four wind farm sites located between Perth and Eneabba. Similar to the Yathroo Project Area, all sites were situated in agricultural landscapes with remnant native vegetation, and contained habitats known to support Carnaby's Black-Cockatoo. The four BBUS yielded 3,772 records over 224 hours of observation. With the exception of one, all flight heights were found to range between 0–50 m AGL, with group sizes varying from 1 to 400 individuals. Several flocks were observed to exhibit "vortexing" behaviour in response to disturbances such as vehicles or raptors. Despite this, only one flight height was recorded above 50 m AGL, and consisted of two birds that briefly rose to an estimated height of 60 m before descending (Bamford, 2025).
- 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). 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 south-west WA. When crossing areas of expansive open ground (or low vegetation such as heaths) Black-Cockatoos tend to fly close to the ground surface. In circumstances where birds are passing across less-expansive cleared areas between patches of remnant trees or isolated individual trees (as is present throughout much of the Project Area) they usually maintain a 'canopy height' flight path (Umwelt,

2025d). 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.

- Further, post-commissioning monitoring for the Carnaby's Black-Cockatoo at Badgingarra wind farm in 2019 which has a minimum tip height of 20 m AGL 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.). The search method for carcasses as Warradarge Wind Farm is not publicly available and Badgingarra wind farm undertook a total of six surveys in 2019 at eight reference turbine sites and eight randomised turbine sites using a search area of 250 m x 250 m.

7.2.1.2 Migratory Shorebirds

Eleven (11) EPBC listed migratory shorebird species were found to have a likelihood of occurrence of moderate or higher and given a risk rating for collisions (Table 7.4). All are non-breeding migrants to Australia during the austral summer, mainly from Europe and Russia, typically favouring coastal and near-shore wetland habitats. Six EPBC listed migratory shorebird species were recorded within the Project Area, with all observations recorded at the wetlands west of Brand Highway, which provide the most suitable habitat locally. Five species were detected during the Summer 2025 BBUS, with no more than five individuals per species recorded. Fifteen Wood Sandpipers were recorded on two occasions in Spring 2024. These low numbers suggest opportunistic and low-density use of these wetlands.

Of the 11 migratory shorebirds assessed, seven were given a pre-mitigation risk rating of "minor" due to the likelihood of collision being "possible" and consequence of collision being "low". The remaining four species were given a "moderate" pre-mitigation risk rating, due to the likelihood of collision being "possible" and consequence of collision being "moderate".

Significant direct mortality is unlikely due to the Project. Migratory shorebirds typically migrate at the 1,000–5,000 m altitude, well above turbine height, making blade strike during migration improbable. Local flights are infrequent and opportunistic, with no flight height data recorded to date. All observed migratory shorebirds have been in wetlands west of Brand Highway, away from turbines. Ongoing surveys (Sep 2025–Mar 2026) will further inform flight behaviour and habitat use.

7.2.1.3 Fork-tailed swift

The Fork-tailed swift was assigned a "moderate" pre-mitigation risk rating due to the likelihood of collision being "likely" and consequence of collision being "low".

There are 3 published reports of Fork-tailed Swift strikes with wind turbines at Australian wind farms within the species' range (Moloney et al., 2019; Nature Advisory, 2025).

7.2.2 Vehicle Strikes

During Project operations, the movement of light vehicles, large trucks and maintenance equipment will occur on the access tracks within the Project Area. Although operational traffic movement numbers are expected to be low, there is some risk of vehicle strike to terrestrial fauna species including medium to large mammals, birds, and reptiles.

The new tracks will largely follow existing farm tracks that will be of much higher quality. As a result, the sight lines will be improved reducing the risk of vehicle strikes compared to those associated with the existing farming vehicles.

7.2.3 Barotrauma

Barotrauma is a phenomenon in which rapid air pressure changes from rotating turbine blades are hypothesised to cause tissue damage to air-containing structures, most notably the lungs of bats (Baerwald et al., 2008). It has also been hypothesised that barotrauma can result in non-lethal injuries, such as hearing impairments and other internal injuries that may result in bats succumbing to their injuries away from turbines (Lawson et al., 2020). Due to the unique respiratory anatomy of birds, they are considered less susceptible to barotrauma than that of mammals, specifically bats (Baerwald et al., 2008) however it is possible.

Research conducted in North America on the relative risk of barotrauma compared with direct collisions has resulted in mixed findings regarding the proportion of deaths that have been attributed to each factor (Ellison, 2012), though it appears the majority of fatalities are due to collisions (Grodsky et al., 2011; Rollins et al., 2012). Baerwald et al. (2008) found that barotrauma to the lungs and possibly other organs accounted for 46% of bats killed at turbines with 92% of the barotrauma in those bats displaying as haemorrhaging in the thoracic and/or abdominal cavities. However, Rollins et al. (2012) found that only 6% (5/81) of bats collected at a wind farm in Illinois had lesions possibly consistent with causation by barotrauma, leading the authors to conclude that “traumatic injury is the major cause of bat mortality at wind farms, and, at best, barotrauma is a minor etiology”. Lawson (2020) used computational fluid-dynamics to model changes in air pressure around moving turbine blades to assess the likelihood of bats occurring within areas of extremely high or lower pressure. The modelled air pressures were also compared to those associated with mortality in rats to assess the likelihood of barotrauma resulting in lethal or sub-lethal injuries to bats. Barotrauma was determined unlikely to be a leading cause of death supporting the alternative hypothesis that collisions are more likely to be the predominant pathway for bat mortalities from operating turbines.

