



Kojonup Wind Farm

Vertebrate Fauna, Bird and Bat Survey 2023 - 2025



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May 2026

Executive Summary

Introduction

Kojonup Wind Farm Pty Ltd propose to develop a 205 megawatt (MW) wind farm, the Kojonup Wind Farm Project (the Project). The Project is located in the Great Southern Region of Western Australia, approximately 10km south-west of Kojonup, within the Shire of Kojonup Local Government Area (Figure 1). The Project involves the construction of 33 turbines in farmland and an underground transmission line north from the Project to an existing substation.

Western Wildlife was commissioned to undertake a basic fauna survey and bird and bat utilisation study of the study area. The purpose of the fauna survey was to gather baseline fauna data to inform environmental impact assessment as part of Project approvals.

Methods

The fauna survey was undertaken in accordance with the *Technical Guidance: terrestrial vertebrate fauna surveys for environmental impact assessment* (EPA 2020), *Referral Guidelines for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo* (DAWE 2022), *Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010) and *Onshore Wind Farms – interim guidance on bird and bat management* (DAWE 2021).

The field surveys were undertaken on the 20 – 24th November 2023, 10 – 15th August 2024, 3rd – 8th November 2024 and 14th – 19th December 2025, with methods comprising:

- Habitat assessment at 102 sites.
- Bird utilisation survey: two morning and two afternoon 20-minute bird surveys, recording bird abundance and flight heights. Surveys at 29 - 33 impact sites and 3 - 8 reference sites on each field survey.
- Bat utilisation survey: deployment of Anabat bat detectors for 3 - 4 nights at 4 - 6 sites on field surveys in 2023 and 2024, plus deployment of a pair of bat detectors on the top and bottom of a meteorological mast in December 2024 and May 2025.
- Cockatoo habitat survey, identifying foraging habitat and habitat trees over a portion of the study area.
- Keeping opportunistic records of fauna.

Species of conservation significance were classified as: **Threatened** if listed as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable under *The Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or *Biodiversity Conservation Act 2016* (BC Act); **Migratory** if listed as Migratory under the EPBC Act and/or BC Act, excluding those species also listed as threatened; **Specially Protected** if listed as Other Specially Protected Species or Conservation Dependent Fauna under the BC Act and **Priority** if listed as Priority by DBCA.

A risk assessment of bats and selected bird species was undertaken by using six factors to determine the likelihood of a mortality (flight height, flight behaviour, status in the study area, habitat preference, migration and known wind farm mortalities) and four factors to determine the consequences of those mortalities on the population of the species (geographic resilience, demographic resilience, population size and conservation status). Once the overall risk levels for the likelihood and consequence of mortality specific to the Project had been assigned for a species, the results were then placed into a risk matrix to determine the level of risk (Negligible, Minor, Moderate, High or Very High).

Results and Discussion

Fauna Habitats

Six fauna habitats were identified in the study area:

- Eucalypt woodland
- Creek
- Granite outcrops
- Pine plantation
- Planted
- Cleared (noting that this includes farm dams and isolated paddock trees)

Of these habitats, the granite outcrops are limited in extent in the study area and the wider region. Creeks are likely to provide ecological linkage and in a largely cleared landscape, all remaining native vegetation is likely to play some role in ecological linkage. Even isolated patches can act as 'stepping stones' to allow movement of fauna through the landscape.

Faunal Assemblage

The predicted vertebrate faunal assemblage includes up to twelve frogs, 46 reptiles, 147 native birds, four introduced birds, 29 native mammals and five introduced mammals. The observed assemblage to date includes two frogs, four reptiles, 78 native birds, one introduced bird, nine native mammals and two introduced mammals. The faunal assemblage is likely to be somewhat depauperate due to the extent of habitat loss in the region, habitat fragmentation and the impacts of wood-cutting, grazing, weeds and feral predators on remaining habitat.

Conservation Significant Fauna

A total of 22 vertebrate fauna of conservation significance may occur in the study area: seven Threatened, two Migratory, three Specially Protected/Conservation Dependant and ten Priority species.

Threatened Species

Seven Threatened species potentially occur in the study area:

- Numbat (*Myrmecobius fasciatus*) – EPBC Act (Endangered), BC Act (Endangered)
- Carnaby’s Cockatoo (*Zanda latirostris*) – EPBC Act (Endangered), BC Act (Endangered)
- Baudin’s Cockatoo (*Zanda baudinii*) – EPBC Act (Endangered), BC Act (Endangered)
- Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*) – EPBC Act (Vulnerable), BC Act (Vulnerable)
- Red-tailed Phascogale (*Phascogale calura*) – EPBC Act (Vulnerable), BC Act (Vulnerable)
- Chuditch (*Dasyurus geoffroii*) – EPBC Act (Vulnerable), BC Act (Vulnerable)
- Malleefowl (*Leipoa ocellata*) – EPBC Act (Vulnerable), BC Act (Vulnerable)

Of these, Carnaby’s Cockatoo and the Forest Red-tailed Black-cockatoo were recorded in the study area and Baudin’s Cockatoo potentially occurs. The study area provides habitat critical for the survival of black-cockatoos: potential breeding habitat in eucalypt woodland and creek habitats and foraging habitat in eucalypt woodlands (all cockatoo species) and pine plantation (Carnaby’s Cockatoo only). No ‘known nesting trees’ were identified in the study area, but ‘potential’ and ‘suitable’ nesting trees were present. Carnaby’s Cockatoo are known to breed within 7km of the study area, the Forest Red-tailed Black-cockatoo breeds within 25km and Baudin’s Cockatoo is known to breed in the vicinity of Kojonup.

The Red-tailed Phascogale is likely to occur in the study area, inhabiting granite woodlands, eucalypt woodlands and creek habitats, potentially occurring even fairly small habitat patches. The Chuditch potentially occurs as a dispersing visitor but is unlikely to be resident. Similarly, the Malleefowl may possibly disperse through the study area on occasion, but no breeding habitat is present. Although the Numbat possibly occurs as there are records in the region, it is more likely to be locally extinct.

Migratory species

Two Migratory species potentially occur in the study area:

- Common Sandpiper (*Actitis hypoleucos*) – EPBC Act (Migratory), BC Act (Migratory)
- Fork-tailed Swift (*Apus pacificus*) – EPBC Act (Migratory), BC Act (Migratory)

Although the Common Sandpiper may occur on occasion, the farm dams and creeks of the study area are not likely to regularly support nationally or internationally significant numbers. The Fork-tailed Swift is a Migratory species that is thought to be almost entirely aerial when visiting Australia.

Specialty Protected species

Three Specialty Protected species potentially occur in the study area:

- Peregrine Falcon (*Falco peregrinus*) – BC Act (Other Specialty Protected)
- Muir's Corella (*Cacatua pastinator pastinator*) – BC Act (Conservation Dependent)
- Brush-tailed Phascogale (*Phascogale tapoatafa*) – BC Act (Conservation Dependent)

Of these species, the Peregrine Falcon and Muir's Corella were recorded in the study area. The Peregrine Falcon is likely to forage in open habitats including cleared farmland. This species is widespread, and its population is considered secure. The study area is on the north-eastern edge of the current range of Muir's Corella, and this species is likely to be a breeding resident in low numbers. The Brush-tailed Phascogale potentially occurs in larger areas of eucalypt woodland with hollow-bearing trees and understory, but it is probable that much of the habitat present is too fragmented and degraded to support this species. It is considered likely to be locally extinct in the wheatbelt and confined to more intact Jarrah forests to the west.

Priority species

Ten Priority species potentially occur in the study area:

- Barking Owl, south-west population (*Ninox connivens connivens*) – Priority 3
- Masked Owl, south-west population (*Tyto novaehollandiae novaehollandiae*) – Priority 3
- Central Long-eared Bat (*Nyctophilus major tor*) – Priority 3
- Western False Pipistrelle (*Falsistrellus mackenziei*) – Priority 4
- Inland Western Rosella (*Platycercus icterotis xanthogenys*) – Priority 4
- Western Brush Wallaby (*Notamacropus irma*) – Priority 4
- Tammar Wallaby (*Notamacropus eugenii derbianus*) – Priority 4
- Quenda (*Isodon fusciventer*) – Priority 4
- Water-rat (*Hydromys chrysogaster*) – Priority 4
- Western Mouse (*Pseudomys occidentalis*) – Priority 4

Of these, only the Inland Western Rosella was recorded in the study area, and this species is likely to be a breeding resident of eucalypt and granite woodlands. The Barking Owl and Masked Owl possibly occur, but their status in the region is difficult to ascertain as they are very rarely recorded. If present, they are likely to inhabit eucalypt woodlands, foraging in woodlands and farmlands and possibly breeding in large eucalypt hollows. The Central Long-eared Bat possibly occurs, but the study area is on the very western edge of the known range of this species. Similarly, the study area is on the very eastern edge of the known range of the Western False Pipistrelle, and this species prefers old-growth forest which is absent from the study area. The Quenda, Western Mouse, Western Brush Wallaby and Tammar Wallaby possibly occur in larger patches of eucalypt woodland with understory, but it is probable that these species are locally extinct. The Water-rat possibly occurs along the creeks and in dams in the study area, although most of this habitat is marginal as the dams are sparsely vegetated and the creeks are not permanent.

Bird Utilisation of the Study Area and Risk Assessment

Overall, 76 bird species were recorded on bird surveys, 96.2% of the 79 bird species recorded thus far across the study area. Of the birds recorded flying at impact sites, 307 flights (5.1%) by 15 species were recorded flying within the RSA, while at reference sites, 33 flights (2.6% of flights) by eight species were recorded flying within the RSA. Only the Wedge-tailed Eagle (*Aquila audax*) was recorded flying above the RSA (>200m), and only on two occasions.

No birds were assessed as being at *Very High* risk or *High* risk, and five species were assessed as being at *Moderate* risk: Baudin's Cockatoo (*Zanda baudinii*), Carnaby's Cockatoo (*Zanda latirostris*), Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*), Wedge-tailed Eagle and Purple-crowned Lorikeet (*Parvipsitta porphyrocephala*). The remaining species were assessed as being at *Minor* or *Negligible* risk, primarily due to an unlikely intersection with the RSA height due to rarity in the region and/or flight behaviour, and a large and widespread population reducing the likelihood of population impacts. Migratory shorebirds and waterbirds are at low risk due to the lack of suitable wetland habitats in or near to the study area.

Bat Utilisation of the Study Area and Risk Assessment

There are eleven species (or subspecies) of bat that potentially occur in the vicinity of the study area. A total of six species were confirmed as occurring in the study area, with at least one more species recorded but unable to be identified to species level.

No Threatened bats occur in the region and no bats were assessed at being of *Very High* or *High* risk. Four species were assessed as being at *Moderate* risk: Chocolate Wattled Bat (*Chalinolobus morio*), Gould's Wattled Bat (*Chalinolobus gouldii*), Southern Forest Bat (*Vespadelus regulus*) and the White-striped Freetail Bat (*Austronomus australis*). The remainder were assessed as being at *Minor* or *Negligible* risk.

Potential Impacts on Fauna

The key potential impacts on terrestrial vertebrate fauna are likely to be:

- habitat loss
- an increase in habitat fragmentation
- accidental mortalities
- collisions with turbines or other infrastructure
- barotrauma
- barrier effects and displacement

The nature and extent of these impacts, as they pertain to the Project, are discussed at a high level.

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1. Introduction

Kojonup Wind Farm Pty Ltd propose to develop a 205-megawatt (MW) wind farm, the Kojonup Wind Farm Project (the Project). The Project is located in the Great Southern Region of Western Australia, approximately 10km south-west of Kojonup, within the Shire of Kojonup Local Government Area (Figure 1). The Project involves the construction of 33 turbines in farmland and an underground transmission line north from the Project to an existing substation.

Western Wildlife was commissioned to undertake a basic fauna survey and bird and bat utilisation study of the study area. The purpose of the fauna survey was to gather baseline fauna data to inform environmental impact assessment as part of Project approvals. The key objectives of the fauna survey were to:

- Identify and describe the fauna habitats present.
- List the vertebrate fauna that were recorded and/or have the potential to occur.
- Identify species of conservation significance, or habitats of particular importance for fauna, that may occur.
- Conduct a bird and bat utilisation survey.
- Conduct a survey for potential cockatoo habitat trees.
- Conduct a risk assessment of bats and selected bird species that potentially occur in the study area.
- Identify potential impacts to fauna.

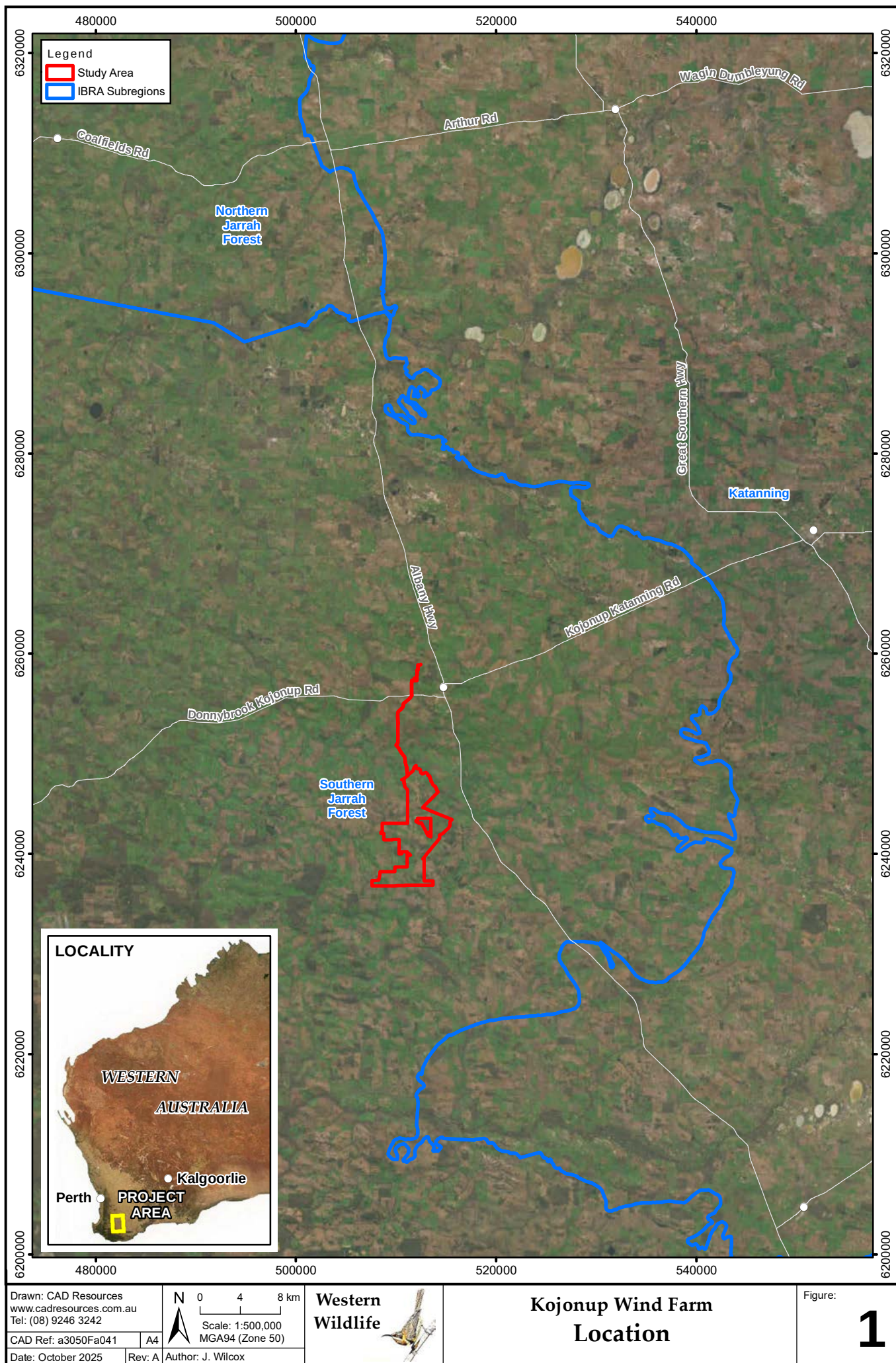
This report includes the findings of the field surveys conducted in November 2023, August 2024, November 2024 and December 2025.

1.1 Regional Context

1.1.1 IBRA Bioregion

The Interim Biogeographic Regionalisation for Australia (IBRA) classifies the land surface of Australia into 89 Bioregions and 419 subregions, each defined by a set of environmental influences that impact the occurrence of flora and fauna and their interaction with the physical environment (DCCEEW 2020).

The study area is in the Southern Jarrah Forest subregion of the Jarrah Forest Bioregion according to IBRA (DCCEEW 2020) (Figure 1). The Jarrah Forest Bioregion occurs on the duricrusted plateau of the Yilgarn Craton and supports Jarrah-Marri forest on laterite gravels in the west and Wandoo-Marri woodlands on clayey soils in the east. The Southern Jarrah Forest subregion is characterized by dissected drainage in the west and poor drainage with wetlands of various sizes in the east, where the plateau levels out. In the south-east there are extensive areas of swamps supporting paperbarks and Swamp Yate (Hearn *et al.*, 2002).



The subregion is home to rare frogs and birds and critical weight range mammals. Refugia identified in the subregion include peaty wetlands in the Blackwood Valley (supports rare frogs), Two People Bay Nature Reserve (supports rare ground-dwelling birds: Noisy Scrub Bird, Western Whipbird and Western Bristlebird), Porongurup Range (supports relict invertebrate taxa) and the Lake Muir-Unicup wetland complex (supports relict aquatic invertebrates) (Hearn *et al.* 2002).

The main land uses in this subregion are grazing, dryland agriculture, forestry and conservation (Hearn *et al.* 2002).

1.1.2 Parks and Reserves

There are no reserves in or directly adjacent to the study area (Figure 2). The nearest reserves are Jingalup Nature Reserve (5km west) and Jingalup South Nature Reserve (6km south-west).

1.1.3 Wetlands

Wetlands in the region are shown on Figure 2. There are no lakes in the study area and there are no Nationally Important Wetlands in the vicinity of the study area, the nearest are the Byenup Lagoon System and Lake Muir, 45km southwest.

1.1.4 Threatened or Priority Ecological Communities

The study areas potentially include the Critically Endangered Threatened Ecological Community (TEC) *Eucalypt Woodlands of the Western Australian Wheatbelt*. These ecological communities are defined primarily by their vegetation, so their significance is not further discussed in this report, except in terms of their value to fauna.

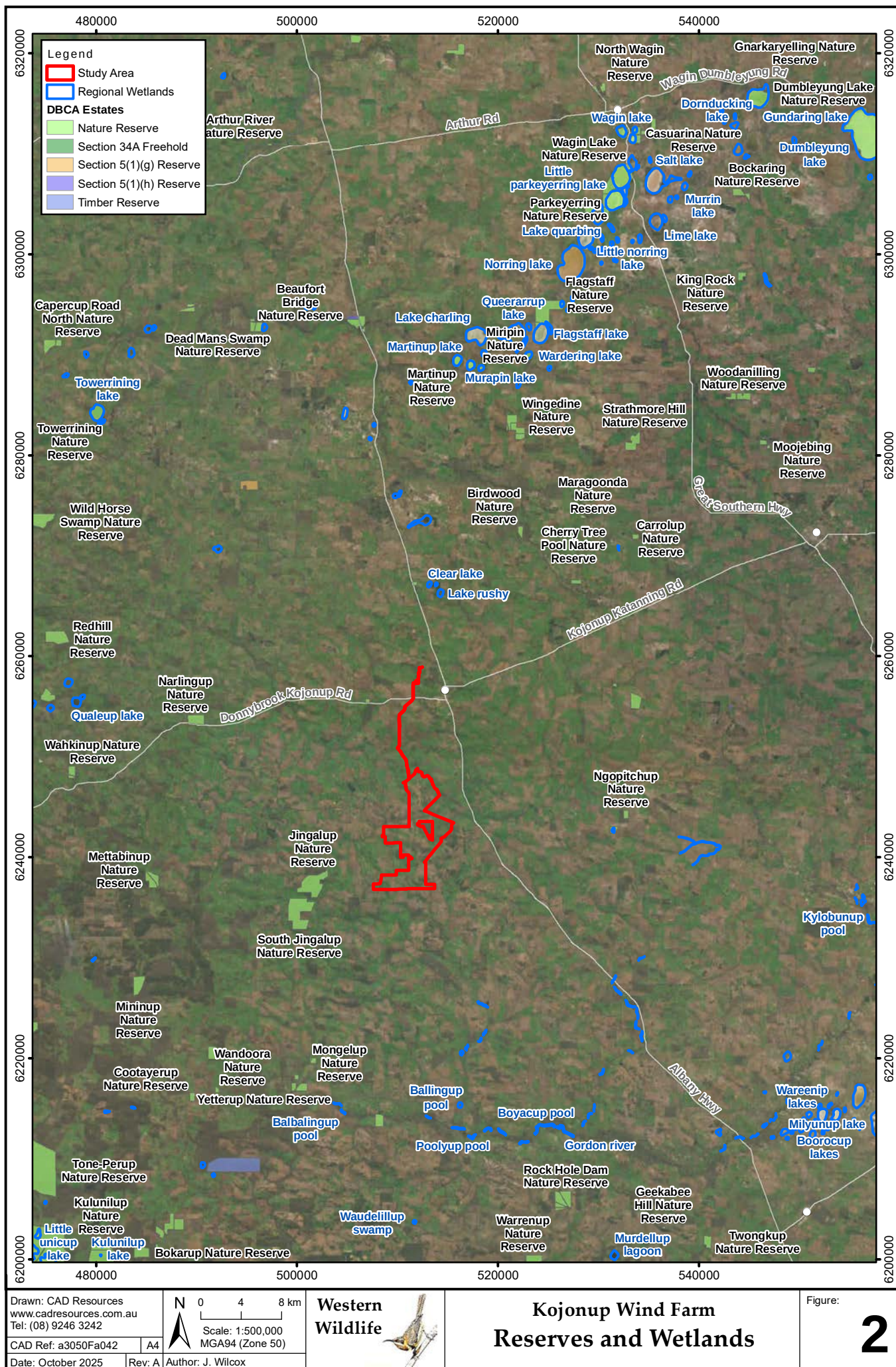
1.1.5 Land Systems

Land systems are broad descriptions of landform, geology and soils. The study area intersects two land systems (Figure 3), which are characterised as follows:

- **Farrar System:** Undulating rises and low hills on granite, in the southern Zone of Rejuvenated Drainage. Grey sandy duplex (mostly deep), sandy gravel, bare rock and red shallow loamy duplex. Supports Wandoo-Jarra-Marri woodland.
- **Jingalup System:** Gently undulating rises, on the southern edge of the Zone of Rejuvenated Drainage. Sandy gravel, grey sandy duplex (mostly deep) and shallow loamy duplex. Marri-Wandoo-Jarra woodland.

1.2 Study Area

The study area is 3,816.8ha and consists of farmland and remnant native vegetation spread across several properties (Figure 4). The proposed transmission line runs north to a substation in the vicinity of Kojonup.



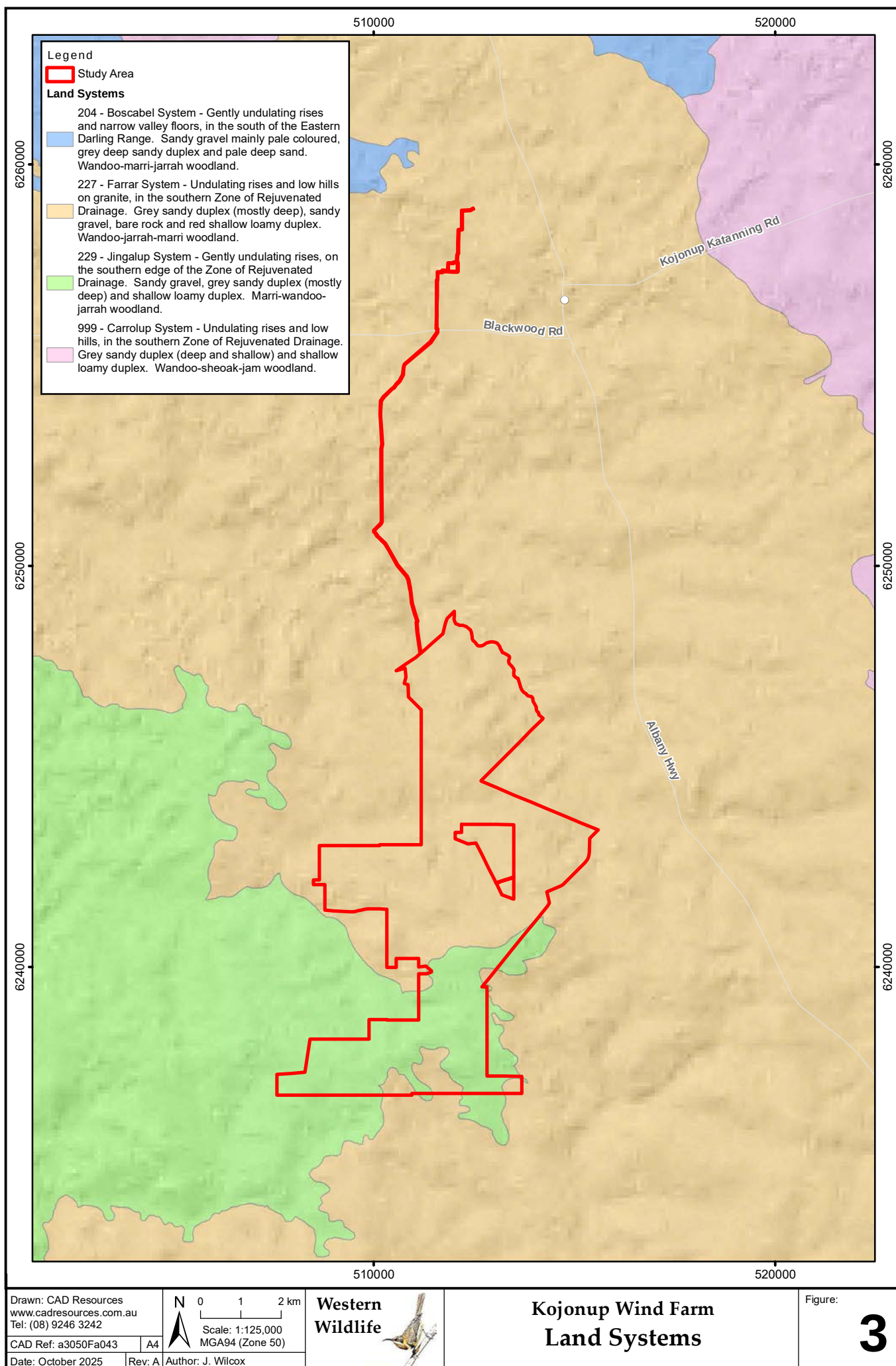
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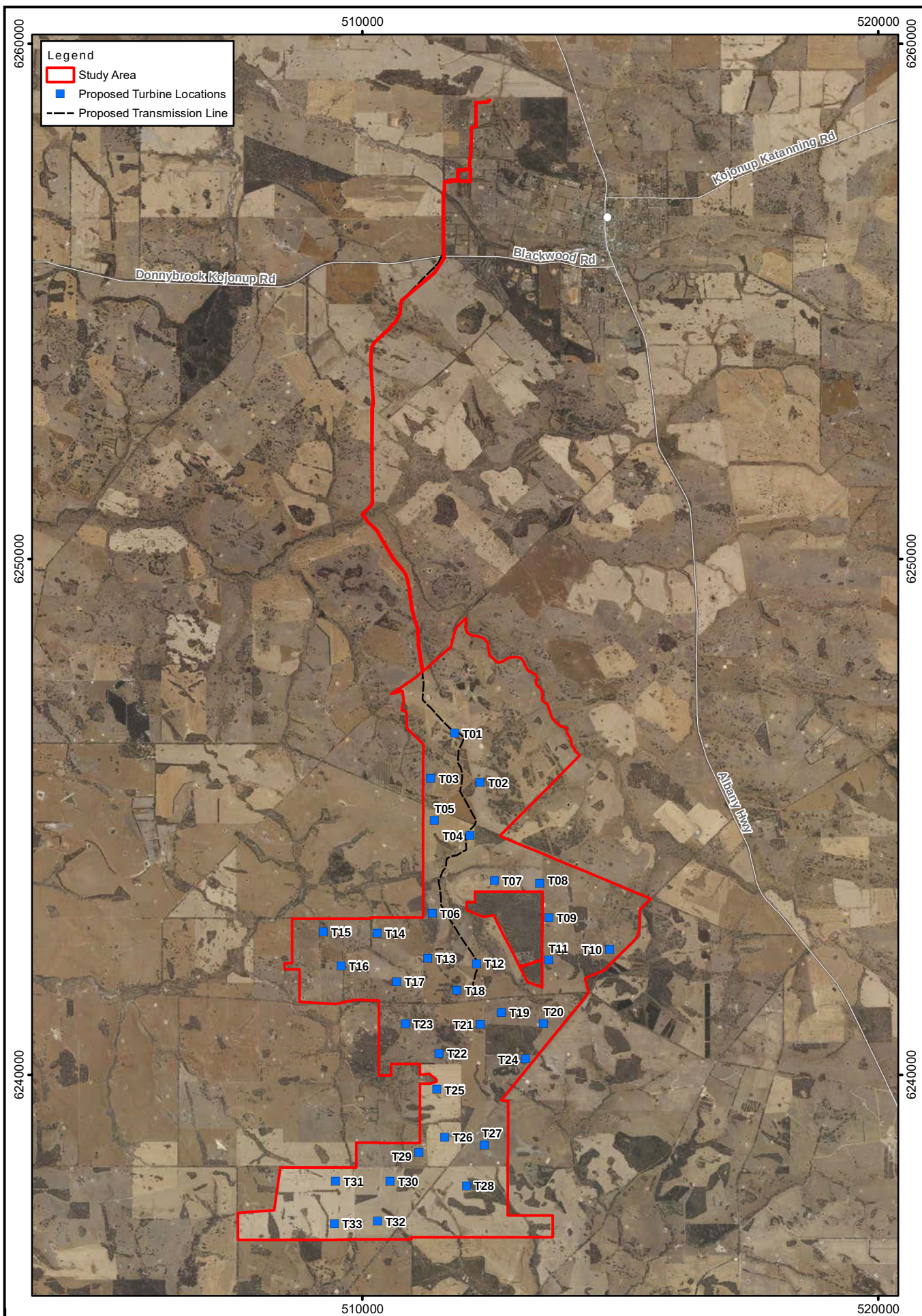


Kojonup Wind Farm Reserves and Wetlands

Figure:

2





1.3 Climate and Weather

The nearest weather station is Kojonup, site number 004032, and the mean monthly maximum and minimum temperatures and rainfall for this weather station are presented in Figure 5.

The long-term average annual rainfall for Kojonup is 525.4mm, based on data between 1885 and 2025 (Bureau of Meteorology 2025). The annual rainfall was about average in 2022 (532.2mm), but lower than average in 2023 (398.8mm), 2024 (424.4mm) and 2025 (375.0mm). The daily temperatures and rainfall during the field survey (as recorded at Katanning, site number 010916), are presented in Appendix 1.

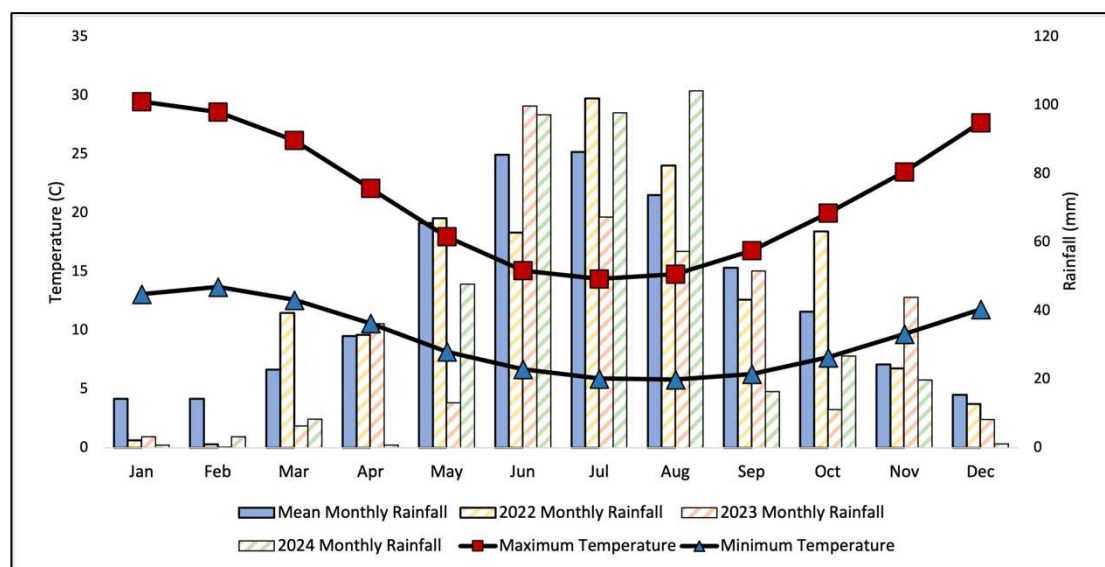


Figure 5. Monthly Climate Statistics for Kojonup.

2. Methods

2.1 Overview

The fauna survey consisted of three main components: a basic vertebrate fauna survey, a preliminary bird and bat utilisation survey and a preliminary cockatoo habitat survey. The methods are further described in the sections below.

2.2 Guidance Documents

The fauna survey was conducted with reference to the following documents:

- Technical guidance: terrestrial vertebrate fauna surveys for environmental impact assessment (EPA 2020)
- Referral Guidelines for 3 WA threatened black cockatoo species: Carnaby's Cockatoo, Baudin's Cockatoo and the Forest Red-tailed Black-cockatoo (DAWE 2022)
- Survey Guidelines for Australia's Threatened Birds (DEWHA 2010)
- Onshore Wind Farms – interim guidance on bird and bat management (DAWE 2021)

2.3 Personnel

Three zoologists undertook the fieldwork, with bat call analysis provided by Specialised Zoological (2024). Details of the survey team and their experience are shown in Table 1. This report was prepared by Ms Jenny Wilcox.

Table 1. Fauna survey personnel.

Name	Role	Qualification	Experience
Ms Jenny Wilcox	Supervising Vertebrate Zoologist (plan and lead fieldwork, analyse data, prepare report)	BSc.Biol/Env.Sci., Hons.	>20 years
Mr Mike Brown	Vertebrate zoologist (fieldwork)	BSc.Env.Sci.	16 years
Mr Brenden Metcalf	Vertebrate zoologist (fieldwork)	BSc.Env.Sci., Hons.	>20 years
Dr Kyle Armstrong	Bat call analysis	PhD. Zool.	>20 years

2.4 Taxonomy and Nomenclature

Taxonomy and nomenclature for fauna species used in this report follow the Western Australian Museum checklists. In the text, common names are used where appropriate, and all scientific names are given in species lists. Where a species lacks a common name, they are referred to by their scientific name.

2.5 Literature Review

Lists of fauna expected to occur in the study area were produced using information from several sources. These included publications that provide information on general patterns of distribution of frogs (Tyler *et al.* 2000), reptiles (Storr *et al.* 1983, 1990, 1999 and 2002, Wilson and Swan 2017), birds (Barrett *et al.* 2003; Johnstone and Storr 1998; Johnstone and Storr 2004) and mammals (Churchill 2007, Menkhorst and Knight 2011; Van Dyck and Strahan 2008).

The databases in Table 2 were searched for fauna records in and around the study area. In all cases the extent of the database search was larger than the extent of the study area in order to pick up records of species in the wider area that may also occur in the study area.

Some species may occur on database results that are not likely to be present in the study area, usually due either to lack of suitable habitat or the study area being outside the known range of the species (i.e., erroneous records or records of vagrants). Some records may be historical, with the species known to be locally or regionally extinct. These species are generally not included in lists of expected fauna unless some discussion is thought to be necessary.

Table 2. Databases used in the preparation of this report.

Database	Type of records held	Area searched
DBCA's Threatened and Priority Fauna Database (DBCA 2023)	Information and records on Threatened and Priority species in Western Australia. Includes records collated from Birds Australia, the Fauna Survey Returns Database and the Western Australian Museum Database.	Study area with a 40km buffer
Dandjoo (DBCA 2024)	Records of fauna, excluding Threatened and Priority Fauna from several sources including industry and research.	Study area with a 40km buffer
Atlas of Living Australia (ALA) Database (ALA 2024)	- Birds Australia Atlas Database - records of bird observations in Australia, 1998-2009. - Birddata - records of bird observations in Australia, 2010-current. - WA Museum Specimen Databases for reptiles frogs, birds and mammals - records of specimens held in the Western Australian Museum. Includes historical records.	Study area with a 40km buffer
Index of Biological Surveys for Assessment (IBSA) Database	Reports and spatial data from fauna surveys undertaken for environmental impact assessment in Western Australia.	Surveys in the same IBRA Bioregion, within 50km of the study area.
EPBC Act Protected Matters Search Tool	Information and modelled distributions for matters protected under the EPBC Act, including threatened species and ecological communities, migratory species and marine species.	Study area with a 5km buffer

2.6 Field Survey

2.6.1 Licensing

As the study was entirely observational, no DBCA licensing was required.

2.6.2 Timing

The fieldwork was undertaken on the following dates:

- 20th – 25th November 2023
- 10th – 15th August 2024
- 3rd – 8th November 2024
- 14th – 19th December 2025

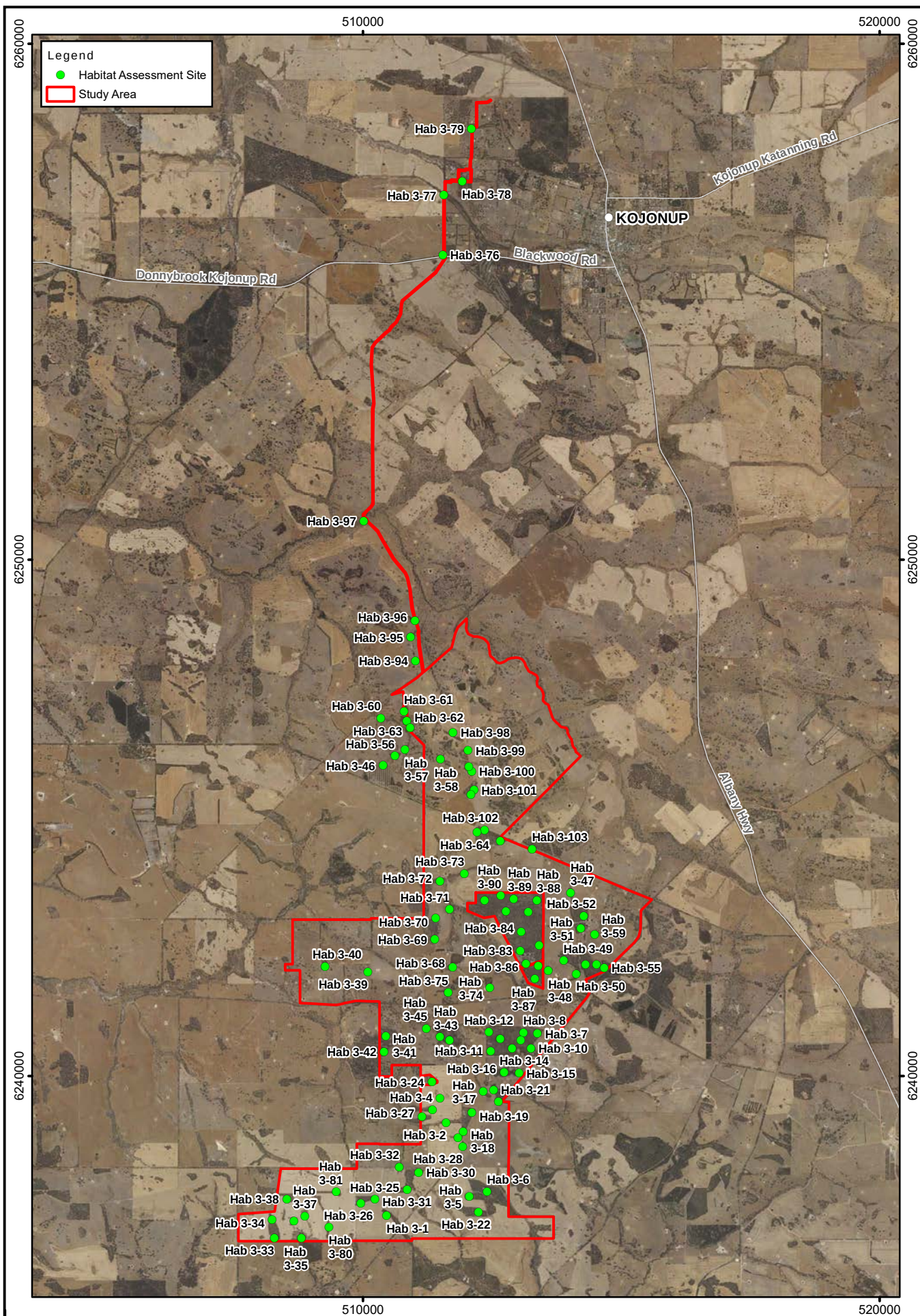
Although timing is not critical for a basic fauna survey, where the emphasis is on habitat characterisation, the spring surveys were scheduled within the July – December survey period for Carnaby's Cockatoo and August – January survey period for Baudin's Cockatoo in the Jarrah Forest, as recommended in DAWE (2022). Although the survey occurred outside the peak season for the Forest Red-tailed Black-cockatoo, the survey guidelines state that surveys for this species can be done any time of the year (DAWE 2022). Spring is also a time of peak activity for the general bird assemblage.

2.6.3 Habitat Assessment and Mapping

Habitat assessments were undertaken at 102 points across the study area (Figure 6, Appendices 2 and 3). At each habitat assessment point the following were recorded:

- Site designation and GPS co-ordinates
- Representative photographs
- Habitat name
- Landform
- Vegetation (brief description of structure and dominant species, if known)
- Evidence of fire
- Disturbance (e.g., weeds, grazing, firewood collection)
- Soil colour and type
- Rock type and presence of any outcropping
- Important habitat elements, including, but not limited to the presence of:
 - Leaf litter accumulations
 - Woody debris and logs
 - Tree hollows or crevices
 - Soils suitable for burrowing
 - Long-unburnt vegetation
 - Caves or rock crevices
 - Dense shelter vegetation
 - Important plant species for conservation significant fauna
- Presence of wetlands
- Any fauna

The fauna habitats of the study area were identified and mapped using the habitat assessments and observations made in the field during the fauna survey, interpretation of vegetation mapping (Mattiske Consulting 2024), aerial photography and land system mapping.



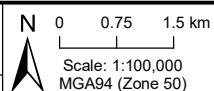
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Date: October 2025

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Author: J. Wilcox



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Kojonup Wind Farm Habitat assessment sites

Figure:

6

2.6.4 Bird Utilisation Survey

Bird survey sites were at proposed turbine locations ('impact sites') and in the surrounding area ('reference sites') (Appendix 2, Figure 7). Three turbine locations were deleted from the proposed layout after the first survey, and data from these sites were included as reference data only (sites A34 – A36). The number of survey sites varied between surveys as site conditions rendered some sites inaccessible at times. There were 33 impact sites in November 2023 (K01 – K33), 29 in August 2024 and 32 in November 2024. Reference sites were added in August 2024, with eight sites sampled (C01 – C08) in both August and November 2024. Reference sites were chosen using aerial photography and contours, to choose sites that had similar characteristics as the impact sites, including visibility, proximity to vegetation and height in the landscape.

Each site was surveyed on four occasions, two in the morning and two in the afternoon (except when vehicle movement bans prohibited site access). Each bird survey was undertaken for 20 minutes by a single observer. All birds seen or heard within 200m of the observer were recorded, and the flight height was recorded as one of the following categories:

- Below rotor swept area (RSA) (0 – 50m)
- At RSA (50 – 200m)
- Above RSA (>200m)
- Not observed flying

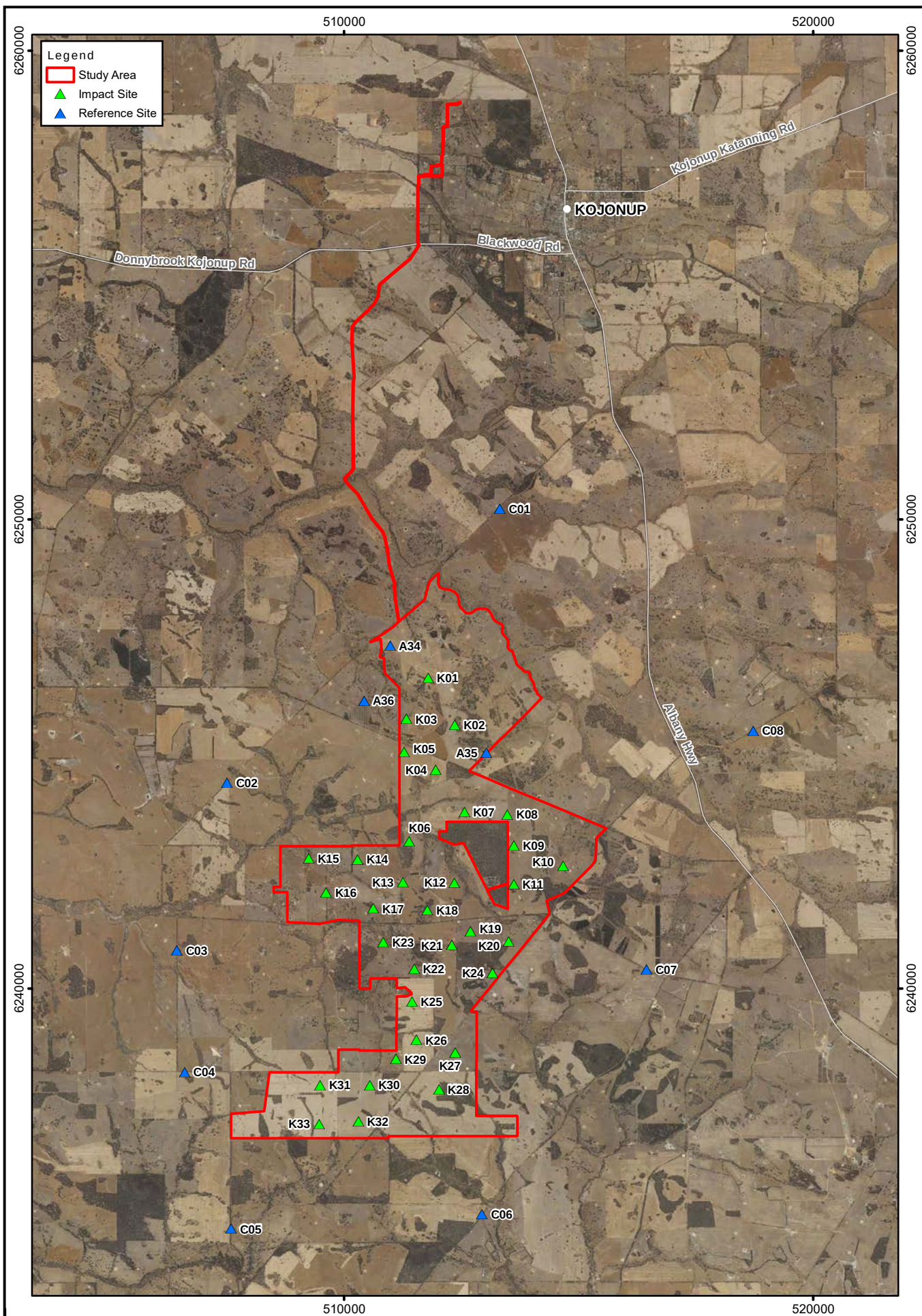
Birds recorded as 'not observed flying' were either perched for the duration of the survey, heard only or moving entirely within vegetation and therefore deemed not to be crossing open habitat. Birds observed outside of the survey area were recorded as opportunistic observations.