Due to the difficulty in diagnosing barotrauma unless the carcass is examined immediately after death, it is possible that cases attributed to barotrauma have been confused with traumatic injury associated with direct collisions. There is currently no published information on barotrauma in Australia.

7.2.4 Barrier Effects

Barrier effects can be caused by wind turbines disrupting links between feeding, roosting and/or nesting areas, or diverting flights (including migratory flights) around a wind farm.

Species that pass wind farms frequently on migration appear to be of higher concern than other species (Hötker et al., 2006). However, these effects on birds, possibly resulting in higher energy consumption or injuries as a result of collision, are not yet well known.

There is currently no published information on barrier effects from wind farms in Australia.

8.0 Avoidance, Mitigation, and Management

The hierarchy of avoid, minimise, and mitigate has been applied to the design process for the Project, with the field survey findings incorporated into the Development Corridor, the Indicative Project Footprint, and the turbine specifications.

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

1. Avoid: Avoiding the highest quality vegetation and habitat, locating turbines over 3.5km away from wetlands where migratory shorebirds were recorded, and setting a minimum turbine tip height above maximum typical flight height for Black-Cockatoos.
2. Mitigate: implementing mitigation and management measures to reduce direct, indirect and cumulative impacts
3. Repair: actively repair temporary impacted areas to promote long-term recovery
4. Offset (where necessary): provide suitable offsets for activities that result in significant residual impacts to MNES even with the implementation of the above principles.

This section provides further details on the avoidance and mitigation measures that have been applied to date and that are proposed to reduce the potential Project impacts on flora, vegetation and fauna values. Offsets are described in **Section 10.0**.

8.1 Avoidance

8.1.1 Initial Ecological Constraints Analysis to Inform the Project Area and "Buildable Area"

The Project Area was subject to an initial ecological constraints analysis, the purpose of which was to identify flora, vegetation and fauna values with varying sensitivity levels and environmental significance and to determine surveys to be completed to better understand biodiversity values. Potentially significant flora, vegetation, and fauna habitat types identified as part of the initial constraints analysis, along with other project constraints, informed a "buildable area" for the preliminary design stage of the Project. Early avoidance and minimisation measured considered as part of the early Project design included:

- Early identification and avoidance of some key blocks of native remnant vegetation (300ha) presumed to be in good condition or better, thus providing greater habitat values.
- Utilising existing cleared land and reducing native vegetation clearing as much as possible.
- Setting turbines back from Lake Guraga by 5 km (which is outside the Project Area) as an initial setback prior to completion of survey in consideration of potential migratory bird presence.

8.1.2 Use of Baseline Ecology Data to Avoid Impacts

Flora and fauna surveys in accordance with relevant guidelines (described in **Section 5.0**) were completed to provide a robust understanding of ecological values in the Project Area. Information from the surveys was then used as part of several design iterations to create an Indicative Project Footprint and turbine specifications with impacts to MNES and other values reduced to as low as possible.

The Project design and Indicative Project Layout:

- Has a minimum turbine tip height of 59 m, which is above the recorded and typical flight height of Black-Cockatoos, which reduces the potential for Black-Cockatoo collision with turbines.
- Significantly avoids areas with the highest Black-Cockatoo foraging habitat value (**Table 6.6**) based on (Bamford, 2020) site condition scoring, as follows:
    - Avoids all areas assessed as having high-quality foraging habitat (Site condition score of 5).
    - Avoids 466.85 ha (or 99.86%) of the highest quality foraging habitat in the Project Area. Of the 467.5 ha of habitat mapped with a foraging condition score of moderate to high or high (Site condition score of 5-6) in the Project Area, only 0.65 ha of moderate to high quality foraging habitat (Site condition score of 5) for Carnaby's Black-Cockatoo is proposed to be cleared. The proposed clearing of moderate to high quality Forest Red-tailed Cockatoo foraging habitat is lower at 0.03 ha.
    - As a specific example, relocated the proposed 330kV transmission line from Walyer Walyer Rd to an area with much lower foraging values, resulting in 1 ha of Black-Cockatoo foraging habitat with a site condition score of 5 being avoided.
- Avoids all Rank 1 (trees with activity at hollow observed) and Rank 2 (trees with hollows of suitable size with chew marks visible) Black-Cockatoo nest-trees. Three Rank 2 and eight Rank 3 trees were recorded in an earlier iteration of the Indicative Project Footprint, and the Project design was subsequently readjusted to avoid clearing all of the Rank 2 trees and five of the Rank 3 trees.
- Avoids known Black-Cockatoo roosting sites and sets turbines back 4 km from the main observed roosting site (Roost B per **Figure 6.10**).
- Avoids placement of turbines within 3.5km of wetlands where migratory shorebirds were recorded in the western side of the Project Area
- Avoids placement of permanent infrastructure in wetland habitat where migratory species have been found to forage during the non-breeding season (Sept–March).
- Avoids all TEC in Good condition or better. The access route from Brand Highway to the proposed BESS site was relocated from its original planned location within a patch of TEC in Good condition, to a location comprising existing cleared tracks and Degraded vegetation. As a result of the relocation, TEC clearing has reduced from 0.25 ha (which included Good condition TEC), to 0.11 of solely Degraded TEC.
- Avoids all native vegetation mapped as 'Very Good' condition or better.

- Significantly minimises clearing of native vegetation mapped as 'Good. The Project sought to avoid clearing native vegetation in 'Good' condition, however 'Good' condition vegetation has been found in many of the road reserves that infrastructure will need to traverse. At these locations, clearing widths have been minimised and infrastructure will seek to cross in a perpendicular fashion where practicable. As such, the total unavoidable area of 'Good' condition vegetation proposed to be cleared is 2.23 ha.
- Avoids larger areas of intact native vegetation.
- Avoids the area where *Grevillea curviloba* was recorded.

The final Project footprint will occupy a much smaller footprint than that represented by the Development Corridor (approximately 21%). As the Project will seek to avoid and minimise clearing impacts to all habitat types during the detailed design phase of the Project, the infrastructure layout within the Development Corridor will be further refined to:

- Minimise 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
- Minimise clearing of vegetation with moderate to high Black-Cockatoo foraging value (Bamford, 2020) site condition score of 5. The current Indicative Project Footprint intersects 0.65 ha of vegetation with moderate to high foraging value. A particular focus of the micro-siting work will be to reduce this as much as practicable.
- Minimise clearing of riparian vegetation. This has been achieved by setting turbines back from riparian vegetation and utilising existing creek crossings where possible.
- Minimise the construction of new creek crossings, by using existing creek crossings where practicable.
- Minimise the bisecting of larger patches of vegetation in order to maintain landscape connectivity.

8.2 Mitigation and Management

Works will be undertaken in accordance with a Project CEMP which will include a management approach and actions to limit and reduce potential impacts to flora, vegetation and fauna, including threatened species. A copy of the Preliminary CEMP is provided in **Appendix G**. Operational impacts to birds and bats will be managed through a Bird and Bat Adaptive Management Plan (BBAMP). A Preliminary BBAMP has been developed to support this referral, and a copy is provided in **Appendix D**.

8.2.1 Native Vegetation and Fauna Habitat Clearing

The Project CEMP will include provisions to limit and reduce potential impacts to vegetation during clearing and other activities. Vegetation management measures will include:

- Personnel involved in native vegetation clearing activities will be required to undertake internal Project specific land clearing training which will outline regulatory requirements, management actions or controls to be implemented, and weed and pest management.

- Approved native vegetation clearing area boundaries will be demarcated prior to clearing, and clearing of remnant native vegetation will not exceed 10.28 ha of remnant native vegetation, 5.45 ha of isolated remnant trees in a cleared agricultural landscape and 5.05 ha of planted native vegetation.
- There will be no clearing of TEC with the exception of 0.11 ha of degraded TEC adjacent to Brand Highway for the purposes of accessing the western part of the Project Area.
- No permanent removal of wetland habitat where migratory species have been found to forage West of Brand Highway.
- Known Rank 1 and Rank 2 Black-Cockatoo nesting trees within 50 m of clearing boundaries will be clearly tagged as "No-go zone" prior to clearing. This could be in the form of flagging or fencing.
- Disturbance of Rank 3 (potentially suitable hollow visible but no chew marks present at entrance; or potentially suitable hollow suspected to be present) trees will be minimised through micro-siting where practicable.
- Micro-siting of Project infrastructure will aim to retain habitat trees where possible.
- Habitat trees that can be safely retained will be marked with flagging tape and avoided.
- Areas planned for native vegetation clearing will be inspected for native fauna immediately prior to undertaking land clearing by a suitably qualified fauna spotter. This will include ensuring that no trees being removed are housing Black-Cockatoos, chicks, or eggs. Where conservation listed fauna are encountered during clearing, these will be reported to the Senior Environmental Advisor immediately.
- Where trees are authorised to be cleared, they will be felled away from areas of retained native vegetation as safe and practicable. Where trees unavoidably fall into retained areas, they will be left in-situ.
- Vegetation clearing will be undertaken progressively and in stages so that only a small subset of the Project footprint is impacted at any one time. The clearing will be undertaken towards adjacent native vegetation to allow fauna to move into adjacent native vegetation ahead of the clearing activity.
- Following the completion of each clearing event, the location and extent of areas cleared will be recorded via GPS / survey and reported within a centralised dataset.