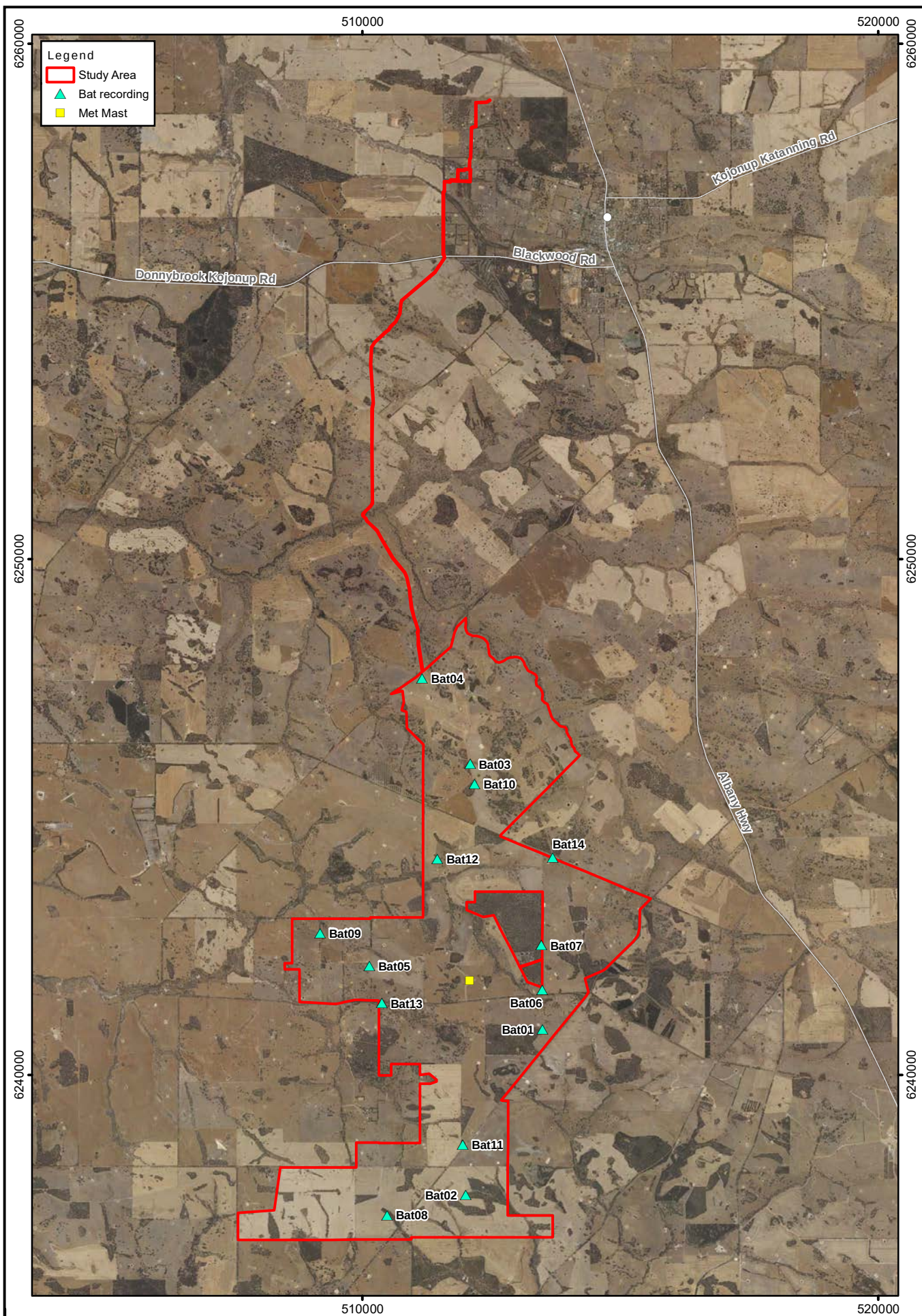
As black-cockatoos were considered a key group of species, flight paths were recorded both during bird surveys and opportunistically whenever these species were encountered. Flight paths were recorded manually onto paper maps in the field and later transcribed into a spatial dataset. For each flight path, the date, time, number of birds, flight height (as per the above categories) and direction was recorded.

2.6.5 Bat Utilisation Survey

To identify the bat assemblage present in the study area, bat calls were recorded using Anabat Swift or Anabat Ranger call detectors placed a metre above the ground and set to record between dusk and dawn. Detectors were deployed 3 – 4 nights at each sampling site to give a total of 22 nights of recordings across six sites in November 2024, and 16 nights recordings across four sites each in August and November 2024 (Appendix 2, Figure 8). The calls were then analysed by Specialised Zoological (2024, 2025), and the bat calls identified to species level where possible (Appendix 7).

To measure the difference in bat activity between ground level and the RSA, a pair of bat detectors was placed with one at 75m and one at the base of a metrological mast (met mast). Bats were sampled at the met mast in December 2024 (16 nights) and May 2025 (18 nights). The methods of data analysis are described in Specialised Zoological (2025) in Appendix 7.





2.6.6 Cockatoo Habitat Survey

The habitats of the study area were assessed for the potential to support one or more of the following Threatened black-cockatoo species:

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

The study area was examined for the presence of vegetation types or plant species known to constitute cockatoo foraging habitat and any evidence of foraging such as chewed fruits or flowers. Overall foraging habitat quality was determined using the scoring tool in DAWE (2022). Any evidence of roosting, such as aggregations of scats and feathers, or potential roost sites were recorded with a GPS location.

In the referral guidelines, breeding habitat for cockatoos is defined as habitat that contains known, suitable or potential nesting trees (DAWE 2022). Potential nesting trees are those that have a suitable diameter at breast height (DBH) to develop a nest hollow (usually a minimum of 30 – 50cm), but do not currently have hollows. A suitable nest tree has a suitable nesting hollow present, and a known nesting tree is one where breeding or evidence of breeding has been recorded (DAWE 2022).

Known, suitable or potential nesting trees were recorded for part of the study area, and this work is on-going. Trees were recorded by measuring the DBH for all Jarrah (*Eucalyptus marginata*) and Marri (*Corymbia calophylla*) trees that had a DBH $\geq$ 50cm and for all Wandoo (*Eucalyptus wandoo*) trees that had a DBH $\geq$ 30cm. Each tree was examined from the ground for the presence of existing hollows. All trees that met the DBH criterion were recorded with a GPS location, the tree species (if known) and whether live or dead. The tree hollows were classified into the following categories:

- Category 1 = Tree occupied by breeding cockatoos ('known nesting tree' according to DAWE 2022).
- Category 2 = Tree contains hollow/s potentially suitable for cockatoos and shows evidence of use by cockatoos (e.g., chew marks) ('known nesting tree' according to DAWE 2022).
- Category 3 = Tree contains hollow/s potentially suitable for cockatoos ('suitable nesting tree' according to DAWE 2022).
- Category 4 = Tree contains hollow/s suitable for other fauna, but none potentially suitable for cockatoos ('potential nesting tree' according to DAWE 2022).
- Category 5 = No visible hollows ('potential nesting tree' according to DAWE 2022).

As hollows were viewed from the ground, no determination could be made of hollow depth, thus the approach of defining all hollows as 'potential'. Any evidence of Feral Bees (*Apis mellifera*) or hollow use by other fauna was also recorded.

Cockatoo foraging habitat was mapped into the following categories:

- Minimal foraging habitat
- Pine plantation
- Woodlands unlikely to be foraging habitat
- Woodlands with Jarrah
- Woodlands with Jarrah and Sheoak
- Woodlands with Marri
- Woodlands with Marri and Jarrah
- Woodlands with Marri and Sheoak
- Woodlands with Marri, Jarrah and Sheoak
- Woodlands with Marri, Jarrah and understory vegetation
- Woodlands with Sheoak

2.6.7 Opportunistic Records

At all times, observations of fauna were noted when they contributed to the accumulation of information on the fauna of the site. These included casual observations of reptiles, mammals and birds seen while travelling between sites or while undertaking other activities. Opportunistic observations were recorded to a general location for common species, and conservation significant species were recorded with a GPS location.

2.7 Assessment of Conservation Significance

2.7.1 Legislative Protection for Fauna

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) is the Commonwealth Government's primary piece of environmental legislation. Listed under Part 3 of the EPBC Act are 'Matters of National Environmental Significance' (MNES); these include threatened species, threatened ecological communities and migratory species. Threatened fauna species are assessed against categories based on International Union for Conservation of Nature (IUCN) criteria.

The migratory species listed under the EPBC Act are those recognised under international agreements. These agreements are the China-Australia Migratory Bird Agreement (CAMBA), the Japan-Australia Migratory Bird Agreement (JAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA), or species listed under the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) for which Australia is a range state.

Matters of National Environmental Significance (MNES) include the following categories:

- **Extinct in the wild (EW):** Taxa known to survive only in captivity.
- **Critically Endangered (Cr):** Taxa facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered (En):** Taxa facing a very high risk of extinction in the wild in the near future.
- **Vulnerable (Vu):** Taxa facing a very high risk of extinction in the wild in the medium-term future.
- **Migratory (Mi):** Taxa listed under international agreements to which Australia is a party.

Reports on the conservation status of most vertebrate fauna species have been produced by the federal Department of Climate Change, Energy, the Environment and Water (DCCEEW) in the form of Action Plans. An Action Plan is a review of the conservation status of a taxonomic group against IUCN categories. Action Plans have been prepared for amphibians (Tyler 1998), reptiles (Cogger *et al.* 1993), lizards and snakes (Chapple *et al.* 2019), birds (Garnett and Barker 2021) and mammals (Woinarski *et al.* 2014). These publications also use categories similar to those used by the EPBC Act. The information presented in some of the earlier Action Plans may be out of date due to changes since publication.

The *Biodiversity Conservation Act 2016* (BC Act) is State legislation that aims to conserve and protect biodiversity and biodiversity components in Western Australia, including threatened fauna. It is administered by the Department of Biodiversity, Conservation and Attractions (DBCA). In addition to threatened fauna, the BC Act has scope to protect threatened ecological communities and important habitats.

Fauna species are listed under the BC Act as threatened species using IUCN categories, or as specially protected species, as described below.

Threatened Species:

- **Extinct in the wild (EW):** Taxa known to survive only in captivity.
- **Critically Endangered (Cr):** Taxa facing an extremely high risk of extinction in the wild in the immediate future.
- **Endangered (En):** Taxa facing a very high risk of extinction in the wild in the near future.
- **Vulnerable (Vu):** Taxa facing a very high risk of extinction in the wild in the medium-term future.

Specially Protected Species:

- **Migratory (Mi):** A subset of the migratory fauna that are known to visit Western Australia that are protected under the international agreements or treaties, excluding species that are listed as Threatened species.
- **Conservation dependent fauna (CD):** Fauna of special conservation need being species dependent on ongoing conservation intervention to prevent it becoming eligible for listing as threatened
- **Other specially protected species (OS):** fauna in need of special protection to ensure their conservation.

Priority species are not listed under State or Commonwealth Acts. In Western Australia, DBCA maintains a list of Priority Fauna made up of species that are possibly Threatened but do not meet adequacy of survey requirements or are otherwise data deficient. There are four levels of Priority as defined by DBCA, as listed below.

- **Priority 1:** Poorly known species (on threatened lands)
- **Priority 2:** Poorly known species in few locations (some on conservation lands)
- **Priority 3:** Poorly known species in several locations (some on conservation lands)
- **Priority 4:** Rare, near threatened and other species in need of monitoring

2.7.2 Levels of Conservation Significance in this report

Five levels of conservation significance are used within this report to indicate the level of significance of fauna species, according to the following criteria:

- **Threatened (T):** Taxa listed as Extinct in the Wild, Critically Endangered, Endangered or Vulnerable under the EPBC Act and/or BC Act. These species are grouped as they are all species considered to be at risk of extinction, are often rare and are likely to be subject to on-going threatening processes.
- **Migratory (Mi):** Taxa listed as Migratory under the EPBC Act and/or BC Act, excluding those species also listed as threatened. These species are grouped as they are not necessarily rare, but may be dependent on specific habitats for a portion of their life-cycle. For these species, loss of important foraging, breeding or stop-over sites may have a disproportionately large impact on populations.
- **Specially Protected (OS or CD):** Taxa listed as Other Specially Protected Species or Conservation Dependent Fauna under the BC Act. These species are not necessarily rare, but may be dependent on on-going conservation to ensure their protection.
- **Priority (P):** Taxa listed as Priority by DBCA. These species are grouped as they are either conservation dependent or data deficient and in need of further survey.

2.8 Likelihood of Occurrence

Fauna of conservation significance were assessed and ranked for their likelihood of occurrence in the study area, according to the criteria in Table 3.

Table 3. Criteria for assessing likelihood of occurrence.

Likelihood	Criteria
Unlikely	- The study area is outside the current known distribution of the species as presented in the literature. - No suitable habitat was identified as being present during the field survey. - For some species, individuals may occur occasionally as vagrants, especially if suitable habitat is located nearby, but the study area itself would not support the species. - May include species generally accepted as being locally extinct.
Possible	- The study area is within or just outside the current known distribution of the species, as presented in the literature. - Any habitat present is either limited in extent or of marginal quality at best. - No recent or nearby records of the species on databases. - The species is generally known to be less common in the vicinity of the study area (e.g., for inland sites, where the species usually occurs on the coast).
Potential	- The study area is within the current known distribution of the species, as presented in the literature. - Habitat of reasonable quality was identified as being present during the field survey. - There are some recent and/or nearby records of the species of databases.
Likely	- The study area is well within the current known distribution of the species, as presented in the literature. - Habitat of good quality was identified as being present during the field survey. - Many recent and nearby records of the species on databases.
Known to occur	- The species was positively identified in the study area during this field survey or recorded as occurring in the study area on previous recent field surveys. - Note that for a species 'known to occur', the habitat may still be marginal and therefore the population may be small, or the species may visit the site irregularly.

2.9 Bird and Bat Risk Assessment

The risk of turbine collision was estimated for all species of bat, all conservation significant birds and categories of birds considered at risk of collision. Collision-risk species were considered to potentially include:

- Diurnal birds of prey
- Nocturnal birds of prey
- Waterbirds (only species recorded in the study area were assessed)
- Shorebirds (only species recorded in the study area were assessed)
- Any bird recorded flying at RSA height in this survey

The likelihood and consequence criteria used to determine risk are adapted from Lumsden *et al.* 2019, *Onshore Wind Farms – interim guidance on bird and bat management* (DAWE 2021) and a review of the literature (e.g. Thaxter *et al.* 2017, Perhold *et al.* 2020, Barrios and Rodriguez 2004, Ribeiro *et al.* 2022 and Stewart *et al.* 2007).

The risk was estimated using six factors to determine the likelihood of a mortality (Table 4) and four factors to determine the consequences of those mortalities on the population of the species (Table 5). It is important to note that the data for many species is incomplete. In particular, records of mortalities incurred at other wind farms in Australia are often not available in the public domain, making it difficult to distinguish between species that *may* be at risk due to ecological or behavioural factors, and those that are *known* to be at risk due to mortality incurred at other sites. Similarly, the demographic resilience of populations is generally inferred, as empirical studies have not been undertaken.

Once the overall risk levels for the likelihood and consequence of mortality specific to the Project had been assigned for a species, the results were then placed into a risk matrix to determine the level of risk (Table 6). The risk matrix should be considered a guide rather than a predictive tool, recognising that bird and bat behaviours are varied and complex and that at times the data available to assess likelihood and consequence rankings are incomplete. Where insufficient data were available, the precautionary principle was applied and a higher ranking selected.

Table 4. Likelihood factors.

Likelihood factors	Ranking		
	Low Loss of individuals unlikely	Moderate Some loss of individuals	High Loss of many individuals
Flight height Known or likely frequency of flights within rotor-swept area (RSA)	Species rarely flies within RSA (<50m or >200m above ground).	Species does fly within the RSA (50 – 200m above ground), although the bulk of their flights are below the RSA (<50m).	Species regularly flies within the RSA (50 – 200m above ground).
Flight behaviour Species may exhibit flight behaviour that makes individuals more or less likely to avoid turbines. For bats, species with a higher wing aspect ratio and high wing loading are at greater risk.	Species flies slowly and/or has high manoeuvrability and/or does not soar. Bats with a low wing aspect ratio and low wing loading	Species flies at moderate speed and/or has moderate manoeuvrability and/or occasionally soars. Bats with a moderate wing aspect ratio and moderate wing loading.	Species flies fast and/or has low manoeuvrability and/or regularly soars. Bats with a higher wing aspect ratio and high wing loading.
Status in study area Species that are common in the study area are at greater risk than those that occur occasionally.	Likelihood of occurrence is possible (see Table 3).	Likelihood of occurrence is potential (see Table 3).	Likelihood of occurrence is likely or known to occur (see Table 3).
Habitat preference Species that occur in open habitats where turbines are sited are at greater risk than species that occur in closed habitats.	Species inhabits closed habitats such as woodlands, rarely entering open areas.	Species usually use closed habitats, but sometime use open habitats, regularly traversing open areas between occupied habitat patches.	Species regularly or usually occurs in open habitats.
Migration Migratory species or species that undertake regular daily movements through the wind farm site potentially have an increased risk of mortality.	Species is sedentary, does not undertake seasonal migration or regular movements between roosting and foraging areas.	Species undertakes regular daily movements in some seasons; wind farm site is not within a regular migration path.	Species is known to make regular or seasonal movements through the wind farm site, including movements of migratory shorebirds or waterbirds between wetlands.
Known wind farm mortalities Species known to have been subject to mortalities at other wind farm projects may be at greater risk of mortality.	No or very few losses reported at other wind farm projects.	Some losses reported at other wind farm projects.	Large losses reported at other wind farm projects.

Table 5. Consequence factors.

Consequence factors	Ranking			
	Negligible No population impact likely	Low Potential impact to local population	Moderate Potential impact to regional population	High Potential impact to total population
Geographic population concentration Highly localised or concentrated population (for whole or part of lifecycle), such that siting of wind farm could have significant consequence to regional, national or international population.	Species that are widely dispersed within areas of suitable habitat and the habitat itself is relatively widespread.	Species that are relatively widespread but may exhibit temporary congregatory behaviour in response to seasonal events such as peak flowering.	Species, such as some shorebirds, that may be more widespread or have greater flexibility in the range of suitable habitat availability, but where a high proportion of the population is likely to be concentrated at sites where they do occur.	Species that congregate, e.g. bats with major aggregations at a few caves, birds that have very restricted distributions or may be seasonally concentrated at very few small locations, such as congregatory waterbirds.
Demographic resilience Impact on population relative to demographic capacity to replace fatalities (i.e. generalised combination of dispersal capacity of potential replacements, fecundity and generation time).	Species that form breeding territories and that have a reasonable proportion of the population as non-breeding 'floaters' that can rapidly replace breeding territorial adults if lost; species that may or may not form breeding territories and that are short-lived and have high fecundity; species that have capacity for long-range or widespread juvenile or sub-adult dispersal.	Species that form breeding territories with a moderate capacity to replace lost breeding adults; species that have modest life-spans with moderate fecundity; species with a capacity for moderate dispersal distances of juveniles or sub-adults.	Species that form breeding territories with some capacity to replace lost breeding adults; species that have moderately long life-spans with modest fecundity; species with capacity for modest dispersal distances of juveniles or sub-adults.	Species that form breeding territories where there is limited capacity for a lost breeding adult to be readily replaced; species that do not form breeding territories and that are long-lived and/or have low fecundity; species that may have short-distance juvenile or sub-adult dispersal capacity only.
Population size Estimated size of population of which the species is a part (Western Australian, Australian or global).	Total population is >100,000	Total population is 20,000 – 100,000 individuals.	Total population is 5,000 – 20,000 individuals.	Total population is <5,000 individuals.

Table 5 (cont.)

Consequence factors	Ranking			
	Negligible No population impact likely	Low Potential impact to local population	Moderate Potential impact to regional population	High Potential impact to total population
Listed conservation status Highest level of conservation status under the EPBC Act, BC Act, DBCA Priority list or in current Action Plans.	No conservation listing.	Other Specially Protected Fauna or Conservation Dependent under the BC Act, DBCA Priority listed, Data Deficient or Near Threatened.	Vulnerable species	Endangered or Critically Endangered species.

Table 6. Risk Matrix

		Consequence of mortality			
		Negligible	Low	Moderate	High
Likelihood of mortality	Low	Negligible	Negligible	Minor	Moderate
	Moderate	Negligible	Minor	Moderate	High
	High	Minor	Moderate	High	Very High

3. Survey Limitations

Various factors can limit the effectiveness of a fauna survey. Pursuant to EPA Technical Guidance (EPA 2020), these factors have been identified and their potential to impact on the effectiveness of the surveys has been assessed in Table 7. All fauna surveys have limitations, and not all fauna species present on the site are likely to be sampled during a survey. Fauna may not be recorded because they are rare, they are difficult to trap or observe, or because they are only present on the site for part of the year.

Table 7. Fauna survey limitations.

Potential Limitation	Extent of limitation for the fauna survey
Availability of data and information	Somewhat Limiting. Although the study area is within the south-west, it is in a relatively understudied area compared to the more forested regions to the west and regions with higher levels of mining development. When assessing risk of impact to birds and bats, basic data on individual species are often unavailable or extrapolated from general traits, and data on previous mortalities at wind farms are sparse in the public domain. No data on impacts of wind farms on black-cockatoos could be sourced in the public domain.
Competency/experience of the survey team, including experience in the bioregion surveyed	Not Limiting. Key personnel have over 20 years' experience with fauna surveys in Western Australia and are experienced with bird and bat surveys. All personnel have undertaken previous surveys in the Jarrah Forest Bioregion and the wheatbelt region of Western Australia.
Scope of survey (e.g., faunal groups excluded from the survey)	Minor Limitation. The survey covered all vertebrate faunal groups. Few reptiles or terrestrial mammals were recorded, but this is consistent with basic fauna surveys of this type. Recording flight heights of nocturnal birds was not undertaken and is considered a challenging task. This is consistent with other wind farm bird surveys.
Timing, weather and season	Minor Limitation. The timing of the survey was consistent with that recommended in the Technical Guidelines (EPA 2020) and DAWE (2022). The weather during the survey was warm to hot and suitable for observing birds, although moderate breezes may have decreased flight activity by smaller birds. Hot weather and a vehicle movement ban on one day resulted in reduced surveys on one afternoon in the November 2023 survey. Wet site conditions made some sites inaccessible for the August 2024 survey.
Disturbance that may have affected the results	Not Limiting. Study area is within farmland, but no unusual disturbances were noted.
The proportion of fauna identified, recorded or collected	Not Limiting. The field component of the survey was supported with a literature review and a relatively high proportion of the potentially occurring birds were recorded. Few reptiles or terrestrial mammals were recorded, but this is consistent with basic fauna surveys of this type.
The adequacy of the survey intensity and proportion of survey achieved (e.g., extent to which the area was surveyed)	Not Limiting. The intensity and coverage of the fauna survey was adequate and appropriate for the level of survey. A representative portion of all habitats were visited during the survey. Bird surveys were undertaken at all proposed turbine locations.
Access problems	Not Limiting. All habitats were readily accessible by vehicle and/or on foot and a representative portion of each habitat was able to be surveyed.
Problems with data and analysis, including sampling biases	Not Limiting. No complex analyses were undertaken, and no problems were noted.

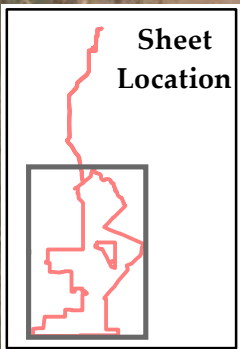
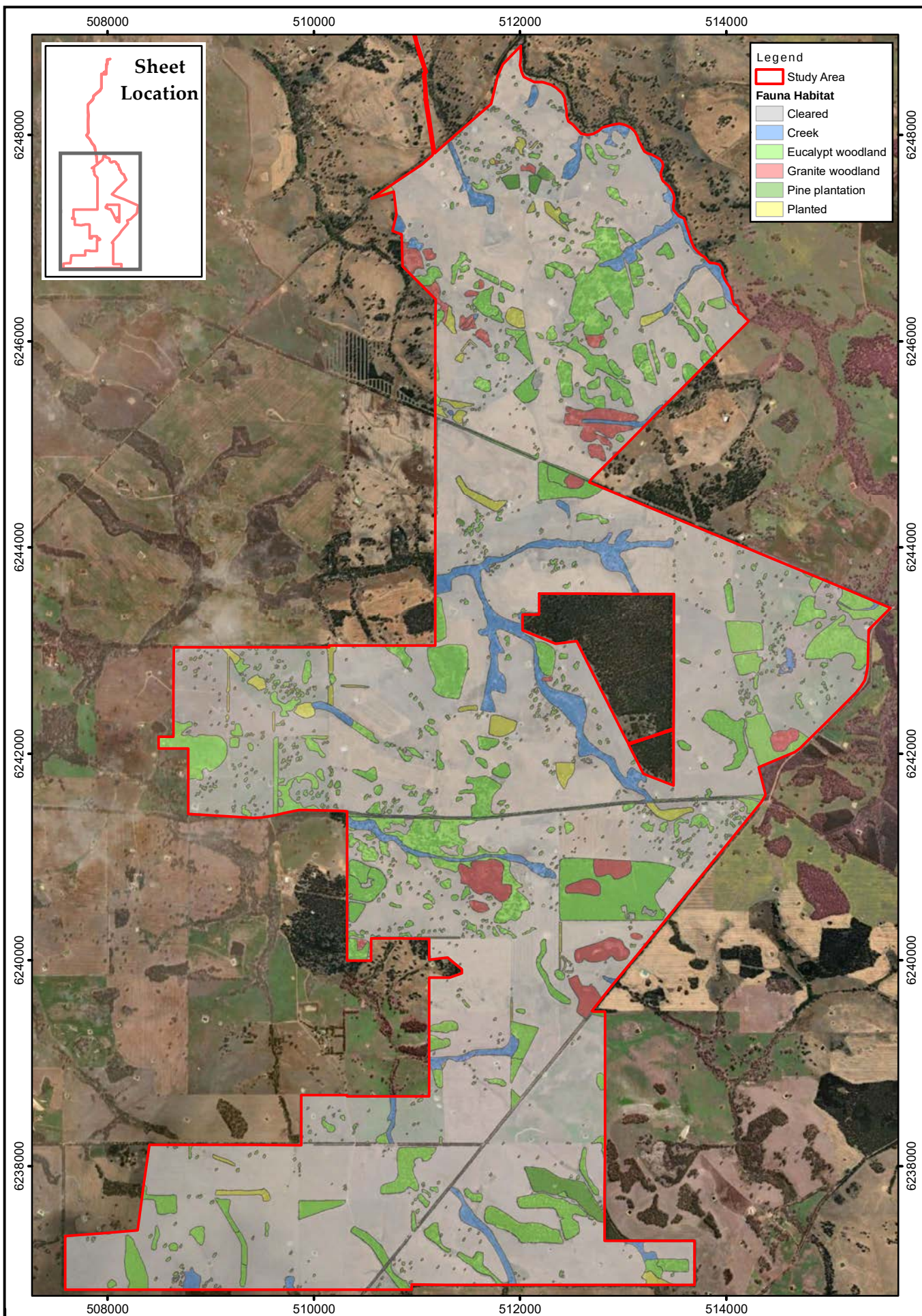
4. Fauna Habitat

4.1 Habitats of the Study Area

Six fauna habitats were identified in the study area (Table 8, Figure 9). Each habitat is described further in the following sections. The majority of the study area (76.4%) is cleared, and the remaining habitats are relatively common in the region. The main disturbances present are those that commonly occur in agricultural regions where the majority of the native vegetation has been cleared. The remaining vegetation occurs as isolated paddock trees and in patches of various size and are impacted by loss of understory habitat through livestock trampling, weed invasion, feral predators, feral herbivores, historical ring-barking of trees for timber and timber cutting for firewood.

Table 8. Fauna habitats in the study area.

Habitat	Key Habitat Elements	Area (ha)
Eucalypt woodland	- Tree hollows provide nesting and shelter habitat for arboreal mammals and reptiles and nesting habitat for birds. - Fallen logs provide shelter habitat. - Where present, Marri and Jarrah in the canopy and Hakea or Banksia spp. in the understory provide food-plants for Threatened Black-cockatoos.	608.1 (15.9%)
Granite woodland	- Dense vegetation surrounding outcrops provide shelter habitat for birds. - Ephemeral pools and run-off areas provide breeding habitat for frogs. - Where present, Marri and Jarrah in the canopy and She-oak in the understory provide food-plants for Threatened Black-cockatoos.	78.2 (2.0%)
Creek	- Creeks may provide ecological linkages. - Creeks provide breeding habitat for frogs. - Where present, Marri and Jarrah in the canopy provide food-plants for Threatened Black-cockatoos.	144.2 (3.8%)
Pine plantation	Pines provide food-plants for Threatened Carnaby's Cockatoo.	19.9 (0.5%)
Planted	Planted vegetation may provide ecological linkage in the absence of remnant native vegetation.	49.9 (1.3%)
Cleared (includes farm dams)	- Cleared areas provide foraging habitat for aerial birds, including birds of prey. - Farm dams provide breeding habitat for frogs. - Farm dams provide breeding habitat for a small number of common waterbirds.	2,916.4 (76.4%)
Total:		3,816.8



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Author: J. Wilcox

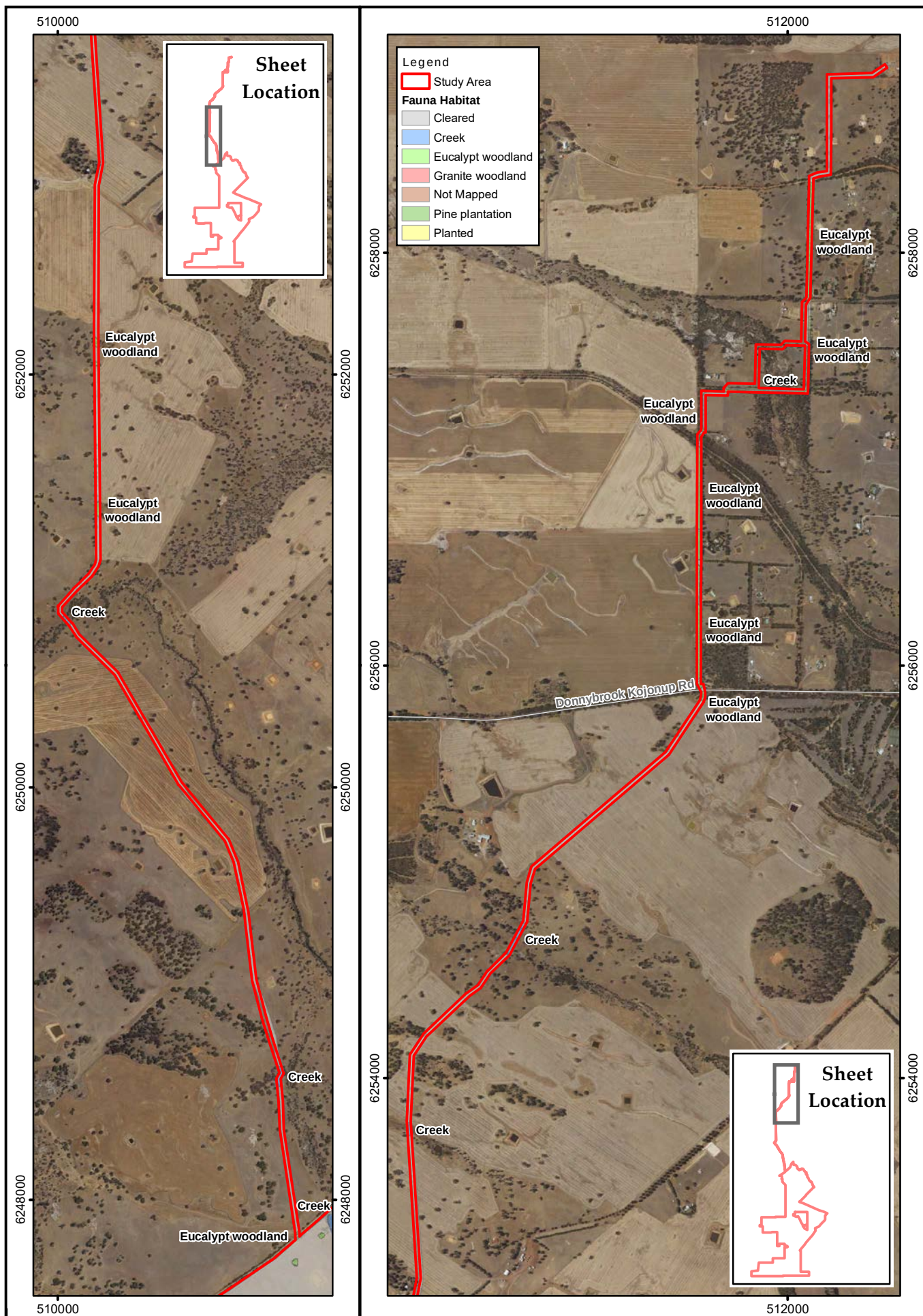
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**Kojonup Wind Farm
Fauna Habitats**

Figure:

9A



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Date: May 2026



0 200 400 m
 Scale: 1:25,000
 MGA94 (Zone 50)

Rev: A Author: J. Wilcox

**Western
 Wildlife**



**Kojonup Wind Farm
 Fauna Habitats**

Figure:

9B

4.1.1 Eucalypt Woodland

Eucalypt woodland occurs in remnant patches of various sizes, usually on low lateritic hills and rises, as the lower lying areas have been cleared for agriculture. The woodlands comprise mainly Wandoo (*Eucalyptus wandoo*), Jarrah (*Eucalyptus marginata*) and/or Marri (*Corymbia calophylla*) with Powderbark Wandoo (*Eucalyptus accedens*) on laterite rises (Plates 1 – 4). The understory in most patches is limited to native and introduced grasses with sparse low native shrubs, with small stands of *Banksia* and other shrubs in the larger patches. Understory vegetation remains in the two largest woodland patches of about 57ha.

This habitat is generally quite disturbed as the woodland patches are used as shelter for stock, a source of firewood and historically as a source of timber for building. In some areas all of the larger trees have been ring-barked, and although the dead trees still have value as many have hollows, these trees will gradually fall and it will take many years for new trees to bear hollows.

Conservation Significant fauna that may be associated with this habitat include, but are not limited to, the Red-tailed Phascogale (*Phascogale calura*: Vulnerable), Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*: Vulnerable), Carnaby's Cockatoo (*Zanda latirostris*: Endangered), Baudin's Cockatoo (*Zanda baudinii*: Endangered), Muir's Corella (*Cacatua pastinator pastinator*: Conservation Dependent), Inland Western Rosella (*Platycercus icterotis xanthogenys*: Priority 4), Brush-tailed Phascogale (*Phascogale tapoatafa*: Conservation Dependent) and Central Long-eared Bat (*Nyctophilus major tor*).



Plate 1. Eucalypt woodland with understory.



Plate 2. Eucalypt woodland with understory.



Plate 3. Eucalypt woodland without understory.



Plate 4. Eucalypt woodland on laterite rise without understory.

4.1.2 Granite Woodland

Small granite outcrops are surrounded by a dense woodland of Rock Sheoak (*Allocasuarina huegeliana*), with occasional Wandoo (*Eucalyptus wandoo*) over White Myrtle (*Hypocalymma angustifolium*) and sedges (Plates 5 - 7). Granite outcrops provide exfoliating rock and ephemeral pools as habitat for reptiles and frogs. Conservation Significant fauna that may be associated with this habitat include the Forest Red-tailed Black-cockatoo (*Calyptrorhynchus banksii naso*: Vulnerable) and Red-tailed Phascogale (*Phascogale calura*: Vulnerable).



Plate 5. Granite outcrop with Sheoak woodland.



Plate 6. Exfoliating rock on granite outcrop.



Plate 7. Granite woodland.

4.1.3 Creek

Small seasonal creeks occur in the shallow valleys on generally sandy-clay soils (Plates 8 – 10). The riparian zone supports an open woodland of Flooded Gum (*Eucalyptus rudis*), sometimes with Swamp Paperbark (*Melaleuca raphiophylla*) and Marri (*Corymbia calophylla*) on the higher ground, over Knotted Club-rush (*Ficinia nodosa*) and introduced grasses.

This habitat is generally very disturbed as the surrounding vegetation has been cleared for farming and it is accessible by livestock. The habitat is impacted by increasing salinity, weeds, grazing, trampling by livestock and lack of regeneration, resulting in a lack of native understory vegetation and a gradual loss of trees.

No Conservation Significant fauna species are particularly associated with the creek habitat, although some species may use it for dispersal and the Water-rat (*Hydromys chrysogaster*: Priority 4) may occur on occasion.



Plate 8. Creek.



Plate 9. Creek.



Plate 10. Creek.

4.1.4 Pine Plantation

Small parts of the study area are planted to pines (Plate 11). There are more extensive pine plantations adjacent to the study area. A Conservation Significant fauna species likely to be associated with this habitat is Carnaby's Cockatoo (*Zanda latirostris*: Endangered).



Plate 11. Pine Plantation.

4.1.5 Planted

Planted vegetation usually consisted of local or non-local eucalypts planted in rows with no understory (Plate 12). No Conservation Significant fauna species are particularly associated with planted vegetation, but some areas may provide habitat, depending on the species planted.



Plate 12. Planted vegetation.

4.1.6 Cleared Land

A large part of the study area is cleared land, generally used for cropping or pasture (Plate 13). A Conservation Significant fauna species that may be associated with this habitat is the Peregrine Falcon (*Falco peregrinus*: other specially protected fauna).

Farm dams also occur on cleared land and may support small numbers of frogs and waterbirds and provide habitat for drinking and bathing (Plate 14). No Conservation Significant fauna species are particularly associated with farm dams, although they may be used occasionally by the Water Rat (*Hydromy chrysogaster*: Priority 4) and Common Sandpiper (*Actitis hypoleucos*: Migratory).



Plate 13. Cleared land.



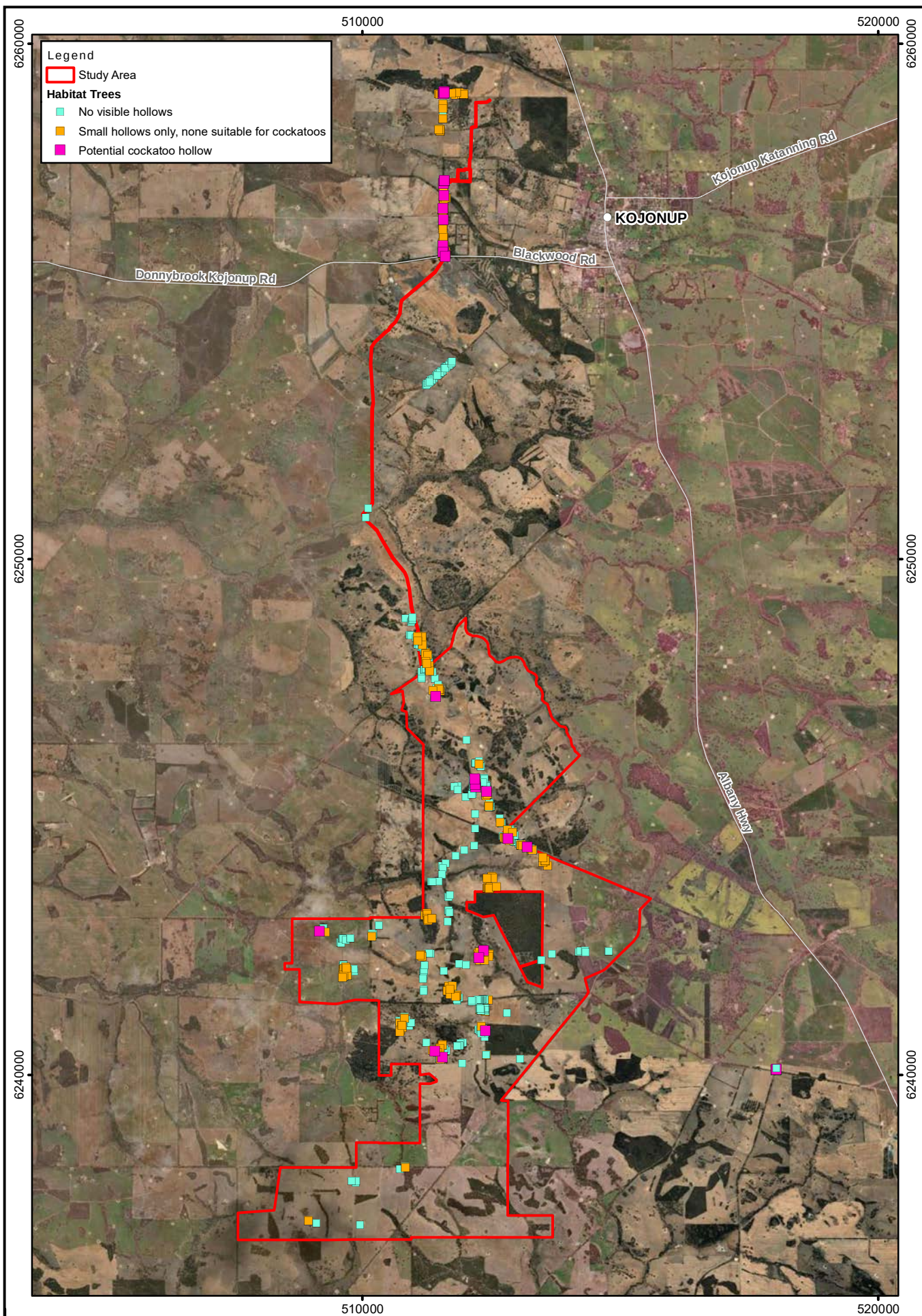
Plate 14. Farm dam on cleared land.

4.2 Habitat Trees

Although all trees potentially provide habitat for fauna, habitat trees in this context refers to potential, suitable or known nesting trees for Threatened black-cockatoos, as defined by (DAWE 2022). Habitat trees are likely to occur mostly in eucalypt woodlands, as well as granite woodlands, creeks and as isolated paddock trees in cleared areas (Plate 15). Habitat trees recorded thus far are shown on Figure 10. Habitat trees have mostly been recorded in the vicinity of the proposed transmission line and other infrastructure, and do not represent all of the habitat trees present in the study area. No known cockatoo breeding trees were recorded, but there were trees containing potentially suitable hollows.



Plate 15. Examples of potential nesting trees in the study area.



4.3 Important Habitats

All habitats have some importance in that they support native fauna, however, habitats may be of particular importance if they:

- support very diverse or unique faunal assemblages
- are restricted or rare in the region (and thus the faunal assemblages are restricted or rare)
- are refugia (e.g. from drought or fire)
- provide ecological linkage
- support conservation significant fauna

None of the habitats in the study area are likely to support a particularly unique faunal assemblage. The vertebrate fauna, although relatively diverse, are typical of the Bioregion.

Granite outcrops within the granite woodlands habitat are small but may act as refugia in the landscape and are relatively rare compared to other habitat types. As areas that were difficult to clear, granite outcrops often remain as habitat islands in an otherwise cleared landscape. The bare rock can provide protection from fire, and exfoliating rock provides moist microhabitats.

Despite being relatively degraded, the creek habitat is likely to function as an ecological linkage, as this may be some of the only remaining vegetation in some areas and occurs in linear corridors. In a largely cleared landscape, all remaining native vegetation is likely to play some role in ecological linkage. Even isolated patches can act as 'stepping stones' to allow movement of fauna through the landscape.

Although widespread in the region, eucalypt woodlands potentially provide important habitat for three Threatened black-cockatoos: Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*: Vulnerable), Carnaby's Cockatoo (*Zanda latirostris*: Endangered) and Baudin's Cockatoo (*Zanda baudinii*: Endangered). Both eucalypt woodlands and granite woodlands potentially provide important habitat for the Red-tailed Phascogale (*Phascogale calura*: Vulnerable).

5. Faunal Assemblage of the Study Area

5.1 Vertebrate Fauna Assemblage

The results of the literature review and field survey were combined to create a list of all the vertebrate fauna potentially occurring at in the study area (Appendix 4). Indicated in the fauna lists are all the species observed in the study area during the fauna survey and those recorded in the region as part of the literature review.

The potentially occurring vertebrate fauna assemblage is summarised in Table 9. The overall faunal assemblage is likely to be somewhat depauperate due to the extent of habitat loss, habitat fragmentation and the impacts of wood-cutting, grazing and feral predators on remaining habitat. In general, larger patches of habitat that retain understory are likely to support more species than small heavily-grazed patches. The faunal assemblage and conservation significant species likely to occur are further discussed in the sections below.

Table 9. Summary of vertebrate fauna predicted to occur in the study area.

Taxon	Total Species Predicted	Total Species Recorded	Conservation significant species			
			Threatened (T)	Migratory (Mi)	Specially Protected (OS,CD)	DBCA Priority (P)
Amphibians	12	2	-	-	-	-
Reptiles	46	4	-	-	-	-
Native Birds	147	78	4	2	2	3
Int. Birds	4	1	-	-	-	-
Native Mammals	29	9	3	-	1	7
Int. Mammals	5	2	-	-	-	-
Totals:	243	96	7	2	3	10

5.1.1 Amphibians

Up to 12 species of frog potentially occur in the study area (Appendix 4). Two frogs were opportunistically observed during the fauna survey. Creeks and ephemeral pools on granite outcrops potentially provide breeding habitat for frogs, as do farm dams in cleared areas. Many frog species burrow and forage in terrestrial environments, so may occur in the eucalypt woodlands and cleared areas, particularly where they are in close proximity to creeks.