8.2.2 Biosecurity (Weed and Disease Risk Management)

The Project has the potential to spread or introduce weeds to the Project Area, which can impact the integrity and longevity of vegetation communities, ecological communities and Threatened species. This risk can be appropriately mitigated and managed through appropriate site management practices.

Weed and disease management measures will be outlined in the CEMP and will include the following measures:

- All ground disturbing plant and equipment will enter and leave the 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 Project Area, 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.

8.2.3 Fauna Management

The Project CEMP will include provisions to limit and reduce potential impacts on fauna, particularly by implementing measures that prevent injury or mortality to fauna during all Project phases.

The following measures will be implemented to limit impacts on threatened and migratory fauna species:

- The minimum blade tip height to be adopted will be 59 m AGL.
- Turbines will not be constructed within 3.5km of the wetlands West of Brand Highway.
- The Project BBAMP will be implemented throughout operations.
- Preclearance searches will be undertaken by a licenced fauna spotter prior to and during clearing activities within remnant vegetation types.
- Where threatened or migratory species are encountered during construction, any activities in proximity (<10 m) to their location will cease until they are no longer present. Handling of such fauna is not permitted unless a Section 40 approval has been granted from DBCA.
- Fauna spotters will be present during all native vegetation clearing to ensure that no potential Black-Cockatoo nest-trees being removed are housing Black-Cockatoos, chicks, or eggs.
- Vegetation clearing will be halted in areas where threatened and migratory species are located, and clearing will not resume until the species leaves the location on its own accord.
- Where injured fauna is encountered, the Wildcare Helpline (08 9474 9055) will be immediately contacted, and the Work Area Supervisor notified.

The following additional mitigation measures will be implemented to limit and reduce indirect impacts (noise, dust, light emissions and traffic) to threatened and migratory 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

- consideration to the type and use of lighting (e.g., shielded lights on buildings, directing lighting away from habitat)

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.

8.2.3.1 Bird and Bat Adaptive Management Plan

Monitoring and management activities concerning bird and bat populations will be conducted in accordance with the Project BBAMP. The BBAMP strategy focuses on monitoring and mitigating potential turbine strike impacts on birds and bats through the implementation of trigger-based, adaptive management measures. Comprehensive monitoring of bird and bat activity, including flight behaviours, both prior to and following Project commissioning, is an essential component of the plan and serves to inform risk profiles for each turbine. Site context and risk profile have been strongly considered when developing the trigger criteria and adaptive management measures nominated in the BBAMP.

Further details are outlined in the Preliminary BBAMP (**Appendix D**), which will be finalised as a Project BBAMP prior to Project commissioning. Approval and execution of the BBAMP, in consultation with DBCA, is a condition of the development approval granted on 23 October 2025 under the *Planning and Development Act 2005*.

8.2.4 Erosion and Sediment Control

The potential impacts of erosion and sedimentation will be mitigated and managed through the measures listed in the Project CEMP (**Appendix G**). This will include the establishment of temporary erosion and sediment control measures during construction such as silt fences, diversion bunds, rock check dams and sedimentation ponds.

9.0 Significant Impact Assessments

9.1 Methodology

Significant Impact Assessments (SIA) have been undertaken for the TEC known to occur in the Project Area and the 14 other MNES fauna species determined to have a Moderate or greater likelihood of occurrence within the Project Area. The assessments were undertaken in accordance with the *Matters of National Environmental Significant: Significant Impact Guidelines 1.1* (Department of the Environment, 2013b).

The SIAs have been structured to provide information on the following aspects:

- Species description, including:
    - General species profile
    - Occurrence and habitat in the Project Area
- Assessment against the relevant *Matters of National Environmental Significant: Significant Impact Guidelines 1.1* (Department of the Environment, 2013b).

Individual assessments have been undertaken for species listed as Vulnerable, Endangered and Critical under the EPBC Act. For species listed solely as Migratory, a single grouped assessment has been undertaken noting the assessment criteria and likely impacts are common.

The SIAs for the 15 MNES are presented in **Appendix J**, with a summary of key impacts provided below for the TEC, two species of Black-Cockatoos and 12 species of migratory species (four of which also have a Threatened status).

9.2 Summary of TEC Impact Assessment Findings

Thirteen (13) patches of the 'Banksia Woodland of the Swan Coastal Plain' TEC comprising a total area of 41.3 ha occur within the Project Area. No patches (either wholly or partially) of the TEC were in 'Pristine', 'Excellent', or 'Very Good' condition.

The Referral Guideline for the Banksia Woodlands of the Swan Coastal Plain ecological community (DoEE, 2016a) identifies seven criteria to be assessed to determine if the Project will have a significant impact on the TEC. Assessments against each of these criteria has been provided in **Appendix I**, and based on the outcomes from this assessment it is unlikely the Project will have a significant impact on the TEC for the following reasons:

- Clearing will not exceed 0.11 ha of TEC removal.
- Clearing is restricted to an area of Degraded TEC.
- The adjacent Good and Very Good condition TEC patches will be avoided and indirect impacts managed via implementation of the Project CEMP.
- The Project is highly unlikely to modify or destroy abiotic factors necessary for the TECs survival.
- No land use alterations are proposed that would modify water quality or availability, or nutrient balances necessary to the survival of the TEC.

9.3 Summary of Black-Cockatoo Impact Assessment Findings

Surveys have been completed to understand Black-Cockatoo habitat values (foraging, breeding, and roosting), site utilisation, and flight characteristics in the Project Area as described in **Section 5.2.2**. An assessment of habitat in the broader area around the Project Area has also been undertaken. A summary of habitat values from these assessments at different scales is provided in **Table 6.6** and **Section 6.3.2**.

Two species of threatened Black-Cockatoos have been recorded within the Project Area during the field survey program; the Carnaby's Black-Cockatoo and the Forest Red-tailed Black-Cockatoo.

The Carnaby's Black-Cockatoo has been recorded on 80 occasions to date during the field survey program, with a maximum flock size of approximately 200 recorded. Two active roost sites have also been identified within the Project Area, but outside the extents of the Development Corridor (refer **Section 6.3.2.4**).

The Forest Red-tailed Black-Cockatoo (*Calyptorhynchus banksii naso*) was recorded during the Winter 2025 BBUS and also during the targeted fauna habitat assessment undertaken in June 2025 (Umwelt, 2025c). Flock sizes ranged from two to eight individuals. The species was not recorded during the Spring 2024, Summer 2025, Autumn 2025 and Spring 2025 BBUS, indicating that it is an intermittent and transient visitor to the Project Area that occurs in small numbers when present. This is supported by the fact that the Project Area lies approximately 40km north of its documented range of distribution.

The *Matters of National Environmental Significant: Significant Impact Guidelines 1.1* criteria used to assess significant impacts to listed threatened species refer to 'populations' and 'important populations' (Department of the Environment, 2013b). These terms have not been defined for Black-Cockatoos, due to the mobile and widely dispersed nature of these species, and the variation in flock compositions. For Black-Cockatoos, DCCEEW (2022) notes it is more appropriate to consider the likelihood of a significant impact from impacts on habitat and individuals rather than a population.

9.3.1 Habitat Loss

Habitat loss as a result of the Project is unlikely to result in a significant impact to Black-Cockatoos. The area and quality of habitat proposed to be impacted in the Indicative Project Footprint is low through avoidance of impacts through Project design. This includes avoiding:

- All high-quality foraging value habitat (Site condition score of 6).
- Clearing of 5.70 ha of Carnaby's Black-Cockatoo moderate to high foraging value habitat (Site condition score of 5) mapped in the Development Corridor, with clearing of moderate to high foraging habitat limited to 0.65 ha.
- Clearing of 0.89 ha of Forest Red-tail Cockatoo moderate to high foraging value habitat (Site condition score of 5) mapped in the Development Corridor, with clearing of moderate to high foraging habitat limited to 0.03 ha.
- Clearing of 466.85 ha (or 99.86%) of moderate to high and high quality foraging habitat (Site condition score of 5 or 6) mapped in the Project Area based on broader scale habitat mapping (see **Section 6.3.2.2** for areas of foraging habitat assessed in the Project Area).

- Clearing Rank 1 and Rank 2 potential Black-Cockatoo nest-trees.
- Known roost sites within the Project Area.

The Project has sought to minimise the clearing of native vegetation as far as practicable, culminating in clearing limits of 10.28 ha of remnant native vegetation, 5.45 ha of isolated remnant trees in cleared agricultural land and 7.33 ha of planted vegetation (native and non-native). The foraging values of this vegetation to both species of Black-Cockatoos are presented in **Table 9.1**, along with the foraging value of vegetation in the Development Corridor and the area of this vegetation avoided. This demonstrates that the Project has been designed to avoid and minimise direct impacts to Black-Cockatoo habitat of moderate and higher value.

Table 9.1 Carnaby's Black-Cockatoo Foraging Habitat Values within Indicative Project Footprint and Avoided

Foraging Value Score out of 6 based on Site Condition (BCE, 2020)	Foraging Value Score out of 10 (BCE, 2020)*	Development Corridor (ha)	Indicative Project Footprint (ha)	Area Avoided (ha)
0: No foraging value	0	3.08	1.42	1.66
1: Negligible to low foraging value	1	20.70	6.30	14.40
2: Low foraging value	2	19.34	4.32	15.02
3: Low to moderate foraging value	5*	26.64	6.63	20.01
4: Moderate foraging value	6*	10.44	2.68	7.77
5: Moderate to high foraging value	7*	6.35	0.65	5.70
6: High foraging value	8*	0.00	0.00	0.00
Not assessed		1.16	1.05	0.11
Total		**87.72**	**23.05**	**64.67**

*Context score=1, Species density score=1

Table 9.2 Forest Red-tailed Black-Cockatoo Foraging Habitat Values of Vegetation within Indicative Project Footprint