5.1.2 Reptiles

Up to 46 species of reptile potentially occur in the study area, of which four were recorded opportunistically during the fauna survey (Appendix 4). Although not likely to represent the total assemblage, it is likely that the overall reptile assemblage is somewhat depauperate in most areas due to the effects of habitat loss, fragmentation and the actions of feral predators.

Eucalypt woodlands that retain understory vegetation, leaf litter, woody debris and logs are likely to be important for providing shelter to reptiles, as are granite outcrops with crevices and exfoliating rock. Larger, more mobile species such as the Bobtail (*Tiliqua rugosa*), Gould's Goanna (*Varanus gouldi*) and Dugite (*Pseudonaja affinis*) may be more resilient as they can move across cleared land between habitat patches and are able to use a variety of habitats including human-modified habitats (Plate 16). Fossorial species, such as Jan's Banded Snake (*Simoselaps bertholdi*), may be somewhat protected from predation due to their habits, as they shelter underground. Arboreal species, such as the Reticulated Velvet Gecko (*Hespeodura reticulata*) are likely to be restricted to eucalypt woodlands, where trees provide crevices and hollows for shelter.



Plate 16. Bobtail (*Tiliqua rugosa*).

5.1.3 Birds

There are 151 species of bird that potentially occur in the study area (147 native and four introduced), of which 79 species were recorded (Appendix 4). Most of the potentially occurring bird species have wide distributions through the south-west, many occurring in a variety of habitats.

The bird assemblage is likely to be typical of the woodlands of the region. About 49% of Western Australian wheatbelt bird species have declined in abundance and/or distribution (Saunders and Ingram 1995). Passerine birds appear particularly vulnerable, with up to 75% of wheatbelt species experiencing declines (Burbidge and Gole 2005). All remnant native vegetation in the wheatbelt is likely to be important for birds. The larger the area of remnant vegetation, the more bird species it is likely to support, and though areas of over 1,500ha are required to conserve a local avifauna, areas as small as 80ha can be important (Kitchener *et al.* 1982). The largest patch of eucalypt woodland habitat in the study area retains its understorey and is about 57ha, so is likely to support a relatively intact bird assemblage.

The bird assemblage is likely to include a suite of species that are resident in the study area, a second group that makes regular or nomadic movements into and through the study area. Resident species include many of the small insectivores such as fairywrens, whistlers and robins. Resident species are present all year, though their populations may fluctuate in response to environmental factors such as rainfall, drought and fire.

Birds that make regular seasonal movements include the Rainbow Bee-eater (*Merops ornatus*), cuckoos and some birds of prey. Honeyeaters and lorikeets also make seasonal or nomadic movements to take advantage of flowering events. Although not present all year, these species are likely to use the study area for foraging, breeding or shelter on a seasonal basis or when conditions are suitable.

5.1.4 Mammals

There are 34 species of mammal that potentially occur in the study area, of which 29 are native and five introduced (Appendix 4). A total of eleven species were recorded on this survey, of which nine were native and two introduced. Sheep (*Ovis aries*) and Cattle (*Bos taurus*) were present as livestock and were not included in totals of species recorded. The mammals recorded were limited to those sighted during the day, observations of secondary signs, and analysis of recorded bat calls, so it is likely that more species would be recorded with other methods.

The native mammal fauna of the study areas is likely to be depauperate when compared to the original mammal assemblage of the region, as there has been local extinction of many critical weight range mammals since European settlement. The habitats in the study area are patchy and fragmented, but even small patches may support some native mammals. Eucalypt woodlands with understory vegetation are more likely to support small ground-dwelling species such as the Little Long-tailed Dunnart (*Sminthopsis dolichura*), however, these species may persist even in degraded habitat if some cover remains, albeit in reduced numbers and species richness.

Six species of insectivorous bat were positively identified from their call (Appendix 7). Other species may be present but could not be unambiguously confirmed from their calls. Bats are likely to forage in woodlands and over water or cleared areas, roosting in tree hollows by day. As bats are very mobile, they can use roost sites in relatively small, isolated eucalypt woodland patches.

The Fox (*Vulpes vulpes*) was recorded in the study area and is likely to be common. The Fox is likely to predate upon native fauna, particularly small mammals and reptiles.

5.2 Vertebrate Fauna of Conservation Significance

A total of 22 vertebrate fauna of conservation significance may occur in the study area: seven Threatened, two Migratory, three Specially Protected/Conservation Dependant and ten Priority species. The likelihood of occurrence of each species is summarised in Table 10 and their ecology and habitat use are discussed in the sections below.

Conservation significant fauna recorded on this survey are shown in Figure 11. Conservation significant fauna recorded within 40km of the study area on DBCA's Threatened and Priority Fauna Database are shown in Figures 11, 13 and 14. Note that some of the points shown have been generalized by DBCA to protect the exact location of protected species, and that the distribution of records reflects survey effort, rather than just distribution of species. Figure 12 shows confirmed breeding and roosting sites for cockatoos (mainly Carnaby's) in the region surrounding the study area.

Nine species recorded on DBCA's Threatened and Priority Fauna Database were omitted from the list in Appendix 4 and the discussion below, although the records are still shown on Figures 13, 15 and 16. The Bilby (*Macrotis lagotis*; Vulnerable), Western Ringtail Possum (*Pseudocheirus occidentalis*; Critically Endangered) and Woylie (*Bettongia penicillata ogilbyi*; Critically Endangered) are locally extinct and only represented by historical record prior to 1935 (DBCA 2023). The Australasian Bittern (*Botaurus poiciloptilus*; Endangered) is represented by a single record from 1982 and inhabits shallow wetlands with dense sedges or rushes, a habitat that is absent from the study area. The Glossy Ibis (*Plegadis falcinellus*; Migratory) is also a bird of vegetated shallow freshwater wetlands that is an uncommon visitor to the region. The Blue-billed Duck (*Oxyura australis*; Priority 4) has been recorded from lakes in the region, but no suitably deep wetland habitat is present in the study area. The Red-necked Stint (*Calidris ruficollis*; Migratory), Red Knot (*Calidris canutus*; Migratory & Endangered) and Hooded Plover (*Thinornis cucullatus*; Priority 4) are shorebirds, the Red Knot represented by a single record from 1885. Although these mobile shorebirds may occur on occasion, the study area lacks habitat to regularly support these species.

Six species listed on the EPBC Act Protected Matters Search Tool (Appendix 5) were omitted from the list in Appendix 4 and the discussion below. The Curlew Sandpiper (*Calidris ferruginea*; Critically Endangered & Migratory), Grey Wagtail (*Motacilla cinerea*; Migratory), Sharp-tailed Sandpiper (*Calidris acuminata*; Vulnerable & Migratory) and Pectoral Sandpiper (*Calidris melanotos*; Migratory) are shorebirds, many of which prefer coastal habitats. These birds are highly mobile and may occur in the region on occasion, but there are no DBCA Threatened and Priority Fauna Database records of these species within 40km and the habitats of the study area are unlikely to regularly support shorebirds. The Southern Whiteface (*Aphelocephala leucopsis*; Vulnerable) and Grey Falcon (*Falco hypoleucos*; Vulnerable) are birds of the arid interior and the study area is outside their current known ranges as presented in the literature.

Table 10. Summary of conservation significant vertebrate fauna.

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

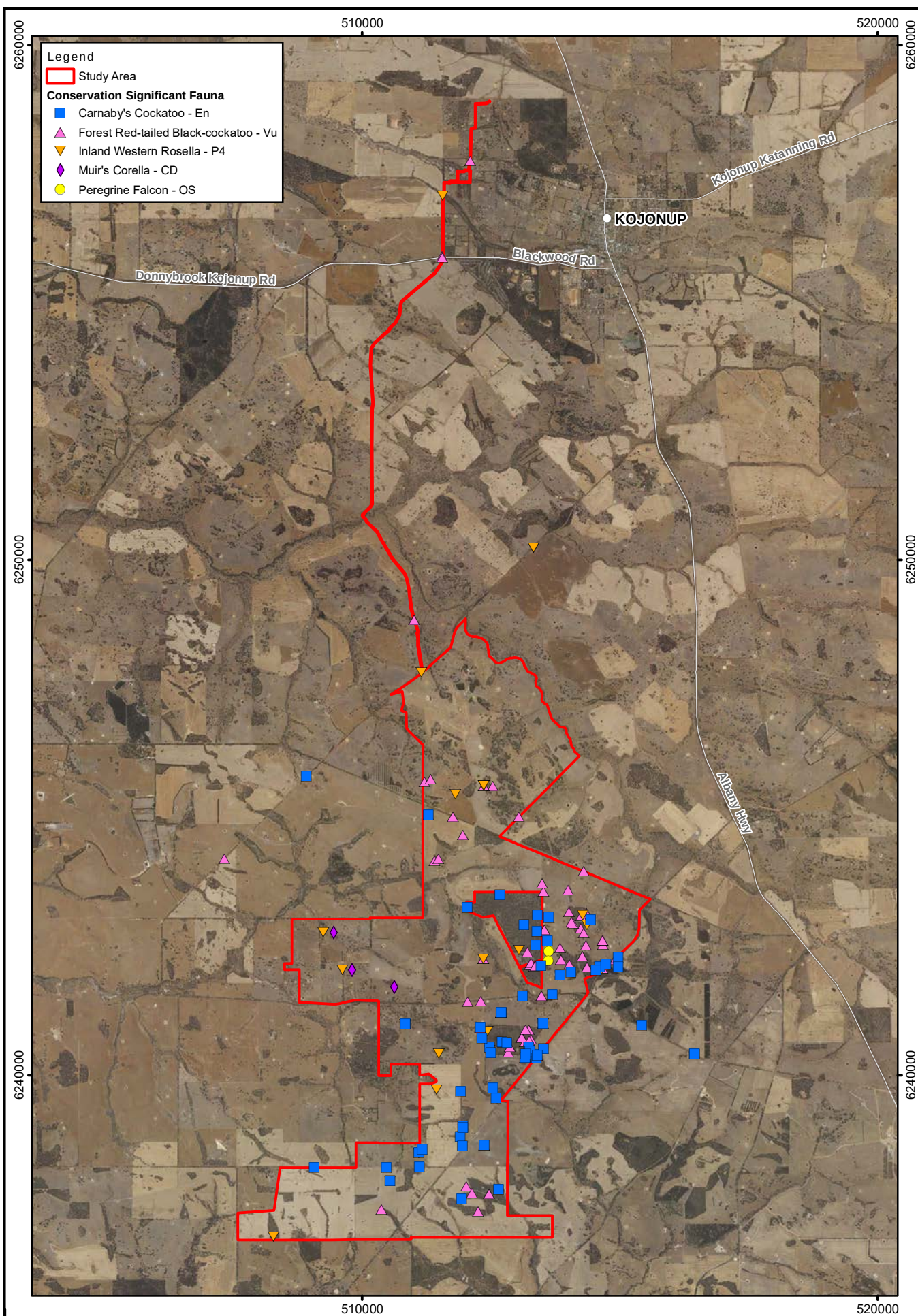
Species	Conservation Status			Likelihood of Occurrence	Summary Explanation
	EPBC Act	BC Act	DBCA Priority		
Threatened Species					
<i>Myrmecobius fasciatus</i> Numbat	En	En	-	Possible	This species possibly occurs on occasion but the majority of the records for this species in the region are historical and the majority of the eucalypt woodland habitat in the study area is unlikely to be suitable due to the complete lack of understory vegetation.
<i>Zanda latirostris</i> Carnaby's Cockatoo	En	En	-	Known to occur	Recorded in Nov 2023, Aug 2024, Nov 2024 and Dec 2025 (sighted and foraging signs). A seasonal visitor with some individuals present all year, this species forages in the study area, may roost in the study area and may breed in large eucalypt hollows.
<i>Zanda baudinii</i> Baudin's Black-Cockatoo	En	En	-	Potential	Potentially a seasonal visitor, this species may forage and/or roost in eucalypt woodlands in the study area and may possibly breed in large eucalypt hollows. The study area is on the eastern edge of the current distribution of the species.
<i>Calyptrorhynchus banksii naso</i> Forest Red-tailed Black Cockatoo	Vu	Vu	-	Known to occur	Recorded in Nov 2023, Aug 2024, Nov 2024 and Dec 2025 (sighted and foraging signs). A seasonal visitor with some individuals present all year, this species forages in the study area, may roost in the study area and may breed in large tree hollows.
<i>Dasyurus geoffroii</i> Chuditch	Vu	Vu	-	Potential	A very mobile species that is unlikely to be resident but potentially disperses through the study area on occasion.
<i>Leipoa ocellata</i> Malleefowl	Vu	Vu	-	Possible	This species may forage in the study area or use the vegetation as a corridor for movement, but disturbance to understory vegetation means it is unlikely that this species breeds in the study area.

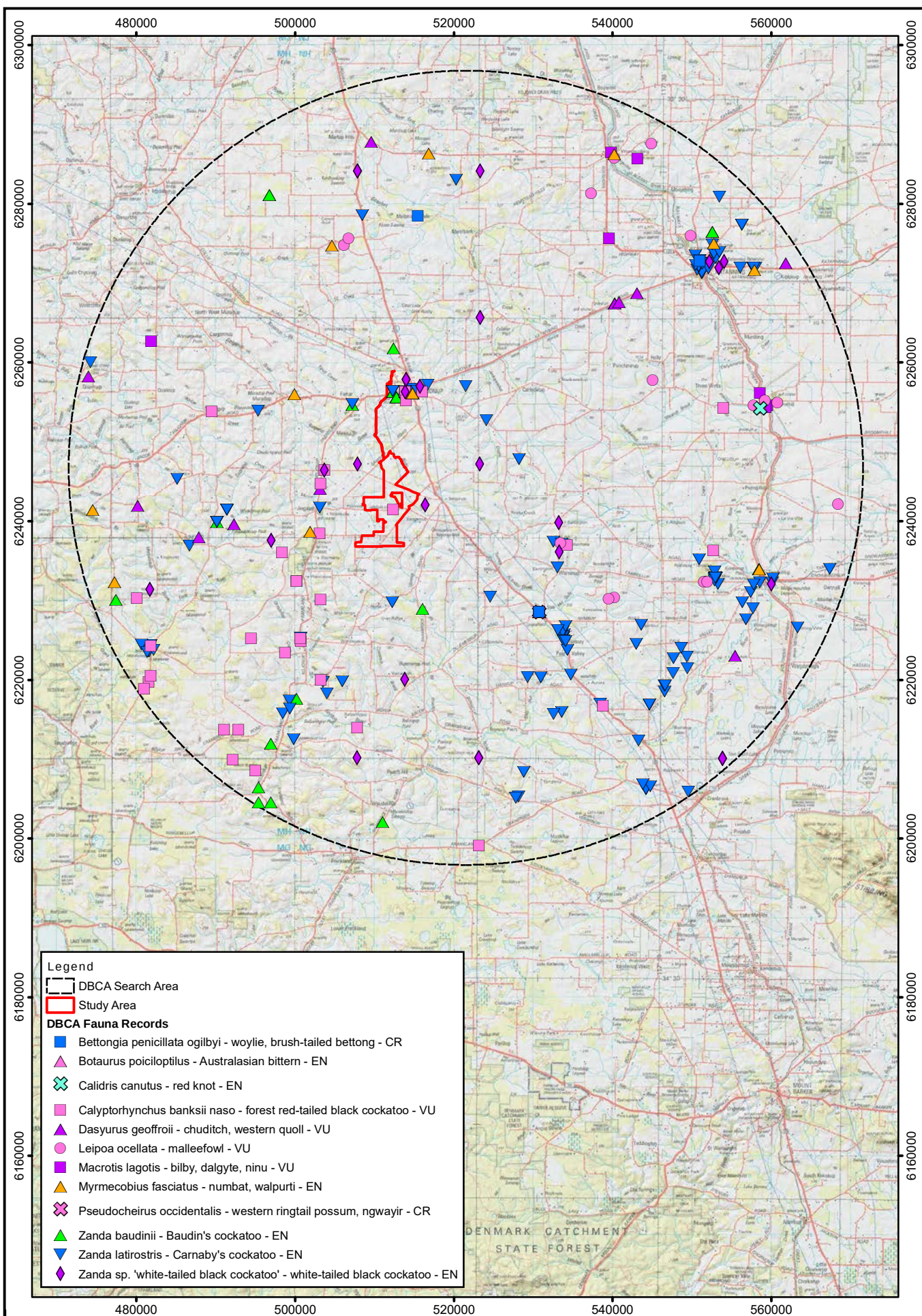
Table 10. (cont.)

Species	Conservation Status			Likelihood of Occurrence	Summary Explanation
	EPBC Act	BC Act	DBCA Priority		
<i>Phascogale calura</i> Red-tailed Phascogale	Vu	CD	-	Likely	The study area is within the core range of this species, there are several records in the surrounding area and there is potentially suitable habitat available in eucalypt woodlands.
Migratory Species					
<i>Actitis hypoleucos</i> Common Sandpiper	Mi	Mi	-	Possible	Single birds may occur on farm dams on occasion, but the study area is unlikely to provide important habitat or regularly support significant numbers.
<i>Apus pacificus</i> Fork-tailed Swift	Mi	Mi	-	Potential	May overfly study area but unlikely to use any habitat in the study area.
Specially Protected Fauna					
<i>Falco peregrinus</i> Peregrine Falcon	-	OS	-	Recorded	Recorded in Aug 2024 and Dec 2025 (sighted). Likely to forage over pasture and may breed in tall trees in or near the study area.
<i>Phascogale tapoatafa</i> Brush-tailed Phascogale	-	CD	-	Potential	There are several recent records within 5km of the study area and although much of the habitat is too fragmented to support this species, it potentially occurs in the larger patches with understory.
<i>Cacatua pastinator pastinator</i> Muir's Corella	-	CD	-	Recorded	Recorded in Aug 2024, Nov 2024 and Dec 2025 (sighted). The study area is on the north-eastern edge of this species range. Likely to occur in small numbers and may be a breeding resident.
DBCA Priority Fauna					
<i>Ninox connivens connivens</i> Barking Owl	-	-	P3	Possible	There are very few records of this species in the region, however, it possibly occurs as a foraging visitor and may breed in large hollows.
<i>Tyto novaehollandiae novaehollandiae</i> Masked Owl	-	-	P3	Possible	There are very few records of this species in the region, however, it possibly occurs as a foraging visitor and may breed in large hollows.

Table 10. (cont.)

Species	Conservation Status			Likelihood of Occurrence	Summary Explanation
	EPBC Act	BC Act	DBCA Priority		
<i>Nyctophilus major tor</i> Central Long-eared Bat	-	-	P3	Possible	There are few records of this species in the region and it is on the western edge of its known range, however, it possibly occurs, roosting and/or breeding in tree hollows.
<i>Falsistrellus mackenziei</i> Western False Pipistrelle	-	-	P4	Possible	Although known from the south-west, there are no nearby records of this species and it prefers old growth forest habitats.
<i>Platycercus icterotis xanthogenys</i> Inland Western Rosella	-	-	P4	Known to occur	Recorded in Nov 2023, Aug 2024, Nov 2024 and Dec 2025 (sighted). The eucalypt and granite woodlands of the study area are suitable for this species, and it is likely to be a breeding resident.
<i>Isodon fusciventer</i> Quenda	-	-	P4	Possible	Recent records in the region so possibly occurs in the study area, where dense vegetation, including weedy vegetation in creeklines, may provide habitat.
<i>Notamacropus eugenii derbianus</i> Tammar Wallaby	-	-	P4	Possible	Mostly represented by historical records in the region, may be locally extinct but possibly occurs in the vicinity of larger woodland patches.
<i>Notamacropus irma</i> Western Brush Wallaby	-	-	P4	Possible	Mostly represented by historical records in the region, may be locally extinct but possibly occurs in the vicinity of larger woodland patches.
<i>Hydromys chrysogaster</i> Water Rat	-	-	P4	Possible	There are few records of this species in the region and the habitats of the study area are only marginally suitable due to the lack of permanent waters, however, this species may occur on larger farm dams or use seasonal creeks when wet.
<i>Pseudomys occidentalis</i> Western Mouse	-	-	P4	Possible	There are a few records of this species in the region, all to the south east, and although it possibly occurs, the patches of the vegetation in the study area may be too small to support this species.





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Author: J. Wilcox

**Western
Wildlife**



**Kojonup Wind Farm
DBCA Threatened fauna records**

Figure:

12

5.2.1 Threatened Fauna

Threatened species are those that are considered in danger of extinction as their populations have declined and/or are still declining, and their total population size is small and/or fragmented or geographically restricted. Sites that support these species may be important for their long-term conservation, particularly if the site supports a resident or breeding population.

There are seven Threatened species that potentially occur in the study area (Table 10).

Numbat – *Myrmecobius fasciatus*

The Numbat is listed as Endangered under the BC Act and EPBC Act.

The Numbat is a diurnal marsupial that once ranged over much of southern semi-arid Australia but is now restricted to populations in the south-west of Western Australia (Woinarski *et al.* 2014). The population size is estimated at under 1000 individuals, and in decline (Woinarski *et al.* 2014).

Numbats almost entirely on termites and shelter in hollow logs, burrows and tree hollows, using a variety of habitats. The young are born in summer. In about July they are left in the burrow and juveniles emerge in September, becoming independent by October (Woinarski *et al.* 2014). Threats to the Numbat are predation by the Fox, Cat and raptors, habitat loss and fragmentation and inappropriate fire regimes that result in the loss of hollow logs as well as direct mortalities and increased predation rates (Woinarski *et al.* 2014).

There are 19 records of the Numbat in the vicinity of the study area on DBCA's Threatened and Priority Database (Figure 12, DBCA 2023). Most of the records are historical, with the most recent record being a dead individual from 2012 from a site about 30km west of the study area. There is also a 2005 sighting from Mardup (11km west of the study area) and two 1993 sightings from Katanning (45km northeast of the study area). Regionally, the Numbat is known to currently persist in the forest at Perup, east of Manjimup (Woinarski *et al.* 2014). It is possible that the Numbat disperses through the study area on occasion, but it's unlikely that the study area regularly supports the species. The Eucalypt Woodland understory is mostly absent, the woodland patches are not well connected and this species is likely to be more vulnerable to predation by foxes in this context.

Carnaby's Cockatoo – *Zanda latirostris*

Carnaby's Cockatoo is listed as Endangered under the BC Act and EPBC Act.

Carnaby's Cockatoo is endemic to the southwest of Western Australia, occurring mostly in the wheatbelt but also on the Swan Coastal Plain and wetter southwest (Johnstone and Storr 1998). The population size is estimated to be 40,000 birds (or possibly between 10,000 – 60,000) (Garnett *et al.* 2011), and there have been no recent estimates of population size (Garnett and Baker 2021).

Typically, Carnaby's Cockatoo breeds in the wheatbelt region of Western Australia, nesting in large hollows in smooth-barked eucalypts such as the Salmon Gum (*Eucalyptus salmonophloia*) and Wandoo (*Eucalyptus wandoo*). However, it has started breeding in areas further west and south than its traditional breeding range, including areas in the Darling Range and on the Swan Coastal Plain (Johnstone *et al.* 2005, Johnstone *et al.* 2011). Some of the Carnaby's Cockatoo population is resident (particularly in wetter areas) and some of the population moves west and south towards the coast after breeding (Johnstone and Storr 1998). Eggs are laid from early July to mid-October (Johnstone and Storr 1998).

A study of GPS-tagged Carnaby's Cockatoos at Coomallo Creek (200km north of Perth) and Borden (350km southeast of Perth) found that breeding birds foraged over two main periods of the day: 6 – 9AM and 3 – 6 PM, separated by a period of day roosting (Riley *et al.* 2023). Each day, birds travelled on average 5.98km from the breeding site, (up to a maximum of 13.55km) in order to forage at Borden, and 6.4km per day (up to a maximum of 11.11km) to forage at Coomallo Creek. Birds at Borden were noted to show clear movement paths along roads when transiting daily between patches of habitat (Shephard and Warren 2018). Similarly, birds tracked in the Pinjar Pine Plantation showed that birds avoided built-up urban areas and cleared land, preferring to move along vegetated areas, including road verges, parks and remnant patches (Shephard and Warren 2018). When travelling over cleared areas, birds flew faster and transited more quickly (Shephard and Warren 2018).

For non-breeding birds, average daily movement from a night roost site when foraging was 16km but ranged from 3 - 31.5km. Flocks appear to partition resources, foraging and roosting in non-overlapping areas. (Shephard and Warren 2018). Larger movements of just over 50km in a day were observed when flocks changed roost sites, and linear migration flights of birds towards breeding sites in the south and east were recorded in October (Shephard and Warren 2018).

Carnaby's Cockatoos forage on the seeds of a range of plant species, but are particularly attracted to proteaceous heaths, *Banksia* and *Eucalyptus* woodlands and pine plantations (Johnstone and Storr 1998). On the Swan Coastal Plain, important food plants include *Banksia attenuata*, *B. menziesii*, *B. grandis*, *B. ilicifolia*, *B. sessilis*, *B. prionotes*, Marri (*Corymbia calophylla*) and Jarrah (*Eucalyptus marginata*) (Shah 2006). In breeding areas, it is important to have sufficient foraging resources in close proximity to nest hollows (DAWE 2022). Carnaby's Black-Cockatoo generally roosts in tall native or introduced eucalypts or pines in riparian habitats or near permanent water (Burnham *et al.* 2010, DAWE 2022).

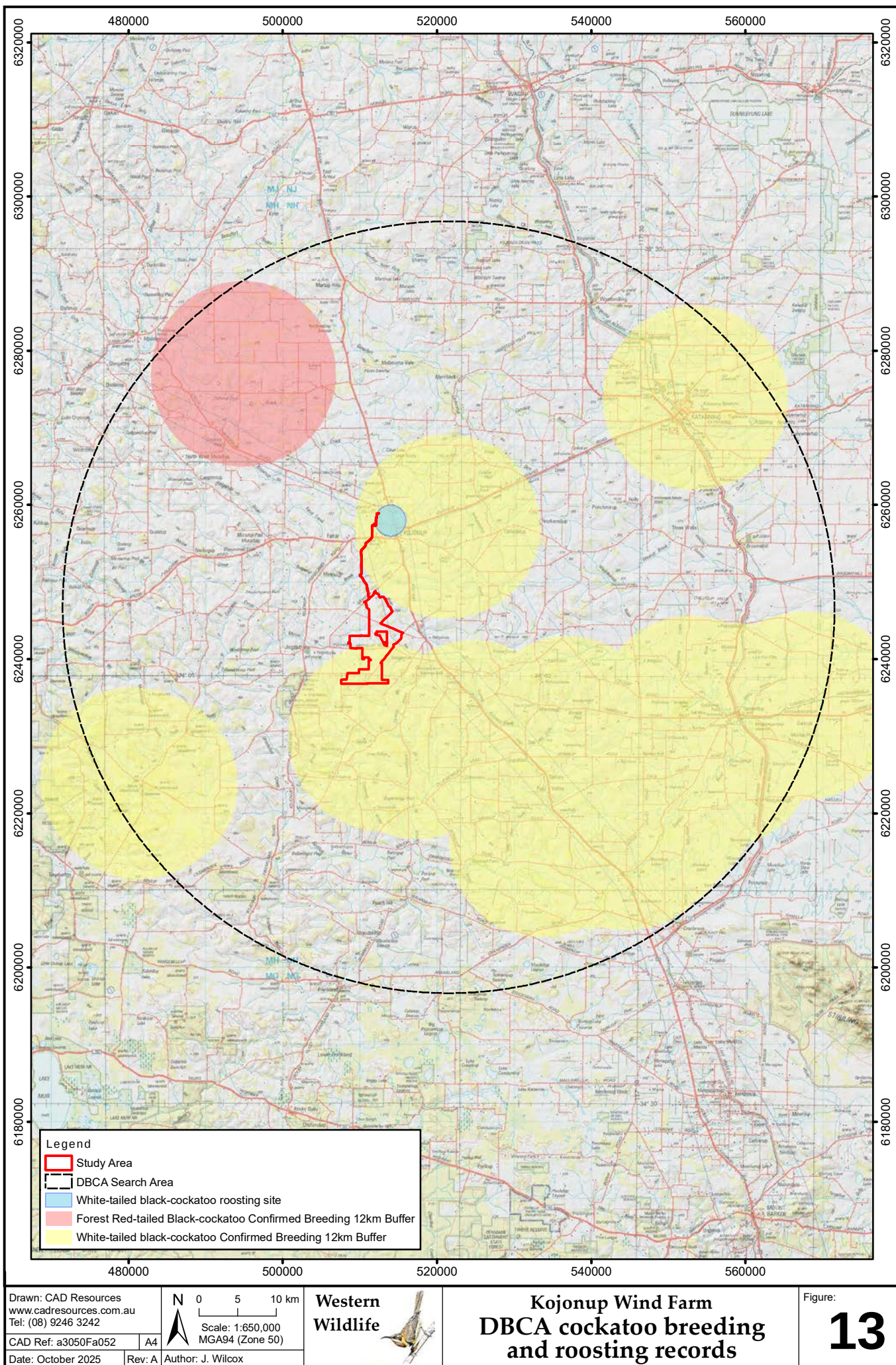
Carnaby's Cockatoo was recorded during the fauna survey, with several sightings and evidence of foraging on Pine, *Hakea* spp. and *Banksia* spp. (Figure 11, Plate 17). The largest group sighted in the study area was of 32 birds, with a flock of 40 recorded outside the study area in pine plantations to the east. There are also many records of this species in the vicinity of the study area on DBCA's Threatened and Priority Database, the largest count being a flock of 1000 at Katanning in 2013 (DBCA 2023). Habitats that have nest hollows that support breeding, supported breeding in the past and/or may support breeding in the future, with nearby foraging and water resources are considered to be 'habitats critical to the survival' of Carnaby's Cockatoo (DPAW 2013). There are several known breeding sites for this species in the region, the nearest about 7km south of the study area (Figure 13). Roosting of 'white-tailed black-cockatoos' is known to occur in Kojonup, with a maximum count of 48 birds at this roost in 2017 (Figure 13).

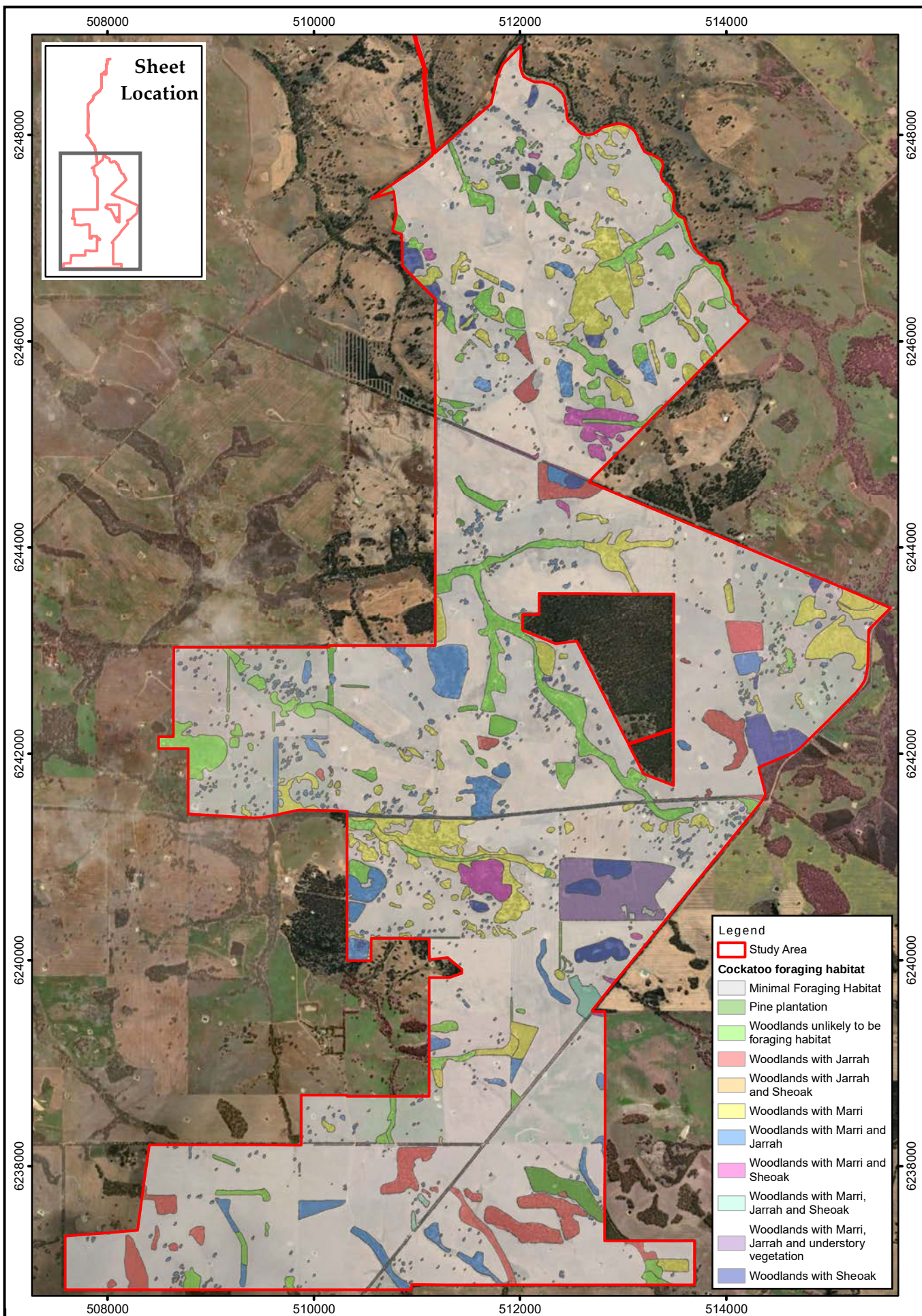


Plate 17. Evidence of Carnaby's Cockatoo foraging on *Banksia sessilis* in the study area.

Carnaby's Cockatoo has been confirmed as a foraging visitor in the study area, with the eucalypt woodland, creek and pine plantation habitats providing potential foraging resources. Cleared areas, when planted to Canola, are also likely to be used as a foraging resource, with the extent of Canola expected to vary from year to year. Marri is likely to be an important food-plant, particularly where it occurs in the lower parts of the landscape where it is better watered and the soils more fertile. Jarrah is also used by this species and proteaceous foraging species occur where the eucalypt woodland retains at least some understory vegetation. The extent of foraging habitat is shown in Figure 14 and Table 11 indicates the area of each foraging habitat type in the study area. The foraging habitat is high-quality according to the DAWE foraging quality scoring tool (Appendix 6).

Potential breeding habitat occurs mostly in the in the eucalypt woodland habitat, but also in the granite woodland, some of the creek habitat and in isolated trees in cleared areas. No breeding was recorded in the study area, but 'potential' and 'suitable' nesting trees were recorded, noting that these trees have been assessed over part of the study area only (Figure 10).





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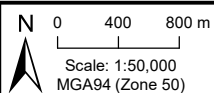
CAD Ref: a3050Fa053

Date: May 2026

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Author: J. Wilcox



**Western
 Wildlife**



Kojonup Wind Farm Cockatoo foraging habitat

Figure:

14A

Table 11. Foraging habitat for black-cockatoos in the study area.

Foraging Habitat Type	Potential use for foraging by cockatoos			Total Area (ha)
	Carnaby's Cockatoo	Baudin's Cockatoo	Forest Red-tailed Black-cockatoo	
Minimal foraging habitat (cleared)	Yes*	-	-	2916.4
Pine plantation	Yes	-	-	19.9
Woodlands unlikely to be foraging habitat	-	-	-	219.0
Woodlands with Jarrah	Yes	Yes	Yes	103.7
Woodlands with Jarrah and Sheoak	Yes	Yes	Yes	0.5
Woodlands with Marri	Yes	Yes	Yes	226.0
Woodlands with Marri and Jarrah	Yes	Yes	Yes	167.3
Woodlands with Marri and Sheoak	Yes	Yes	Yes	43.7
Woodlands with Marri, Jarrah and Sheoak	Yes	Yes	Yes	13.5
Woodlands with Marri, Jarrah and understory vegetation	Yes	Yes	Yes	47.4
Woodlands with Sheoak	-	-	Yes (secondary)	59.4
Total foraging habitat for each cockatoo species:	3538.4	602.1	661.5	
Total:				3,816.8

* Foraging habitat is available for Carnaby's Cockatoo in cleared areas planted to Canola. These areas are likely to change from year to year, and many cleared areas within the 2,916.4ha were pasture at the time of survey, and of no foraging value. Excluding cleared areas leaves 622.0ha of native woodland and pine plantation foraging habitat for Carnaby's Cockatoo.

Baudin's Cockatoo – *Zanda baudinii*

Baudin's Cockatoo is listed as Endangered under the BC Act and EPBC Act.

Baudin's Cockatoo is endemic to the southwest of Western Australia and is more common in the deep south-west (Johnstone and Storr 1998). The population size was estimated to be 5,000 – 8,000 birds in 2017, down from 10,000 - 15,000 birds in 1995 – 2004, and the current population estimate is 3,250 (Garnett and Baker 2021). Baudin's Cockatoo has declined primarily due to persecution by orchardists and loss of habitat due to wildfires and vegetation clearance in their range (Johnstone and Storr 1998).

Baudin's Cockatoos breed in forests of Karri, Marri and Jarrah in the deep southwest, where the annual rainfall is on average more than 750mm. Breeding occurs in late winter to spring (August to November), using a large hollow in a eucalypt, generally in Karri, Marri or Wandoo (Johnstone and Storr 1998). The hollows used are usually 30 - 40cm in diameter and more than 30cm deep. Breeding occurs as far north as Lowden, with an isolated breeding record further north at Serpentine, and east to Kojonup (Johnstone and Kirkby 2008).

Outside of the breeding season Baudin's Cockatoo can gather into large foraging flocks. Baudin's Cockatoos in urban or peri-urban areas have smaller flock sizes (<50 birds) than in forested areas (200+ birds) and undertake smaller daily movements (3.42 – 6.89km) compared with flocks in the forest (9.44km) (Rycken *et al.* 2021). In the non-breeding season this species ranges more widely, foraging primarily in habitats that contain Marri, and their distribution is probably defined by where Marri trees occur.

Baudin's Cockatoos feed mainly on the seeds of eucalypts, with most of their diet consisting of Marri seeds. They also feed on seeds from other plants (e.g., Jarrah, *Banksia*, *Hakea* or commercial orchard crops such as apples and pears) and take some invertebrate material by stripping bark from trees (Johnstone and Storr 1998, Johnstone *et al.*, 2005). Roosting habitat is generally in the tallest trees in riparian habitats, near permanent water or in sheltered gullies (Johnstone and Kirkby 2008).

There are 28 records of this species in the vicinity of the study area on DBCA's Threatened and Priority Database (Figure 12, DBCA 2023). Baudin's Cockatoo potentially occurs, although the study area is on the eastern edge of the current range of this species and no evidence of foraging was found. It is possible that the current range of this species no longer encompasses the study area, due to the overall population decline. Potential foraging habitat is present in areas of eucalypt woodland or creek with Marri or Jarrah, including woodland areas without understory, and may also forage where there is understory containing *Banksia* and *Hakea*, although Marri is the favoured food-plant. The extent of foraging habitat is shown in Figure 14 and Table 11 indicates the area of each foraging habitat type in the study area. The foraging habitat is high-quality according to the DAWE foraging quality scoring tool (Appendix 6).

Potential breeding habitat is likely to be present in eucalypt woodlands and creeks. A single known breeding site has been recorded in the region in the vicinity of Kojonup (Johnstone and Kirkby 2008), and it is possible that there are others that remain unrecorded. No breeding was recorded in the study area, but 'potential' and 'suitable' nesting trees were recorded, noting that these trees have been assessed over part of the study area only (Figure 10). Although no evidence of roosting was observed, roosting of 'white-tailed black-cockatoos' is known to occur in Kojonup, with a maximum count of 48 birds at this roost in 2017 (Figure 13).

Forest Red-tailed Black-Cockatoo – *Calyptorhynchus banksii naso*

The Forest Red-tailed Black-Cockatoo is listed as Vulnerable under the BC Act and EPBC Act.

The Forest Red-tailed Black-Cockatoo is endemic to the southwest of Western Australia. It is patchily distributed through its range (Johnstone and Storr 1998), with the population size estimated to be 15,000 birds (Johnstone and Kirkby 1999). It occurs in Jarrah, Marri and Karri forests, also ranging onto the Swan Coastal Plain.

On a study of Forest Red-tailed Black-Cockatoos on the Swan Coastal Plain, average daily movement was 11km, but ranged between 4 - 16.5km (Shephard and Warren 2019). The birds show a daily movement pattern consisting of morning foraging, day roosting, afternoon foraging and night roosting, with the longest residence times associated with night roosting and morning foraging sites (Shephard and Warren 2019, Riley *et al.* 2023). Flight speed for the Forest Red-tailed Black-Cockatoos was low (at or below 1m/s), and the birds appeared to move slowly through the landscape while either foraging, day roosting or resting (Shephard and Warren 2018). This species also appears to partition both roosting and foraging resources across the Swan Coastal Plain. Resident flocks had home-range sizes between 8 - 45km², which when applied to a roost site, suggested the home-range of the flock has a maximum radius of 3.8km from the roost.

Home-range size varies between resident urban and peri-urban flocks, with a range of 6.0 – 52.6km² (Rycken *et al.* 2022). Larger home-ranges were associated with the flock moving between multiple smaller foraging sites, often travelling along and making use of vegetation in road verges (Rycken *et al.* 2022). Daily movements averaged 16.4km for the flock with the larger home-range, with several days showing a movement of more than 20km. A flock with a smaller home-range of 6.0km², based in larger areas of remnant vegetation, travelled only 4.9km per day on average.

The average distance that birds moved between key night roost and foraging sites was small at 0.47 – 5.12km (Shephard and Warren 2018). Roost sites on the Swan Coastal Plain were in mature stands of trees ranging from 10 – 20m, dominated by Marri and other tall tree species including Jarrah and Spotted Gum. Water was present at 67% of day roost sites and 40% of night roost sites, although most peri-urban sites that did not have water immediately present had water nearby, usually in troughs. Roost occupancy is seasonal on the Swan Coastal Plain.

Forest Red-tailed Black Cockatoos feed primarily on the seeds of Marri and Jarrah, but also feed on the seeds of Blackbutt (*Eucalyptus patens*), Forest Sheoak (*Allocasuarina fraseriana*), Snottygobble (*Persoonia longifolia*) and Cape Lilac (Johnstone and Storr 1998). It nests in hollows in Karri (*Eucalyptus diversicolor*), Marri, Jarrah, Bullich (*Eucalyptus megacarpa*) and Wandoo (*Eucalyptus wandoo*) (Johnstone and Storr 1998, DAWE 2022). However, they have generally been found to prefer nesting in large veteran or stag Marri trees with a mean DBH of 90cm (Johnstone *et al.* 2013). The Forest Red-tailed Black-Cockatoo (*Calyptrorhynchus banksii naso*) breeds through much of the year with peaks in autumn (April-June) and spring (August-October).

The Forest Red-tailed Black-cockatoo was recorded during the fauna survey, with several sightings and evidence of foraging on Jarrah and Marri (Figure 11, Plate 18). The largest flock sighted was five birds. There are many records of this species in the vicinity of the study area on DBCA's Threatened and Priority Database, the largest flock recorded being 30 birds at Jingalup in 2013 (Figure 12, DBCA 2023). Potential foraging habitat is present in areas of eucalypt woodland or creek with Marri or Jarrah, including woodland areas without understory. The extent of foraging habitat is shown in Figure 14 and Table 11 indicates the area of each foraging habitat type in the study area. The foraging habitat is high-quality according to the DAWE foraging quality scoring tool (Appendix 6).



Plate 18. Forest Red-tailed Cockatoos foraging on Jarrah in the study area.

Potential breeding is likely to be present in eucalypt woodlands and creeks. A single known breeding site has been recorded in the region (Figure 13), and it is likely that there are others that remain unrecorded. No breeding was recorded in the study area, but ‘potential’ and ‘suitable’ nesting trees were recorded, noting that these trees have been assessed over part of the study area only (Figure 9). Although no evidence of roosting was observed, and there are no known roost sites in the region (Figure 13), this species potentially roosts in or near the study area.

Chuditch – *Dasyurus geoffroii*

The Chuditch is listed as Vulnerable under the BC Act and EPBC Act.

The Chuditch used to occur across much of Australia but is now restricted to the southwest of Western Australia. It is vulnerable to predation by foxes and increases in areas where fox control is undertaken (Burbidge 2004). Although they used to occupy a variety of habitats, the majority of Chuditch now occur in the Jarrah forest with some wheatbelt populations in drier woodlands, heath and mallee shrublands (Van Dyck and Strahan 2008; Orrell and Morris 1994). Critical habitat for the Chuditch includes all habitats currently occupied by Chuditch for foraging, breeding and/or dispersal, habitat within their known range in which an undiscovered population may reside and habitats temporarily unoccupied (e.g. due to fire) but which will support Chuditch in the future (DEC 2012). Important habitat elements include sufficient sites for dens, sufficient prey resources and large areas (DEC 2012).

Chuditch are wide-ranging and occupy large home-ranges of 300 - 400ha for females and more than 1,200ha for males. These home-ranges are overlapping, with a core non-overlapping area described by the den sites, of about 90ha for females and 400ha for males (Serena and Soderquist 1989). Chuditch use a variety of denning sites including hollow logs, burrows, and rocky outcrops, and an individual may use up to 180 den sites within their home-range.

Key threats to the Chuditch include predation by foxes and consumption of toxic feral cat baits, with minor threats including road mortalities, timber harvesting, predation by feral cats and prescribed burning (Woinarski *et al.* 2014).

There are 15 records of the Chuditch in the vicinity of the study area on DBCA's Threatened and Priority Database (Figure 12, DBCA 2023). Although some of these records are historical, more recent records include a dead specimen at Jingalup in 2005 (5km west of the study area) and a day sighting at Jingalup in 1995. This species is very mobile and potentially occurs as dispersing individuals, at least on occasion, and it is unlikely that the study area regularly supports the species. If present, the Chuditch is likely to use eucalypt woodland, creek and granite outcrop habitats in the study area, using hollow logs, rock crevices and possibly tree hollows as daytime shelter.

Malleefowl – *Leipoa ocellata*

The Malleefowl is listed as Vulnerable under the BC Act and EPBC Act.