Foraging Value Score out of 6 based on Site Condition (BCE, 2020)	Foraging Value Score out of 10 (BCE, 2020)*	Development Corridor (ha)	Indicative Project Footprint (ha)	Area Avoided (ha)
0: No foraging value	0	34.40	12.65	21.75
1: Negligible to low foraging value	1	1.26	0.21	1.05
2: Low foraging value	2	14.21	2.76	11.45
3: Low to moderate foraging value	5*	20.03	3.08	16.94
4: Moderate foraging value	6*	15.74	3.27	12.47
5: Moderate to high foraging value	7*	0.91	0.03	0.89
6: High foraging value	8*	0.00	0.00	0.00
Not assessed		**1.16**	**1.05**	**0.11**
Total		**87.72**	**23.05**	**23.05**

*Context score=1, Species density score=1

The proposed clearing of Black-Cockatoo foraging habitat of any value by the Project represents approximately 0.05% of the potentially suitable foraging habitat in remnant vegetation within 12km of the Project Area (see **Section 6.3.2.1**).

A potential Black-Cockatoo nest assessment recorded 560 potential nest-trees (DBH > 500 mm) within the Development Corridor, 112 of which lie in the Indicative Project Footprint. No active nests (Rank 1) were recorded within the Development Corridor, and although three Rank 2 and eight Rank 3 trees were recorded in the Indicative Project Footprint at the time of survey, Project design was readjusted to avoid clearing all of the Rank 2 trees and five of the Rank 3 trees.

Two roosting sites have been identified during the field survey program both of which lie outside the Development Corridor.

Based on the above, residual impacts to Black-Cockatoo habitat is unlikely to result in a significant impact to either Carnaby's Black-Cockatoo or Forest Red-Tailed Black Cockatoo. A detailed assessment against *Significant Impact Guidelines 1.1* criteria is provided in **Appendix I**.

9.3.2 Direct Mortality

Direct mortality as a result of the Project is not likely to have a significant impact on Black-Cockatoos through the adoption of a minimum blade tip height of 59 m AGL and through implementing the Project BBAMP.

Collision with turbines and turbine blades poses a direct mortality risk to Black-Cockatoos. Flight heights for both Carnaby's Black-Cockatoo (42 records) and Forest Red-tailed Black-Cockatoo (1 record) were recorded as part of BBUS completed to date with the results presented in **Table 7.5**. Neither of the species were recorded flying within the RSA, with one to two individuals of Carnaby's Black-Cockatoo being recorded at a maximum flight height of 50 m AGL on three occasions. The ERM developed for the species shows that the majority (99%) of flight time for the species occurred below 30 m AGL.

The Forest Red-tailed Black-Cockatoo was recorded flying at a maximum height of 8 m AGL, however this is based on a single flight observation recorded during the BBUS. It should be noted however that both Carnaby's Black-Cockatoo and Forest Red-tailed Black-Cockatoo exhibit similar flight behaviours.

Neoen is also collecting Black-Cockatoo flight height data for other potential wind farm projects in the Wheatbelt region. To date, flight data has been recorded for 80 Carnaby's Black-Cockatoo flights with the maximum height observed being 50 m AGL. For the Forest Red-tailed Black-Cockatoo, data has been recorded for 16 flight heights, with the maximum flight height recorded being 40 m AGL.

Between August 2024 and March 2025, Bamford Consulting Ecologists (BCE) conducted BBUS across four wind farm sites located between Perth and Eneabba. Similar to the Project Area, all sites were situated in agricultural landscapes with remnant native vegetation, and contained habitats known to support Carnaby's Black-Cockatoo. The four BBUS yielded 3,772 records over 224 hours of observation. With the exception of one, all flight heights were found to range between 0–50 m AGL, with group sizes varying from 1 to 400 individuals. Several flocks were observed to exhibit "vortexing" behaviour in response to disturbances such as vehicles or raptors. Only one flight height was recorded above 50 m AGL, and consisted of two birds that briefly rose to an estimated 60 m before descending (Bamford, 2025).

Based on the above understanding of Black-Cockatoo flight height, and through the adoption of a minimum blade tip-height of 59m AGL and measures in the BBAMP, direct mortality to Black-Cockatoos as a result of turbine and blade strike is unlikely to contribute to a decline in the population of either Carnaby's Black-Cockatoo or Forest Red-Tailed Black Cockatoo. A detailed assessment against all *Significant Impact Guidelines 1.1* criteria is provided in **Appendix I**.

9.4 Summary of Migratory Species Impact Assessment Findings

Six migratory species have been recorded within the Project Area as part of the field survey program to date, with a further six having a moderate or high likelihood of occurring in the Project Area. All 12 of these species are non-breeding migrant visitors to Australia during the austral summer, with the majority migrating from Europe and Russia. Eleven of the 12 species are migratory shorebirds, most of which have a preference for coastal environments with some utilising near-shore wetlands and other water bodies. The fork-tailed swift is not a shorebird and is almost exclusively aerial. As a result of this, habitat impacts are not relevant or discussed for the fork-tailed swift.