The Malleefowl is a bird of dense shrublands, mulga woodlands and mallee woodlands. It used to be common in the southern arid and semi-arid areas of Western Australia (Johnstone and Storr 1998). In order to construct their nest mounds, the Malleefowl needs leaf litter on sandy substrates (Garnett and Crowley 2010). The mounds are usually constructed intermittently by a pair of birds between autumn and spring. Between early spring and mid to late summer, 15 - 25 eggs are laid in the mound by the female, while the male continues to tend the mound. The chicks emerge between November and January (sometimes as late as March), and as they receive no parental care, chick mortality can be high (Benshemesh 2007). Malleefowl will often breed in the same general area year after year, and new mounds may be constructed, or old mounds re-used. The adult birds have been found to range over one to many square kilometres, and these home ranges overlap (Benshemesh 2007).

As Malleefowl nest on the ground, the eggs and flightless chicks are vulnerable to predation by feral predators. However, the main threat to Malleefowl is habitat loss and the fragmentation and degradation of remaining habitat, as well as the death of adults on roads (Benshemesh 2007, Garnett *et al.* 2011). Fire can have a significant impact on populations, by killing adult birds, causing local extinctions in fragmented habitats and causing a cessation in breeding activity for many years after a fire (Benshemesh 2007).

There are 18 records of Malleefowl in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (Figure 12, DBCA 2023). Although some of the records are historical, there are also more recent records from Woodanilling in 2007 (35km northeast of the study area), near Tambellup in 2006 (38km east), Katanning in 2016 (43km northeast) and Boscabel in 2001 (18km north). Given that there are relatively recent, though sparse, records throughout the region, it is possible that Malleefowl occur in the study area. Any birds present are likely to be foraging or dispersing on an irregular basis, and breeding habitat is unlikely to be present as most vegetated areas lack understory.

Red-tailed Phascogale – *Phascogale calura*

The Red-tailed Phascogale is listed as Vulnerable EPBC Act and Conservation Dependent under the BC Act.

The Red-tailed Phascogale has declined in numbers and in range. It favours Wandoo or York Gum woodlands with Rock Sheoak but also uses other habitats including shrublands (Woinarski *et al.* 2014). The home-range is from 1.5 to 8ha, and this species uses a range of nesting sites including tree hollows, grasstree skirts and stumps (Woinarski *et al.* 2014). Long-unburnt habitats are important for this species, with frequent, intense fires being a key threat to the species. Other key threats include loss and fragmentation of habitat and predation by feral cats (Woinarski *et al.* 2014). The majority of the range of this species overlaps the southern wheatbelt, and as such the population is fragmented, often occurring in isolated reserves (Maxwell *et al.* 1996).

There are 46 records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (Figure 12, DBCA 2023). Some of these records are from a successful relocation project in Kojonup Nature Reserve and Birdwood Nature Reserve, 17km north of the study area, and the closest records to the study area are a night sighting in Kojonup in 2012 and a dead individual 10km west of Tambellup in 2002. The Red-tailed Phascogale is likely to occur in the study area as the study area is within the core range of the species, the woodlands are potentially suitable habitat and the species is known to persist in relatively small woodland remnants.

5.2.2 Migratory Fauna

Migratory species are not always present at a site, but a particular site may have significance as a seasonal or ephemeral foraging, breeding or shelter area. Impacts to these sites may then impact the population both within the site and further afield. For Migratory shorebirds, a site is deemed internationally important if it regularly supports more than 1% of the flyway population of a species, or a total abundance of at least 20,000 shorebirds, and nationally important if it regularly supports more than 0.1% of the flyway population of a species, at least 2,000 shorebirds or at least 15 shorebird species (Hansen *et al.* 2016, DoEE 2017). The study area is unlikely to provide important habitat for Migratory shorebirds, although individuals may occur on occasion, as the creekline habitat and the farm dams in the cleared areas do not provide the exposed mudflats and shorelines that these species require.

There are two Migratory species that potentially occur in the study area (Table 10).

Common Sandpiper – *Actitis hypoleucos*

The Common Sandpiper is listed as Migratory under the BC Act and EPBC Act.

The Common Sandpiper may be present at any time of the year, but more likely between September and March (Johnstone and Storr 1998). This species occurs in a range of salt and freshwater habitats, including coasts, river pools, drying swamps and floodwaters (Johnstone and Storr 1998), however, it is most common on the coast (Geering *et al.* 2007).

There are nine records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database, mostly near Katanning and Broomehill (Figure 15, DBCA 2023). The Common Sandpiper may be a non-breeding visitor to farm dams and creeks in the study area, but only in very low numbers and only very occasionally. The study area is not likely to regularly support a nationally or internationally important proportion of the population (190 or 1,900 birds respectively, Hansen *et al.* 2016).

Fork-tailed Swift – *Apus pacificus*

The Fork-tailed Swift is listed as Migratory under the EPBC Act and BC Act.

The Fork-tailed Swift is a non-breeding visitor to Australia between September and April (Boehm 1962, Johnstone and Storr 1998). The bird is primarily observed foraging for insects in proximity to cyclonic weather (Boehm 1962). Although a migratory species, the Fork-tailed Swift has a large range and a large population that appears to be stable (BirdLife International 2024).

Although there are no records from the surrounding area on DBCA's Threatened and Priority Fauna Database (Figure 15, DBCA 2023), the Fork-tailed Swift has the potential to be an occasional summer visitor in small numbers. It is generally considered to be scarce at inland sites in the south-west (DoE 2015). The Fork-tailed Swift is a largely aerial species when in Australia and therefore only likely to forage above the study area.

5.2.3 Specially Protected Fauna

The populations of Specially Protected species are large enough that they are not considered to be Threatened. However, they require on-going conservation intervention (i.e., Conservation Dependent) or be specially protected in order to prevent them from becoming Threatened.

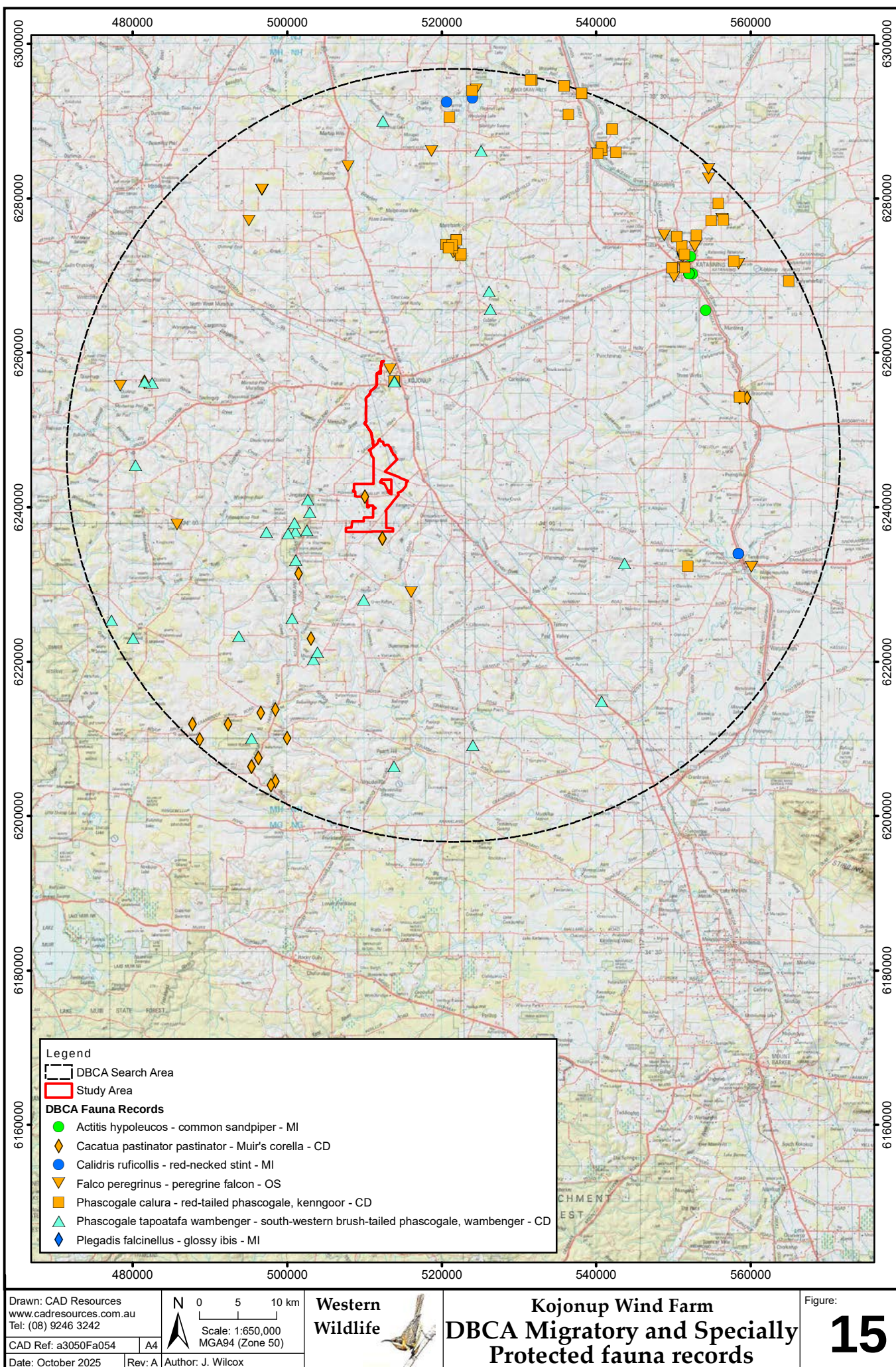
There are three specially protected vertebrate species that may occur in the study area (Table 10).

Peregrine Falcon – *Falco peregrinus*

The Peregrine Falcon is listed as Other Specially Protected Fauna under the BC Act.

The Peregrine Falcon is a widespread bird of prey that globally has a very large range and a very large population that appears to be stable (BirdLife International 2024). In Western Australia the population is secure, though this species may experience reductions at a local level due to human disturbance at nesting sites (Debus 1998). The Peregrine Falcon nests mainly on ledges on cliffs or rocky outcrops, and it may also use tall trees (Johnstone and Storr 1998). This species often takes advantage of man-made structures such as abandoned open pits or quarries.

There are 30 records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (Figure 15), and this species was recorded on the fauna survey in August 2024 and December 2025 (Figure 11). The Peregrine Falcon is likely to be a breeding resident of the region and occur regularly in the study area in low numbers.



The Peregrine Falcon is likely to forage in open habitats in the study area, primarily pasture. A pair of birds is likely to occupy a home-range of 20-30km² (BirdLife International 2024), so the study area potentially supports 2 - 3 pairs. The habitats of the study area are unlikely to be important for this species unless a nesting site is present, as cleared agricultural land is common in the region and its population is large and increasing (Birdlife International 2024). Nesting may occur in tall trees of any habitat.

Brush-tailed Phascogale – *Phascogale tapoatafa*

The Brush-tailed Phascogale is listed as Conservation Dependent under the BC Act.

The Brush-tailed Phascogale is a nocturnal carnivore that occurs in open forests and woodlands with a sparse understory (Van Dyck and Strahan 2008). It is listed as Near Threatened in the Action Plan for Australian Mammals 2012 due to its continuing population decline due to the actions of habitat loss, degradation and fragmentation (Woinarski *et al.* 2014). Females have been found to have non-overlapping home ranges of about 20 – 40ha, and males have or 100ha home ranges that may overlap with other males or females (Van Dyck and Strahan 2008). Nest sites include tree hollows and stumps, and within a year an individual phascogale may use up to 40 different sites.

There are 30 records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database, including several records at Jingalup Nature Reserve, 5km west of the study area (Figure 15, DBCA 2023). The Brush-tailed Phascogale potentially occurs in larger areas of eucalypt woodland with hollow-bearing trees and understory, but it is probable that much of the habitat present is too fragmented and degraded to support this species. It is considered likely to be locally extinct in the wheatbelt and confined to the wetter Jarrah forest regions (Woinarski *et al.*, 2014).

Muir's Corella – *Cacatua pastinator pastinator*

Muir's Corella is listed as Conservation Dependent under the BC Act.

Muir's Corella is endemic to south-west Western Australia, currently occurring between Boyup Brook, Rocky Gully and Frankland, although it used to occur as far north as the Swan River. Its population is currently estimated at 20,000 individuals, up from 400 in the 1940s and likely still increasing (Garnet and Baker 2021). Its initial population decline was due to widespread persecution as a pest of grain crops, and as they have increased in abundance they have once again caused disturbance and damage issues (DPAW 2015).

Muir's Corella prefers partly cleared eucalypt forests and is locally common in farmlands (Johnstone and Storr 1998). They nest in a large hollow in Jarrah or Marri, foraging nearby the nest tree (Johnstone and Storr 1998). Eggs are laid from September to November. In summer, this species can form large flocks in summer foraging areas (DPAW 2015).

There are 25 records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (Figure 15, DBCA 2023) and this species was recorded in the study area (Figure 11). The study area is on the north-eastern edge of the current range of Muir's Corella. As these birds were present in the August and November 2024 surveys and the December 2025 survey, it is likely that they are breeding in the study area or nearby.

5.2.4 Priority Fauna

Priority 1, 2 or 3 species need further survey effort, as insufficient data exist to adequately determine their status. Many Priority 1, 2 and 3 species are known from only a few records in a limited number of locations, thus determining their status in the study area may be problematic. Priority 4 species are considered to require regular monitoring, as although they are adequately known, they are either rare, near threatened or recently removed from the threatened list.

There are ten Priority fauna species that potentially occur in the study area (Table 10).

Barking Owl – *Ninox connivens connivens*

The southwest subpopulation of the Barking Owl is listed as Priority 3 by DBCA.

The southwest subpopulation of the Barking Owl inhabits the southwest corner of Western Australia. The range of this subspecies also extends across the southeast of Australia. It occurs in dry sclerophyll woodlands, particularly in association with watercourses and forest edge (Garnett *et al.* 2010). It nests in large eucalypt hollows in mature trees. The southwest subpopulation is extremely rare, with only five reported sightings between 2011 and 2020, and no records from targeted searches undertaken in 1999/2000 and 2015/2016 (Garnett and Baker 2021, Liddelow *et al.* 2002, Fulton 2017).

There is a single historical record of this species from Katanning on DBCA's Threatened and Priority Fauna Database (Figure 16, DBCA 2023). The status of the species in the local area is uncertain due to the paucity of records, however, this species possibly occurs in the study area. If present, it may nest in large hollows in eucalypt woodland habitat.

Masked Owl – *Tyto novaehollandiae novaehollandiae*

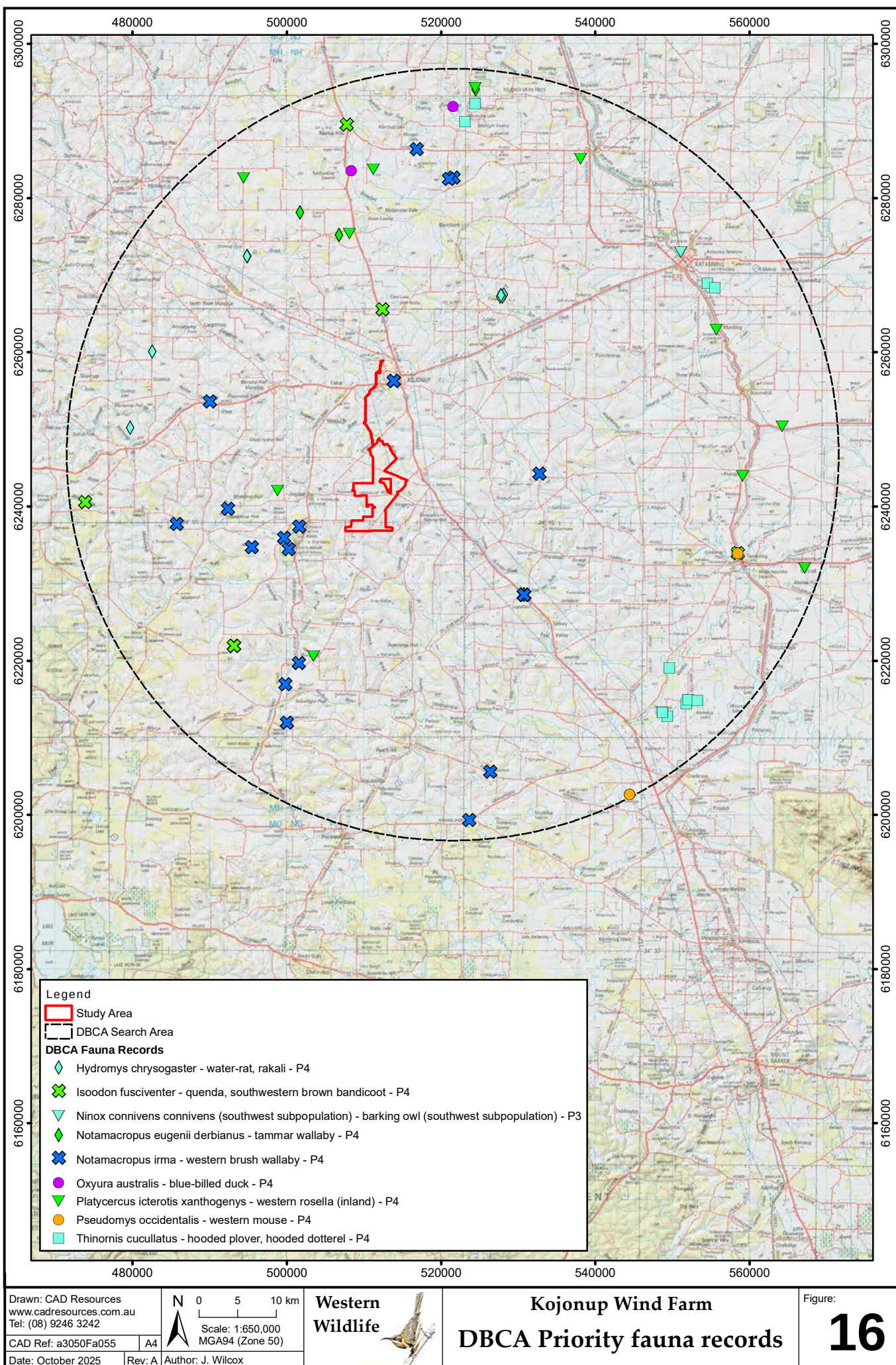
The southwest subspecies of the Masked Owl is listed as Priority 3 by DBCA.

The south-west subspecies of the Masked Owl inhabits forested areas, breeding in large tree hollows (Johnstone and Storr 1998). It is suggested that this species prefers open forests and forest edges for hunting (Liddelow *et al.* 2002). There are no records in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (DBCA 2023). As the study area is within the known range of the species, the Masked Owl possibly occurs in the study area. If present, it may nest in large hollows in eucalypt woodland habitat.

Central Long-eared Bat – *Nyctophilus major tor*

The Central Long-eared Bat is listed as Priority 3 by DBCA.

The Central Long-eared Bat is widespread across the arid south of Australia and though thought to have a population of substantially more than 10,000 individuals, the reliability of this estimate is low (Woinarski *et al.* 2014). It occurs in eucalypt woodlands with a tall shrub understorey and around granite outcrops, roosting beneath bark, in tree crevices or in the foliage of trees (Van Dyck and Strahan 2008, Churchill 2008). Current threats to this species are inferred and include habitat loss and fragmentation or inappropriate fire regimes leading to a loss of habitat and/or roost sites (Woinarski *et al.* 2014).



Although there are no records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database, this species is known to occur within 40km (ALA 2024). The study area represents the very western edge of the known range of this species. The Central Long-eared Bat possibly occurs in the eucalypt woodlands in the study area, roosting or breeding in tree hollows.

Western False Pipistrelle – *Falsistrellus mackenziei*

The Western False Pipistrelle is listed as Priority 4 by DBCA.

The Western False Pipistrelle is considered Near Threatened in the Action Plan for Australian Mammals 2012, as its population is declining, however, the population is not severely fragmented and does not exhibit extreme fluctuations (Woinarski *et al.* 2014). This species is endemic to south-west Australia and occurs in forests and woodlands. It is thought to be locally common in Karri forest but may be uncommon or declining in Jarrah and Tuart forests. The Western False Pipistrelle roosts in tree hollows, hollow branches or stumps during the day, in colonies of five to 30 (Churchill 2007). It favours habitats in or adjacent to old-growth forests (Churchill 2008).

There are no records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (DBCA 2023). The Western False Pipistrelle was not detected during the fauna survey (Appendix 7). It possibly occurs in the study area, however, the habitats present are likely to be too open, as this species prefers old-growth forests. If present, it is likely to occur in eucalypt woodlands, roosting in tree hollows.

Inland Western Rosella – *Platycercus icterotis xanthogenys*

The Inland Western Rosella is listed as Priority 4 by DBCA.

The Inland Western Rosella is endemic to southern Western Australia. The population of this species is thought to be declining in the western wheatbelt due to clearing, but stable in the western woodlands (Garnett and Crowley 2000). Although still listed as a Priority species, the Inland Western Rosella was not listed in the 2010 Action Plan for Australian Birds as the population is considered too large and the decline too slow to be designated Near Threatened (Garnett *et al.* 2011). This species occurs in eucalypt and casuarina woodlands, nesting in tree hollows (Johnstone and Storr 1998).

Despite there only being 11 records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (Figure 16, DBCA 2023), this species was regularly recorded during the fauna survey (Figure 11). The Inland Western Rosella is likely to be a breeding resident in the study area, nesting in eucalypt woodlands and foraging in all habitats, including cleared areas under crop.

Quenda – *Isoodon fusciventer*

The Quenda (or Southern Brown Bandicoot) is listed as Priority 4 by DBCA.

The Quenda occurs in a range of habitats, preferring dense vegetation such as wetlands and heathlands (Woinarski *et al.* 2014). The Quenda is listed as Least Concern in the Action Plan for Australian Mammals 2012, as although it has declined in the past, fox control has allowed its numbers to recover and the population is no longer declining (Woinarski *et al.* 2014).

There are nine records of Quenda in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database, most of which are historical (Figure 16, DBCA 2023). The only more recent records are from Mobrup in 2012, about 46km south west of the study area. Although it is possible that this species occurs in the study area, none of its distinctive diggings were observed and most of the vegetation lacks the dense understory that this species requires for shelter. It is probable that the current range of this species has contracted to the west and no longer includes the study area, although occasional individuals possibly occur from time to time.

Tammar Wallaby – *Notamacropus eugenii derbianus*

The Tammar Wallaby is listed as Priority 4 by DBCA.

The Tammar Wallaby was once widespread in south-western Australia, but now occurs only on islands and in several reserves and National Parks, with reintroduced populations at a number of sites (Woinarski *et al.* 2014). This species is locally common in areas that are baited for foxes. The Tammar Wallaby inhabits dense vegetation during the day, foraging in open grassy areas at night (Woinarski *et al.* 2014).

There are seven records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database, most of which are historical (Figure 16, DBCA 2023). The Tammar Wallaby possibly occurs in the study area, however, it is probable that this species is locally extinct in the area due to lack of fox control, habitat loss and fragmentation.

Western Brush Wallaby – *Notamacropus irma*

The Western Brush Wallaby is listed as Priority 4 by DBCA.

The Western Brush Wallaby occurs in areas of forest or woodland where there is a dense, shrubby understory. Although there are no robust measures of abundance, it is considered to be relatively common, particularly in areas with fox baiting (Woinarski *et al.* 2014). The home-range size of one individual has been estimated at about 9.9ha for males and 5.3ha for females (Bamford and Bamford 1999), therefore several individuals may be supported in the study area.

There are 25 records of the Western Brush Wallaby in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database (Figure 16, DBCA 2023). The most recent records are from Wingedine Nature Reserve and Jingalup Nature Reserve in 2005, at least 5km from the study area. The Western Brush Wallaby possibly occurs in larger areas of remnant vegetation but may be locally extinct due to lack of fox control, habitat loss and fragmentation.

Water-rat – *Hydromys chrysogaster*

The Water-rat is listed as Priority 4 by DBCA.

The Water-rat lives near permanent freshwater or brackish wetlands, including rivers, lakes and farm dams (Van Dyck and Strahan 2008). Although it hunts on land, the majority of its prey are aquatic insects, fish, crustaceans and molluscs. It dens in a burrow tunnelled into the bank, or sometimes a hollow log. This species is listed as Least Concern in the Action Plan for Australian Mammals 2012 (Woinarski *et al.* 2014) and is considered likely to have benefited from artificial waterways (Van Dyck and Strahan).

There are nine records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database, the closest record from 2009, in a nature reserve 18km northeast of the study area (Figure 16, DBCA 2023). The Water-rat possibly occurs along the creeks and in dams in the study area, although most of this habitat is marginal as the dams are sparsely vegetated, the creeks are not permanent and are impacted by grazing and salinity.

Western Mouse – *Pseudomys occidentalis*

The Western Mouse is listed as Priority 4 by DBCA.

The Western Mouse is restricted to south-west Western Australia, occurring in remnant vegetation in the southern wheatbelt, with the smallest known occupied area being about 200ha (Woinarski *et al.* 2014). This species is listed as Near Threatened in the Action Plan for Australian Mammals 2012 (Woinarski *et al.* 2014) and is thought to be declining, although the evidence is not robust. The Western Mouse is nocturnal, sheltering in burrows by day, and feeds on invertebrates and fibrous plant material. It occurs in long-unburnt vegetation (Van Dyck and Strahan 2008).

There are four records of this species in the vicinity of the study area on DBCA's Threatened and Priority Fauna Database, the most recent record from 1987, from Anderson Lake Nature Reserve, 77km southeast of the study area (Figure 16, DBCA 2023). This species possibly occurs in the study area as it is known from the region, however, it is likely that the patches of vegetation in the study area are too small to support the Western Mouse.

6. Bird Utilisation of the Study Area

6.1 Species Richness and Abundance

Overall, 76 bird species were recorded on bird surveys, 75 species at impact sites and 57 at reference sites (Table 12). This is 96.2% of the 79 bird species recorded thus far across the study area (Table 9). The lower number recorded at reference sites is likely to be a function of the smaller number of sites, rather than a genuine lack of species. The number of flights recorded for each species for each survey period at impact and reference sites are given in Appendix 8.

Table 12. Summary of bird survey statistics.

Summary statistic	Impact Sites (Sites K01 – K33)					Reference Sites (Sites C01 – C08 and A34 – A36)					Total for all sites
	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Total	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Total	
Number of sites sampled	33	29	32	33	33	3	8	8	8	11	44
Total individual flights recorded:	1,115	1,745	1,192	1,357	5,409	82	395	414	390	1,281	6,690
Flights below RSA (<50m)	1,055	1,662	1,131	1,286	5,134	81	391	403	372	1,247	6,381
Flights at RSA (50 – 200m)	60	83	61	70	274	1	4	11	17	33	307
Flights above RSA (>200m)	0	0	0	1	1	0	0	0	1	1	2
Proportion at RSA (50 – 200m)	5.4%	4.8%	5.1%	5.2%	5.1%	1.2%	1.0%	2.7%	4.3%	2.6%	4.6%
Total species richness:	57	59	53	50	75	21	41	39	34	57	76
Species richness below RSA (<50m)	57	59	53	42	63	7	31	23	24	40	63
Species richness at RSA (50 – 200m)	6	10	9	6	14	1	3	4	5	8	15
Species richness above RSA (200m+)	0	0	0	1	1	0	0	0	1	1	1
Species present, but not recorded flying	13	15	10	8	12	13	10	14	8	16	13
Conservation significant species: (showing total flights recorded)	• Carnaby's Cockatoo (En) - 29 • Forest Red-tailed Black-cockatoo (Vu) - 32 • Muir's Corella (CD) – 10 • Peregrine Falcon (OS) - 1 • Inland Western Rosella (P4) - 24					• Carnaby's Cockatoo (En) - 42 • Forest Red-tailed Black-cockatoo (Vu) - 4 • Inland Western Rosella (P4) - 6					

Twelve of the 75 species at impact sites and 16 of the 57 species at reference sites were not recorded flying through open air on any survey, but were sighted within vegetation, perched or heard only (Table 12). These are represented by species with a total count of '0' in Appendix 8. Species not recorded flying largely represent those that prefer wooded habitats and that rarely cross open cleared areas.

Across the four surveys, the total number of bird flights recorded was 5,409 at impact sites and 1,281 at reference sites (Table 12), noting that individual birds may be responsible for more than one flight record if crossing the survey area multiple times.

The most abundantly recorded birds at impact sites were the Tree Martin (1,656 flights), Australian Ringneck (966 flights), Australian Raven (549 flights) and Australian Magpie (393 flights). These birds were consistently the most abundant on each survey and between them comprised 59.3% of all flight records. Excluding species not recorded flying, 27 species (36.0% of species) were recorded flying on <10 occasions (Appendix 8a). Similarly, the most abundantly recorded birds at reference sites were the Tree Martin (431 flights), Australian Ringneck (217 flights), Australian Raven (112 flights) and Australian Magpie (82 flights) (Appendix 8b).

Five conservation significant birds were observed during bird surveys (Table 12, Appendix 8). It is important to note that the overall number of flights recorded for conservation significant species is relatively modest, and thus the conclusions drawn from these data on flight behaviour is only of moderate confidence.

6.2 Flight Heights

In total, 15 bird species were recorded flying in the RSA during bird surveys (Table 13). It is important to note here that Carnaby's Cockatoo, although not recorded flying in the RSA during bird surveys, was observed flying in the RSA opportunistically on one occasion. The only other conservation significant species recorded flying in the RSA was the Forest Red-tailed Black-cockatoo, with a single flight at a reference site (Table 13).

Of the birds recorded flying at impact sites, 307 birds (5.1% of flights) of 15 species were recorded flying within the RSA (Table 12). A single flight by one bird (a Wedge-tailed Eagle) was recorded above the RSA. The remaining 5,134 flights (94.9 % of flights) by 63 species were recorded below the RSA (Table 12).

Of birds recorded flying at reference sites, 33 flights (2.6% of flights) by eight species were recorded within the RSA (Table 12). Similarly to the impact sites, a single flight by one Wedge-tailed Eagle was recorded above the RSA in reference sites.

At impact sites, the species most often recorded flying in the RSA were the Tree Martin (113 flights), Purple-crowned Lorikeet (73 flights) and Australian Raven (27 flights) with <12 individual flights of the remaining species (Table 13). Few birds were recorded flying in the RSA at reference sites, however, the Tree Martin (13 flights), Purple-crowned Lorikeet (6 flights) and Wedge-tailed Eagle (6 flights) had the most records (Table 13).

Although the overall number of records were low, for the Wedge-tailed Eagle, of 25 flights observed overall, 68.0% were in the RSA. For the Welcome Swallow, 45.0% were in the RSA, for the Black-shouldered Kite 33.3% were in the RSA and for the Australian Kestrel 21.4% were in the RSA. Although the Tree Martin had the overall largest number of flights recorded in the RSA (126), this represented only 6.0% of the Tree Martin flights observed (Table 13). Note that these percentages are based on small overall sample sizes for most species. This is particularly notable for the Forest Red-tailed Black-cockatoo, where a result of 25% of flights within the RSA at reference sites is based on only four records. Further data would refine these proportions, however, it would be challenging to collect sufficient data for uncommonly occurring species.

Table 13. Summary of all birds recorded flying in the RSA (50 – 200m).

Species	At-risk Group	Total Count			Count at RSA (50 – 200m)			Proportion at RSA (50 – 200m)		
		Impact	Reference	Total	Impact	Reference	Total	Impact	Reference	Overall
Australian Kestrel	DBOP	24	4	28	6	-	6	25.0%	-	21.4%
Australian Magpie	FHR	393	82	475	2	-	2	0.5%	-	0.4%
Australian Pipit	FHR	131	5	136	6	-	6	4.6%	-	4.4%
Australian Raven	FHR	549	112	661	27	3	30	4.9%	2.7%	4.5%
Black-faced Cuckoo-shrike	FHR	56	7	63	6	-	6	10.7%	-	9.5%
Black-faced Woodswallow	FHR	75	2	77	2	1	3	2.7%	50.0%	3.9%
Black-shouldered Kite	DBOP	5	4	9	1	2	3	20.0%	50.0%	33.3%
Dusky Woodswallow	FHR	34	3	37	6	-	6	17.6%	-	16.2%
Elegant Parrot	FHR	59	10	69	11	1	12	18.6%	10.0%	17.4%
Forest Red-tailed Black-cockatoo	CS	34	4	38	-	1	1	-	25.0%	2.6%
Purple-crowned Lorikeet	FHR	358	75	433	73	6	79	20.4%	8.0%	18.2%
Red Wattlebird	FHR	58	29	87	1	-	1	1.7%	-	1.1%
Tree Martin	FHR	1,656	431	2,087	113	13	126	6.8%	3.0%	6.0%
Wedge-tailed Eagle	DBOP	18	7	25	11	6	17	61.1%	85.7%	68.0%
Welcome Swallow	FHR	20	-	20	9	-	9	45.0%	-	45.0%
Total individuals:		3,470	775	4,245	274	33	307	7.9%	4.3%	7.2%
Total species:		15	14	15	14	8	15	14	8	15

6.3 Risk Assessment – Birds

The details of the risk assessment are presented in Appendix 9. No birds were assessed as being at *Very High* risk or *High* risk (Table 14, Appendix 9). Five species were assessed as being at being at *Moderate* risk: Carnaby's Cockatoo, Baudin's Cockatoo, Forest Red-tailed Black-cockatoo, Wedge-tailed Eagle and Purple-crowned Lorikeet (Table 14). The remaining species have been assessed as being at *Minor* or *Negligible* risk (Table 14), primarily due to an unlikely intersection with the RSA height due to rarity in the region and/or flight behaviour, and a large, widespread population reducing the likelihood of population impacts.

Baudin's Cockatoo is listed as Endangered and although it was not recorded in the study area, it potentially occurs. Due to its very small total population size (3,250 birds), the fact the population is declining and this species has a slow replacement rate for lost adults, any loss of birds potentially has an impact on the population as a whole. However, despite three surveys in the study area, including searching for foraging signs, this species has yet to be recorded. This suggests that this species is rare or absent from the study area, possibly as a result of range contraction due to its declining population. As this drastically reduces the likelihood of a collision, the risk rating has been assessed at *Moderate* instead of *High*.

Both Carnaby's Cockatoo (Endangered) and the Forest Red-tailed Black Cockatoo (Vulnerable) were recorded in the study area. Both species are capable of flying at RSA height, and thus far both species have been recorded flying at RSA height, each on a single occasion (Table 13, Figures 17 and 18). Recorded activity of Carnaby's Cockatoo was centred around the southern part of the study area, particularly around larger areas of native vegetation and pine plantations (Figure 17). Flights were often along road verges, which is consistent with observations elsewhere (Shepard and Warren 2018). However, Carnaby's Cockatoo also made short flights across cleared areas. The Forest Red-tailed Black-cockatoo behaved similarly, but the activity of this species was located more in the central part of the study area (Figure 18). The overall flock sizes recorded were low, with between 1 and 40 (mean of 4.4 birds) for Carnaby's Cockatoo and between 1 – 5 (mean of 2.5 birds) for the Forest Red-tailed Black-Cockatoo. For both species, loss of individuals potentially has an impact on the regional population, as the populations of these long-lived species are already under pressure from other threats. The data gathered thus far suggests that relatively modest numbers of these species occur, but there is the potential for larger flocks to move through on occasion. Flocks of hundreds of birds are considered unlikely to occur.

The Wedge-tailed Eagle has no formal conservation listing; however, it is regularly reported as a mortality at wind farms. This species was recorded during the survey, often recorded flying at RSA height and three nest sites were recorded in the study area (Table 13, Figure 19, Plate 19). This species is long lived and slow to reproduce, and repeated loss of individuals may impact the regional population. Birds have nested successfully within 200m of turbines (BL&A 2017), but inexperienced young birds are likely to be at risk of collision. Despite this, the Wedge-tailed Eagle is common in the region, and their overall population trend is increasing (Birdlife International 2024), so although there is likely to be impacts, they are unlikely to significantly impact the persistence of the species in the region. An increasing population trend means that there is capacity within the population to replace lost individuals at a regional level.

The Purple-crowned Lorikeet also does not have a formal conservation listing but was recorded flying at RSA height during this survey (Table 13). This species is likely to be very common in the area when the eucalypt canopy is in flower, and the repeated loss of individuals has the potential to impact at least the local population, despite this species being relatively common overall.



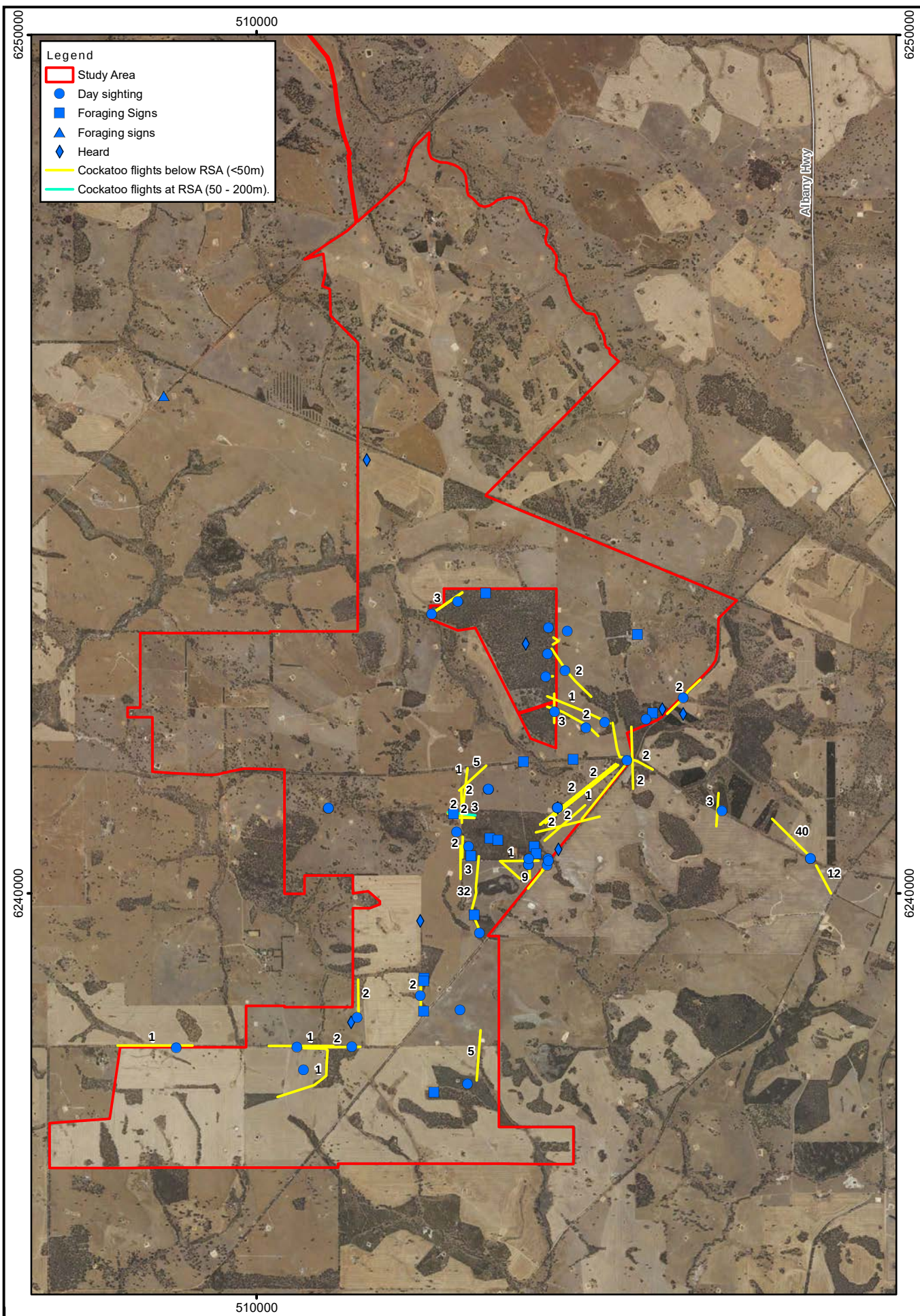
Plate 19. Wedge-tailed Eagle nests in the study area.

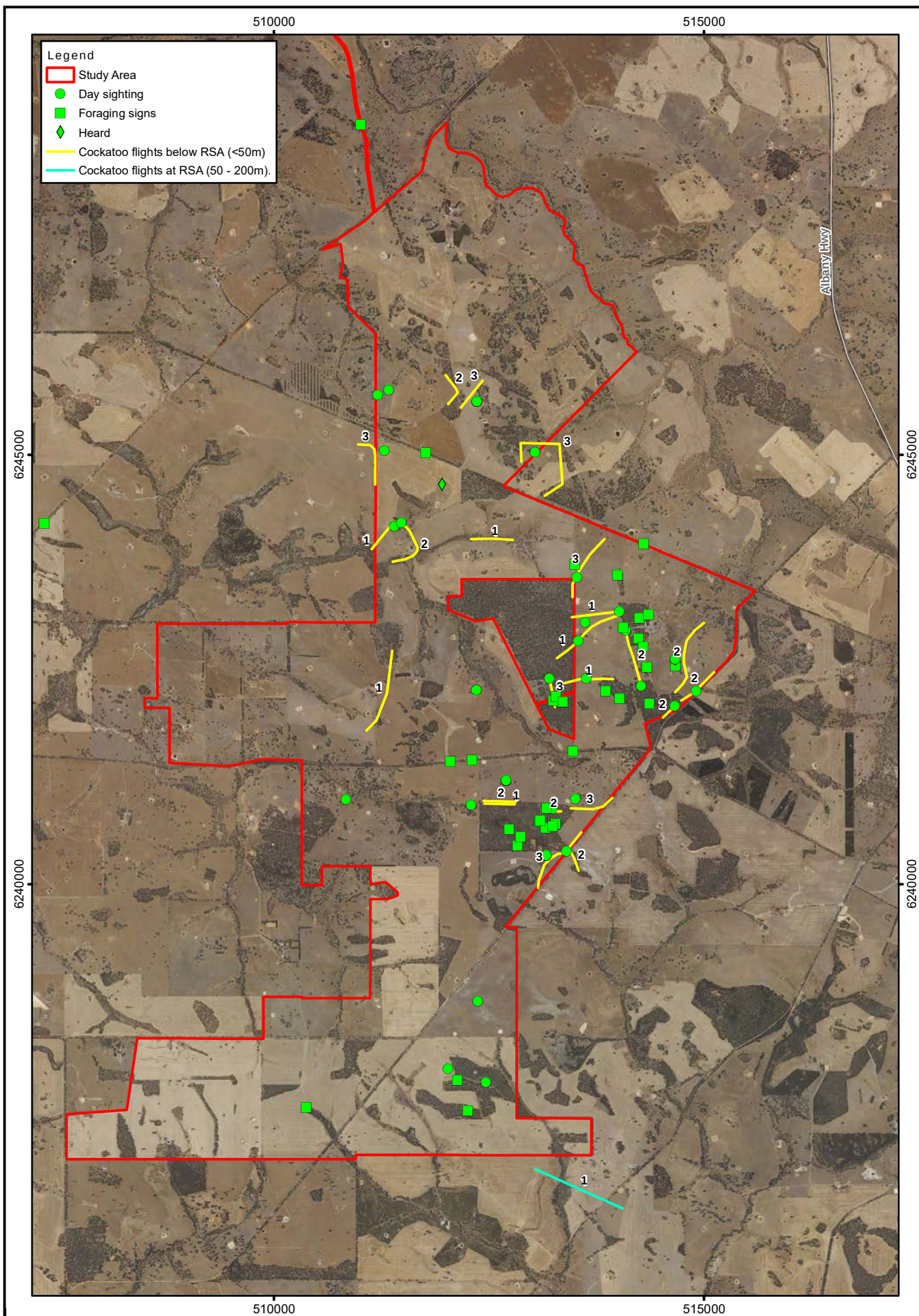
Table 14. Risk rating for assessed bird species.

Species	Conservation Status	Recorded in study area	Risk Rating
Carnaby's Cockatoo <i>Zanda latirostris</i>	En	Yes	Moderate
Baudin's Black-Cockatoo <i>Zanda baudinii</i>	En	-	Moderate
Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	Vu	Yes	Moderate
Malleefowl <i>Leipoa ocellata</i>	Vu	-	Minor
Common Sandpiper <i>Actitis hypoleucos</i>	Mi	-	Negligible
Fork-tailed Swift <i>Apus pacificus</i>	Mi	-	Minor
Peregrine Falcon <i>Falco peregrinus</i>	OS	Yes	Minor
Muir's Corella <i>Cacatua pastinator pastinator</i>	CD	Yes	Minor
Barking Owl <i>Ninox connivens connivens</i>	P3	-	Minor
Masked Owl <i>Tyto novaehollandiae novaehollandiae</i>	P3	-	Minor
Inland Western Rosella <i>Platycercus icterotis xanthogenys</i>	P4	Yes	Negligible
Black-shouldered Kite <i>Elanus axillaris</i>	-	Yes	Minor
Square-tailed Kite <i>Lophoictinia isura</i>	-	-	Minor
Whistling Kite <i>Haliastur sphenurus</i>	-	-	Negligible
Swamp Harrier <i>Circus approximans</i>	-	Yes	Negligible
Spotted Harrier <i>Circus assimilis</i>	-	-	Negligible
Brown Goshawk <i>Accipiter fasciatus</i>	-	-	Negligible
Collared Sparrowhawk <i>Accipiter cirrocephalus</i>	-	Yes	Negligible
Wedge-tailed Eagle <i>Aquila audax</i>	-	Yes	Moderate
Little Eagle <i>Hieraaetus morphnoides</i>	-	-	Minor
Australian Hobby <i>Falco longipennis</i>	-	-	Negligible
Brown Falcon <i>Falco berigora</i>	-	Yes	Minor
Australian Kestrel <i>Falco cenchroides</i>	-	Yes	Minor

Table 13. (cont.)

Species	Conservation Status	Recorded in study area	Risk Rating
Pacific Black Duck <i>Anas superciliosus</i>	-	Yes	Negligible
Grey Teal <i>Anas gracilis</i>	-	Yes	Negligible
Australian Shelduck <i>Tadorna tadornoides</i>	-	Yes	Negligible
Australian Wood Duck <i>Chenonetta jubata</i>	-	Yes	Negligible
White-faced Heron <i>Egretta novaehollandiae</i>	-	Yes	Negligible
Australasian Grebe <i>Tachybaptus novaehollandiae</i>	-	Yes	Negligible
Eastern Barn Owl <i>Tyto javanica</i>	-	-	Negligible
Southern Boobook <i>Ninox boobook</i>	-	-	Negligible
Tawny Frogmouth <i>Podargus strigoides</i>	-	-	Negligible
Spotted Nightjar <i>Eurostopodus argus</i>	-	-	Negligible
Australian Owlet-nightjar <i>Aegotheles cristatus</i>	-	-	Negligible
Purple-crowned Lorikeet <i>Parvipsitta porphyrocephala</i>	-	Yes	Moderate
Elegant Parrot <i>Neophema elegans</i>	-	Yes	Minor
Tree Martin <i>Petrochelidon nigricans</i>	-	Yes	Minor
Welcome Swallow <i>Hirundo neoxena</i>	-	Yes	Minor
Australian Magpie <i>Gymnorhina tibicen</i>	-	Yes	Minor
Australia Raven <i>Corvus coronoides</i>	-	Yes	Negligible
Black-faced Cuckoo-shrike <i>Coracina novaehollandiae</i>	-	Yes	Minor
Dusky Woodswallow <i>Artamus cyanopterus</i>	-	Yes	Minor
Black-faced Woodswallow <i>Artamus cinereus</i>	-	Yes	Negligible
Red Wattlebird <i>Anthochaera carunculata</i>	-	Yes	Negligible
Australian Pipit <i>Anthus australis</i>	-	Yes	Negligible





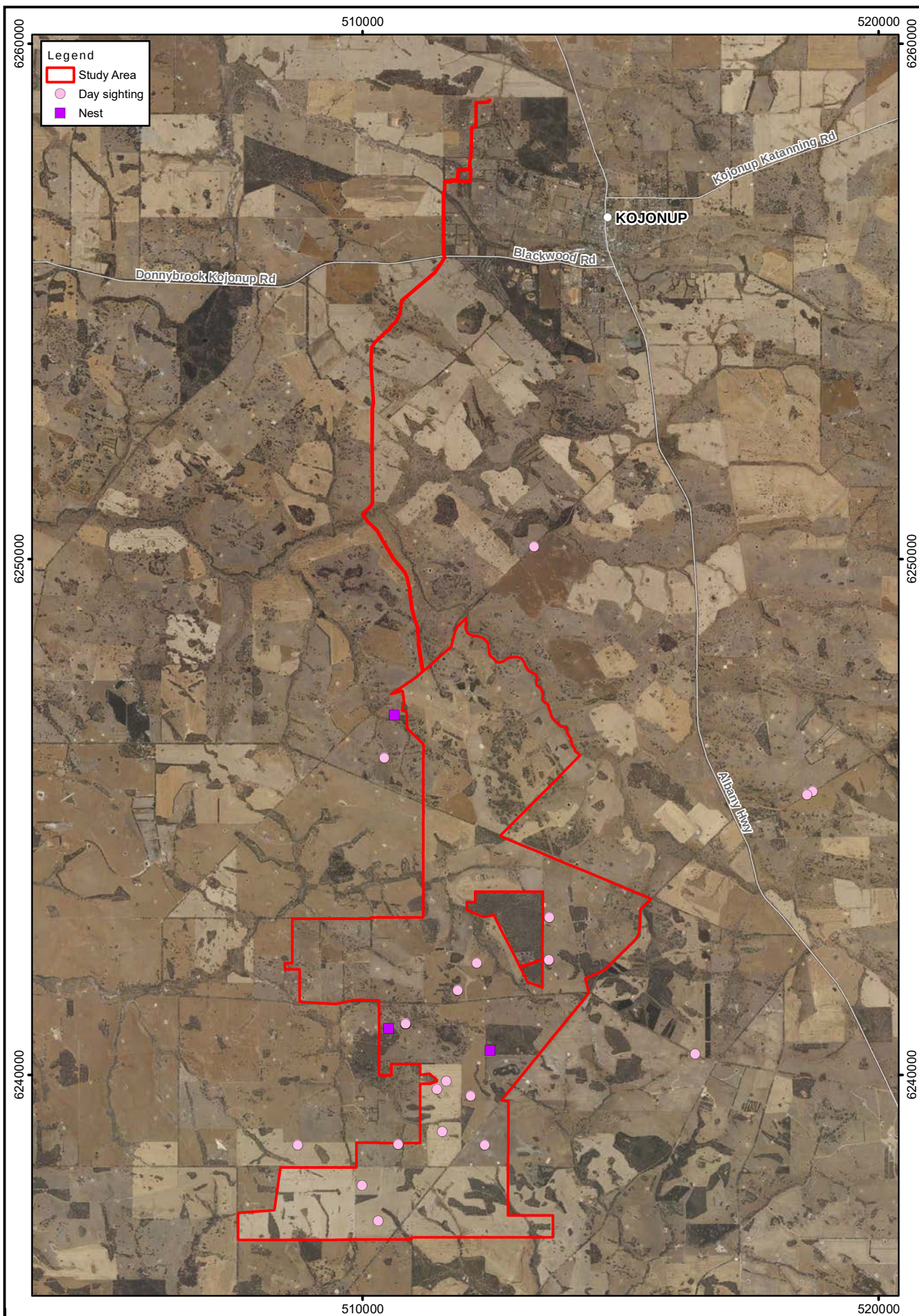
Western
Wildlife



Kojonup Wind Farm Forest Red-tailed Black- cockatoo records and flights

Figure:

18



7. Bat Utilisation of the Study Area

7.1 Species Richness and Abundance

There are eleven species (or subspecies) of bat that potentially occur in the vicinity of the study area. A total of six species were confirmed as occurring in the study area, with at least one more species recorded but unable to be identified to species level (Table 15, Appendix 7). Species in the genus *Nyctophilus* are not readily separated on call, and their presence can only be confirmed by trapping.

As true estimates of bat abundance are difficult to ascertain, the frequency of detection of each species is used as a surrogate. The frequency of detection is based on the number of sampling sites plus the nights where each species was detected (Specialised Zoological 2025). Of the species recorded on this survey, the Inland broad-nosed Bat had the lowest frequency of detection, and the Southern Forest Bat the highest (Table 15). The White-striped Freetail Bat had a moderate score overall, as this species is not present all year.

Table 15. Frequency of detection for each bat species recorded.

Species	Frequency of Detection		
	Aug 2024	Nov 2024	Combined
Chocolate Wattled Bat <i>Chalinolobus morio</i>	0.69	0.94	0.81
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	0.75	1.00	0.88
Inland Broad-nosed Bat <i>Scotorepens balstoni</i>	0.19	0.13	0.16
Long-eared Bats <i>Nyctophilus spp.</i>	0.44	0.44	0.44
South-west Freetail Bat <i>Ozimops kitcheneri</i>	0.25	0.75	0.50
Southern Forest Bat <i>Vespadelus regulus</i>	0.94	1.00	0.97
White-striped Freetail Bat <i>Austronomus australis</i>	0	0.81	0.41

(data in this table after Specialised Zoological 2025, Appendix 7).

7.2 Flight Heights

Bat activity was measure near ground level and in the RSA (at 75m) in December 2024 and May 2025, using the mean nightly rate of encounter (the mean number of sound files per species per recording night). Overall, bat activity was lower at 75m than near ground level for all species (Table 16). Some species were not recorded at all at 75m, however, these species also showed relatively low nightly encounter rates at ground level and further sampling may result in detections.

Table 16. Mean nightly rate of encounter for each bat species recorded at the Met Mast.

Species	Mean Nightly Rate of Encounter			
	Dec 2024		May 2025	
	Bottom (1m)	Top (75m)	Bottom (1m)	Top (75m)
Chocolate Wattled Bat <i>Chalinolobus morio</i>	0.4	0	1.4	0
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	8.4	5.6	5.4	0.2
Inland Broad-nosed Bat <i>Scotorepens balstoni</i>	0	0	0.3	0
Long-eared Bats <i>Nyctophilus spp.</i>	0.1	0	1.3	0
South-west Freetail Bat <i>Ozimops kitcheneri</i>	6.6	5.6	0.2	0.1
Southern Forest Bat <i>Vespadelus regulus</i>	3.1	0.1	1.7	0
White-striped Freetail Bat <i>Austronomus australis</i>	42.8	26.1	0.7	0.3

(data in this table after Specialised Zoological 2025, Appendix 7).

7.3 Risk Assessment - Bats

The details of the risk assessment are presented in Appendix 9. No Threatened bats occur in the region and no bats were assessed at being of *Very High* or *High* risk (Table 17, Appendix 9). Two Priority bats possibly occur, but the likelihood of these species being present is low. Four species were assessed as being at *Moderate* risk, the Chocolate Wattled Bat, Gould's Wattled Bat, Southern Forest Bat and White-striped Freetail Bat (Table 17).

All species were recorded in the study area and are often recorded as mortalities at other wind farm projects (Appendix 9). The White-striped Freetail Bat is the only bat in south-west Western Australia recognised as being migratory, moving northwards during the cooler months of April - September and southwards during the warmer months of October – March (Bullen and McKenzie 2005), and it also displays a high wing aspect ratio and high wing loading (Norberg *et al.* 1987). All four species are common and widespread across Australia, so although there is a risk of an impact to the local population of these species, it is not likely that there would be an impact to the population as a whole.

Table 17. Risk rating for all bat species potentially present.

Species	Conservation Status	Recorded in study area	Risk Rating
Central Long-eared Bat <i>Nyctophilus major tor</i>	P3	-	Minor
Chocolate Wattled Bat <i>Chalinolobus morio</i>	-	Yes	Moderate
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	-	Yes	Moderate
Greater Long-eared Bat <i>Nyctophilus major major</i>	-	-	Minor
Inland Broad-nosed Bat <i>Scotorepens balstoni</i>		Yes	Negligible
Holt's Long-eared Bat <i>Nyctophilus holtorum</i>	-	-	Minor
Lesser Long-eared Bat <i>Nyctophilus geoffroii</i>	-	-	Negligible
South-west Freetail Bat <i>Ozimops kitcheneri</i>	-	Yes	Minor
Southern Forest Bat <i>Vespadelus regulus</i>	-	Yes	Moderate
Western False Pipistrelle <i>Falsistrellus mackenziei</i>	P4	-	Minor
White-striped Freetail Bat <i>Austronomus australis</i>	-	Yes	Moderate

8. Potential Impacts to Fauna

This section provides a high-level summary of the likely impacts of a wind farm development on vertebrate fauna. The key potential impacts on vertebrate fauna are likely to be:

- habitat loss
- an increase in habitat fragmentation
- accidental mortalities
- collisions with turbines or other infrastructure
- barotrauma
- barrier effects and displacement

Each of these are discussed below.

8.1 Habitat Loss

The overall amount of clearing for wind farms is generally modest, with turbines sited in cleared areas, but there is likely to be some clearing for access and transmission infrastructure. The scale of the impact is related to the amount of habitat cleared, with the caveat that some habitats may be of greater importance where they are more intact, better connected in a network of ecological linkage, or provide breeding, foraging or roosting habitat for black-cockatoos or other conservation significant fauna.

A small amount of habitat loss is unlikely to significantly impact most species, however, loss of any potential cockatoo breeding habitat (most eucalypt woodlands) or more than 1ha of high-quality foraging habitat is potentially a significant impact for black-cockatoos (DAWE 2022). The eucalypt and granite woodlands of the study area are likely to provide both potential breeding habitat and high-quality foraging habitat (Figures 10 and 14, Appendix 6). Losses to habitat patches containing the Red-tailed Phascogale (*Phascogale calura*: Endangered) are likely to impact this species, given how little habitat remains in the landscape, and at the minimum, all occupied habitat is likely to be considered critical habitat for this species.

8.2 Habitat Fragmentation

Loss of entire habitat patches or increases in the distance between patches may negatively impact the ability of fauna to move through an already highly cleared landscape. Smaller species, such as the Red-tailed Phascogale (*Phascogale calura*: Endangered), are more at risk, as they are less likely to negotiate cleared areas and would be vulnerable to the feral predators that are prevalent in the landscape. Black-cockatoo movements are unlikely to be impeded by minor habitat loss, but cockatoos do travel along vegetated areas, including road verges, and this should be taken into consideration.

Increased habitat fragmentation and an influx of construction vehicles has the potential to add to habitat degradation through an increase in edge effects and importing weeds or disease. It is noted, however, that most habitat patches are already degraded through grazing, salinity, weeds and/or the presence of feral predators, and further impacts would be difficult to define in this context.

8.3 Accidental Mortalities

It is likely that there would be some mortality of fauna during construction, mostly due to habitat clearing, but also through accidental road mortalities or entrapment of fauna in excavations or bins. During construction and operation there is a risk of accidental road mortalities. Conservation significant species at risk during clearing are species that roost or den in hollows during the day, species that nest in hollows where the unfledged young are at risk and species that are more likely to hide than disperse away from clearing activities. These species, therefore, may be accidentally crushed during clearing. Fauna may be attracted to food-waste and trapped in bins or become trapped in steep-sided open excavations during construction. Road mortalities are more likely if there are vehicle movements at night and are more likely to impact ground-dwelling species.

Conservation significant species that may be at risk of accidental mortalities include:

- Red-tailed Phascogale (*Phascogale calura*: Endangered), Chuditch (*Dasyurus geoffroii*: Vulnerable) and Brush-tailed Phascogale (*Phascogale tapoatafa*: Conservation Dependent) as they shelter in tree hollows during the day, may be attracted to food waste and may become trapped in excavations.
- Unfledged young of the Forest Red-tailed Black-cockatoo (*Calyptorhynchus banksii naso*: Vulnerable), Carnaby's Cockatoo (*Zanda latirostris*: Endangered), Baudin's Cockatoo (*Zanda baudinii*: Endangered), Inland Western Rosella (*Platycercus icterotis xanthogenys*: Priority 4) or other conservation significant birds where they nest in tree hollows.
- Central Long-eared Bat (*Nyctophilus major tor*), as they roost in tree hollows during the day (although their likelihood of occurrence is 'possible').

8.4 Collisions with Turbines or Other Infrastructure

Mortality of both bats and birds at wind farms can result from collisions with turbine blades, towers, transmission lines and other infrastructure (Schuster *et al.* 1015). Factors influencing the risk of collisions include the attributes of the wind turbine (e.g. tower height, blade length and lighting), landscape attributes (e.g. topography, vegetation, proximity to wetlands, roost sites or migration flyways) and species-specific attributes (e.g. abundance, flight behaviour, patterns of dispersal).

Bats are generally thought to be at higher risk of mortality at wind farms than birds (Thaxter *et al.* 2017). Globally, collisions with wind turbines have become a leading cause of bat mortality, as the number of wind farm facilities have increased (O'Shea *et al.* 2016). Causes of susceptibility are not well understood. Some bats appear attracted to turbines, but the reasons for this remain uncertain (Cryan *et al.* 2014, Cryan and Barclay 2009). Multiple studies from both Australia and internationally have shown that the bat species most impacted by wind turbines tend to be:

- Tree-roosting species (Arnett 2008; Cryan *et al.* 2014), noting that all of the potentially occurring bat species in the study area are tree-roosting, although some have also adapted to using buildings (Churchill 2008).
- Species with a higher wing aspect ratio and high wing loading, resulting in higher flight speeds but less manoeuvrability (Hull and Cawthen 2013; AWWI 2018, Rydell *et al.* 2010).
- Migratory species (Arnett 2008; Frick *et al.* 2017, Hartman *et al.* 2021).
- Species that forage in the open air, as opposed to those that fly under the canopy, close to vegetation or in the understory (Rydell *et al.* 2010).

Equally, it has been noted in many studies that not all birds are equally at risk of collision. Higher risk groups include:

- Diurnal birds of prey (Thaxter *et al.* 2017, Perhold *et al.* 2020, Barrios and Rodriguez 2004, Ribeiro *et al.* 2022, Stewart *et al.* 2007).
- Migratory shorebirds (Thaxter *et al.* 2017, Stewart *et al.* 2007)
- Waterbirds (Stewart *et al.* 2007), although found less at risk by Thaxter *et al.* (2017).

Just because birds fly at the RSA height does not mean that collisions are inevitable. Collision avoidance behaviour has not been well documented, and a recent review found that it was difficult to make estimates of micro-avoidance rates as there were very few records of birds flying close enough to turbines to require micro-avoidance, and that collisions are likely to be rare events (Cook *et al.* 2018). A recent study of seabirds at an offshore windfarm in the United Kingdom has found that birds adjust their flight direction and heights to avoid turbines, resulting in micro-avoidance rates of 96%, with no collisions recorded during the span of the study (Tjørnløv *et al.* 2023).

Studies on diurnal birds of prey in the northern hemisphere have found collision avoidance rates of 98% for White-tailed Eagles (*Haliaeetus albicilla*) (May *et al.* 2011), 99% for Golden Eagles (*Aquila chrysaetos*) (Whitfield 2009), 99% for Hen Harriers (*Circus cyaneus*) (Whitfield and Madders 2006a) and 95% for the Kestrel (*Falco tinnunculus*) (Whitfield and Madders 2006b). There are no robust data on avoidance rates for Australian species, however SNH (2018) recommends 98% as a default for unknown species when undertaking collision risk modelling.

8.5 Barotrauma

Barotrauma occurs where bats show no obvious external injury but show significant internal damage as a result of sudden changes in air pressure in close proximity to turbine blades (Baerwald *et al.* 2008; Hartmann *et al.* 2021). There is no published information on barotrauma in Australia, and international studies display mixed results in the proportion of deaths attributable to barotrauma, as opposed to direct collisions. Baerwald *et al.* (2008) found that 46% of bat mortalities were due to barotrauma, while Rollins *et al.* (2012) attributed only 6% of mortalities to barotrauma.

8.6 Barrier Effects and Displacement

Indirect impacts of wind farms may arise through barrier effects or displacement due to disturbance by people, vehicles or the presence of turbines (Powlesland 2009, Drewitt and Langston 2006). Barrier effects, also known as macro-avoidance, are caused by wind farms diverting flights, including migratory flights, around the wind farm or disrupting movement of birds between foraging, roosting and/or breeding sites (Hötter *et al.* 2006, Schuster *et al.* 2015, Cook *et al.* 2018). Although there is currently no published information on the barrier effect of wind farms in Australia, it is considered more likely to impact migratory species and possible effects are higher energy consumption (Schuster *et al.* 2015).

The displacement impact of wind farms is not well understood, and studies are often hampered by poor survey design (Schuster *et al.* 2015, Cook *et al.* 2018). Habitat loss occurs due to avoidance of the wind farm site. Studies have found mixed results with some species showing no signs of displacement, while others avoiding both turbines and access roads.

9. Conclusions

The study area contains six habitats: eucalypt woodland, creek, granite outcrop, pine plantation, planted and cleared. These are likely to support a vertebrate faunal assemblage typical of the region, with larger, more intact habitat patches supporting more species than the smaller patches lacking understory. A key value of the habitats present is ecological linkage, maintaining faunal populations across the landscape by allowing dispersal. Some of these habitats are known or are likely to support conservation significant fauna.

Twenty-two conservation significant fauna potentially occur, but for most species, the study area is unlikely to provide important habitat because the habitats are marginal, the habitats are common and widespread in the region and/or the species has a low likelihood of occurring.

Six conservation significant fauna were recorded or considered likely to occur:

- **Carnaby's Cockatoo** (*Zanda latirostris*: Endangered) – recorded
- **Forest Red-tailed Black-cockatoo** (*Calyptorhynchus banksii naso*: Vulnerable) – recorded
- **Inland Western Rosella** (*Platycercus icterotis xanthagenys*: Priority 4) – recorded
- **Red-tailed Phascogale** (*Phascogale calura*: Endangered) – likely
- **Muir's Corella** (*Cacatua pastinator pastinator*: Conservation Dependent) – recorded
- **Peregrine Falcon** (*Falco peregrinus*: Other Specially Protected Fauna) – recorded

Of these, the black-cockatoos and Red-tailed Phascogale are most significant, as their populations are small and declining. The study area provides foraging habitat (particularly eucalypt woodland and pine plantation) and potential breeding habitat for cockatoos (mainly in Wandoo, Jarrah and Marri). Loss of any potential cockatoo breeding habitat or more than 1ha of high-quality foraging habitat is potentially a significant impact for black-cockatoos (DAWE 2022). The Red-tailed Phascogale is likely to be present, particularly in larger eucalypt woodland or granite woodland patches. Loss of any habitat occupied by Red-tailed Phascogale is likely to be considered a significant impact on the species. The Inland Western Rosella and Peregrine Falcon are widespread and their populations are large and comparatively secure. Their habitats are common in the region and these species are less likely to be impacted by a wind farm development. Muir's Corella originally declined due to persecution, and once again has an increasing population trend.

The remaining conservation significant species potentially or possibly occur. Many are on the edge of their known range in the vicinity of the study area (e.g. Western False Pipistrelle, *Falsistrellus mackenziei*), so they may or may not be present. Others are very rarely reported anywhere (e.g. Barking Owl, *Ninox connivens connivens* and Masked Owl, *Tyto novaehollandiae novaehollandiae*) and therefore their status is difficult to ascertain with certainty. More mobile species (e.g. Chuditch, *Dasyurus geoffroii* and Malleefowl, *Leipoa ocellata*) may disperse through the study area but are unlikely to be resident. For these species, the study area is less likely to provide important habitat, however, habitats may still have importance for some species if further survey found them to be present.

Overall, 76 bird species were recorded on bird surveys, 96.2% of the 79 bird species recorded thus far across the study area. Of the birds recorded flying at impact sites, 307 flights (5.1%) by 15 species were recorded flying within the RSA, while at reference sites, 33 flights (2.6% of flights) by eight species were recorded flying within the RSA. Only the Wedge-tailed Eagle was recorded flying above the RSA (>200m).

Although the overall number of records were low for the Wedge-tailed Eagle, of 25 flights observed overall, 68% were in the RSA. For the Purple-crowned Lorikeet, 18.2% of the 433 flights observed were in the RSA. Other species, such as the Welcome Swallow, had a large proportion of their flights within the RSA, but these were based on small overall sample sizes. Although the Tree Martin had the overall largest number of flights recorded in the RSA (126), this represented only 6.0% of the flights observed.

Five conservation significant birds were observed during bird surveys: Carnaby's Cockatoo, Forest Red-tailed Black-cockatoo, Peregrine Falcon, Muir's Corella and Inland Western Rosella. Only the Forest Red-tailed Black-cockatoo recorded flying in the RSA during bird surveys, with a single individual recorded outside the study area. Flight paths of Carnaby's Cockatoo and Forest Red-tailed Black-cockatoos were recorded opportunistically, and all were below RSA height except one record of two Carnaby's flying at RSA height. From the data collected, Carnaby's and Forest Red-tailed Black-cockatoos were found to often fly along road verges and fence-lines but also crossed cleared areas between patches of native vegetation.

No birds were assessed as being at *Very High* risk or *High* risk and five species were assessed as being at *Moderate* risk (Baudin's Cockatoo, Carnaby's Cockatoo, Forest Red-tailed Black-cockatoo, Wedge-tailed Eagle and Purple-crowned Lorikeet). It appears that Baudin's Cockatoo is rare or absent from the study area, as it has yet to be recorded despite four field surveys. The other black cockatoo species are present in small numbers. The Wedge-tailed Eagle has an increasing population trend, and although there are likely to be impacts, these are unlikely to significantly impact the persistence of the species in the region.

The remaining species were assessed as being at *Minor* or *Negligible* risk, primarily due to an unlikely intersection with the RSA height due to rarity in the region and/or flight behaviour, and a large and widespread population reducing the likelihood of population impacts. Both Migratory shorebirds and waterbirds are at low risk due to the lack of suitable wetland habitats in or in close proximity to the study area.

There are eleven species (or subspecies) of bat that potentially occur in the vicinity of the study area. A total of six species were confirmed as occurring in the study area, with at least one more species recorded but unable to be identified to species level.

No Threatened bats occur in the region and no bats were assessed as being of *Very High* or *High* risk. Four species were assessed as being at *Moderate* risk (Chocolate Wattled Bat, Gould's Wattled Bat, Southern Forest Bat and White-striped Freetail Bat) and the remainder were assessed as being at *Minor* or *Negligible* risk.

10. References

- ALA (Atlas of Living Australia) Database (2024). Database extract study area +40km buffer 2024.
- Baerwald, E.F., D'Amours, G.H., Klug, B.J. and Barclay, R.M.R. (2008). Barotrauma is a significant cause of bat fatalities at wind turbines. *Current Biology* 18(16), 695–696.
- Barrett, G., Silcocks, A., Barry, S., Cunningham, R. and Poulter, R. (2003). *The New Atlas of Australian Birds*. Royal Australasian Ornithologists Union, Victoria.
- Barrios L, Rodriguez A. 2004 Behavioural and environmental correlates of soaring-bird mortality at on-shore wind turbines. *Journal of Applied Ecology* 41, 72–81
- Beard, J.S. (1980) A new phytogeographic map of Western Australia. Western Australian Herbarium Research Notes 3: 45.
- Bennett, E.M., Florent, S.N., Venosta, M., Gibson, M., Jackson, A. and Stark, E. (2022). Curtailment as a successful method for reducing bat mortality at a southern Australian wind farm. *Austral Ecology* 47: 1329 – 1339.
- Benshemesh, J. (2007). *National Recovery Plan for Malleefowl*. Department for Environment and Heritage, South Australia.
- Biosis (2021). Silverton Wind Farm: Bird and Bat Monitoring 2018 - 2020. Report for GE Renewable Energy. E. Baldwin & C. Potts. Biosis Pty Ltd. Melbourne, VIC
- BirdLife International (2024) IUCN Red List for birds. URL: <http://www.birdlife.org>
- BL&A (Brett Lane and Associates Pty Ltd (2017). *Sapphire Wind Farm – Bird and Bat Adaptive Management Program*. Unpublished report to CWP Renewables Pty Ltd.
- Boehm, E.F. (1962). Some habits of the Fork-tailed Swift. *Emu* 61(4) 281-282.
- Brigham, R. M., Gutsell, R. C. A., Wiacek, R. S., and Geiser, F. (1999). Foraging Behaviour in Relation to the Lunar Cycle by Australian Owlet-nightjars *Aegotheles cristatus*. *Emu - Austral Ornithology*, 99(4), 253–261.
- Burbidge, A.H. and Gole, C. (2005). Regional reports: South Western Australia. In: Olsen et al. (eds) *The state of Australia's birds 2005. Woodlands and birds. Supplement to Wingspan* 15(4), p. 10.
- BOM (Bureau of Meteorology) (2025). Monthly Climate Statistics for Kojonup and Katanning. URL: <http://www.bom.gov.au/climate/>
- Chapple, D., Tingley, R., Mitchell, N, Macdonald, S., Keogh, J.S, Bowles, P., Cox, N., and Woinarski, J. (2019). *The Action Plan for Australian Lizards and Snakes 2017*. CSIRO Publishing, Clayton South, Victoria.
- Churchill, S. (2008). *Australian Bats*. 2nd Edition. Reed New Holland, Sydney.
- Cogger, H.G., Cameron, E.E., Sadler, R.A. and Eggler, P. (1993). *The Action Plan for Australian Reptiles*. Endangered Species Programme Project Number 124, Australian Nature Conservation Agency, Canberra.
- Cook, A. S. C. P., Humphreys, E. M., Bennet, F., Masden, E. A., & Burton, N. H. K. (2018). Quantifying avian avoidance of offshore wind turbines: Current evidence and key knowledge gaps. *Marine Environmental Research*. 140: 278-288.
- Cryan PM, Barclay RMR (2009) Causes of bat fatalities at wind turbines: hypotheses and predictions. *Journal of Mammalogy* 90: 1330–1340.
- Cryan, P.M., Gorresen, P.M., Hein, C.D., Schirmacher, M.R., Diehl, R.H., Huso, M.M., et. al. (2014). Behaviour of bats at wind turbines. *Proceedings of the National Academy of Sciences of the United States of America* 111, 15126–15131.
- DAWE (2021). Onshore Wind Farms – interim guidance on bird and bat management.
- DAWE (Department of Agriculture, Water and Environment) (2022). *Referral guideline for 3 WA threatened black cockatoo species: Carnaby's Cockatoo (Zanda latirostris), Baudin's Cockatoo (Zanda baudinii) and the Forest Red-tailed Black-Cockatoo (Calyptorhynchus banksii naso)*.
- DPAW (Department of Parks and Wildlife) (2015). Muir's Corella management. Wildlife Management Program No 61. Department of Parks and Wildlife, Perth, Western Australia.
- Debus, S. (1998). *The Birds of Prey of Australia: A Field Guide*. Oxford University Press, Australia.
- DBCA (2023). Threatened and Priority Fauna Database extract, 2023.

DBCA (2024). Dandjoo Search Accessed April 2024.

DCCEEW (Department of Climate Change, Energy, the Environment and Water) (2020), Interim Biogeographic Regionalisation for Australia (Subregions) v. 7 (IBRA).

DoE (Department of the Environment) (2015). Referral Guidelines for 14 birds listed as Migratory species under the EPBC Act. Commonwealth of Australia.

DoEE (Department of Environment and Energy) (2017). EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species. Commonwealth of Australia.

EcoLogical Australia (2022). *Implementation Report – Year One*. Unpublished report prepared for CWP Renewables Pty Ltd

Elmoby (2019). Post Construction Bird and Bat Monitoring Results Year 1: July 2018 – June 2020, Yaloak South Wind Farm, Victoria. Unpublished Report to Pacific Hydro Pty Ltd.

Elmoby (2020). Post Construction Bird and Bat Monitoring Results Year 2: July 2019 – June 2020, Yaloak South Wind Farm, Victoria. Unpublished Report to Pacific Hydro Pty Ltd.

Elmoby (2021). Post Construction Bird and Bat Monitoring Results Year 3: July 2020 – June 2021, Yaloak South Wind Farm, Victoria. Unpublished Report to Pacific Hydro Pty Ltd.

EPA (Environmental Protection Authority) (2020). *Technical Guidance – Terrestrial Vertebrate Fauna Surveys for Environmental Impact Assessment*. EPA, Western Australia.

Ferguson-Lees, J. and Christie, D.A. (2001) *Raptors of the world*. Houghton Mifflin Company, New York.

Frith, H. J. (1962). The Mallee Fowl. Angus and Robertson, Sydney.

Garnett, S.T. and Barker, G.B. (2021). *The Action Plan for Australian Birds 2020*. CSIRO Publishing, Collingwood, Victoria.

Geering, A., Agnew, L. and Harding, S. (2007). *Shorebirds of Australia*. CSIRO Publishing, Collingwood, Victoria.

Government of Western Australia (2000). *Bush Forever Volume 2*. Department of Environmental Protection, Perth.

Hansen, B.D., Fuller, R.A., Watkins, D., Rogers, D.I., Clemens, R.S., Newman, M., Woehler, E.J. and Weller, D.R. (2016) *Revision of the East Asian-Australasian Flyway Population Estimates for 37 listed Migratory Shorebird Species*. Unpublished report for the Department of the Environment. BirdLife Australia, Melbourne.

Hearn, R., Williams, K., Comer, S. and Beecham, B. (2002). Jarrah Forest 2 (JF2 – Southern Jarrah Forest Subregion). In 'A Biodiversity Audit of Western Australia's 53 Biogeographical Subregions in 2002'. Ed by J.E. May and N.L. McKenzie. Department of Conservation and land Management, Western Australia.

Hull, C.L., Stark, E.M., Peruzzo, S. and Sims, C.C. (2013). Avian collisions at two wind farms in Tasmania, Australia: taxonomic and ecological characteristics of colliders versus non-colliders, *New Zealand Journal of Zoology*, 40:1, 47-62.

Johnstone, R.E. & Storr, G.M. (1998). *Handbook of Western Australian Birds. Volume 1: Nonpasserines (Emu to Dollarbird)*. Western Australian Museum, Perth.

Johnstone, R.E. & Storr, G.M. (2004). *Handbook of Western Australian Birds. Volume 2: Passerines (Blue-winged Pitta to Goldfinch)*. Western Australian Museum, Perth.

Kitchener, D.J. Dell, J., Muir, B.G. and Palmer, M. (1982). Birds in Western Australian wheatbelt reserves — implications for conservation. *Biological Conservation* 22(2): 127-163.

May, R., Nygård, T., Lie Dahl, E., Reitan, O. & Bevanger, K. (2011). *Collision risk in white-tailed eagles. Modelling kernel-based collision risk using satellite telemetry data in Smøla wind-power plant*. NINA report 692.

Maxwell, S., Burbidge, A. A., and Morris, K. (1996). *The 1996 action plan for Australian marsupials and monotremes*. Wildlife Australia, Canberra.

McKenzie, N.L. and Start, A.N. (1986). Structure of bat guilds in the Kimberley mangroves, Australia. *Journal of Animal Ecology* 55:401 – 420.

- Menkhorst, P. and Knight, F. (2011). *A field guide to the mammals of Australia*. 3rd Edition. Oxford University Press, South Melbourne.
- Moloney P. D., Lumsden L. F. & Smales I. (2019). Investigation of existing post-construction mortality monitoring at Victorian wind farms to assess its utility in estimating mortality rates. Technical Report Series no. 302. Arthur Rylah Institute for Environmental Research, Heidelberg.
- Orell, P. and Morris, K. (1994). *Chuditch recovery plan*. Wildlife Management Program No 13. Department of Conservation and Land Management.
- O'Shea, T.J., Cryan, P.M., Hayman, D. T.S., Plowright, R.K., Streicker, D.G., 2016. Multiple mortality events in bats: a global review. *Mammal Review* 2016, 46, 175–190.
- Perhold, V., Ralston-Paton, S. and Ryan, P. (2020). On a collision course? The large diversity of birds killed by wind turbines in South Africa. *Journal of African Ornithology* 91(3): 228-239.
- Powlesland, R. (2009). Impact of wind farms on birds: a review. Science for Conservation.
- Ribeiro, J., Carduoso, P.E., Debastiani, V. and Santos, J. (2022). 15 years of bird mortality at wind farms: a review for Portugal. Wind Energy and Wildlife Impacts Conference Proceedings.
- Riley, K. J., Warren, K., Armstrong, N., Yeap, L., Dawson, R., Mawson, P. R., Saunders, D. A., Cooper, C. E., & Shephard, J. M. (2023). Accelerometry reveals limits to use of an energy-saving anthropogenic food source by a threatened species: A case of Carnaby's cockatoos (*Zanda latirostris*) and canola. *Ecology and Evolution* 13, e10598. <https://doi.org/10.1002/ece3.10598>
- Rollins K.E., Meyerholz D.K., Johnson G.D., Capparella A.P., and Loew S.S. 2012. A forensic investigation into the etiology of bat mortality at a wind farm: barotrauma or traumatic injury? *Veterinary Pathology* 49: 362-371
- Rycken, S. J. E., Warren, K. S., Yeap, L., Donaldson, R., Mawson, P., Dawson, R., and Shephard, J.M. (2022). Forest specialist species in the urban landscape: Do different levels of urbanization affect the movements of Forest Red-tailed Black Cockatoos (*Calyptorhynchus banksii naso*)? *Avian Conservation and Ecology* 17(1):11. <https://doi.org/10.5751/ACE-02061-170111>
- Rycken, S., Shephard, J.M., Yeap, L., Vaughan-Higgins, R., Page, M., Dawson, D., Karen Smith, K., Mawson, P.R. and Kristin S. Warren, K.S. (2021). Regional variation in habitat matrix determines movement metrics in Baudin's cockatoos in southwest Western Australia. *Wildlife Research* 48: 18-29.
- Rydell, J., Bach, L., Dubourg-Savage, M., Green, M., Rodrigues, L., and Hedenström. A. (2010). Bat mortality at wind turbines in northwestern Europe. *Acta Chiropterol* 12(2):261–74.
- Saunders, D. and Ingram, J. (1995). *Birds of Southwestern Australia: An atlas of changes in the distribution and abundance of the wheatbelt avifauna*. Surrey Beatty and Sons, Chipping Norton.
- Schuster, E., Bulling, L., & Köppel, J. (2015). Consolidating the State of Knowledge: A Synoptical Review of Wind Energy's Wildlife Effects. *Environmental Management*, 56(2), 300–331.
- SNH (2018). *Wind farm impacts on birds - Use of Avoidance Rates in the NatureScot Wind Farm Collision Risk Model*. Scottish Natural Heritage.
- Specialised Zoological (2024). *Acoustic analysis and bat call identification from Kojonup, Western Australia*. Unpublished report by Specialised Zoological for Western Wildlife Pty Ltd, 6 May 2024, project reference SZ732.
- Specialised Zoological (2025). *Acoustic analysis and bat call identification from Kojonup, Western Australia*. Unpublished report by Specialised Zoological for Western Wildlife Pty Ltd, 19 October 2025, project reference SZ779.
- STEWART, G. B., PULLIN, A. S., & COLES, C. F. (2007). Poor evidence-base for assessment of windfarm impacts on birds. *Environmental Conservation*, 34(01), 1.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1983). *Lizards of Western Australia. II. Dragons and Monitors*. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (2002). *Snakes of Western Australia*. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1990). *Lizards of Western Australia. III. Geckoes and Pygopods*. W.A. Museum, Perth.
- Storr, G.M., Smith, L.A. and Johnstone, R.E. (1999). *Lizards of Western Australia. I. Skinks*. 2nd edition. W.A. Museum, Perth.

- Thaxter, C. B., Buchanan, G. M., Carr, J., Butchart, S. H. M., Newbold, T., Green, R. E., Pearce-Higgins, J. W. (2017). Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment. *Proceedings of the Royal Society B: Biological Sciences*, 284(1862), 20170829.
- Tjørnløv, R.S., Skov, H., Armitage, M., Barker, M., Jørgensen, J.B. Mortensen, L.O., Thomas, K. and Uhrenholdt, T. (2023). *Resolving Key Uncertainties of Seabird Flight and Avoidance Behaviours at Offshore Wind Farms: Final Report for the study period 2020-2021*. Unpublished report to Vattenfall.
- Tyler, M.J. (1998). *The Action Plan for Australian Frogs*. Environment Australia, Canberra.
- Tyler, M.J., Smith, L.A. and Johnstone, R.E. (2000). *Frogs of Western Australia*. W.A. Museum, Perth.
- Van Dyck and Strahan, R. (Ed.) (2008). *The Mammals of Australia*. 3rd Edition. Australian Museum/Reed Books, Sydney.
- Western Wildlife (in press). Flat Rocks Wind Farm Stage 2: Basic vertebrate fauna survey, bird and bat utilisation survey 2023. Unpublished report to Moonies Hill Pty Ltd.
- Whitfield, D.P. (2009). Collision avoidance of golden eagles at wind farms under the 'Band' collision risk model. Report to Scottish Natural Heritage.
- Whitfield, D.P. & Madders, M. (2006a). A review of the impacts of wind farms on hen harriers *Circus cyaneus* and an estimation of collision avoidance rates. Natural Research Information Note 1 (revised). Natural Research Ltd, Banchory, UK.
- Whitfield, D.P. & Madders, M. (2006b). Deriving collision avoidance rates for red kites *Milvus milvus*. Natural Research Information Note 3. Natural Research Ltd, Banchory, UK.
- Wilson, S. and Swan, G. (2017). *A complete guide to the reptiles of Australia*. 5th Edition. New Holland Publishers (Australia).
- Woinarski, J.C.Z., Burbidge, A.A. and Harrison, P.L. (2014). *The Action Plan for Australian Mammals 2012*. CSIRO Publishing.

Appendices.

Appendix 1. Daily weather observations during survey periods.

Data after BOM (2025), as recorded at Katanning, site number 010916.

Month	Date	Survey	Daily Temperature (°C)		Rainfall (mm)	Wind (speed km/hr, direction)	
			Minimum	Maximum		9AM	3PM
November 2023	20 – 11 – 23	1	11.5	29.2	0	19, ESE	22, SE
	21 – 11 – 23	1	12.8	30.3	0	26, ESE	24, E
	22 – 11 – 23	1	12.5	32.8	0	20, E	22, ENE
	23 – 11 – 23	1	12.9	33.2	0	24, NE	22, ENE
	24 – 11 – 23	1	12.3	36.4	0	20, NE	17, ESE
August 2024	10 – 08 – 24	2	6.8	20.7	0	09, N	28, NNW
	11 – 08 – 24	2	11.0	17.7	1.8	15, W	20, WNW
	12 – 08 – 24	2	10.7	16.7	0.4	19, WNW	28, WNW
	13 – 08 – 24	2	7.9	17.4	0.6	13, NNW	20, NNW
	14 – 08 – 24	2	9.2	15.0	4.8	20, WNW	28, WNW
	15 – 08 – 24	2	6.7	14.1	3.4	24, W	17, W
November 2024	03 – 11 – 24	3	10.4	23.1	0	09, SE	11, W
	04 – 11 – 24	3	9.9	27.3	0	11, ENE	09, WSW
	05 – 11 – 24	3	10.7	22.0	0	31, W	22, W
	06 – 11 – 24	3	10.2	19.9	0	26, SW	15, S
	07 – 11 – 24	3	5.3	21.7	0	20, WSW	15, SW
	08 – 11 – 24	3	10.2	17.3	0	11, ESE	15, ESE
Dec 2025	14 – 12 – 25	4	13.0	37.0	0	26, ENE	20, NE
	15 – 12 – 25	4	18.8	38.9	0	20, NNE	19, NNW
	16 – 12 – 25	4	21.8	40.9	0	22, N	31, NW
	17 – 12 – 25	4	16.4	28.4	0	30, WSW	20, SSW
	18 – 12 – 25	4	13.1	25.7	0	24, SE	22, SE
	19 – 12 – 25	4	10.8	30.4	0	20, E	7, S

Appendix 2. Sampling Locations.

Appendix 2						
Site Type	Site Name	Zone	Easting	Northing	Start Date	Stop Date
Bat recording	Bat01	50	513496	6240883	20/11/2023	24/11/2023
Bat recording	Bat02	50	512009	6237671	20/11/2023	24/11/2023
Bat recording	Bat03	50	512086	6246031	21/11/2023	24/11/2023
Bat recording	Bat04	50	511162	6247695	21/11/2023	24/11/2023
Bat recording	Bat05	50	510138	6242116	20/11/2023	24/11/2023
Bat recording	Bat06	50	513487	6241661	20/11/2023	24/11/2023
Bat recording	Bat07	50	513471	6242518	11/8/2024	15/8/2024
Bat recording	Bat08	50	510481	6237285	11/8/2024	15/8/2024
Bat recording	Bat09	50	509180	6242750	11/8/2024	15/8/2024
Bat recording	Bat10	50	512177	6245644	11/8/2024	15/8/2024
Bat recording	Bat11	50	511947	6238648	4/11/2024	8/11/2024
Bat recording	Bat12	50	511456	6244187	4/11/2024	8/11/2024
Bat recording	Bat13	50	510377	6241392	4/11/2024	8/11/2024
Bat recording	Bat14	50	513686	6244216	4/11/2024	8/11/2024
Bat recording	Met bottom 1	50	512069	6241808	3/12/2024	18/12/2024
Bat recording	Met bottom 2	50	512069	6241808	12/5/2025	29/5/2025
Bat recording	Met top 1	50	512069	6241808	3/12/2024	18/12/2024
Bat recording	Met top 2	50	512069	6241808	12/5/2025	29/5/2025
Habitat Assessment	Hab 3-1	50	510456	6237296	20/11/2023	20/11/2023
Habitat Assessment	Hab 3-2	50	511606	6239099	20/11/2023	20/11/2023
Habitat Assessment	Hab 3-3	50	511488	6239566	20/11/2023	20/11/2023
Habitat Assessment	Hab 3-4	50	511345	6239349	20/11/2023	20/11/2023
Habitat Assessment	Hab 3-5	50	512057	6237673	20/11/2023	20/11/2023
Habitat Assessment	Hab 3-6	50	512402	6237766	20/11/2023	20/11/2023
Habitat Assessment	Hab 3-7	50	513376	6240826	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-8	50	513105	6240837	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-9	50	513056	6240699	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-10	50	513249	6240541	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-11	50	512474	6240489	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-12	50	512433	6240850	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-13	50	512656	6240717	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-14	50	512881	6240531	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-15	50	513017	6240056	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-16	50	512729	6240075	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-17	50	512324	6239703	21/11/2023	21/11/2023

Appendix 2						
Site Type	Site Name	Zone	Easting	Northing	Start Date	Stop Date
Habitat Assessment	Hab 3-18	50	511938	6238922	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-19	50	512107	6239291	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-20	50	512621	6239508	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-21	50	512529	6239737	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-22	50	512236	6237370	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-24	50	511333	6239887	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-25	50	510226	6237611	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-26	50	509958	6237536	21/11/2023	21/11/2023
Habitat Assessment	Hab 3-27	50	511144	6239218	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-28	50	511929	6238640	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-29	50	511835	6238801	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-30	50	511074	6238129	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-31	50	510850	6237797	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-32	50	510705	6238239	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-33	50	508279	6236864	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-34	50	508241	6237216	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-35	50	508809	6236855	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-36	50	508662	6237194	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-37	50	508875	6237289	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-38	50	508525	6237624	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-39	50	510089	6242019	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-40	50	509263	6242125	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-41	50	510435	6240776	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-42	50	510406	6240471	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-43	50	511488	6240760	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-44	50	511676	6240704	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-45	50	511226	6240925	22/11/2023	22/11/2023
Habitat Assessment	Hab 3-46	50	510385	6246012	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-47	50	514019	6243553	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-48	50	513589	6242043	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-49	50	513885	6242240	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-50	50	514133	6241975	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-51	50	514217	6242863	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-52	50	514277	6243106	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-53	50	514517	6242161	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-54	50	514310	6242166	23/11/2023	23/11/2023

Appendix 2						
Site Type	Site Name	Zone	Easting	Northing	Start Date	Stop Date
Habitat Assessment	Hab 3-55	50	514667	6242097	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-56	50	510616	6246201	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-57	50	510815	6246323	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-58	50	511493	6246133	23/11/2023	23/11/2023
Habitat Assessment	Hab 3-59	50	514484	6242746	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-60	50	510345	6246935	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-61	50	510792	6247063	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-62	50	510846	6246885	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-63	50	510909	6246749	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-64	50	512208	6244719	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-65	50	512089	6245459	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-66	50	512049	6245995	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-67	50	512657	6244558	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-68	50	511736	6242118	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-69	50	511388	6242645	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-70	50	511408	6243059	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-71	50	511677	6243230	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-72	50	511488	6243771	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-73	50	511961	6243921	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-74	50	512450	6241705	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-75	50	511650	6241612	24/11/2023	24/11/2023
Habitat Assessment	Hab 3-76	50	511546	6255904	4/11/2024	4/11/2024
Habitat Assessment	Hab 3-77	50	511567	6257067	4/11/2024	4/11/2024
Habitat Assessment	Hab 3-78	50	511924	6257330	4/11/2024	4/11/2024
Habitat Assessment	Hab 3-79	50	512098	6258349	4/11/2024	4/11/2024
Habitat Assessment	Hab 3-80	50	509340	6237079	10/8/2024	10/8/2024
Habitat Assessment	Hab 3-81	50	509486	6237755	10/8/2024	10/8/2024
Habitat Assessment	Hab 3-82	50	513409	6242528	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-83	50	513044	6242428	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-84	50	513063	6242800	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-85	50	513393	6242135	13/8/2024	13/8/2024
Habitat Assessment	Hab 3-86	50	513158	6242180	13/8/2024	13/8/2024
Habitat Assessment	Hab 3-87	50	513322	6241887	13/8/2024	13/8/2024
Habitat Assessment	Hab 3-88	50	513364	6243401	14/8/2024	14/8/2024
Habitat Assessment	Hab 3-89	50	512917	6243435	14/8/2024	14/8/2024
Habitat Assessment	Hab 3-90	50	512662	6243492	14/8/2024	14/8/2024

Appendix 2						
Site Type	Site Name	Zone	Easting	Northing	Start Date	Stop Date
Habitat Assessment	Hab 3-91	50	512351	6243399	14/8/2024	14/8/2024
Habitat Assessment	Hab 3-92	50	512768	6243196	14/8/2024	14/8/2024
Habitat Assessment	Hab 3-93	50	513196	6243177	14/8/2024	14/8/2024
Habitat Assessment	Hab 3-94	50	511015	6248043	5/11/2024	5/11/2024
Habitat Assessment	Hab 3-95	50	510923	6248501	5/11/2024	5/11/2024
Habitat Assessment	Hab 3-96	50	511006	6248824	5/11/2024	5/11/2024
Habitat Assessment	Hab 3-97	50	510017	6250754	5/11/2024	5/11/2024
Habitat Assessment	Hab 3-98	50	511743	6246658	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-99	50	512032	6246310	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-100	50	512106	6245902	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-101	50	512147	6245538	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-102	50	512354	6244767	11/8/2024	11/8/2024
Habitat Assessment	Hab 3-103	50	513272	6244402	11/8/2024	11/8/2024
Bird Survey Impact Site	K01	50	511793	6246626		
Bird Survey Impact Site	K02	50	512361	6245619		
Bird Survey Impact Site	K03	50	511332	6245747		
Bird Survey Impact Site	K04	50	511952	6244659		
Bird Survey Impact Site	K05	50	511282	6245046		
Bird Survey Impact Site	K06	50	511388	6243145		
Bird Survey Impact Site	K07	50	512562	6243769		
Bird Survey Impact Site	K08	50	513482	6243714		
Bird Survey Impact Site	K09	50	513619	6243050		
Bird Survey Impact Site	K10	50	514666	6242622		
Bird Survey Impact Site	K11	50	513617	6242225		
Bird Survey Impact Site	K12	50	512356	6242262		
Bird Survey Impact Site	K13	50	511250	6242264		
Bird Survey Impact Site	K14	50	510288	6242753		
Bird Survey Impact Site	K15	50	509244	6242775		
Bird Survey Impact Site	K16	50	509617	6242048		
Bird Survey Impact Site	K17	50	510622	6241704		
Bird Survey Impact Site	K18	50	511775	6241668		
Bird Survey Impact Site	K19	50	512700	6241211		
Bird Survey Impact Site	K20	50	513509	6240997		
Bird Survey Impact Site	K21	50	512293	6240925		
Bird Survey Impact Site	K22	50	511492	6240417		
Bird Survey Impact Site	K23	50	510837	6240988		

Appendix 2						
Site Type	Site Name	Zone	Easting	Northing	Start Date	Stop Date
Bird Survey Impact Site	K24	50	513166	6240335		
Bird Survey Impact Site	K25	50	511446	6239717		
Bird Survey Impact Site	K26	50	511545	6238902		
Bird Survey Impact Site	K27	50	512370	6238638		
Bird Survey Impact Site	K28	50	512022	6237851		
Bird Survey Impact Site	K29	50	511102	6238495		
Bird Survey Impact Site	K30	50	510545	6237941		
Bird Survey Impact Site	K31	50	509485	6237940		
Bird Survey Impact Site	K32	50	510300	6237162		
Bird Survey Impact Site	K33	50	509462	6237113		
Bird Survey Reference Site	C01	50	513321	6250238		
Bird Survey Reference Site	C02	50	507503	6244390		
Bird Survey Reference Site	C03	50	506431	6240810		
Bird Survey Reference Site	C04	50	506594	6238220		
Bird Survey Reference Site	C05	50	507588	6234873		
Bird Survey Reference Site	C06	50	512939	6235186		
Bird Survey Reference Site	C07	50	516450	6240406		
Bird Survey Reference Site	C08	50	518729	6245501		
Bird Survey Reference Site	A34	50	511793	6246626		
Bird Survey Reference Site	A35	50	512361	6245619		
Bird Survey Reference Site	A36	50	511332	6245747		

Appendix 3. Habitat Assessments.