All records of migratory shorebirds have been in the wetlands west of Brand Highway. These wetlands are considered to provide the most suitable habitat for migratory shorebirds in the Project Area. Five of the species were recorded during the Summer 2025 BBUS, and the number of individuals did not exceed five for any of these species. A total of 15 Wood Sandpiper were recorded on two separate occasions during the Basic and Targeted Fauna Survey in Spring 2024. The low number of individuals recorded suggests low-density and limited duration usage of the most suitable wetland habitats in the Project Area.

In developing the SIA's for migratory species, it is noted that many of the Conservation Advice Notes for migratory species define habitat critical to the survival of the species as those that exceed the thresholds used to determine internationally or nationally important habitat. For the purposes of the migratory SIAs in this document, this has been used to determine habitat critical to the survival of the species.

EPBC guidelines (Department of the Environment, 2013a) note that wetland habitat should be considered internationally important if it regularly supports:

- 1 percent of the individuals in a population of one species or subspecies of waterbird or
- A total abundance of at least 20,000 water birds.

It further notes that habitat should be considered nationally important for migratory shorebirds if it regularly supports:

- 0.1 percent of the flyway population of a single species of migratory shorebird or
- 2,000 migratory shorebirds or
- 15 migratory shorebird species.

In further support of this, the recent *Australian National Directory of Important Migratory Shorebird Habitat* (Driessen et al, 2025) notes that for a site to be classed as internationally important, 1% of a species' flyway population had to use that site, and for a site to be considered nationally important, 0.1% of a species' flyway population had to use the site.

To date, water birds recorded in the Project Area have not exceeded 20,000, migratory shorebirds have not exceeded 2,000 and six migratory shorebirds have been recorded on site. As a result of this, the 1% and 0.1% flyway populations will be used to define if wetlands on site can be considered internationally or nationally important, and thereby habitat critical to the survival of the species.

DCCEEW *Draft referral guideline for 14 birds listed as migratory species under the EPBC Act* (DCCEEW, 2015) provides guidance on what is considered an ecologically significant proportion of a population for migratory birds. These guidelines indicate that 1% of the population is considered internationally important and 0.1% is considered nationally important. These thresholds have been considered as part of the impact assessment for each species and in developing criteria for the Preliminary BBAMP.

EPBC Act Policy Statement 3.21: *Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (DoEE, 2017) identifies loss of habitat, degradation of habitat, increased disturbance and direct mortality as the primary significant impacts on migratory birds. A brief assessment against these is provided below, with a more detailed assessment against the *MNES Significant Impact Guidelines 1.1* (Department of the Environment, 2013b) provided in **Appendix I**.

9.4.1 Habitat Loss

Habitat loss as a result of the Project is unlikely to have a significant impact on migratory shorebirds.

The most suitable and preferred migratory shorebird habitat within the Project Area is limited to three wetlands west of Brand Highway totalling 264 ha. The much smaller Lake Yangy (14.5 ha) to the east has the potential to support migratory shorebirds, however is likely not as suitable or preferred as the wetlands to the west of Brand Highway. The locations of these wetlands are presented in **Figure 6.12**.

Direct habitat loss will be limited to 1 ha of degraded vegetation on the edge of one of the wetlands to the west, that will be rehabilitated at the end of construction (**Figure 9.1**). Although this area is within the area mapped as wetlands based on DBCA geomorphic wetlands spatial data, it is fringing vegetation adjacent to the wetland and is unlikely to contain foraging habitat. The clearing of this degraded habitat is required to connect to existing transmission line and is already subject to agricultural activities.

FIGURE 9.1

Extent of Proposed Temporary Clearing of Wetland Habitat

Legend

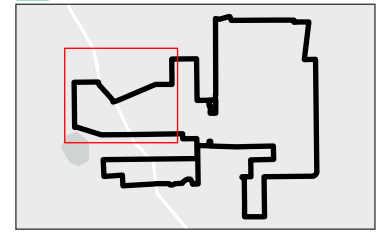
- Project Area
- Disturbance Footprint
- Road

Preliminary Layout

- Firewater Tanks
- Communication Towers
- Wind Turbine Generator (WTG)
- Internal Roads and underground Cabling (Permanent)
- Proposed 330kV transmission route - 13.21km
- BESS
- O&M Facility
- Substation
- Western Power Terminal
- Batch
- Batch Plant
- Satellite Compound

Geomorphic Wetlands, Swan Coastal Plain (DBCA – 019)

- Proposed Temporary Clearing
- To be Retained



0 1 2

Kilometres

Scale 1:40,000 at A4
GDA2020 MGA Zone 50

umwelt

Image Source: ESRI Basemap (2023) | **Data Source:** Landgate (2024) Umwelt (2025)

9.4.2 Degradation of Habitat

Habitat degradation as a result of the Project is unlikely to have a significant impact on migratory shorebirds.