Appendix 3	
Habitat Assessment	Photograph
Hab 3-1 Habitat: Eucalypt woodland / creek Landform: gentle slope Vegetation: Jarrah and Marri woodland, planted Sheoak, over low mixed shrubs, some <i>Hakea prostrata</i>, native and exotic grasses. Fire age: no recent fire Disturbance: small remnant, weeds Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plants (Marri, Jarrah, <i>Hakea prostrata</i>), some tree hollows, some logs, leaf litter, understory vegetation, linkage. Wetlands: seasonal creek	
Hab 3-2 Habitat: Creek Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses and spike rush. Fire age: no recent fire Disturbance: small remnant, weeds Soil: brown sandy clay Rock: none Important elements: Cockatoo food plants (Marri, Jarrah) some tree hollows, logs, linkage. Wetlands: seasonal creek	
Hab 3-3 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: very small remnant, grazed, weeds Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri), linkage. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-4 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: small remnant, grazed, weeds Soil: brown gravelly sand Rock: none Important elements: tree hollows, logs, leaf litter, understory vegetation, linkage. Wetlands: none	
Hab 3-5 Habitat: Eucalypt woodland / creek Landform: low rise Vegetation: Wandoo, Jarrah and Marri woodland over sparse low mixed shrubs, some <i>Banksia sessilis</i>, native and exotic grasses. Fire age: no recent fire Disturbance: small remnant, grazed, weeds, timber cutting Soil: brown gravelly sand Rock: some laterite boulders Important elements: Cockatoo food plants (Jarrah, Marri, <i>B. sessilis</i>) tree hollows, logs, leaf litter. Wetlands: none	
Hab 3-6 Habitat: Pine plantation Landform: gentle slope Vegetation: Planted Pines. Fire age: no recent fire Disturbance: original vegetation entirely replaced Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (pine). Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-7 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and occasional Marri woodland, over low mixed shrubs and sedges, some <i>Hakea lissocarpa</i>, native grasses. Fire age: no recent fire Disturbance: timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, <i>H. lissocarpa</i>), tree hollows, logs, leaf litter, understory vegetation. Wetlands: none	
Hab 3-8 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and occasional Marri woodland, over low mixed shrubs and sedges, some <i>Hakea lissocarpa</i>, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, <i>H. lissocarpa</i>), tree hollows, logs, leaf litter, understory vegetation. Wetlands: none	
Hab 3-9 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland, over low mixed shrubs and sedges, some <i>Banksia armata</i>(?) and <i>Banksia trifurcata</i>, native grasses. Fire age: no recent fire Disturbance: timber cutting Soil: yellow gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, <i>Banksia</i>), tree hollows, logs, understory vegetation. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-10 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland, over low mixed shrubs and sedges, some <i>Banksia sessilis</i>, native grasses. Fire age: no recent fire Disturbance: timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, Banksia), tree hollows, logs, understory vegetation. Wetlands: none	
Hab 3-11 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland with scattered Wandoo, over low mixed shrubs and sedges, some <i>Banksia sessilis</i>, native grasses. Fire age: no recent fire Disturbance: timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, Banksia), tree hollows, logs, understory vegetation. Wetlands: none	
Hab 3-12 Habitat: Eucalypt woodland Landform: low rise Vegetation: Jarrah, Marri and Wandoo woodland, over low mixed shrubs and sedges, some <i>Hakea lissocarpa</i>, native grasses. Fire age: no recent fire Disturbance: timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, Hakea), tree hollows, logs, understory vegetation. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-13 Habitat: Sheoak woodland / Granite outcrop Landform: gentle slope Vegetation: Sheoak woodland, over <i>Hypocalymma angustifolium</i> and sedges. Mosses and Boyra on granite. Fire age: no recent fire Disturbance: rabbits Soil: brown sand Rock: Granite exposures Important elements: Exfoliating rock, dense vegetation. Wetlands: seasonally damp at granite edges	
Hab 3-14 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over low mixed shrubs and sedges, some <i>Hakea lissocarpha</i>, native grasses. Fire age: no recent fire Disturbance: small remnant, weeds, ground disturbance Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, Hakea), tree hollows, logs, understory vegetation. Wetlands: none	
Hab 3-15 Habitat: Sheoak woodland / Granite outcrop Landform: gentle slope Vegetation: Sheoak woodland, over <i>Hypocalymma angustifolium</i> and sedges. Mosses and Boyra on granite. Fire age: no recent fire Disturbance: rabbits, weeds Soil: brown sand Rock: Granite exposures Important elements: Exfoliating rock, ephemeral rock pools, dense vegetation. Wetlands: seasonally damp at granite edges, ephemeral pools	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-16 Habitat: Sheoak woodland / Granite outcrop Landform: gentle slope Vegetation: Sheoak woodland, over <i>Hypocalymma angustifolium</i> and sedges. Mosses and <i>Boyra</i> on granite. Fire age: no recent fire Disturbance: rabbits, weeds Soil: brown sand Rock: Granite exposures Important elements: Exfoliating rock, ephemeral rock pools, dense vegetation. Wetlands: seasonally damp at granite edges, ephemeral pools	
Hab 3-17 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over low mixed shrubs and sedges, native and exotic grasses. Fire age: no recent fire Disturbance: small remnant, weeds, grazed Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, understory vegetation, linkage. Wetlands: none	
Hab 3-18 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over grasstrees, low mixed shrubs and sedges, some <i>Banksia armata</i> (?), native grasses. Fire age: no recent fire Disturbance: weeds, some grazing Soil: brown sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, <i>Banksia</i>), tree hollows, logs, understory vegetation. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-19 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo, Jarrah and Marri woodland over low mixed shrubs and sedges, some <i>Hakea lissocarpa</i>, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, some grazing Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, Hakea), tree hollows, logs, understory vegetation. Wetlands: none	
Hab 3-20 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Regrowth Jarrah and Marri woodland with some Sheoak over low mixed shrubs and sedges, native grasses. Fire age: no recent fire Disturbance: weeds, some grazing Soil: brown gravelly sand Rock: small outcropping granite Important elements: Cockatoo food plant (Marri, Jarrah), understory vegetation. Wetlands: none	
Hab 3-21 Habitat: Sheoak woodland Landform: gentle slope Vegetation: Sheoak woodland with occasional Wandoo over grasstrees, <i>Hypocalymma angustifolium</i> and sedges. Mosses and <i>Boyra</i> on granite. Fire age: no recent fire Disturbance: rabbits, weeds Soil: brown sand Rock: Near small granite exposures Important elements: Tree hollows, dense vegetation. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-22 Habitat: Eucalypt woodland Landform: low rise Vegetation: Jarrah woodland with some Marri and Wandoo over some <i>Banksia sessilis</i>, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, timber cutting, grazed Soil: brown gravelly sand Rock: surface laterite rocks Important elements: Cockatoo food plant (Marri, Jarrah, Banksia), tree hollows, logs. Wetlands: none	
Hab 3-24 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: grazed, weeds Soil: brown gravelly sand Rock: granite boulders and small exposures Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-25 Habitat: Eucalypt woodland Landform: low rise Vegetation: Jarrah, Marri and Wandoo woodland over mixed low shrubs, native and exotic grasses. Fire age: no recent fire Disturbance: weeds Soil: grey gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-26 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Regrowth Jarrah and Wandoo woodland over low mixed shrubs and sedges, native grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: grey gravelly sand Rock: none Important elements: Cockatoo food plant (Jarrah), tree hollows, logs, understory vegetation. Wetlands: none	
Hab 3-27 Habitat: Eucalypt woodland Landform: low hill Vegetation: Wandoo woodland with occasional Jarrah and Marri, over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: laterite gravel and granite boulders Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-28 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo woodland with some Sheoak over grasstrees, low mixed shrubs and sedges, some <i>Banksia armata</i> (?), <i>Hakea</i> sp., native grasses. Fire age: no recent fire Disturbance: weeds Soil: grey sand Rock: none Important elements: Cockatoo food plant (Banksia, Hakea), tree hollows, logs, understory vegetation. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-29 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: grey sand Rock: granite rocks Important elements: tree hollows, logs. Wetlands: none	
Hab 3-30 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland with some Wandoo over sparse mixed shrubs and native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: grey sandy clay Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-31 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland with some Wandoo over sparse mixed shrubs and native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-32 Habitat: Eucalypt woodland / creek Landform: gentle slope Vegetation: Wandoo woodland over exotic grasses. Some planted vegetation along creek. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown sand Rock: granite boulders Important elements: tree hollows, logs. Wetlands: seasonal creek	
Hab 3-33 Habitat: Eucalypt woodland Landform: low hill Vegetation: Jarrah woodland with some Marri and Wandoo over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: grey sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-34 Habitat: Eucalypt woodland Landform: low hill Vegetation: Jarrah and Wandoo woodland with some Marri over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: grey sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-35 Habitat: Creek Landform: gentle slope Vegetation: Mostly planted eucalypts with some remnant York Gum, Wandoo and Marri over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, ground disturbance Soil: brown sandy clay Rock: none Important elements: Cockatoo food plant (Marri), tree hollows, logs, seasonal water. Wetlands: dam, seasonal creek	
Hab 3-36 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed. Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-37 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over exotic grasses. Fire age: recently burnt Disturbance: weeds, grazed, tree deaths Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-38 Habitat: Eucalypt woodland Landform: low hill Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, tree deaths Soil: grey sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-39 Habitat: Paddock trees Landform: gentle slope Vegetation: Wandoo Jarrah and Marri trees over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows. Wetlands: none	
Hab 3-40 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo and Powderbark Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, rabbits Soil: brown gravelly sand Rock: none Important elements: tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-41 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: laterite gravel Important elements: tree hollows, logs. Wetlands: none	
Hab 3-42 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Regrowth Jarrah woodland with some Marri over occasional Banksia sessilis, sparse low shrubs and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-43 Habitat: Eucalypt woodland Landform: gentle lower slope Vegetation: Jarrah and Marri woodland over mixed low shrubs, sedges, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: grey sandy clay Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, understory vegetation. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-44 Habitat: Sheoak woodland Landform: gentle slope Vegetation: Sheoak woodland over sparse Tea-tree and sedges. Fire age: no recent fire Disturbance: grazed Soil: brown sand Rock: small granite outcrops Important elements: Leaf litter, dense vegetation. Wetlands: none	
Hab 3-45 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown sand Rock: small granite boulders Important elements: Cockatoo food plant (Marri, Jarrah), logs. Wetlands: seasonal creek	
Hab 3-46 Habitat: Planted Landform: gentle slope Vegetation: Planted eucalypts Fire age: no recent fire Disturbance: weeds, grazed, replacement of original vegetation Soil: brown sand Rock: none Important elements: Linkage. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-47 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown gravelly sand Rock: outcropping granite boulders Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-48 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: outcropping granite rocks Important elements: Cockatoo food plant (Marri, Jarrah), some tree hollows, logs. Wetlands: none	
Hab 3-49 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland with occasional Wandoo over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown sand Rock: laterite rocks Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-50 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland with occasional Wandoo over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown sand Rock: laterite rocks Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter. Wetlands: none	
Hab 3-51 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over sparse low shrubs, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: grey gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-52 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-53 Habitat: Sheoak woodland / granite outcrop Landform: gentle slope Vegetation: Sheoak woodland over <i>Banksia armata</i> (?), sedges, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: granite outcrop Important elements: Cockatoo food plant (<i>Banksia</i>), ephemeral pools, exfoliating granite. Wetlands: ephemeral pools	
Hab 3-54 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over sparse low shrubs, sedges, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown gravelly sand Rock: laterite rocks Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-55 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over <i>Banksia armata</i> (?), sedges, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: yellow gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, <i>Banksia</i>), tree hollows, logs, understory vegetation. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-56 Habitat: Eucalypt woodland Landform: low hill Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-57 Habitat: Creek Landform: valley Vegetation: Flooded Gum woodland over spike rush and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown sand Rock: none Important elements: tree hollows, logs. Wetlands: seasonal creek	
Hab 3-58 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Marri and Sheoak woodland over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: granite rocks Important elements: Cockatoo food plant (Marri, Sheoak), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-59 Habitat: Creek / Dam Landform: valley Vegetation: Flooded Gum and Marri woodland over spike rush and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: grey sand Rock: none Important elements: Cockatoo food plant (Marri) tree hollows, logs. Wetlands: seasonal creek, dam	
Hab 3-60 Habitat: Creek Landform: valley Vegetation: Flooded Gum woodland over spike rush and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: grey sand Rock: occasional granite boulder Important elements: tree hollows, logs. Wetlands: seasonal creek	
Hab 3-61 Habitat: Eucalypt woodland Landform: hilltop Vegetation: Jwandoo and Powderbark Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: outcropping laterite rocks Important elements: tree hollows, logs, leaf litter Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-62 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: regrowth Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri). Wetlands: none	
Hab 3-63 Habitat: Granite outcrop Landform: gentle slope Vegetation: Sheoak, Jarrah and Marri woodland over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown sand Rock: outcropping granite Important elements: Cockatoo food plant (Marri, Jarrah), exfoliating rock, ephemeral pools. Wetlands: ephemeral pools	
Hab 3-64 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: grey sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-65 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), small tree hollows, logs. Wetlands: none	
Hab 3-66 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), small tree hollows, logs. Wetlands: none	
Hab 3-67 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland with occasional Sheoak over sparse low shrubs, sedges, native and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-68 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah, Wandoo and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: minor laterite outcropping Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-69 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: minor laterite outcropping Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-70 Habitat: Eucalypt woodland Landform: moderate slope Vegetation: Marri woodland over exotic grasses. Fire age: recent fire, young saplings Disturbance: weeds, grazed, ring-barked trees Soil: brown gravelly sand Rock: laterite outcropping Important elements: Cockatoo food plant (Marri), tree hollows.. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-71 Habitat: Creek Landform: valley Vegetation: Open Flooded Gum woodland over spikerush and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown clay-sand Rock: none Important elements: Tree hollows. Wetlands: seasonal creek	
Hab 3-72 Habitat: Creek Landform: valley Vegetation: Melaleuca woodland over sedges and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown clay-sand Rock: none Important elements: Dense vegetation. Wetlands: seasonal creek	
Hab 3-73 Habitat: Creek Landform: valley Vegetation: Open Flooded Gum woodland over spikerush and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown clay-sand Rock: none Important elements: None noted. Wetlands: seasonal creek	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-74 Habitat: Planted Landform: gentle slope Vegetation: Planted eucalypts over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, original vegetation cleared Soil: brown gravelly sand Rock: none Important elements: None noted Wetlands: none	
Hab 3-75 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: minor laterite outcropping Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-76 Habitat: Eucalypt woodland Landform: flat Vegetation: Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, remnant on road verge Soil: grey gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-77 Habitat: Eucalypt woodland Landform: flat Vegetation: Wandoo woodland over Sheoak over mixed native shrubs, sedges and exotic grasses. Fire age: no recent fire Disturbance: weeds, remnant on road verge Soil: grey gravelly sand Rock: none Important elements: Cockatoo food plant (<i>Banksia sessilis</i>), leaf litter Wetlands: none	
Hab 3-78 Habitat: Creek Landform: shallow valley Vegetation: Melaleuca woodland over exotic grasses, spikerush and samphire. Wandoo on higher ground. Fire age: no recent fire Disturbance: weeds, grazed, dead trees Soil: brown gravelly sand Rock: none Important elements: Tree hollows, frog habitat Wetlands: seasonal creek	
Hab 3-79 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri), tree hollows. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-80 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, narrow tree line Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-81 Habitat: Eucalypt woodland Landform: gentle upper slope Vegetation: Jarrah and Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, narrow tree line Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-82 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Wandoo woodland with occasional Marri over open sedges and herbs. Fire age: no recent fire Disturbance: weeds, timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-83 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over sedges and low Banksia sp. Fire age: no recent fire Disturbance: weeds, timber cutting Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, Banksia), tree hollows, logs. Wetlands: none	
Hab 3-84 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over sedges. Fire age: no recent fire Disturbance: old fenceline, timber cutting Soil: brown sandy clay Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	
Hab 3-85 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over sedges and low shrubs Fire age: no recent fire Disturbance: old contour banks Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-86 Habitat: Eucalypt woodland Landform: gentle mid-slope Vegetation: Jarrah and Marri woodland over sedges and low shrubs Fire age: no recent fire Disturbance: none noted Soil: brown gravelly sand Rock: minor granite outcropping Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter. Wetlands: none	
Hab 3-87 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over sedges and low shrubs Fire age: no recent fire Disturbance: none noted Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter Wetlands: none	
Hab 3-88 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah, Marri and Wandoo woodland over open sedges, sparse low shrubs and pasture weeds. Fire age: no recent fire Disturbance: weeds, grazed, some tree deaths Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-89 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah, Marri and Wandoo woodland over open sedges and low shrubs. Fire age: no recent fire Disturbance: weeds. Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah, Hakea), tree hollows, logs, leaf litter Wetlands: none	
Hab 3-90 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah, Marri and Wandoo woodland over open sedges and low shrubs including Banksia sp. Fire age: no recent fire Disturbance: none noted Soil: brown sandy clay Rock: minor granite outcropping Important elements: Cockatoo food plant (Marri, Jarrah, Banksia, Hakea), tree hollows, logs. Wetlands: none	
Hab 3-91 Habitat: Eucalypt woodland Landform: moderate slope Vegetation: Wandoo and Powderbark Wandoo woodland over sparse sedges and low shrubs Fire age: no recent fire Disturbance: none noted Soil: brown gravelly sand Rock: small breakaway, rocks Important elements: Tree hollows, logs, leaf litter, rock crevices Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-92 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over sedges and low shrubs. Fire age: no recent fire Disturbance: none noted Soil: brown gravelly sand Rock: minor granite outcropping Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter, rock crevices. Wetlands: none	
Hab 3-93 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over sedges and low shrubs. Fire age: no recent fire Disturbance: none noted Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter. Wetlands: none	
Hab 3-94 Habitat: Eucalypt woodland Landform: low rise Vegetation: Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared Soil: brown gravelly sand Rock: occasional granite boulders Important elements: Cockatoo food plant (Marri). Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-95 Habitat: Creek Landform: shallow valley Vegetation: Flooded Gum woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared Soil: brown clay Rock: occasional granite boulders Important elements: Tree hollows, frog habitat Wetlands: seasonal creek	
Hab 3-96 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared Soil: brown sand Rock: granite boulders and minor outcropping Important elements: Cockatoo food plant (Marri), tree hollows, rock crevices Wetlands: none	
Hab 3-97 Habitat: Creek Landform: shallow valley Vegetation: Flooded Gum and Melaleuca woodland over sedges and exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed Soil: brown clayey sand Rock: none Important elements: Small tree hollows, frog habitat. Wetlands: seasonal creek	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-98 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared, tree deaths Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri), tree hollows. Wetlands: none	
Hab 3-99 Habitat: Eucalypt woodland Landform: low rise Vegetation: Wandoo and Powderbark Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared, timber cutting Soil: brown gravelly sand Rock: none Important elements: Tree hollows, leaf litter, logs. Wetlands: none	
Hab 3-100 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows. Wetlands: none	

Appendix 3	
Habitat Assessment	Photograph
Hab 3-101 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo, Jarrah and Marri woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows. Wetlands: none	
Hab 3-102 Habitat: Eucalypt woodland Landform: flat Vegetation: Jarrah and Marri woodland over Sheoak over sedges and low shrubs. Fire age: no recent fire Disturbance: weeds Soil: brown gravelly sand Rock: none Important elements: Cockatoo food plant (Marri, Jarrah), tree hollows, logs, leaf litter. Wetlands: none	
Hab 3-103 Habitat: Eucalypt woodland Landform: gentle slope Vegetation: Wandoo woodland over exotic grasses. Fire age: no recent fire Disturbance: weeds, grazed, parkland cleared Soil: brown gravelly sand Rock: none Important elements: Tree hollows Wetlands: none	

Appendix 4. Vertebrate fauna potentially occurring in the Study Area.

Key to records:

- This survey = species recorded in the study area on this survey, November 2023, August or November 2024 and December 2025.
- FRWF S2 = species recorded at the Flat Rocks Wind Farm Stage 2 (Western Wildlife, in press)
- ALA = species recorded within 40km on the Atlas of Living Australia Database.
- Dandjoo = species recorded within 40km on Dandjoo Database.
- DBCA = species records from the DBCA Threatened and Priority Species Database.
- EPBC = species & species habitat from the EPBC Protected Matters Search Tool.
- Int = introduced species.

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
FROGS								
Pelodyadidae								
Slender Tree Frog	<i>Litoria adelaidensis</i>				+	+		
Motorbike Frog	<i>Litoria moorei</i>				+			
Limnodynastidae								
Western Spotted Frog	<i>Heleioporus albopunctatus</i>				+	+		
Hooting Frog	<i>Heleioporus barycragus</i>							
Whooping Frog	<i>Heleioporus inornatus</i>							
Moaning Frog	<i>Heleioporus eyrei</i>				+	+		
Pobblebonk / Banjo Frog	<i>Limnodynastes dorsalis</i>		+		+	+		
Humming Frog	<i>Neobatrachus pelobatoides</i>				+			
Myobatrachidae								
Quacking Frog	<i>Crinia georgiana</i>				+	+		
Bleating Froglet	<i>Crinia pseudinsignifera</i>		+		+	+		
Turtle Frog	<i>Myobatrachus gouldii</i>				+	+		
Guenther’s Toadlet	<i>Pseudophryne guentheri</i>				+	+		
REPTILES								
Chelidae								
Long-necked Turtle	<i>Chelodina oblonga</i>				+	+		
Carphodactylidae								
Southern Barking Gecko	<i>Underwoodisaurus milii</i>				+	+		

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Diplodactylidae								
Clawless Gecko	<i>Crenadactylus ocellatus</i>				+	+		
South Coast Gecko	<i>Diplodactylus calcicolus</i>				+	+		
Wheatbelt Ground Gecko	<i>Diplodactylus granariensis</i>				+	+		
Speckled Stone Gecko	<i>Diplodactylus lateroides</i>				+	+		
Reticulated Velvet Gecko	<i>Hesperoedura reticulata</i>				+	+		
Gekkonidae								
Marbled Gecko	<i>Christinus marmoratus</i>				+	+		
Variegated Dtella	<i>Gehyra variegata</i>				+			
Pygopodidae								
Granite Worm-lizard	<i>Aprasia pulchella</i>					+		
Sandplain Worm-lizard	<i>Aprasia repens</i>				+	+		
Striated Worm-lizard	<i>Aprasia striolata</i>				+			
Marble-faced Delma	<i>Delma australis</i>				+			
Fraser's Legless Lizard	<i>Delma fraseri</i>				+	+		
Burton's Legless Lizard	<i>Lialis burtonis</i>				+			
Common Scaly-foot	<i>Pygopus lepidopodus</i>				+	+		
Agamidae								
Ornate Crevice Dragon	<i>Ctenophorus ornatus</i>		+		+	+		
Bearded Dragon	<i>Pogona minor</i>				+			
Scincidae								
Southwestern Cool-skink	<i>Acritoscincus trilineatus</i>				+	+		
Fence Skink	<i>Cryptoblepharus buechananii</i>		+	+	+	+		
Odd-striped Ctenotus	<i>Ctenotus impar</i>				+	+		
King's Skink	<i>Egernia kingii</i>				+			
Southwestern Crevice-skink	<i>Egernia napoleonis</i>				+	+		
Bright Crevice-skink	<i>Egernia richardi</i>				+			
Lowlands Earless Skink	<i>Hemiergis peronii</i>				+	+		
Dwarf Four-toed Slider	<i>Lerista distinguenda</i>				+	+		
Bull Skink	<i>Liopholis multiscutata</i>				+			
Dwarf Skink	<i>Menetia greyii</i>		+		+	+		
Dusky Morethia	<i>Morethia obscura</i>				+	+		
Western Blue-tongue	<i>Tiliqua occipitalis</i>				+			
Bobtail	<i>Tiliqua rugosa</i>		+	+	+	+		
Varanidae								
Gould's Monitor	<i>Varanus gouldii</i>				+			
Southern Heath Monitor	<i>Varanus rosenbergi</i>				+			
Pythonidae								
Children's Python	<i>Antaresia childreni</i>				+	+		
Carpet Python	<i>Morelia spilota imbricata</i>							

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Typhlopidae								
Southern Blind Snake	<i>Anilius australis</i>				+	+		
Fat Blind Snake	<i>Anilius pinguis</i>				+			
Beaked Blind Snake	<i>Anilius waitii</i>							
Elapidae								
Bardick	<i>Echiopsis curta</i>				+			
Western Crowned Snake	<i>Elapognathus coronatus</i>				+			
Tiger Snake	<i>Notechis scutatus</i>				+	+		
Dugite	<i>Pseudonaja affinis</i>				+	+		
Gwardar / Western Brown Snake	<i>Pseudonaja mengdeni</i>				+			
Jan's Banded Snake	<i>Simoselaps bertholdi</i>				+			
Gould's Hooded Snake	<i>Suta gouldii</i>				+	+		
Black-backed Snake	<i>Suta nigriceps</i>				+	+		
BIRDS								
Casuariidae								
Emu	<i>Dromaius novaehollandiae</i>				+			
Anatidae								
Black Swan	<i>Cygnus atratus</i>				+	+		
Grey Teal	<i>Anas gracilis</i>		+		+	+		
Pacific Black Duck	<i>Anas superciliosa</i>		+		+	+		
Australian Wood Duck	<i>Chenonetta jubata</i>		+	+	+			
Pink-eared Duck	<i>Malacorhynchus membranaceus</i>				+			
Australian Shelduck	<i>Tadorna tadornoides</i>		+		+	+		
Megapodiidae								
Malleefowl	<i>Leipoa ocellata</i>	T			+		+	+
Phasianidae								
Stubble Quail	<i>Coturnix pectoralis</i>		+	+	+			
Brown Quail	<i>Synoicus ypsilophora</i>				+			
Podargidae								
Tawny Frogmouth	<i>Podargus strigoides</i>			+	+	+		
Caprimulgidae								
Spotted Nightjar	<i>Eurostopodus argus</i>				+			
Aegothelidae								
Australian Owlet-Nightjar	<i>Aegotheles cristatus</i>				+	+		
Apodidae								
Fork-tailed Swift	<i>Apus pacificus</i>	Mi						+

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Cuculidae								
Pallid Cuckoo	<i>Heteroscenes pallidus</i>				+			
Fan-tailed Cuckoo	<i>Cacomantis flabelliformis</i>		+		+			
Horsfield's Bronze-Cuckoo	<i>Chalcites basalus</i>		+	+	+			
Shining Bronze-Cuckoo	<i>Chalcites lucidus</i>		+	+	+			
Columbidae								
Domestic (Feral) Pigeon	<i>Columba livia</i>	Int			+			
Common Bronzewing	<i>Phaps chalcoptera</i>		+	+	+	+		
Brush Bronzewing	<i>Phaps elegans</i>		+		+			
Crested Pigeon	<i>Ocyphaps lophotes</i>		+	+	+			
Spotted Turtle-dove	<i>Spilopelia chinensis</i>	Int			+			
Laughing Turtle-dove	<i>Spilopelia senegalensis</i>	Int			+			
Rallidae								
Eurasian Coot	<i>Fulica atra</i>				+	+		
Dusky Moorhen	<i>Gallinula tenebrosa</i>				+			
Purple Swampphen	<i>Porphyrio porphyrio</i>				+	+		
Australian Spotted Crake	<i>Porzana fluminea</i>				+			
Spotless Crake	<i>Zapornia tabuensis</i>				+			
Black-tailed Nativehen	<i>Tribonyx ventralis</i>				+			
Podicipedidae								
Hoary-headed Grebe	<i>Poliocephalus poliocephalus</i>				+	+		
Australasian Grebe	<i>Tachybaptus novaehollandiae</i>		+		+			
Turnicidae								
Painted Button-quail	<i>Turnix varius</i>		+	+	+			
Little Button-quail	<i>Turnix velox</i>				+			
Burhinidae								
Bush Stone-Curlew	<i>Burhinus grallarius</i>				+	+		
Recurvirostridae								
Black-winged Stilt	<i>Himantopus himantopus</i>				+			
Charadriidae								
Red-capped Plover	<i>Charadrius ruficapillus</i>				+			
Black-fronted Dotterel	<i>Elseya melanops</i>				+			
Red-kneed Dotterel	<i>Erythrogonys cinctus</i>				+			
Banded Lapwing	<i>Vanellus tricolor</i>				+	+		
Scolopacidae								
Common Sandpiper	<i>Actitis hypoleucos</i>	Mi			+		+	
Phalacrocoracidae								
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>				+	+		
Great Cormorant	<i>Phalacrocorax carbo</i>				+			
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>				+			

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Threskiornithidae								
Yellow-billed Spoonbill	<i>Platalea flavipes</i>				+	+		
Australian White Ibis	<i>Threskiornis moluccus</i>				+	+		
Straw-necked Ibis	<i>Threskiornis spinicollis</i>				+			
Ardeidae								
Eastern Great Egret	<i>Ardea alba</i>				+			
White-necked Heron	<i>Ardea pacifica</i>				+			
White-faced Heron	<i>Egretta novaehollandiae</i>		+	+	+			
Nankeen Night Heron	<i>Nycticorax caledonicus</i>				+			
Accipitridae								
Black-shouldered Kite	<i>Elanus axillaris</i>		+		+			
Square-tailed Kite	<i>Lophoictinia isura</i>				+			
Whistling Kite	<i>Haliastur sphenurus</i>				+			
Swamp Harrier	<i>Circus approximans</i>		+		+			
Spotted Harrier	<i>Circus assimilis</i>				+			
Brown Goshawk	<i>Accipiter fasciatus</i>				+			
Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>		+		+			
Wedge-tailed Eagle	<i>Aquila audax</i>		+	+	+	+		
Little Eagle	<i>Hieraaetus morphnoides</i>				+			
Tytonidae								
Eastern Barn Owl	<i>Tyto javanica</i>			+	+			
Masked Owl	<i>Tyto novaehollandiae</i>	P			+			
Strigidae								
Barking Owl (southwest)	<i>Ninox connivens connivens</i>	P			+		+	
Southern Boobook Owl	<i>Ninox boobook</i>				+	+		
Alcedinidae								
Laughing Kookaburra	<i>Dacelo novaeguineae</i>	Int	+	+	+			
Sacred Kingfisher	<i>Todiramphus sanctus</i>		+	+	+			
Meropidae								
Rainbow Bee-eater	<i>Merops ornatus</i>		+		+	+		
Falconidae								
Peregrine Falcon	<i>Falco peregrinus</i>	OS	+	+	+		+	
Australian Hobby	<i>Falco longipennis</i>				+			
Brown Falcon	<i>Falco berigora</i>		+	+	+	+		
Australian Kestrel	<i>Falco cenchroides</i>		+	+	+			

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Cacatuidae								
Muir's Corella	<i>Cacatua pastinator pastinator</i>	CD	+		+		+	
Little Corella	<i>Cacatua sanguinea</i>				+			
Forest Red-tailed Black-cockatoo	<i>Calyptorhynchus banksii naso</i>	T	+	+	+		+	+
Baudin's Cockatoo	<i>Zanda baudinii</i>	T			+		+	+
Carnaby's Cockatoo	<i>Zanda latirostris</i>	T	+	+	+		+	+
Galah	<i>Eolophus roseicapilla</i>		+	+	+			
Psittaculidae								
Purple-crowned Lorikeet	<i>Parvipsitta porphyrocephala</i>		+	+	+	+		
Regent Parrot	<i>Polytelis anthopeplus</i>		+	+	+	+		
Australian Ringneck	<i>Barnardius zonarius</i>		+	+	+	+		
Inland Western Rosella	<i>Platycercus icterotis xanthogenys</i>	P	+	+	+	+		
Red-capped Parrot	<i>Purpuricephalus spurius</i>		+	+	+	+		
Budgerigar	<i>Melopsittacus undulatus</i>				+			
Elegant Parrot	<i>Neophema elegans</i>		+	+	+	+		
Climacteridae								
Rufous Treecreeper	<i>Climacteris rufus</i>		+	+	+	+		
Maluridae								
Splendid Fairy-wren	<i>Malurus splendens</i>		+	+	+	+		
Blue-breasted Fairy-wren	<i>Malurus pulcherrimus</i>				+	+		
Meliphagidae								
Western Spinebill	<i>Acanthorhynchus superciliosus</i>				+	+		
Red Wattlebird	<i>Anthochaera carunculata</i>		+	+	+	+		
Western Wattlebird	<i>Anthochaera lunulata</i>		+		+	+		
Spiny-cheeked Honeyeater	<i>Acanthagenys rufogularis</i>				+			
Yellow-throated Miner	<i>Manorina flavigula</i>		+	+	+	+		
Singing Honeyeater	<i>Gavicalis virescens</i>		+	+	+	+		
White-eared Honeyeater	<i>Nesoptilotis leucotis</i>				+			
Yellow-plumed Honeyeater	<i>Ptilotula ornata</i>		+	+	+	+		
Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>		+		+	+		
Gilbert's Honeyeater	<i>Melithreptus chloropsis</i>		+		+			
Brown Honeyeater	<i>Lichmera indistincta</i>		+	+	+	+		
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>		+		+	+		
White-cheeked Honeyeater	<i>Phylidonyris niger</i>				+	+		
Tawny-crowned Honeyeater	<i>Glyciphila melanops</i>				+	+		
Black Honeyeater	<i>Sugomel nigrum</i>				+			
White-fronted Chat	<i>Epthianura albifrons</i>		+		+			
Pardalotidae								
Spotted Pardalote	<i>Pardalotus punctatus</i>		+		+	+		
Striated Pardalote	<i>Pardalotus striatus</i>		+	+	+	+		

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Acanthizidae								
White-browed Scrubwren	<i>Sericornis frontalis</i>				+	+		
Rufous Fieldwren	<i>Calamanthus campestris</i>				+			
Weebill	<i>Smicronis brevirostris</i>		+	+	+	+		
Western Gerygone	<i>Gerygone fusca</i>		+	+	+	+		
Inland Thornbill	<i>Acanthiza apicalis</i>		+		+	+		
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>		+	+	+	+		
Western Thornbill	<i>Acanthiza inornata</i>		+	+	+	+		
Chestnut-rumped Thornbill	<i>Acanthiza uropygialis</i>				+			
Pomatostomidae								
White-browed Babbler	<i>Pomatostomus superciliosus</i>		+	+	+	+		
Artamidae								
Masked Woodswallow	<i>Artamus personatus</i>				+			
Black-faced Woodswallow	<i>Artamus cinereus</i>		+	+	+			
Dusky Woodswallow	<i>Artamus cyanopterus</i>		+	+	+	+		
Grey Butcherbird	<i>Cracticus torquatus</i>		+	+	+	+		
Pied Butcherbird	<i>Cracticus nigrogularis</i>		+	+	+			
Australian Magpie	<i>Gymnorhina tibicen</i>		+	+	+	+		
Grey Currawong	<i>Strepera versicolor</i>				+	+		
Campephagidae								
Ground Cuckoo-shrike	<i>Coracina maxima</i>				+			
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>		+	+	+	+		
White-winged Triller	<i>Lalage tricolor</i>		+	+	+			
Neosittidae								
Varied Sittella	<i>Daphoenositta chrysoptera</i>		+	+	+	+		
Oreoicidae								
Crested Bellbird	<i>Oreoica gutturalis</i>				+			
Falcunculidae								
Western Shrike-tit	<i>Falcunculus frontatus</i>				+	+		
Pachycephalidae								
Western Golden Whistler	<i>Pachycephala fuliginosus</i>		+	+	+	+		
Rufous Whistler	<i>Pachycephala rufiventris</i>		+	+	+	+		
Grey Shrike-thrush	<i>Colluricincla harmonica</i>		+	+	+	+		
Rhipiduridae								
Grey Fantail	<i>Rhipidura albiscapa</i>		+	+	+	+		
Willie Wagtail	<i>Rhipidura leucophrys</i>		+	+	+			
Monarchidae								
Magpie-lark	<i>Grallina cyanoleuca</i>		+	+	+	+		
Restless Flycatcher	<i>Myiagra inquieta</i>		+	+	+	+		
Corvidae								
Australian Raven	<i>Corvus coronoides</i>		+	+	+	+		

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Petroicidae								
Jacky Winter	<i>Microeca fascinans</i>				+	+		
Hooded Robin	<i>Melanodryas cucullata</i>				+			
Red-capped Robin	<i>Petroica goodenovii</i>		+		+			
Scarlet Robin	<i>Petroica boodang</i>		+	+	+	+		
Western Yellow Robin	<i>Eopsaltria griseogularis</i>		+	+	+	+		
Hirundinidae								
White-backed Swallow	<i>Cheramoeca leucosterna</i>				+			
Welcome Swallow	<i>Hirundo neoxena</i>		+	+	+			
Fairy Martin	<i>Petrochelidon ariel</i>				+			
Tree Martin	<i>Petrochelidon nigricans</i>		+	+	+	+		
Acrocephalidae								
Australian Reed Warbler	<i>Acrocephalus australis</i>				+			
Locustellidae								
Brown Songlark	<i>Cincloramphus cruralis</i>		+	+	+			
Rufous Songlark	<i>Cincloramphus mathewsi</i>				+			
Little Grassbird	<i>Poodytes gramineus</i>				+			
Zosteropidae								
Silvereye	<i>Zosterops lateralis</i>		+	+	+	+		
Dicaeidae								
Mistletoebird	<i>Dicaeum hirundinaceum</i>		+		+			
Motacillidae								
Australian Pipit	<i>Anthus australis</i>		+	+	+			
MAMMALS								
Tachyglossidae								
Echidna	<i>Tachyglossus aculeatus</i>		+	+	+			
Dasyuridae								
Mardo	<i>Antechinus flavipes</i>				+	+		
Chuditch	<i>Dasyurus geoffroii</i>	T			+		+	+
Red-tailed Phascogale	<i>Phascogale calura</i>	T			+		+	+
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	CD			+		+	
Fat-tailed Dunnart	<i>Sminthopsis crassicaudata</i>				+	+		
Dusky Dunnart	<i>Sminthopsis fuliginosus</i>				+			
Gilbert's Dunnart	<i>Sminthopsis gilberti</i>				+	+		
Myrmecobiidae								
Numbat	<i>Myrmecobius fasciatus</i>	T			+		+	+
Peramelidae								
Quenda/South'n Brown Bandicoot	<i>Isodon fusciventer</i>	P			+		+	
Burramyidae								
Western Pygmy Possum	<i>Cercartetus concinnus</i>				+	+		

Appendix 4								
Species		Status	Records					
			This survey	FRWF S2	ALA	Dandjoo	DBCA	EBPC
Tarsipedidae								
Honey Possum	<i>Tarsipes rostratus</i>							
Phalangeridae								
Common Brushtail Possum	<i>Trichosurus vulpecula</i>		+	+	+	+		
Macropodidae								
Tammar Wallaby	<i>Notamacropus eugenii derbianus</i>	P			+		+	
Western Brush Wallaby	<i>Notamacropus irma</i>	P			+		+	
Western Grey Kangaroo	<i>Macropus fuliginosus</i>		+	+	+	+		
Muridae								
Water Rat	<i>Hydromys chrysogaster</i>	P			+		+	
House Mouse	<i>Mus musculus</i>	Int			+	+		
Western Mouse	<i>Pseudomys occidentalis</i>	P					+	
Black Rat	<i>Rattus rattus</i>	Int			+			
Molossidae								
White-striped Free-tailed Bat	<i>Austronomus australis</i>		+	+	+			
Western Free-tailed Bat	<i>Ozimops kitcheneri</i>		+	+	+			
Vespertilionidae								
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>		+	+	+	+		
Chocolate Wattled Bat	<i>Chalinolobus morio</i>		+	+	+	+		
Western False Pipistrelle	<i>Falsistrellus mackenziei</i>	P						
Lesser Long-eared Bat	<i>Nyctophilus geoffroyi</i>				+			
Holt's Long-eared Bat	<i>Nyctophilus holtorum</i>							
Greater Long-eared Bat	<i>Nyctophilus major major</i>							
Central Long-eared Bat	<i>Nyctophilus major tor</i>	P			+			
Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>		+					
Southern Forest Bat	<i>Vespadelus regulus</i>		+	+	+	+		
Canidae								
Fox	<i>Vulpes vulpes</i>	Int	+	+	+			
Felidae								
Feral Cat	<i>Felis catus</i>	Int			+			
Leporidae								
Rabbit	<i>Oryctolagus cuniculus</i>	Int	+	+	+	+		

Appendix 5. EPBC Protected Matters Search Tool results.

Fauna species listed for the study area with a 5km buffer.

Species	EPBC Act Status	Type of Presence
<i>Aphelocephala leucopsis</i> Southern Whiteface	Vulnerable	Species or species habitat MAY occur within area
<i>Calidris acuminata</i> Sharp-tailed Sandpiper	Vulnerable, Migratory	Species or species habitat MAY occur within area
<i>Calidris ferruginea</i> Curlew Sandpiper	Critically Endangered, Migratory	Species or species habitat MAY occur within area
<i>Calyptorhynchus banksii naso</i> Forest Red-tailed Black-cockatoo	Vulnerable	Species or species habitat KNOWN to occur within area
<i>Falco hypoleucos</i> Grey Falcon	Vulnerable	Species or species habitat MAY occur within area
<i>Leipoa ocellata</i> Malleefowl	Vulnerable	Species or species habitat LIKELY to occur within area
<i>Zanda baudinii</i> Baudin's Cockatoo	Endangered	Breeding KNOWN to occur within area
<i>Zanda latirostris</i> Carnaby's Cockatoo	Endangered	Species or species habitat KNOWN to occur within area
<i>Dasyurus geoffroii</i> Chuditch	Vulnerable	Species or species habitat KNOWN to occur within area
<i>Myrmecobius fasciatus</i> Numbat	Endangered	Species or species habitat MAY occur within area
<i>Phascogale calura</i> Red-tailed Phascogale	Vulnerable	Species or species habitat KNOWN to occur within area
<i>Actitis hypoleucos</i> Common Sandpiper	Migratory	Species or species habitat MAY occur within area
<i>Calidris melanotos</i> Pectoral Sandpiper	Migratory	Species or species habitat MAY occur within area
<i>Apus pacificus</i> Fork-tailed Swift	Migratory	Species or species habitat LIKELY to occur within area
<i>Motacilla cinerea</i> Grey Wagtail	Migratory	Species or species habitat MAY occur within area

Appendix 6. Foraging Quality Scoring Tool

Appendix 6			
Attribute	Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red-tailed Black-cockatoo
Starting Score	10 Site contains foraging habitat, consisting of woodlands containing Marri as the primary food-plant and woodlands containing Jarrah as a secondary food-plant.	10 Site contains foraging habitat, consisting of woodlands containing Marri, Hakea and Banksia sessilis as the primary food-plants. Also small pine plantations with pine as the primary foodplant.	10 Site contains foraging habitat, consisting of woodlands containing Marri and Jarrah as the primary food-plants and Sheoak as a secondary food-plant.
Foraging potential <i>Subtract 2 from your score if there is no evidence of feeding debris on your site.</i>	-2 No foraging evidence noted.	-0 Evidence of foraging on Marri, Hakea, pine and Banksia sessilis.	-0 Evidence of foraging on Marri and birds sighted foraging on Jarrah.
Connectivity <i>Subtract 2 from your score if you have evidence to conclude that there is no other foraging habitat within 12 km of your site.</i>	-0 Site is within 12km of other woodlands containing Marri.	-0 Site is within 12km of other woodlands containing Marri and Banksia sessilis.	-0 Site is within 12km of other woodlands containing Marri and Jarrah.
Proximity to breeding <i>Subtract 2 if you have evidence to conclude that your site is more than 12 km from breeding habitat</i>	-0 This species is known to breed in the vicinity of Kojonup.	-0 Breeding recorded 7km south of the study area.	-0 The nearest confirmed breeding record is 25km north of the study area, however, it is likely that there is undocumented breeding within 12km
Proximity to roosting <i>Subtract 1 if you have evidence to conclude that your site is more than 20 km from a known night roosting habitat.</i>	-0 Roosting may occur at Kojonup, as 'white-tailed black cockatoos' have been recorded roosting (Figure 12)	-0 Roosting may occur at Kojonup, as 'white-tailed black cockatoos' have been recorded roosting (Figure 12). Also, as this species is present in the study area it is likely that there are roosts within 20km.	-0 Although no roost sites are known in the region, as this species is present in the study area it is likely that there are roosts within 20km.
Impact from significant plant disease <i>Subtract 1 if your site has disease present (e.g. Phytophthora spp. or Marri canker) and the disease is affecting more than 50% of the preferred food plants present.</i>	-0 No significant plant disease noted during field survey.	-0 No significant plant disease noted during field survey.	-0 No significant plant disease noted during field survey.
Total Score	8	10	10

Appendix 6			
Attribute	Baudin's Cockatoo	Carnaby's Cockatoo	Forest Red-tailed Black-cockatoo
Appraisal	Potential foraging habitat occurs throughout the study area in patches of remnant vegetation containing Marri and/or Jarrah woodlands and woodlands with an understory containing proteaceous shrubs such as Banksia and Hakea. There are areas of similar native woodland within 12km of the site, including to the south-west in Jingalup Nature Reserve (see Figure 2). There is one 'white-tailed black-cockatoo' roost site in the region, at Kojonup, however, there are also likely to be undocumented roosts for at least Carnaby's Cockatoo and the Forest Red-tailed Black-cockatoo, as these species have been recorded in the study area. Carnaby's Cockatoo is known to breed within 12km. The closest confirmed breeding record for the Forest Red-tailed Black-Cockatoo is 25km north of the study area, but there are likely to be undocumented breeding sites.		

Appendix 7. Bat Call Analysis

Reports in this Appendix:

- Specialised Zoological (2024). *Acoustic analysis and bat call identification from Kojonup, Western Australia*. Unpublished report by Specialised Zoological for Western Wildlife Pty Ltd, 6 May 2024, project reference SZ732.
- Specialised Zoological (2025). *Acoustic analysis and bat call identification from Kojonup, Western Australia*. Unpublished report by Specialised Zoological for Western Wildlife Pty Ltd, 19 October 2025, project reference SZ779.

Acoustic analysis and bat call identification from Kojonup, Western Australia

Prepared for **Western Wildlife Pty Ltd**

Version **6 May 2024**

SZ project reference **SZ732**



Prepared by **Dr Kyle Armstrong and Yuki Konishi**

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This report should be included as an appendix in any larger submission to Government, and cited as:

Specialised Zoological (2024). Acoustic analysis and bat call identification from Kojonup, Western Australia. Unpublished report by Specialised Zoological for Western Wildlife Pty Ltd, 6 May 2024, project reference SZ732.

Summary

Bat identifications from acoustic recordings are provided from two areas ('Stage 2', 'Stage 3') near Kojonup, c. 240 km south-east of Perth, Western Australia. The identification of bat species from full spectrum WAV-format recordings of their echolocation calls was based on measurements of characteristic frequency, observation of pulse shape, and the pattern of harmonics. At least six species of bat were identified as being present (**Tables 1** and **2**). Representative echolocation calls for each identification are illustrated (**Figure 1**), as recommended by the Australasian Bat Society (ABS 2006). Further details are available should verification be required.

Methods

The data provided were recorded in WAV format with Titley Scientific Anabat Swift bat detectors (sampling rate 500 kHz, set to turn on automatically at sunset and off at sunrise).

A multi-step acoustic analysis procedure developed to process large full spectrum echolocation recording datasets from insectivorous bats (Armstrong et al. 2021a,b) was applied to the recordings made on the survey. Firstly, the WAV files were scanned for bat echolocation calls using several parameter sets in the software SCAN'R version 1.8.3 (Binary Acoustic Technology), which also provides measurements (SCAN'R parameters) from each putative bat pulse. The outputs were then used to determine if putative bat pulses measured in SCAN'R could be identified to species. This was done using a custom [R] language application that performed three tasks:

1. undertook a Discriminant Function Analysis on training data from representative calls from south-western Australia;
2. from the measurements of each putative bat pulse from SCAN'R, calculated values for the first two Discriminant Functions that could separate the echolocation call types derived from the analysis of training data, and plotted these resulting coordinates over data ellipses representing one standard deviation of the variation for the defined call types; and
3. facilitated an inspection in a spectrogram of multiple examples of each call type for each recording night by opening the original WAV files containing pulses of interest in Adobe Audition version 23.1.

Species were identified based on information in Churchill (2008). Nomenclature follows Jackson and Groves (2015). Identifications were supported by distribution information in a curated source of distribution records maintained by the Australasian Bat Society, Inc. (<https://www.ausbats.org.au/batmap.html>) (Milne et al. 2023).

Comments on identifications

Most species were identified unambiguously. The call type allocated to a species of long-eared bat *Nyctophilus* sp. is attributable to one of three species: Holt's long-eared bat *Nyctophilus holtorum*, the lesser long-eared bat *N. geoffroyi*, and/or the western long-eared bat *N. major major*.

Limitations

The identifications presented in this report have been made within the following context:

1. The identifications made herein were based on the ultrasonic acoustic data recorded and provided by a 'third party' (the client named on the front of this report).
2. The scope of this report extended to providing information on the identification of bat species in bulk ultrasonic recordings. Further comment on these species and the possible impacts of a planned project on bat species were not part of the scope.
3. In the case of the present report, the recording equipment was set up and supplied by Specialised Zoological. The equipment was operated by the third party during the survey.
4. Other than the general location of the study area, Specialised Zoological has not been provided with detailed information of the survey area, has not made a visit to observe the habitats available for bats, nor have we visited the specific project areas on a previous occasion.
5. Specialised Zoological has had no input into the overall design and timing of this bat survey, recording site placement, nor the degree of recording site replication.
6. While Specialised Zoological has made identifications to the best of our ability given the available materials, and reserves the right to re-examine the data and revise any identification following a query, it is the client's and / or proponent's responsibility to provide supporting evidence for any identification, which might require follow-up trapping effort or non-invasive methods such as video recordings. Specialised Zoological bears no liability for any follow-up work that may be required to support an identification based initially on the analysis of acoustic recordings undertaken and reported on here.
7. There are a variety of factors that affect the 'detectability' of each bat species, given the frequency, power and shape characteristics of their calls. Further information on the analysis and the various factors that can impinge on the reliability of identifications can be provided upon request.
8. The analysis of ultrasonic recordings is one of several methods that can be used to survey for bats, and comprehensive surveys typically employ more than one method. If an identification in the present report is ambiguous or in question, a trapping programme would help to resolve the presence of the possibilities in the project area.
9. This version of the document supersedes any previous version. Previous drafts are not authorised by us for submission to the regulator or the public domain.

References

- ABS (2006). Recommendations of the Australasian Bat Society Inc for reporting standards for insectivorous bat surveys using bat detectors. *The Australasian Bat Society Newsletter* 27: 6–9. [ISSN 1448-5877]
- Armstrong K.N., Broken-Brow J., Hoyer G., Ford G., Thomas M. and Corben C. (2021a). Effective detection and identification of sheath-tailed bats of Australian forests and woodlands. *Australian Journal of Zoology* 68:346–363. <https://doi.org/10.1071/ZO20044>
- Armstrong K.N., Clarke S., Linke A., Scanlon A., Roetman P., Hitch, A.T. and Donnellan S.C. (2021b). Citizen science implements the first intensive acoustics-based survey of insectivorous bat species across the Murray-Darling Basin of South Australia. *Australian Journal of Zoology* 68: 364–381. <https://doi.org/10.1071/ZO20051>
- Churchill, S.K. (2008). *Australian bats*. 2nd ed. Allen and Unwin, Crows Nest, NSW.
- Jackson, S.M. and Groves, C.P. (2015). *Taxonomy of Australian mammals*. CSIRO Publishing, Victoria.
- Milne D.J., Reardon T.B. and Ford G. (2023) BatMap – authoritative distribution maps for Australian bats. *Australian Mammalogy*. 45: 350–355. <https://doi.org/10.1071/AM23005>

Table 1. Species identified in the present survey from all sites combined.

VESPERTILIONIDAE	
Gould’s wattled bat	<i>Chalinolobus gouldii</i>
Chocolate wattled bat	<i>Chalinolobus morio</i>
Unidentified long-eared bat	<i>Nyctophilus</i> sp.
Southern forest bat	<i>Vespadelus regulus</i>
MOLOSSIDAE	
White-striped free-tailed bat	<i>Austronomus australis</i>
Western free-tailed bat	<i>Ozimops kitcheneri</i>

Table 2. Species identifications from all recording nights at all sites. See Table 1 for full species names.

					<i>A. australis</i>	<i>C. gouldii</i>	<i>C. morio</i>	<i>O. kitcheneri</i>	<i>Nyctophilus</i> sp.	<i>V. regulus</i>
Serial	First night	Last night	Nights	Coordinates						
Stage 2										
449972	8/11/2023	12/11/2023	5	-33.929913, 117.402043	X	X	X	X	NC	X
461278	8/11/2023	12/11/2023	5	-33.884078, 117.301968	X	X	X	X	NC	X
642025	9/11/2023	12/11/2023	4	-33.921063, 117.380552	X	X	.	X	.	X
642149	8/11/2023	12/11/2023	5	-33.884685, 117.364992	X	X	.	X	NC	X
Stage 3										
449972	21/11/2023	23/11/2023	3	-33.926173, 117.130733	X	X	X	X	NC	X
461278	21/11/2023	23/11/2023	3	-33.911102, 117.120643	X	X	.	X	.	X
636475	20/11/2023	23/11/2023	4	-33.972466, 117.146172	X	X	.	X	.	X
642025	20/11/2023	23/11/2023	4	-33.965592, 117.145852	X	X	X	X	NC	X
642149	20/11/2023	23/11/2023	4	-33.961430, 117.109705	X	X	.	.	.	X
656318	20/11/2023	23/11/2023	4	-34.001530, 117.130043	X	X	X	X	NC	X

Definition of confidence level codes

. Not detected.

X Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence.

NC Needs Confirmation. Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in the *Comments on identifications* section of this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

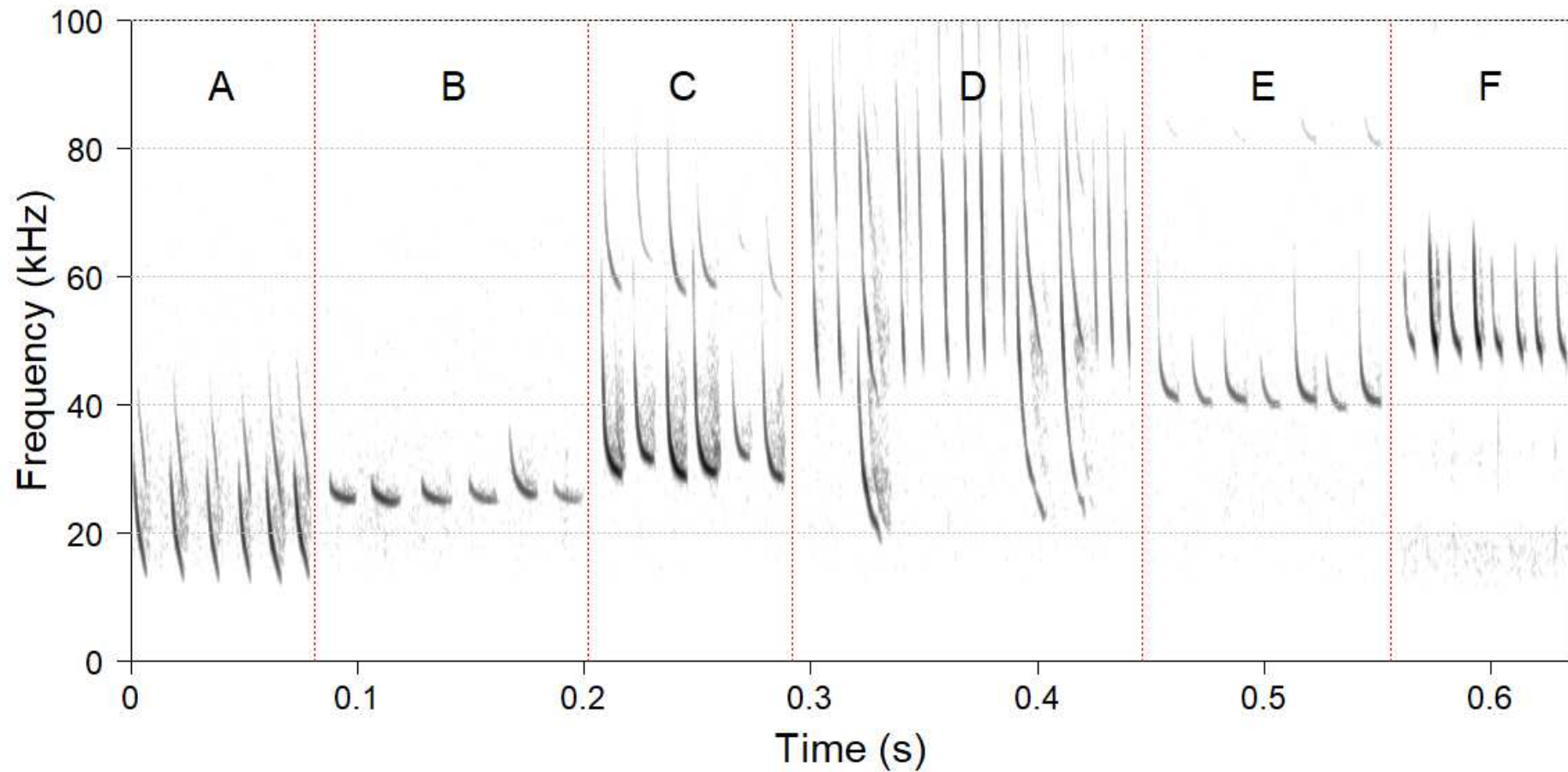


Figure 1. Representative echolocation call sequence portions of the species identified (**A:** *Austronomus australis*; **B:** *Ozimops kitcheneri*; **C:** *Chalinolobus gouldii*; **D:** *Nyctophilus* sp.; **E:** *Vespadelus regulus*; **F:** *Chalinolobus morio*; time between pulses has been compressed).



**Acoustic analysis and
bat call identification
from Kojonup, Western Australia**

Prepared for **Western Wildlife Pty Ltd**

Version **2025-10-19**

SZ project reference **SZ779**

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This report should be included as an appendix in any larger submission to Government, and cited as:

Specialised Zoological (2025). Acoustic analysis and bat call identification from Kojonup, Western Australia. Unpublished report by Specialised Zoological for Western Wildlife Pty Ltd, version 2025-10-19, project reference SZ779.

Version history

Date	Note
2025-10-19	Final version

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Summary

Project scope and sampling design

Bat identifications from bat detector sound files are provided from a proposed wind energy project area near Kojonup, Western Australia. The scope of the analysis extended to determining the presence of all bat species in recordings taken across the project area, as well as levels of ‘activity’ at the top and bottom of a centrally-located Met Mast.

The dataset submitted for analysis comprised two parts:

1. Recordings from bat detectors set at stationary sites over two separate surveys (August and November 2024). This comprised a total of 19,798 full spectrum WAV-format sound files recorded with Titley Scientific Anabat Ranger ultrasonic recorders (sampling rate 500 kHz; file durations 3 – 10 seconds) at eight sites over 32 survey nights (4 nights per site).
2. Recordings from a Met Mast site (positions ‘top’, ‘bottom’) from two sampling periods (December 2024, n = 16 nights; May 2025, n = 18 nights; total 32,427 WAV files).

Species detections

At least seven species of bat were identified (**Tables 1 and 2; Figure 1**). One of these (Inland Broad-nosed Bat *Scotorepens balstoni*) was unexpected given that the authoritative extent of its range (Milne et al. 2023) is outside the project area. The calls of long-eared bats *Nyctophilus* spp. cannot be identified reliably to species, and candidates include: Holt’s Long-eared Bat *N. holtorum*, the Lesser Long-eared Bat *N. geoffroyi*, and/or the Western Long-eared Bat *N. major major*.

Calculated metrics of ‘bat activity’

In addition to presence/absence at the recording sites, two metrics were calculated to assess ‘commonness’ of species (**Appendix 1**):

Frequency of Detection—proportion of survey nights that each species was detected (**Table 3**). Calculated for all recording sites and nights except the Met Mast position.

Rate of Encounter—the number of sound files per night with calls of each species (commonly referred to as ‘activity’). This was standardised by taking the mean over all survey nights (**Table 4**). Met Mast only.

Collision Risk

Given the calculations of Frequency of Detection (**Table 3**), the risk of collision with wind turbines was calculated for each species based on a standardised scheme developed by Specialised Zoological (**Table 5; Appendix 2**). Note that there appears to be a clear difference in activity levels between seasons, so Collision Risk will actually vary with season. This is particularly relevant for the White-striped Free-tailed Bat *Austronomus australis* that flies over tree canopy (maximum altitude unknown), and that had a relatively high Rate of Encounter in November and December 2024.

Patterns of detection at Met Masts

Four species were detected at the top of the Met Mast. It is not possible to determine the maximum height of individual bats that were recorded by the bat detectors, however there are clearly several species that have the potential to fly within the Rotor Swept Zone (**Table 4; Appendix 3**). The empirical measurements of bat activity correspond reasonably well with the predicted use of higher altitude flight space in the scheme presented in **Appendix 2**. Seasonal differences in the patterns of the activity level of bats, including within the Rotor Swept Zone, are evident in the Met Mast recordings.

Methods

Automated analyses and manual validations

A multi-step acoustic analysis procedure developed to process large full spectrum echolocation recording datasets from insectivorous bats (Armstrong et al. 2021a,b) was applied to the passive site-based recordings made on the survey. Firstly, the WAV files were scanned for bat echolocation calls using several parameter sets in the software SCAN'R version 1.8.3 (Binary Acoustic Technology), which also provides measurements (SCAN'R parameters) from each putative bat pulse. The outputs were then used to determine if putative bat pulses measured in SCAN'R could be identified to species. This was done using a custom [R] language application that performed three main tasks:

1. Undertook a Discriminant Function Analysis on training data from representative calls from south-western Australia;
2. From the measurements of each putative bat pulse from SCAN'R, calculated values for the first two Discriminant Functions that could separate the echolocation call types derived from the analysis of training data, and plotted these resulting coordinates over data ellipses representing one standard deviation of the variation for the defined call types;
3. Facilitated an inspection in a spectrogram of multiple examples of each call type for each recording night by opening the original WAV files containing pulses of interest in ADOBE AUDITION version 25.0.

Species were identified based on information in the author's unpublished material and Churchill (2008). Nomenclature follows Jackson and Groves (2015). Identifications were supported by distribution information in a curated source of distribution records maintained by the Australasian Bat Society, Inc. (<https://www.ausbats.org.au/batmap.html>) (Milne et al. 2023).

Compiling activity levels at the Met Mast

The calculation of Rate of Encounter for the Met Mast recordings was facilitated by a custom [R] script that first filtered out files containing only background noise and signal, and then applied a Discriminant Function Analysis to cluster echolocation types in the remaining files. Subsets of the sound files containing signals in each of the call type clusters were produced. Each of these sound files was opened and inspected in ADOBE AUDITION, and all false positive detections were removed. Thus, false positive rate (incorrect identifications) is zero, and false negative rate (incorrect rejections) is standardised based mostly on clustering thresholds.

Limitations

The identifications presented in this report have been made within the following context:

1. The identifications made herein were based on the ultrasonic acoustic data recorded and provided by a 'third party' (the client named on the front of this report).
2. The scope of this report extended to providing information on the identification of bat species in bulk ultrasonic recordings. Further extended comment on these species and the possible impacts of a planned project on bat species were not part of the scope.
3. In the case of the present report, the recording equipment was not set up or supplied by Specialised Zoological. The equipment was operated by the third party during the survey.
4. Other than the general location of the study area, Specialised Zoological has not been provided with detailed information about the survey area, has not made a visit to observe the habitats available for bats, nor have we visited the specific project areas on a previous occasion.
5. Specialised Zoological has had no input into the overall design and timing of this bat survey, recording site placement, nor the degree of recording site replication.
6. The identifications listed herein have been made to the best of our ability given the available materials, and Specialised Zoological reserves the right to re-examine the data and revise any identification following a query. It is the client's and / or proponent's responsibility to provide supporting evidence for any identification, which might require follow-up trapping effort or non-invasive methods such as video recordings. Specialised Zoological bears no liability for any follow-up work that may be required to support an identification based initially on the analysis of acoustic recordings undertaken and reported on here.
7. There are a variety of factors that affect the 'detectability' and encounter rates of each bat species, given the frequency, power and shape characteristics of their calls; the foraging and flight behaviour of different species; and the type and condition of recording equipment. Further information on the analysis and the various factors that can impinge on the reliability of identifications can be provided upon request.
8. The analysis of ultrasonic recordings is one of several methods that can be used to survey for bats, and comprehensive surveys typically employ more than one method. If an identification in the present report is ambiguous or in question, a trapping programme would help to resolve the presence of the possibilities in the project area.
9. Values in the tables of this report might change in subsequent analyses because of the re-application of a refined classification in the Collision Risk scheme.
10. This version of the document supersedes any previous version. Drafts and all previous versions are not authorised by us for submission to the regulator or the public domain.

References

- Armstrong K.N., Broken-Brow J., Hoyer G., Ford G., Thomas M. and Corben C. (2021a). Effective detection and identification of sheath-tailed bats of Australian forests and woodlands. *Australian Journal of Zoology* 68:346–363. <https://doi.org/10.1071/ZO20044>
- Armstrong K.N., Clarke S., Linke A., Scanlon A., Roethman P., Hitch, A.T. and Donnellan S.C. (2021b). Citizen science implements the first intensive acoustics-based survey of insectivorous bat species across the Murray-Darling Basin of South Australia. *Australian Journal of Zoology* 68: 364–381. <https://doi.org/10.1071/ZO20051>
- Churchill, S.K. (2008). *Australian bats*. 2nd ed. Allen and Unwin, Crows Nest, NSW.
- Jackson, S.M. and Groves, C.P. (2015). *Taxonomy of Australian mammals*. CSIRO Publishing, Victoria.
- MacKenzie D.I., Nichols J.D., Lachman G.B., Droege S., Royle J.A. and Langtimm, C.A. (2002). Estimating site occupancy rates when detection probabilities are less than one. *Ecology* 83: 2248–2255. [https://doi.org/10.1890/0012-9658\(2002\)083\[2248:ESORWD\]2.0.CO;2](https://doi.org/10.1890/0012-9658(2002)083[2248:ESORWD]2.0.CO;2)
- Milne D.J., Reardon T.B. and Ford G. (2023) BatMap – authoritative distribution maps for Australian bats. *Australian Mammalogy*. 45: 350–355. <https://doi.org/10.1071/AM23005>

Table 1. Species identified in the dataset from all sites combined. The predicted ‘presence’ (defined as ‘occasional or regular forays into this range’) above 50 metres in altitude is an authoritative designation based on the author’s (K. Armstrong) accumulated casual field observations and general knowledge from various sources, and as a precautionary consideration in the absence of data collected in a systematic study.

Predicted presence above 50 m altitude		
VESPERTILIONIDAE		
Medium	Gould’s Wattled Bat	<i>Chalinolobus gouldii</i>
Medium	Chocolate Wattled Bat	<i>Chalinolobus morio</i>
Low	Unidentified long-eared bat	<i>Nyctophilus</i> sp.
Medium	Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>
Medium	Southern Forest Bat	<i>Vespadelus regulus</i>
MOLOSSIDAE		
High	White-striped Free-tailed Bat	<i>Austronomus australis</i>
Medium	Western Free-tailed Bat	<i>Ozimops kitcheneri</i>

Table 2. Summary of bat species detected on each recording night at each survey site.

				<i>A. australis</i>	<i>C. gouldii</i>	<i>C. morio</i>	<i>Nyctophilus</i> sp.	<i>O. kitcheneri</i>	<i>S. balstoni</i>	<i>V. regulus</i>
Site unit	Night	Latitude	Longitude							
August 2024										
Wbat01 111441	11/08/2024	-33.955643	117.09935	.	X	X	.	.	.	X
Wbat01 111441	12/08/2024	-33.955757	117.099449	.	X	X	NC	.	.	X
Wbat01 111441	13/08/2024	-33.955666	117.099411	.	.	X	.	.	.	X
Wbat01 111441	14/08/2024	-33.955677	117.099396	.	.	.	.	.	.	X
Wbat02 111442	11/08/2024	-33.929565	117.131752	.	X	X	NC	NC	.	X
Wbat02 111442	12/08/2024	-33.929588	117.131691	.	X	X	NC	NC	.	X
Wbat02 111442	13/08/2024	-33.929619	117.131676	.	X	X	NC	.	.	X
Wbat02 111442	14/08/2024	-33.929508	117.131676	.	.	X	NC	X	.	X
Wbat03 111462	11/08/2024	-34.005112	117.113899	.	X	X	NC	X	NC	X
Wbat03 111462	12/08/2024	-34.005062	117.113541	.	X	X	.	.	NC	X
Wbat03 111462	13/08/2024	-34.004642	117.113441	.	X	X	.	.	NC	X
Wbat03 111462	14/08/2024	-34.005013	117.113396	.	X	.	.	.	.	X
Wbat04 111443	11/08/2024	-33.957809	117.145912	.	X	.	NC	.	.	X
Wbat04 111443	12/08/2024	-33.957943	117.146156	.	X	.	.	.	.	X
Wbat04 111443	13/08/2024	-33.957779	117.145737	.	X	X	.	.	.	X
Wbat04 111443	14/08/2024	-33.957844	117.145851	.	.	.	.	.	.	.
November 2024										
Wbat01 111441	4/11/2024	-33.992695	117.129311	X	X	X	.	X	NC	X
Wbat01 111441	5/11/2024	-33.992661	117.129265	X	X	X	NC	.	.	X
Wbat01 111441	6/11/2024	-33.992653	117.129349	X	X	X	.	X	.	X
Wbat01 111441	7/11/2024	-33.992737	117.129395	X	X	X	.	X	.	X
Wbat02 111442	4/11/2024	-33.996738	117.099724	X	X	X	.	X	.	X
Wbat02 111442	5/11/2024	-33.996727	117.099655	X	X	X	.	.	.	X
Wbat02 111442	6/11/2024	-33.996693	117.099739	X	X	X	.	.	.	X
Wbat02 111442	7/11/2024	-33.996731	117.099693	.	X	.	NC	X	.	X
Wbat03 111462	4/11/2024	-33.94252	117.148293	X	X	X	NC	X	.	X
Wbat03 111462	5/11/2024	-33.942425	117.14798	X	X	X	NC	X	.	X
Wbat03 111462	6/11/2024	-33.942478	117.148148	X	X	X	.	X	.	X
Wbat03 111462	7/11/2024	-33.942455	117.148064	.	X	X	.	X	.	X
Wbat04 111443	4/11/2024	-33.967995	117.112221	X	X	X	NC	X	NC	X
Wbat04 111443	5/11/2024	-33.967976	117.112373	X	X	X	NC	X	.	X
Wbat04 111443	6/11/2024	-33.968239	117.112404	.	X	X	NC	.	.	X
Wbat04 111443	7/11/2024	-33.968002	117.112335	X	X	X	.	X	.	X

Definition of confidence level codes

.

 Not detected. **X** Unambiguous identification of the species at the site based on measured call characteristics and comparison with available reference material. Greater confidence in this ID would come only after capture and supported by morphological measurements or a DNA sequence. **NC Needs Confirmation.** Either call quality was poor, or the species cannot be distinguished reliably from another that makes similar calls. Alternative identifications are indicated in this report. If this is a species of conservation significance, further survey work might be required to confirm the record.

Table 3. Summary of Frequency of Detection for each species over all nights combined per survey (* no Met Mast data included).

	August 2024	November 2024	All 2024
<i>A. australis</i>	0	0.81	0.41
<i>C. gouldii</i>	0.75	1.00	0.88
<i>C. morio</i>	0.69	0.94	0.81
<i>Nyctophilus</i> sp.	0.44	0.44	0.44
<i>O. kitcheneri</i>	0.25	0.75	0.50
<i>S. balstoni</i>	0.19	0.13	0.16
<i>V. regulus</i>	0.94	1.00	0.97

Table 4. Summary of the Mean Nightly Rate of Encounter (mean number of sound files per species per recording night) at two positions on the Met Mast (top, bottom) in two sampling periods (December 2024, n = 16 nights; May 2025, n = 18 nights).

	Dec 2024		May 2025	
	Bottom	Top	Bottom	Top
<i>A. australis</i>	42.8	26.1	0.7	0.3
<i>C. gouldii</i>	8.4	5.6	5.4	0.2
<i>C. morio</i>	0.4	0	1.4	0
<i>Nyctophilus</i> sp.	0.1	0	1.3	0
<i>O. kitcheneri</i>	6.6	5.6	0.2	0.1
<i>S. balstoni</i>	0	0	0.3	0
<i>V. regulus</i>	3.1	0.1	1.7	0

Table 5. Calculated Collision Risk Scores for each species based on the recorded frequencies of detection (from all surveys combined; see Appendix 2).

		High altitude likelihood	Altitude category	Frequency across the surveys	Frequency category	Risk Score	Collision Risk
VESPERTILIONIDAE							
Gould's Wattled Bat	<i>Chalinolobus gouldii</i>	Medium	2	0.88	4	8	High
Chocolate Wattled Bat	<i>Chalinolobus morio</i>	Medium	2	0.81	4	8	High
Long-eared bat species	<i>Nyctophilus</i> sp.	Low	1	0.44	2	2	Low
Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>	Medium	2	0.16	1	2	Low
Southern Forest Bat	<i>Vespadelus regulus</i>	Medium	2	0.97	4	8	High
MOLOSSIDAE							
White-striped Free-tailed Bat	<i>Austronomus australis</i>	High	3	0.41	2	6	Medium
Western Free-tailed Bat	<i>Ozimops kitcheneri</i>	Medium	2	0.50	3	6	Medium

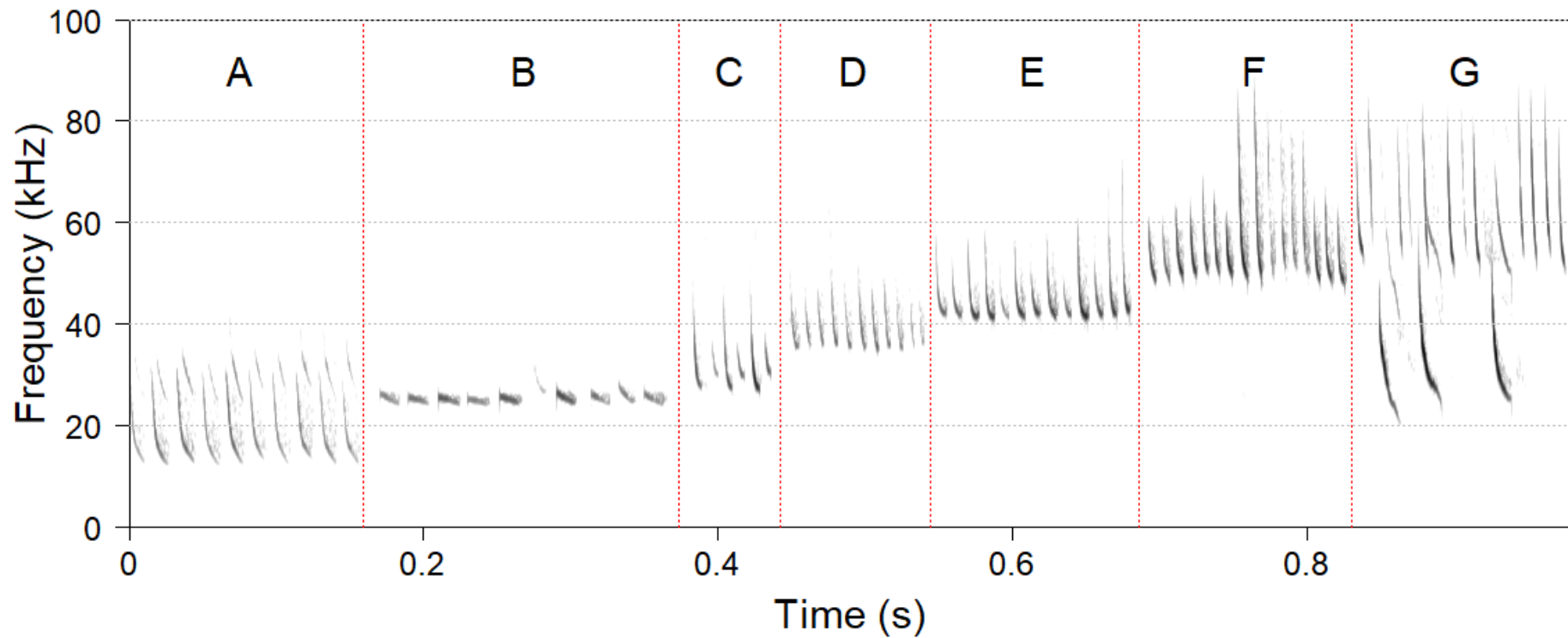


Figure 1. Representative echolocation call sequence portions of the species identified (**A:** *Austronomus australis*; **B:** *Ozimops kitcheneri*; **C:** *Chalinolobus gouldii*; **D:** *Scotorepens balstoni*; **E:** *Vespadelus regulus*; **F:** *Chalinolobus morio*; **G:** *Nyctophilus* sp.; time between pulses has been compressed).

Appendix 1. Choosing metrics

Careful consideration was given to choosing a metric to estimate how common each species of bat was in the project area. It is important to understand the limitations of bat detector recordings for questions that seek an understanding of ‘commonness’. Several metrics were deemed to be inappropriate given these limitations, and the chosen metrics were considered in the context of an appropriately-worded question and its assumptions.

Number of individuals. Bat detectors cannot be used to estimate true abundance (number of individuals) because it is not possible to determine how many individuals contribute to a particular ultrasonic recording. Thus, it is not possible to determine ‘local population size’ directly.

Relative abundance. Likewise, it is not possible to calculate relative abundance, because this metric is also derived from a count—it is the proportion or percentage of individuals of one species compared to the total number of individuals from all species within a given community or ecosystem. The output metric is a decimal value between 0 and 1 that sums to 1.0 across all species at a particular site.

Activity levels (‘Rate of Encounter’ herein). The number of WAV files containing a call type for each recording night at each site (with the duration of each WAV file standardised and stated). In pre-construction environmental assessments for wind energy projects in other parts of Australia, it is common for consultancy reports to contain compiled totals of the number of bat detector sound files that contain an echolocation sequence of each species. This measure is compared over time (seasonal and yearly survey periods) at the same sites to document trends in levels of presence, and differences between major habitat types; and it is sometimes compared across project areas and regions. This is a reasonable approach but there are numerous biases that contribute to the totals for each species, and reports do not always state them explicitly or make mention of how they were controlled:

- Some individual bats might linger near a particular bat detector for longer periods than other species or individuals, inflating how common they appear to be. This can be addressed somewhat by maximising the number of sampling site replicates and sampling nights.
- How well the echolocation calls of certain species, especially those of conservation significance, can be distinguished from the calls of other bat species.
- The consistency with which the same and different analysts will allocate particular echolocation sequence examples to candidate species within and across datasets when manually identifying calls from spectrogram images.
- The consistency and accuracy of the performance of custom automated identification routines developed by different analysts in commercial software programmes (e.g., Titley Scientific ANABAT INSIGHT; Wildlife Acoustics KALEIDOSCOPE); and in comparison to the more advanced custom system used here.
- The lack of standard identification models for regions or species of interest.

- Biases in sampling design, such as habitat representation, microphone orientation and microphone condition, and bat detector types (some models of certain brands have microphones with different capabilities), and trigger settings on bat detectors.

Occupancy (**'Frequency of Detection'** herein). This is a measure based on Species Richness; it reports the proportion of sampling sites plus nights where each species was detected. Ideally the number of sampling nights per site would be standardised where bat detectors are left for more than one night, so sampling effort and therefore probability of detection would be equivalent amongst sites. The output metric is a decimal value between 0 and 1 that does not sum to 1.0 across all species. In this report the term 'Frequency of Detection' is used to avoid confusion with a more sophisticated approach called 'occupancy modelling' (*sensu* MacKenzie et al. 2002), which accounts for (estimates) detectability and reports the probability that a site is truly occupied.

Given the sampling design and the various constraints discussed above, two appropriate metrics for wind energy projects are **Frequency of Detection** and **Rate of Encounter**. These metrics can directly address the following question:

How common is each species of bat across the project area and over seasons?

The assumptions include:

- The sampling design and intensity (sampling sites and nights) was sufficient to provide a good estimate.
- Microphone condition in the bat detectors was good and relatively consistent amongst units.
- The detectability of each species is approximately equal (this will be violated for some species).

Appendix 2. Collision Risk

To understand the Collision Risk of different bat species for wind energy projects, it can be useful to apply a modified generic risk matrix (**Box 1**).

In place of 'Probability' (rows), this scheme uses the Frequency of Detection values calculated across all sites surveyed, as sorted into four frequency ranges between 0 and 1.

In place of 'Consequence' (columns), it uses three likelihood categories of the species being present above 50 metres in altitude (turbine absent). The predicted 'presence' (defined as 'occasional or regular forays into this range') above 50 metres in altitude is an authoritative designation based on accumulated casual field observations and general knowledge from various sources, and as a precautionary consideration in the absence of data collected in a systematic study (K. Armstrong). If a better, quantitative, understanding of how often different species occur in different altitudinal bands (in this project area specifically), this would require the application of either a specialist radar, or a stereo thermal vision system paired with an ultrasonic recorder.

The final score in the matrix is then divided and used to derive three collision risk categories.

Box 1. A Collision Risk score calculator (**above**), and derived categorisation of risk level (**below**).

		Likelihood of presence above 50 metres altitude		
		Low	Medium	High
Frequency of detection		1	2	3
0 – 0.25	1	1	2	3
0.25 – 0.50	2	2	4	6
0.50 – 0.75	3	3	6	9
0.75 – 1.0	4	4	8	12

Risk Score from matrix	Collision Risk
1 – 2	Low risk
3 – 6	Medium risk
7 – 12	High risk

Appendix 3. Nightly Rate of Encounter values from the Met Mast

	<i>A. australis</i>	<i>C. gouldii</i>	<i>C. morio</i>	<i>Nyctophilus</i> sp.	<i>O. kitcheneri</i>	<i>S. balstoni</i>	<i>V. regulus</i>
Bottom Dec 2024							
3/12/2024	4	0	0	0	2	0	2
4/12/2024	4	1	1	0	2	0	0
5/12/2024	23	5	0	0	1	0	1
6/12/2024	14	7	0	0	0	0	1
7/12/2024	23	5	0	0	0	0	0
8/12/2024	47	4	0	0	0	0	0
9/12/2024	8	20	1	0	1	0	4
10/12/2024	61	2	1	0	4	0	14
11/12/2024	54	14	1	0	2	0	4
12/12/2024	145	5	1	0	8	0	8
13/12/2024	95	4	1	0	53	0	9
14/12/2024	85	26	1	0	8	0	1
15/12/2024	43	6	0	0	7	0	1
16/12/2024	28	19	0	0	13	0	4
17/12/2024	45	15	0	2	5	0	0
18/12/2024	5	1	0	0	0	0	0
Bottom May 2025							
12/05/2025	1	0	0	0	0	0	0
13/05/2025	3	1	0	0	0	0	1
14/05/2025	4	1	0	0	1	0	1
15/05/2025	1	4	0	1	0	0	3
16/05/2025	0	11	1	0	0	2	3
17/05/2025	0	7	3	6	0	0	0
18/05/2025	0	3	2	1	0	0	4
19/05/2025	0	1	2	0	0	0	1
20/05/2025	0	1	3	0	0	0	2
21/05/2025	0	22	3	4	3	0	6
22/05/2025	1	6	1	2	0	0	2
23/05/2025	0	1	1	1	0	1	1
24/05/2025	0	0	1	1	0	0	0
25/05/2025	0	1	0	0	0	0	2
26/05/2025	0	0	0	0	0	0	1
27/05/2025	0	3	3	3	0	1	0
28/05/2025	1	25	4	3	0	0	3
29/05/2025	1	11	1	1	0	1	0

	<i>A. australis</i>	<i>C. gouldii</i>	<i>C. morio</i>	<i>Nyctophilus</i> sp.	<i>O. kitcheneri</i>	<i>S. balstoni</i>	<i>V. regulus</i>
Top December 2024							
2024-12-03	10	7	0	0	0	0	0
2024-12-04	7	2	0	0	3	0	0
2024-12-05	9	1	0	0	3	0	0
2024-12-06	1	12	0	0	5	0	0
2024-12-07	11	1	0	0	2	0	0
2024-12-08	28	5	0	0	0	0	0
2024-12-09	5	26	0	0	0	0	0
2024-12-10	41	2	0	0	27	0	0
2024-12-11	47	18	0	0	8	0	0
2024-12-12	69	2	0	0	7	0	0
2024-12-13	40	0	0	0	20	0	1
2024-12-14	41	2	0	0	0	0	0
2024-12-15	46	2	0	0	2	0	0
2024-12-16	18	9	0	0	2	0	0
2024-12-17	41	1	0	0	10	0	0
2024-12-18	4	0	0	0	0	0	0
Top May 2025							
2025-05-12	1	0	0	0	0	0	0
2025-05-13	1	0	0	0	0	0	0
2025-05-14	1	0	0	0	0	0	0
2025-05-15	2	0	0	0	0	0	0
2025-05-18	0	2	0	0	1	0	0
2025-05-21	0	1	0	0	0	0	0

Appendix 8. Flight heights of birds recorded in surveys.

Appendix 8a. Flight heights of all birds recorded in impact site surveys.

Sites K01 – K33.

Key to At-risk Group: CS = Conservation Significant species, DBOP = Diurnal Bird of Prey, WB = Waterbird, FHR = Flight Height Risk as recorded flying in the RSA in this survey.

Appendix 8a																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Australasian Grebe	WB		3			3											3
Australian Kestrel	DBOP	3	6	7	2	18		2	4		6						24
Australian Magpie	FHR	93	119	96	83	391	1	1			2						393
Australian Pipit	FHR	26	34	51	14	125			6		6						131
Australian Raven	FHR	97	218	147	60	522		17	10		27						549
Australian Ringneck		135	354	165	311	965											965
Australian Shelduck	WB		19	2		21											21
Australian Wood Duck	WB	2	37	17		56											56
Black-faced Cuckoo-shrike	FHR	4	15	28	3	50		4	2		6						56
Black-faced Woodswallow		11	19	16	27	73				2	2						75
Black-shouldered Kite	DBOP	4				4				1	1						5

Appendix 8a																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Brown Falcon	DBOP		2	3	3	8											8
Brown Honeyeater		4	1		1	6											6
Brown Songlark		6				6											6
Brown-headed Honeyeater			19		8	27											27
Brush Bronzewing			1			1											1
Carnaby's Cockatoo*	CS	18	3	2	6	29											29
Common Bronzewing			1	2	3	6											6
Crested Pigeon				3	1	4											4
Dusky Woodswallow	FHR	2	23	2	1	28		2	4		6						34
Elegant Parrot	FHR	14	18	13	3	48	4	4	1	2	11						59
Fan-tailed Cuckoo																	0
Forest Red-tailed Black-cockatoo	CS	19	4	7	2	32											32
Galah		5		5	11	21											21
Gilbert's Honeyeater																	0
Golden Whistler																	0
Grey Butcherbird		2				2											2
Grey Fantail		11	1	1	1	14											14
Grey Shrike-thrush		3	1	4		8											8
Grey Teal	WB				2	2											2

Appendix 8a																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Horsfield's Bronze Cuckoo				1		1											1
Inland Thornbill																	0
Inland Western Rosella	CS	9	6	5	4	24											24
Laughing Kookaburra		10	4	7	4	25											25
Magpie-lark		28	7	7	4	46											46
Muir's Corella	CS			4	6	10											10
New Holland Honeyeater																	0
Painted Button-quail																	0
Peregrine Falcon	DPOB				1	1											1
Pied Butcherbird																	0
Purple-crowned Lorikeet	FHR	47	26	24	188	285	16	8	8	41	73						358
Rainbow Bee-eater																	0
Red Wattlebird	FHR	30	11	14	2	57		1			1						58
Red-capped Parrot		1	6	1	8	16											16
Red-capped Robin			1			1											1
Regent Parrot		17	69	62	130	278											278
Restless Flycatcher			1			1											1
Rufous Treecreeper		1				1											1
Rufous Whistler		2		0		2											2

Appendix 8a																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Sacred Kingfisher				1		1											1
Scarlet Robin		5	9	5	1	20											20
Shining Bronze-cuckoo		3		1		4											4
Silvereye		8		11	1	20											20
Singing Honeyeater		1	9	8	1	19											19
Splendid Fairy-wren					2	2											2
Spotted Pardalote																	0
Striated Pardalote		7	15	12	0	34											34
Stubble Quail					1	1											1
Tree Martin	FHR	355	511	321	356	1,543	25	42	24	22	113						1,656
Varied Sitella			11	15	8	34											34
Wedge-tailed Eagle	DBOP		2	3	1	6	5	2	2	2	11				1	1	18
Weebill		4	26	15	1	46											46
Welcome Swallow	FHR	10	1			11	9				9						20
Western Gerygone		3	25	13	1	42											42
Western Thornbill		5	2			7											7
Western Wattlebird			1			1											1
Western Yellow Robin																	0
White-browed Babbler																	0

Appendix 8a																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
White-faced Heron	WB	1	1	1	1	4											4
White-fronted Chat				2		2											2
White-winged Triller		1				1											1
Willie Wagtail		21	4	4	3	32											32
Yellow-plumed Honeyeater																	0
Yellow-rumped Thornbill		18	16	23	20	77											77
Yellow-throated Miner		9				9											9
Total flights:		1,055	1,662	1,131	1,286	5,134	60	83	61	70	274	0	0	0	1	1	5,409
Total species:		43	44	44	42	63	6	10	9	6	14	0	0	0	1	1	75

*Note that Carnaby's Cockatoo was recorded flying at RSA opportunistically outside of surveys.