The wetlands west of Brand Highway where migratory shorebirds have been recorded are currently subjected to agricultural pressures, and the vegetation surrounding the wetlands has been mapped as being in Degraded and Completely Degraded condition.

The main ancillary infrastructure to be constructed west of Brand Highway are the BESS, substation and Western Power terminal. Construction of these facilities will be undertaken in accordance with the Project CEMP (**Appendix G**) which sets out management measures to be implemented to protect the key environmental values of the area such as surface water, vegetation and fauna habitat. Through site design and implementation of the CEMP, wetland hydrology and ecological function is expected to remain unaffected as a result of construction and operation activities.

9.4.3 Increased Disturbance

The Project is unlikely to result in a level of disturbance that will significantly impact migratory shorebirds.

The migratory shorebirds recorded in the Project Area to date are mobile non-breeding species that use a wide network of coastal environments and inland wetlands across Australia during the austral summer. Turbines have been setback more than 3.5 km from wetlands in the west, within the Project Area, where migratory shorebirds have been recorded. Other ancillary infrastructure such as the BESS, substation and Western Power terminal have been set back over 175 m from the closest edge of these wetlands which is more than the minimum 165 m buffer recommended in EPBC Act Policy Statement 3.21 (DoEE, 2017).

Whilst there is the potential for temporary disturbance to migratory shorebirds during construction of the BESS, substation and Western Power terminal, this will be limited to approximately 24 – 30 months and to the edges of the wetlands closest to the construction footprint. Adjacent wetlands, and the edges of wetlands set further back from the construction footprint can still be utilised by migratory shorebirds if required.

9.4.4 Direct Mortality

Direct mortality as a result of the Project is unlikely to have a significant impact on migratory species.

Collision with turbines and turbine blades during flight pose the key direct mortality risk to migratory species. Generally, migratory species are known to undertake two flight types within Australia:

- Biannual long-distance flights when travelling from their breeding sites in the Northern hemisphere, to non-breeding sites in Australia.
- Local flights between foraging areas and to favoured roosting locations.

During biannual long distance migration flights, migratory species inhabiting Australia typically fly at altitudes of 1,000–5,000 m (Geering et al., 2007). This far exceeds the RSA and therefore blade strike during migration flights is highly unlikely.

The key factor likely to influence local flight heights is the geographical distribution of suitable foraging and roosting sites. Migratory shorebirds are known or considered likely to occur at four of the Project Area wetlands as mapped in **Figure 6.12**. Three of these wetlands are adjacent to one another in the west of the Project Area and are located 3.5 km from the nearest turbine. The pH of these wetlands was measured on 23 September 2025 with their values ranging 8.38 to 8.74. A pH in the range of 6.5 to 9.0 is considered ideal for freshwater aquatic organisms which the shorebirds may feed on (ANZECC 1992, CCREM 1991, Alabaster & Lloyd 1982, USEPA 1986). The fourth wetland is Lake Yangy found in the eastern part of the Project Area. Due to its smaller size, higher pH of 11.54 (measured on 2 September 2025) which is unlikely to provide favourable foraging resources, and lower habitat suitability, it is therefore less likely to attract notable numbers of migratory shorebirds, with any presence also expected to be of shorter duration.

To date, no migratory shorebird flight height data has been recorded as part of the field program, and migratory shorebirds have only been recorded in the wetlands west of Brand Highway that are setback 3.5 km from turbines. As a precautionary and conservative approach, targeted migratory shorebird surveys are being undertaken between September 2025 and March 2026 to gather further information on flight heights, population density and usage of the various wetlands within the Project Area. Outcomes from this monitoring will be used to inform the Project detailed design and the management and mitigation measures in the Project BBAMP.

The significant impact assessments of threatened ecological communities and threatened fauna are explained in detail in **Appendix I**.

10.0 Environmental Offsets

Residual impacts will remain following implementation of the mitigation hierarchy, as described in **Section 8.0.** However, when these impacts are evaluated against the criteria set out in the Significant Impact Guidelines 1.1, they are unlikely to be deemed significant considering the extent, fragmentation, and quality of native vegetation proposed for clearing.

Nevertheless, an environmental offset is still anticipated to be required under the Part V EP Act Native Vegetation Clearing Permit process and will be developed in accordance with the WA Environmental Offset Policy 2011 and Environment Offset Guidelines 2014.

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Appendix A

Detailed and Targeted Flora and Vegetation Assessment

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Appendix B

Basic and Targeted Fauna Assessment

Appendix C

Targeted Fauna Habitat Assessment

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Appendix D

Preliminary Bird and Bat Adaptive Management Plan

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Appendix E

Protected Matter Search Tool Results

Appendix F

Likelihood of Occurrence Assessment

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Appendix G

Preliminary Construction Environmental Management Plan

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Appendix H

Bird and Bat Utilisation Summary Report

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Appendix I

Significant Impact Assessments

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P 1300 793 267 E info@umwelt.com.au W umwelt.com.au

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