Appendix 8b. Flight heights of all birds recorded in reference site surveys.

Sites C01 – C08, A34 - 36

Key to At-risk Group: CS = Conservation Significant species, DBOP = Diurnal Bird of Prey, WB = Waterbird, FHR = Flight Height Risk as recorded flying in the RSA in this survey.

Appendix 8b																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Australasian Grebe	WB																0
Australian Kestrel	DBOP		1	1	2	4											4
Australian Magpie	FHR	6	32	28	16	82											82
Australian Pipit			2	3		5											5
Australian Raven	FHR	38	34	22	15	109		1	2		3						112
Australian Ringneck		12	62	43	100	217											217
Australian Shelduck	WB		3			3											3
Australian Wood Duck	WB																0
Black-faced Cuckoo-shrike	FHR		3	2	2	7											7
Black-faced Woodswallow				1		1			1		1						2
Black-shouldered Kite	DBOP				2	2				2	2						4
Brown Falcon	DBOP		1			1											1
Brown Honeyeater																	0

Appendix 8b																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Brown Songlark																	0
Brown-headed Honeyeater			4			4											4
Carnaby's Cockatoo	CS		2	40		42											42
Common Bronzewing				2	1	3											3
Crested Pigeon				2		2											2
Dusky Woodswallow	FHR		3			3											3
Elegant Parrot	FHR		2	1	6	9		1			1						10
Fan-tailed Cuckoo																	0
Forest Red-tailed Black-cockatoo	CS	3				3				1	1						4
Galah				2		2											2
Grey Butcherbird																	0
Grey Fantail			1			1											1
Grey Shrike-thrush					0	0											0
Grey Teal	WB																0
Inland Thornbill																	0
Inland Western Rosella	CS		4	1	1	6											6
Laughing Kookaburra			1		8	9											9

Appendix 8b																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Magpie-lark			1	1		2											2
Mistletoebird																	0
Painted Button-quail																	0
Pied Butcherbird																	0
Purple-crowned Lorikeet	FHR		7	30	32	69				6	6						75
Red Wattlebird	FHR		16	12	1	29											29
Red-capped Parrot		2	6		8	16											16
Regent Parrot		17	33	10	22	82											82
Restless Flycatcher																	0
Rufous Treecreeper																	0
Rufous Whistler					1	1											1
Scarlet Robin			5			5											5
Silvereye			7	9	2	18											18
Singing Honeyeater			2	6	1	9											9
Splendid Fairy-wren					2	2											2
Spotted Pardalote																	0
Striated Pardalote			14	1		15											15

Appendix 8b																	
Species	At-risk Group	Flights Below RSA (<50m)					Flights At RSA (50 – 200m)					Flights Above RSA (>200m)					Total
		Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	Nov 2023	Aug 2024	Nov 2024	Dec 2025	Subtotal	
Stubble Quail																	0
Tree Martin	FHR	3	97	180	138	418		2	4	7	13						431
Varied Sitella			4		8	12											12
Wedge-tailed Eagle	DBOP						1		4	1	6						7
Weebill			13		0	13											13
Western Gerygone			7			7											7
Western Thornbill																	0
White-faced Heron	WB		1	1		2											2
Willie Wagtail			4		2	6											6
Yellow-rumped Thornbill			19	5	2	26											26
Total flights:		81	391	403	372	1247	1	4	11	17	33	0	0	0	1	1	1,281
Total species:		7	31	23	24	40	1	3	4	5	8	0	0	0	1	1	57

Appendix 9. Bird and Bat Risk Assessment

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Conservation Significant Birds				
Carnaby's Cockatoo <i>Zanda latirostris</i>	Endangered	Moderate - Recorded in the study area. - Of 71 recorded flights on BUS surveys, all were observed flying below the RSA, however, a single flight in the RSA by 2 birds was recorded opportunistically. It is considered likely that the majority of flights would be below the RSA, but this species is capable of flying at RSA. - A post-nuptial migrant, moving between inland breeding sites and coastal foraging sites, however, it is unknown whether the study area lies in a path of migration. Also undertakes daily movements averaging 16km between roost sites and foraging sites (Shephard and Warren 2018) and averaging 6km between breeding sites and foraging sites (Riley <i>et al.</i> 2023). - Species likely to largely occur in woodlands when foraging and breeding. A large bird, it is likely to traverse open habitats, although it is known to prefer following vegetated areas such as road verges (Shephard and Warren 2018).	Moderate - Population restricted to south-west Western Australia, estimated at 40,000 birds and declining (Garnett and Baker 2021). - Single young raised each year by long-lived birds. Generation length estimated at 10.85 years (BirdLife International 2024). Limited capacity to replace lost adults, population already under pressure from other threats. - Important breeding area occurs nearby in the vicinity of Tambellup (between about 25 – 55km southeast), where there is likely to be a concentration of birds. Likely to concentrate at roost sites, but it is unknown whether roosting occurs near turbine locations. - Listed as Endangered (EPBC Act).	Moderate

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Baudin's Black-Cockatoo <i>Zanda baudinii</i>	Endangered	Low - Not recorded in the study area but likely to occur. As this species has not been recorded across three field trips, it appears likely that this species is uncommon in the region. - It is considered likely that the majority of flights would be below the RSA, but this species is capable of flying at RSA. - A post-nuptial migrant, moving north after the breeding season, however, the study area is not likely to be in a path of migration as it is on the edge of the known range of the species. - Species likely to largely occur in woodlands when foraging and breeding. A large bird, it is likely to traverse open habitats.	High - Population estimated at 3,250 and declining rapidly (Garnett and Baker 2021). - Single young raised each year by long-lived birds. Generation length estimated at 13.24 years (BirdLife International 2024). Limited capacity to replace lost adults, population already under pressure from other threats. - Study area is on the eastern edge of this species' range and there are unlikely to be concentrations of the population present. - Listed as Endangered (EPBC Act). Listed as Critically Endangered in 2022 on the IUCN Red List for Birds (BirdLife International 2024).	Moderate
Forest Red-tailed Black Cockatoo <i>Calyptorhynchus banksii naso</i>	Vulnerable	Moderate - Recorded in the study area. - Of 36 recorded flights on BUS surveys, one flight by one bird was recorded within the RSA, outside the study area. It is considered likely that the majority of flights would be below the RSA, but this species is capable of flying at RSA. - Species likely to largely occur in woodlands when foraging and breeding. A large bird, it is likely to traverse open habitats	Moderate - Population estimated at 16,800 with the likelihood for future declines (Garnett and Baker 2021). - Single young raised each year by long-lived birds. Generation length estimated at 14.3 years (BirdLife International 2024). Limited capacity to replace lost adults, population already under pressure from other threats. - Likely to concentrate at roost sites, but it is unknown whether roosting occurs near turbine locations. - Listed as Vulnerable (EPBC Act).	Moderate

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Malleefowl <i>Leipoa ocellata</i>	Vulnerable	Low - Not recorded in study area but may possibly occur as infrequent dispersing birds as they are known from the region. - Not migratory. - Adult birds rarely fly except when disturbed or to roost in the canopy (Frith 1962). Considered unlikely to fly at the RSA.	Moderate - Population estimated at 25,000 and are likely to decline further, mainly due to the increased frequency of drought and large-scale fires (Garnett and Baker 2021). - Species is not likely to congregate in the vicinity of the study area, instead it is less likely to occur compared to surrounding areas with larger areas of remnant native vegetation. - Long-lived, generation length estimated at 9.13 years (BirdLife International 2024). - Listed as Vulnerable (EPBC Act).	Minor
Common Sandpiper <i>Actitis hypoleucos</i>	Migratory	Low - Not recorded in study area but may possibly occur as single birds on farm dams. - No data on flight height are available for this species, but shorebirds in general fly at considerable height, well above the RSA, during migration. - Migratory species, but the study area is not in a major flyway and there are limited resources in the region to attract the species.	Low - Study area not likely to regularly support more than 1 or 2 birds due to lack of habitat; a nationally important site supports 190 birds and an internationally important site supports 1,900 birds (Hansen <i>et al.</i> 2016). - Species is not likely to congregate in the vicinity of the study area due to lack of suitable wetland habitat. - Generation length estimated at 6.8 years (BirdLife International 2024). - Listed as Migratory (EPBC Act)	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Fork-tailed Swift <i>Apus pacificus</i>	Migratory	Moderate - Not recorded in study area and no nearby records but may possibly occur in small groups in summer. - Flight heights between 1m and 1,000m have been recorded (DoE 2015). - A non-breeding Migratory species, it enters north-west Australia in October-November, departing in April. 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Species has a very large global range and a large global population of at least 100,000, that is stable (Birdlife International 2024, DoE 2015). In Australia, it occurs across the country but is more common in the north and more common in coastal and sub-coastal areas. - Species is not likely to congregate in the vicinity of the study area and significant numbers (0.1% of the population or 100 birds) are unlikely to regularly occur. - Long-lived, generation length estimated at 12.5 years (BirdLife International 2024). - Listed as Migratory (EPBC Act).	Minor
Peregrine Falcon <i>Falco peregrinus</i>	Other Specially Protected Fauna (BC Act)	Moderate - Recorded opportunistically in study area, flying below RSA, and once on a BUS, also flying below the RSA. - Likely to use open habitats for foraging. - Forages by hunting from a high perch, high quartering or soaring, or low fast flight. Also display flights during breeding season (Debus 1998), so likely to intersect the RSA. 2 wind farm mortalities recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Species occurs across Australia and has a very large global range. The global population is very large (248,000 – 478,000 individuals) and the trend is increasing after a ban on DDT in the 1970s (Birdlife International (2024). - Long-lived, generation length estimated at 6 years (BirdLife International 2024), young disperse widely (60km for males, 130k for females and up to 500km recorded) (Debus 1998). - Listed as Other Specially Protected Fauna (BC Act).	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Muir's Corella <i>Cacatua pastinator pastinator</i>	Conservation Dependent (BC Act)	Moderate - Recorded in study area. Edge of the current known range of this species. - Of 10 recorded flights on BUS surveys, all were observed flying below the RSA. - Likely to largely occur in woodlands and farmlands when foraging and breeding. A large bird, it is likely to traverse open habitats between woodland patches. 3 (of other <i>Cacatua</i> sp.) in south-west Victoria (Biosis 2020).	Low - Population estimated at 20,000 and increasing (Garnett and Baker 2021). Population has increased to the extent that it has once again become a pest species in farmland and towns (DPAW 2015). - Small area of occupancy but expanding as the population increases. - Long-lived, generation length estimated at 13 years (BirdLife International 2024). - Listed as Conservation Dependent (BC Act) and as Least Concern in Action Plan (Garnett and Baker 2021).	Minor
Barking Owl <i>Ninox connivens connivens</i>	Priority 3	Low - Not recorded in study area. May possibly occur as the study area is within the known range of the species, but only one nearby record and extremely rarely recorded in the south-west. - May forage in open farmland.	Moderate - The south-west subspecies is considered extremely rare (Liddelow <i>et al.</i> 2002). No population estimate exists, although the population of the species outside Queensland has been estimated at 1,000 individuals (Garnett and Baker 2021). - Not congregatory, breeding pairs spaced 2 – 10km apart and overall density low at 0.10 – 0.12birds/ha (Garnett and Baker 2021). - Moderately long-lived, generation length estimated at 4.1 years (BirdLife International 2024). - Listed as DBCA Priority 3	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Masked Owl <i>Tyto novaehollandiae novaehollandiae</i>	Priority 3	Low - Not recorded in study area. May possibly occur as the study area is within the known range of the species, but no nearby records and likely to be uncommon. - May forage in open farmland.	Moderate - For the species overall, the population is suspected to be declining, little data available on this subspecies, but it is restricted to south-west Western Australia and poorly known. - Not congregatory. - Moderately long-lived, generation length estimated at 5.01 years (BirdLife International 2024). - Listed as DBCA Priority 3	Minor
Inland Western Rosella <i>Platycercus icterotis xanthogenys</i>	Priority 4	Low - Recorded in the study area. - Of 30 recorded flights on BUS surveys, all were observed below the RSA. Considered unlikely to fly at RSA height. - Sedentary species, likely to forage and breed in eucalypt woodlands, but may also forage in crops and likely to disperse across cleared areas between habitat patches.	Low - This subspecies is restricted to the semi-arid southern interior Western Australia, where it has declined in the north-eastern part of its range but is still moderately common in the vicinity of the study area (Johnstone and Storr 1998). - Not congregatory, occurs as pairs and small flocks (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 5.01 years (BirdLife International 2024), clutch size usually 5-8 (Johnstone and Storr 1998). - Listed as DBCA Priority 4 and as Least Concern in Action Plan (Garnett and Baker 2021).	Negligible
Diurnal Birds of Prey				

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Black-shouldered Kite <i>Elanus axillaris</i>	Least Concern	Moderate - Recorded in study area and likely to be a common species of open farmland habitats. - Of 9 recorded flights in the BUS, 3 were within the RSA. - Prefers open habitats, including farmland (Johnstone and Storr 1998). - Forages by quartering and hovering, or sometimes from a perch (Debus 1998). 3 wind farm mortalities recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread across Australia, this species has increased in abundance due to clearing for agriculture. Global population very large, Australian population not quantified but likely to be large (Birdlife International 2024). - Not congregatory, usually occurs as singles, sometimes pairs (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 6.6 years (BirdLife International 2024). May have 2 broods in a year, juveniles disperse widely, up to 1,000km recorded (Debus 1998). - No conservation listing.	Minor
Square-tailed Kite <i>Lophoictinia isura</i>	Least Concern	Moderate - Not recorded in study area and likely to be a relatively rare species in the region. - Mainly occurs in eucalypt woodlands (Johnstone and Storr 1998). - Migratory, with southern birds moving north in winter after breeding (Debus 1998). - Forages by low, slow quartering of the tree or shrub canopy, dropping to snatch prey. Aerial displays in breeding season (Debus 1998).	Low - Widespread across Australia. Population not quantified but believed to be small but stable (Birdlife International 2024). - Not congregatory, solitary outside of the breeding season (Debus 1998). - Moderately long-lived, generation length estimated at 7.6 years (BirdLife International 2024). - No conservation listing.	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Whistling Kite <i>Haliastur sphenurus</i>	Least Concern	Low - Not recorded in study area. May possibly occur but more likely to prefer wetland areas (absent from the study area). - Favours wooded wetlands and farmlands in the south-west (Johnstone and Storr 1998). - Regularly soars, forages by quartering, high soaring or ambushing from trees near water (Debus 1998), therefore considered likely to intersect the RSA. 1 wind farm mortality in south-west Victoria (Biosis 2020), 15 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread across Australia. Population may be in slight decline but it is very large (Birdlife International 2024). - Not congregatory. Usually occurs as singles or pairs or small flocks around wetlands (Johnstone and Storr 1998). - Long-lived, generation length estimated at 11.5 years (BirdLife International 2024). - No conservation listing.	Negligible
Swamp Harrier <i>Circus approximans</i>	Least Concern	Low - Likely to be uncommon, as this species usually forages in wetland habitats. - Although not recorded in BUS, this species was observed opportunistically, flying below the RSA. - Forages by low, slow quartering, as well as soaring (Debus 1998). Breeding display involves soaring high (Debus 1998), therefore considered likely to intersect RSA at times. 2 wind farm mortalities at 2 sites in Tasmania (Hull <i>et al.</i>, 2013), 6 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Population not quantified but believed to be moderately small - large and stable (Birdlife International 2024). - Moderately long-lived, generation length estimated at 7.8 years (BirdLife International 2024). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Spotted Harrier <i>Circus assimilis</i>	Least Concern	Low - Not recorded in study area. Uncommon in the far south-west so likely to be uncommon in the study area. - Inhabits sparsely wooded plains, including farmland (Johnstone and Storr 1998). - Forages by low, slow quartering, or transect hunting, often at or near ground level (Debus 1998). Breeding display infrequent but involves soaring high (Debus 1998), therefore considered likely to intersect RSA at times. 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - This species is widespread in Australia and has a large population that appears to be stable (BirdLife International 2024). - Moderately long-lived, generation length estimated at 7.8 years (BirdLife International 2024). - No conservation listing.	Negligible
Brown Goshawk <i>Accipiter fasciatus</i>	Least Concern	Low - Not recorded in study area but likely to occur. - Inhabits both woodlands and farmlands. - Usually forages from a perch, ambushing prey, but to a lesser extent also employs low fast flight and soaring (Debus 1998). Therefore, considered less likely to intersect RSA. 3 wind farm mortalities recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - This species occurs across Australia and has a large population, although it is suspected of decreasing (BirdLife International 2024). - Not congregatory, usually occurs as singles, sometimes pairs (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 5.44 years (BirdLife International 2024). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Collared Sparrowhawk <i>Accipiter cirrocephalus</i>	Least Concern	Low - Recorded opportunistically in study area. - Inhabits both woodlands and farmlands. - Usually forages from a concealed perch in foliage, also short tree to tree flights, to a lesser extent it also forages by quartering or with low fast flight (Debus 1998), therefore, considered less likely to intersect RSA. 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - This species occurs across Australia and has a large population that appears to be stable (BirdLife International 2024). - Not congregatory, usually occurs in pairs and singles (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 4.4 years (BirdLife International 2024). - No conservation listing.	Negligible
Wedge-tailed Eagle <i>Aquila audax</i>	Least Concern	High - Recorded in study area and nesting sites present. - Of 25 flights recorded in the BUS, 17 were in the RSA. - Occurs in lightly wooded habitats, including farmlands and is sedentary in favourable areas (Johnstone and Storr 1998). - Foraging strategy/flight behaviour involves regular soaring (Debus 1998) and likely intersection with the RSA. 2 mortalities reported at Silverton Wind Farm in NSW (Biosis 2021), 5 in south-west Victoria (Biosis 2020), 5 in NSW (EcoLogical 2022), 4 and 2 in Victoria (Elmoby 2020, 2021), 18 at 2 sites in Tasmania (Hull <i>et al.</i>, 2013), 58 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread in Australia, population large and possibly increasing due to clearing for agriculture and the introduction of rabbits (Birdlife International 2024, Ferguson-Lees and Christie 2001). - Not congregatory, usually occurs in pairs and singles (Johnstone and Storr 1998). - May be other pressures on this species in farmland, including illegal trapping and shooting (Ferguson-Lees and Christie 2001) - Long-lived, generation time estimated at 18.1 years (Birdlife International 2024). Each pair in the south-west on average raises less than 1 young per year (Debus 2019). - No conservation listing.	Moderate

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Little Eagle <i>Hieraaetus morphnoides</i>	Least Concern	Moderate - Not recorded in study area but may occur. - Inhabits woodlands and open habitats, particularly favours a mosaic of timbered and open country, such as farmland (Marchant and Higgins 1993). - Some populations migratory. - Foraging strategy/flight behaviour involves regular soaring (Debus 1998), therefore likely intersection with the RSA. 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread in Australia, population large and stable (Birdlife International 2024). - Not congregatory, usually occurs as singles, sometimes pairs (Johnstone and Storr 1998). - Long lived, generation time estimated at 18 years (Birdlife International 2024), juveniles disperse up to 3,000km (Debus 1998). - No conservation listing.	Minor
Australian Hobby <i>Falco longipennis</i>	Least Concern	Low - Not recorded in study area but may occur, although this species is uncommon in the region. - Occurs in woodlands, often near water, and likely to forage in and traverse open habitats. - At least partly migratory, birds in the south or at high altitude migrate north in autumn after breeding (Debus 1998, Johnstone and Storr 1998). - Forages using low, fast flight, but also uses high quartering. Soaring and chasing involved in breeding behaviour (Debus 1998). 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread across Australia. Common in well-watered arid and semi-arid areas, uncommon elsewhere (Johnstone and Storr 1998) - Not congregatory, usually occurs in pairs and singles (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 6.2 years (BirdLife International 2024), clutch size usually 3 (Johnstone and Storr 1998). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Brown Falcon <i>Falco berigora</i>	Least Concern	Moderate - Recorded in study area, likely to be a relatively common inhabitant of open farmland and woodland edges. - Of 9 records in the BUS, all were below RSA. - Largely sedentary, some movement north in autumn has been recorded (Johnstone and Storr 1998). - Foraging is mostly from a perch, but some soaring is used (Debus 1998). 8 wind farm mortalities in south-west Victoria (Biosis 2020), 2 in NSW (EcoLogical 2022), 1 in Victoria (Elmoby 2021), 6 at 2 sites in Tasmania (Hull <i>et al.</i>, 2013), 1 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Common, widespread across Australia. Population may be declining slowly (BirdLife International 2024). - Not congregatory, usually occurs in pairs and singles (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 6.2 years (BirdLife International 2024), clutch size usually 3 (Johnstone and Storr 1998). - No conservation listing.	Minor
Australian Kestrel <i>Falco cenchroides</i>	Least Concern	Moderate - Recorded in study area and likely to be a common species of open farmland habitats. - Of 28 flights recorded in the BUS, 22 were below RSA and 6 were at RSA height. - At least partly migratory, moving north in autumn, returning late winter (Johnstone and Storr 1998). - Foraging strategy to fly low and slow over ground, then hover when prey sighted (Johnstone and Storr 1998). May hover at RSA height. 1 mortality reported at Silverton Wind Farm in NSW (Biosis 2021), 23 in south-west Victoria (Biosis 2020), 5 in NSW (EcoLogical 2022), 2 in Victoria (Elmoby 2021), 54 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Common, widespread across Australia. Population large and increasing (BirdLife International 2024). - Not congregatory, usually occurs in singles, sometimes pairs (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 6.2 years (BirdLife International 2024), clutch size usually 4 (Johnstone and Storr 1998). - No conservation listing.	Minor
Nocturnal Birds of Prey				

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Eastern Barn Owl <i>Tyto javanica</i>	Least Concern	Low - Not recorded in study area but likely to occur. - Prefers lightly-wooded habitats. - Although it forages in open habitats, foraging strategy involves flying at low speed within 3-5m of the ground. 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread and common across Australia. - Not congregatory, usually occurs in pairs and singles (Johnstone and Storr 1998). - Moderately long-lived, generation length estimated at 6.2 years (Birdlife International 2024), clutch size usually 3 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Southern Boobook <i>Ninox boobook</i>	Least Concern	Low - Not recorded in study area but likely to occur as it is relatively common in the south-west. - Occurs in a variety of habitats including woodlands and open habitats.	Low - Widespread and common across Australia, population >100,000 individuals, thought to be declining but this has not been quantified (BirdLife International 2024). - Not congregatory, usually occurs in pairs and singles (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 5.45 years, clutch size usually 2 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Tawny Frogmouth <i>Podargus strigoides</i>	Least concern	Low - Not recorded in study area but likely to be a relatively common species. - Occurs in wooded habitats, roosting in trees. Likely to forage in and traverse open habitats. - Forages by taking prey from the ground, so unlikely to regularly fly at RSA height. - Occasional mortalities reported (unpublished data reported in BL&A 2017).	Low - Widespread across Australia except for desert regions. Population not quantified but believed to be large and stable (Birdlife International 2024). - Not congregatory, occurs as pairs or singles (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 7.5 years (BirdLife International 2024), clutch size usually 2 (Johnstone and Storr 1998). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Spotted Nightjar <i>Eurostopodus argus</i>	Least Concern	Low - Not recorded in study area but possibly occurs, unlikely to be common in the region. - Prefers open habitats, including farmland. - Forages by hawking for insects.	Low - Widespread across much of Australia. Population not quantified but believed to be large and stable (Birdlife International 2024). - Not congregatory, occurs as pairs or singles (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 5.4 years (BirdLife International 2024), clutch size usually 1 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Australian Owlet-nightjar <i>Aegotheles cristatus</i>	Least Concern	Low - Not recorded in study area, may occur but uncommon in the wetter parts of its range. - Occurs in eucalypt woodlands, roosting and nesting in tree hollows. - Nocturnal forager. Forages by flying out or up from a perch to catch prey in the air or off vegetation. Brigham <i>et al.</i> (1999) found the proportion of time spent perching above 10m varied from 0 to 49%. 1 mortality reported at Silverton Wind Farm in NSW (Biosis 2021).	Low - Widespread across Australia. Population not quantified but believed to be common and no reported declines (BirdLife International 2024). - Not congregatory, occurs as singles (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 5.4 years (BirdLife International 2024), clutch size usually 3 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Waterbirds				

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Pacific Black Duck <i>Anas superciliosus</i>	Least Concern	Low - Recorded opportunistically in the study area and likely to occur in small numbers, mostly on farm dams, creeks or damp pasture. - Forages on the ground and in water. - Nomadic. 3 wind farm mortalities recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread across Australia. This species has an extremely large range and although the population trend is decreasing, the population size is large (BirdLife International 2024). - Usually occurs as singles, pairs, and small groups, large aggregations occur on larger wetlands (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 5.6 years (BirdLife International 2024), clutch size usually 7 - 10 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Grey Teal <i>Anas gracilis</i>	Least Concern	Low - Recorded opportunistically in the study area and likely to occur in small numbers, mostly on farm dams, creeks or damp pasture. - Of the 2 flights recorded in the BUS, both were below the RSA. - Forages on the ground and in water. - Nomadic. 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Widespread across Australia. The population large and fluctuating, with a declining population trend (BirdLife International 2024). - Occurs as singles, pairs and small groups, large aggregations occur on larger wetlands (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 4.9 years (BirdLife International 2024), clutch size usually 6 - 10 (Johnstone and Storr 1998). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Australian Shelduck <i>Tadorna tadornoides</i>	Least Concern	Low - Recorded in study area and likely to occur in small numbers, mostly on farm dams, creeks or green pasture. - Of 24 records in the BUS, all were below RSA. - Forages on the ground or in water.	Low - Widespread across Australia. Population large with an increasing population trend (BirdLife International 2024). Population in the south-west has increased since establishment of the wheatbelt (Johnstone and Storr 1998). - Seasonally congregatory, occurs in pairs or family parties in the breeding season, then can congregate in large flocks in October – May (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 7.3 years (BirdLife International 2024), clutch size usually 5-24 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Australian Wood Duck <i>Chenonetta jubata</i>	Least Concern	Low - Recorded in study area and likely to occur in small numbers, mostly on farm dams, creeks or green pasture. - Of 56 records in the BUS, all were below RSA. - Forages on the ground. - Mortalities at wind farms reported (unpublished data reported in BL&A 2017), 1 in south-west Victoria (Biosis 2020).	Low - Widespread across Australia. Population not quantified but believed to be common (BirdLife International 2024). Population in the south-west has increased since European settlement, particularly since the 1940s due to increased farmland and dams (Johnstone and Storr 1998). - Somewhat congregatory, occasionally large aggregations, but usually occurs in pairs, family parties or small groups (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 7 years (BirdLife International 2024), clutch size usually 5-20 (Johnstone and Storr 1998). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
White-faced Heron <i>Egretta novaehollandiae</i>	Least Concern	Low - Recorded in study area and likely to occur in small numbers, mostly on farm dams or damp pasture. - Forages on the ground or in shallow water. - Of 6 records in the BUS, all were below RSA.	Low - Widespread across Australia. Population not quantified but believed to be common (BirdLife International 2024). - Not usually congregatory, occurs as singles and pairs, large aggregations rare (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 6.6 years (BirdLife International 2024), clutch size usually 4 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Australasian Grebe <i>Tachybaptus novaehollandiae</i>	Least Concern	Low - Recorded opportunistically in the study area and likely to occur in very small numbers, mostly on farm dams and unlikely to use other habitats. - Of the 6 flights recorded in the BUS, all were below the RSA. - Forages on the water.	Low - Widespread across Australia. Population not quantified but believed to be common (BirdLife International 2024). - Not usually congregatory, occurs as singles and pairs, larger flocks on large lakes (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 6.6 years (BirdLife International 2024), clutch size usually 4- 5 (Johnstone and Storr 1998). - No conservation listing.	Negligible
Bird species recorded flying at RSA in this survey				

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Purple-crowned Lorikeet <i>Parvipsitta porphyrocephala</i>	Least Concern	High - Recorded in study area and likely to be common. - Of 433 records in the BUS, 354 were below RSA and 79 were in the RSA. - Forages in forests and woodlands but crosses open habitats between woodland patches. - Nomadic, moving in response to the availability of blossom (Johnstone and Storr 1998). Likely to be common in study area when eucalypt canopy is in flower. - Flight fast and direct when moving between habitat patches.	Low - Restricted to south-west Western Australia, common within its range but thought to be slowly declining (BirdLife International 2024). - Somewhat congregatory, occurring in small flocks up to 40, moving in response to availability of flowering eucalypts. Sometimes breed in groups, many pairs using tree hollows in close proximity (Johnstone and Storr 1998). - Modest lifespan, generation time estimated at 3.5 years (BirdLife International 2024), clutch size usually 2-4 (Johnstone and Storr 1998), reasonable capacity to replace lost adults. - No conservation listing.	Moderate
Elegant Parrot <i>Neophema elegans</i>	Least Concern	High - Recorded in study area and likely to be a common species of open farmland habitats. - Of 69 records in the BUS, 57 were below RSA and 12 were in the RSA. - Favours lightly wooded habitats including farmland, usually foraging on the ground. - Largely sedentary, some movements north and south-west in autumn (Johnstone and Storr 1998).	Negligible - Has increased its range since European settlement. Restricted to southern Australia, common in the southern part of its range, uncommon or scarce elsewhere (Johnstone and Storr 1998). - Not usually congregatory, pairs or small flocks, occasionally large flocks (Johnstone and Storr 1998). - Moderately long-lived, generation time estimated at 4.9 years (BirdLife International 2024), clutch size 4-6 (Johnstone and Storr 1998). - No conservation listing.	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Tree Martin <i>Petrochelidon nigricans</i>	Least Concern	High - Recorded in study area and likely to be a common species of open farmland habitats. - Of 2,087 records in the BUS, 1,961 were below RSA and 126 were in the RSA. - Migratory; birds in south-west Australia forming flocks in early summer, moving north in late summer - autumn and returning in late winter – spring to breed (Johnstone and Storr 2004). - An aerial insectivore, flight highly manoeuvrable.	Negligible - Common and widespread across Australia, believed to be increasing in abundance (BirdLife International 2024). - Congregates in roaming flocks in early summer, but these flocks wander and are unlikely to be restricted to a particular site. - Moderately long-lived, generation length estimated at 4 years (BirdLife International 2024). - No conservation listing.	Minor
Welcome Swallow <i>Hirundo neoxena</i>	Least Concern	High - Recorded in study area and likely to be a common species of open farmland habitats, usually in association with buildings, tanks and other infrastructure. - Of 20 records in the BUS, 11 were below RSA and 9 were in the RSA. - Likely to be sedentary in the south-west, migratory elsewhere. - An aerial insectivore, flight highly manoeuvrable. 1 wind farm mortality in Victoria (Elmoby 2019), 4 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Negligible - Originally confined to coasts, this species has colonised the interior with European settlement. Widespread and abundant, the population trend is increasing (Birdlife International 2024). - Not congregatory, occurs as singles, pairs and small flocks (Johnstone and Storr, 1998). - Moderately long-lived, generation length estimated at 4 years (BirdLife International 2024). - No conservation listing.	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Australian Magpie <i>Gymnorhina tibicen</i>	Least Concern	Moderate - Recorded in study area and likely to be a common species of open farmland habitats. - Of 475 records in the BUS, 473 were below RSA and 2 were in the RSA. - Sedentary. - Known to collide with turbines (unpublished data reported in BL&A 2017), 13 in south-west Victoria (Biosis 2020), 9 in NSW (EcoLogical 2022), 1, 1 and 3 in Victoria (Elmoby 2019, 2020, 2021), 115 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Common and widespread across Australia, believed to be increasing in abundance and particularly common in coastal and agricultural areas (BirdLife International 2024). - Not congregatory, usually in pairs and small groups (Johnstone and Storr 2004). - Long-lived, generation length estimated at 12.7 years (BirdLife International 2024). - Usually breeds in small groups containing some non-breeding members, so some capacity to replace lost adults. - No conservation listing.	Minor
Australia Raven <i>Corvus coronoides</i>	Least Concern	Moderate - Recorded in study area and likely to be a common species of open farmland habitats. - Of 661 records in the BUS, 631 were below RSA and 30 were in the RSA. - Sedentary. - Forages mainly on the ground. 12 (<i>Corvus</i> spp.) wind farm mortalities in south-west Victoria (Biosis 2020), 1 in NSW (EcoLogical 2022), 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Negligible - Common and widespread across Australia, this species has an extremely large range and a large population with an increasing population trend (BirdLife International 2024). In the south-west, this species is most numerous in farmlands, especially the wheatbelt (Johnstone and Storr 2004). - Usually congregatory, mostly in singles, pairs or small groups, occasionally in large flocks (300+) at food-rich sites (Johnstone and Storr 2004). - Long-lived, generation length estimated at 7.9 years (BirdLife International 2024). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Black-faced Cuckoo-shrike <i>Coracina novaehollandiae</i>	Least Concern	Moderate - Recorded in study area. Occurs in wooded habitats and cleared land. This species can cross open areas on migration. - Of the 63 records in the BUS, 57 were below RSA and 6 were in the RSA. - Migrant, southern birds move north in mid-January to June (Johnstone and Storr 2004). - Usually forages in the tree canopy (Johnstone and Storr 2004).	Low - Common and widespread across Australia, this species has an extremely large range and the population size is large but the population trend is decreasing (BirdLife International 2024). - Not congregatory, usually in singles or pairs or small groups of up to 30 on migration (Johnstone and Storr 2004). - Moderately long-lived, generation length estimated at 4.6 years (BirdLife International 2024). - No conservation listing.	Minor
Dusky Woodswallow <i>Artamus cyanopterus</i>	Least Concern	Moderate - Recorded in study area. Favours partly cleared farmland and eucalypt woodlands but uncommon in the wheatbelt due to clearing (Johnstone and Storr 2004). - Of the 37 records in the RSA, 31 were below the RSA and 6 were in the RSA. - Partial migrant. Flocks in autumn and moves north. - An aerial insectivore, flight highly manoeuvrable. Hawks for insects over the canopy (Johnstone and Storr 2004). 1 wind farm mortality recorded from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Common and widespread across southern Australia, this species has an extremely large range, and the population is large but the population trend is decreasing (BirdLife International 2024). This species has declined in the south-west, often replaced by the conspecific Black-faced Woodswallow (Johnstone and Storr 2004). - Not usually congregatory, usually in singles, pairs or small groups, occasionally large flocks of up to 200 (Johnstone and Storr 2004). - Moderately long-lived, generation length estimated at 3.6 years (BirdLife International 2024). - No conservation listing.	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Black-faced Woodswallow <i>Artamus cinereus</i>	Least Concern	Moderate - Recorded in study area, prefers open or sparsely-wooded habitats including farmland. - Of the 77 records in the BUS, 74 were below the RSA and 3 was in the RSA. - Mostly sedentary. - An aerial insectivore, flight highly manoeuvrable	Negligible - Common and widespread across Australia, this species has an extremely large range and an unquantified but large population with an increasing population trend (BirdLife International 2024). This species has greatly increased its range and abundance in southern agricultural areas (Johnstone and Storr (2004). - Not congregatory, usually in singles, pairs or small groups (Johnstone and Storr 2004). - Moderately long-lived, generation length estimated at 3.7 years (BirdLife International 2024). - No conservation listing.	Negligible
Red Wattlebird <i>Anthochaera carunculata</i>	Least Concern	Moderate - Recorded in study area but prefers well-wooded habitats. - Of the 87 records in the BUS, 86 were below the RSA and 1 was in the RSA. Intersection with the RSA considered likely to be a rare event. - Partly migratory, largely leaving the warmer, drier parts of its range in summer. Moves in flocks from late summer to early winter (Johnstone and Storr 2004).	Negligible - Common and widespread across southern Australia, this species has an extremely large range and the population trend is stable (BirdLife International 2024). - Not usually congregatory, usually in singles or pairs sometimes in large flocks of up to 100 in late summer/early winter (Johnstone and Storr 2004). - Moderately long-lived, generation length estimated at 6.9 years (BirdLife International 2024). - No conservation listing.	Negligible

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Australian Pipit <i>Anthus australis</i>	Least Concern	Low - Recorded in study area and considered a very common species of open farmland habitats (Johnstone and Storr 2004). - Of the 136 records in the BUS, 130 were below the RSA and 6 were at the RSA. - Largely sedentary - Forages mainly on the ground (Johnstone and Storr 2004). Courting males conduct undulating flights that may intersect the RSA on occasion. - Known to collide with turbines on occasion: 1 mortality in south-west Victoria (Biosis 2020), 2 from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Low - Common and widespread across Australia, this species has an extremely large range and an unknown but very large population with a stable population trend (BirdLife International 2024). - Not congregatory, usually in singles, pairs or small groups (Johnstone and Storr 2004). - Moderately long-lived, generation length estimated at 3.7 years (BirdLife International 2024). - No conservation listing.	Negligible
BATS				
Central Long-eared Bat <i>Nyctophilus major tor</i>	Priority 3	Low - Possibly occurs, project is on very western edge of its known range. - Usually under the canopy, flying within the understory (Churchill 2008). 'High altitude likelihood' rated as low for <i>Nyctophilus spp.</i> present on site (Specialised Zoological 2025). - Wing aspect ratio high, wing loading low (Norberg and Rayner 1987).	Moderate - Population likely >10,000 (Woinarski <i>et al.</i>, 2014) and widespread across southern arid Australia. - Listed as DBCA Priority 3, Least Concern in Action Plan (Woinarski <i>et al.</i>, 2014).	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Chocolate Wattled Bat <i>Chalinolobus morio</i>	Least Concern	High - Recorded in study area, high frequency of detection (Specialised Zoological 2025). - Relatively unlikely to fly in RSA, flies in the open spaces between the forest canopy and understory (Churchill 2008). 'High altitude likelihood' rated as medium based on expert opinion (Specialised Zoological 2025). - Sedentary species, flies 5 – 10km from the roost to forage (Churchill 2008). - Flight agile (Bullen and McKenzie 2001), wing aspect ratio high, wing loading medium (Norberg and Rayner 1987). 5 wind farm mortalities from 15 sites across Victoria (Moloney <i>et al.</i> 2019), 1 from south-west Victoria (Bennett <i>et al.</i> 2022), 1 and 2 in Victoria (Elmoby 2019, 2021).	Low - No conservation listing. - Often bears twins (Churchill 2008), so moderate ability to replace lost individuals compared with other bats. - Population large and widespread across southern Australia.	Moderate

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Gould's Wattled Bat <i>Chalinolobus gouldii</i>	Least Concern	High - Recorded in study area, high frequency of detection (Specialised Zoological 2025). - May fly in the RSA, flies below or within the lower level of the forest canopy, along forest edges, creeklines and around isolated paddock trees (Churchill 2008). 'High altitude likelihood' rated as medium based on expert opinion (Specialised Zoological 2025). - Flight agile (Bullen and McKenzie 2001), wing aspect ratio high, wing loading medium (Norberg and Rayner 1987). 38 wind farm mortalities in Tasmania (Hull and Cawthen 2013), 49 from 15 sites across Victoria (Moloney <i>et al.</i> 2019), 9 from south-west Victoria (Bennett <i>et al.</i> 2022), 11 in south-west Victoria (Biosis 2020), 2 from Silvertown in NSW (Biosis 2021), 1 in NSW (EcoLogical 2022), 14 and 9 in Victoria (Elmoby 2019, 2021).	Low - No conservation listing. - Usually bears twins (Churchill 2008), so moderate ability to replace lost individuals compared with other bats. - Population large and widespread across Australia.	Moderate
Greater Long-eared Bat <i>Nyctophilus major major</i>	Least Concern	Low - Possibly occurs, project is on very eastern edge of its known range. - Flight likely below RSA, usually under the canopy, flying within the understory (Churchill 2008). 'High altitude likelihood' rated as low for <i>Nyctophilus spp.</i> present on site (Specialised Zoological 2025). - Sedentary but using multiple roosts, flying up to 1,200m from the roost to forage. - Wing aspect ratio high, wing loading medium (Norberg and Rayner 1987).	Moderate - No conservation listing. - Often bears twins (Churchill 2008), so moderate ability to replace lost individuals compared with other bats. - Population restricted to forested regions in south-west Western Australia.	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Inland Broad-nosed Bat <i>Scotorepens balstoni</i>	Least Concern	Low - Recorded in study area, but uncommon with a low frequency of detection (Specialised Zoological 2025). - This species is generally thought to forage below the canopy, within 15m of the ground (Churchill 2008). 'High altitude likelihood' rated as medium based on site data (Specialised Zoological 2025).	Low - No conservation listing. - Bears a single young each year, so limited ability to replace lost individuals. - Population widespread across Australia, more common in arid and semi-arid areas, less common in southern regions (Churchill 2008).	Negligible
Holt's Long-eared Bat, <i>Nyctophilus holtorum</i> (Previously Gould's Long-eared Bat, <i>Nyctophilus gouldi</i>)	Least Concern	Low - Possibly occurs in study area but no records within 40km on ALA (2023) and species is on the very eastern edge of its range. - Unlikely to fly in RSA, flies under the forest canopy, 2-5m above the ground. 'High altitude likelihood' rated as low for <i>Nyctophilus spp.</i> present on site (Specialised Zoological 2025). - Wing aspect ratio high, wing loading low (Norberg and Raynor 1987). - Data from closely related <i>Nyctophilus gouldii</i>: 1 wind farm mortality from 15 sites across Victoria (Moloney <i>et al.</i> 2019) 3 in south-west Victoria (Biosis 2020).	Moderate - No conservation listing. - Bears twins about 50% of the time (Churchill 2008), so moderately-low ability to replace lost individuals compared with other bats. - Population restricted to forested regions in south-west Western Australia.	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Lesser Long-eared Bat <i>Nyctophilus geoffroyi</i>	Least Concern	Low - Likely to occur in study area, presence not confirmed. - Forages close to vegetation, including in the understory, usually 6-10m above the ground in forests (Churchill 2008). 'High altitude likelihood' rated as low based on expert opinion (Specialised Zoological 2025). - Wing aspect ratio high, wing loading low (Norberg and Rayner 1987). 6 wind farm mortalities from 15 sites across Victoria (Moloney <i>et al.</i> 2019), 2 from south-west Victoria (Bennett <i>et al.</i> 2022), 13, 2 in Victoria (Elmoby 2019, 2021).	Low - No conservation listing. - Usually bears twins (Churchill 2008), so moderate ability to replace lost individuals compared with other bats. - Population large and widespread across Australia.	Negligible
South-west Freetail Bat <i>Ozimops kitcheneri</i>	Least Concern	Moderate - Recorded in study area, relatively low frequency of detection (Specialised Zoological 2025). - Flies at or above canopy height, also forages on ground (Churchill 2008). Forages up to 12km from the roost. 'High altitude likelihood' rated as medium based expert opinion (Specialised Zoological 2025). - Wing aspect ratio average, wing loading high (Norberg and Rayner 1987).	Low - No conservation listing. - Bears a single young each year, but relatively long-lived at 10 years (Churchill 2008), so moderate ability to replace lost individuals. - Population large and widespread across Australia.	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
Southern Forest Bat <i>Vespadelus regulus</i>	Least Concern	High - Recorded in study area, high frequency of detection (Specialised Zoological 2025). - Unlikely to fly in RSA, usually forages at less than half the canopy height, close to vegetation, including foraging within the understory (Churchill 2008). 'High altitude likelihood' rated as medium based on expert opinion (Specialised Zoological 2025). - Flight agile (Bullen and McKenzie 2001), wing aspect ratio average, wing loading low (Norberg and Rayner 1987). 2 wind farm mortalities in Tasmania (Hull and Cawthen 2013), 2 from 15 sites across Victoria (Moloney <i>et al.</i> 2019), 2 from south-west Victoria (Bennett <i>et al.</i> 2022) 3 and 3 in Victoria (Elmoby 2019, 2021).	Low - No conservation listing. - Bears a single young each year (Churchill 2008), so limited ability to replace lost individuals. - Population large and widespread across Australia.	Moderate
Western False Pipistrelle <i>Falsistrellus mackenziei</i>	Priority 4	Low - Not recorded but possibly occurs, however, prefers old growth habitats and project is on the very eastern edge of its known range. - Flight fast and direct, but usually in the open spaces between the forest canopy and understory (Churchill 2008). - Wing aspect ratio high, wing loading high (Bullen 2008). 28 wind farm mortalities of a similar species, <i>Falsistrellus tasmaniensis</i>, from 15 sites across Victoria (Moloney <i>et al.</i> 2019).	Moderate - Population likely to be >10,000 individuals but declining (Woinarski <i>et al.</i> 2014). - Bears a single young each year (Churchill 2008), so limited ability to replace lost individuals. - Population restricted to forested regions in south-west Western Australia. - Listed as DBCA Priority 4, Near Threatened in Action Plan (Woinarski <i>et al.</i> 2014).	Minor

Appendix 9				
Species	Status	Likelihood	Consequence	Risk Rating
White-striped Freetail Bat <i>Austronomus australis</i>	Least Concern	High - Recorded in study area, activity levels moderate overall as not present all year. - Likely to fly in RSA, flies over canopy, typically 50m above ground (Churchill 2008). 'High altitude likelihood' rated as high based on expert opinion (Specialised Zoological 2025). - Migratory, moving northwards during the cooler months of April - September and southwards during the warmer months of October – March) (Bullen and McKenzie 2005). - Wing aspect ratio high, wing loading very high (Norberg and Rayner 1987). 296 wind farm mortalities in Victoria across 15 sites (Moloney <i>et al.</i> 2019), 24 in southwest Victoria (Bennett <i>et al.</i> 2022), 18 in south-west Victoria (Biosis 2020), 4 from Silvertown in NSW (Biosis 2021), 9 in NSW (EcoLogical 2022), 26 and 9 in Victoria (Elmoby 2019, 2021).	Low - No conservation listing. - Bears a single young each year (Churchill 2008), so limited ability to replace lost individuals. - High capacity for dispersal. - Population large and widespread across Australia.	Moderate