Willogoleche Stage 2 Wind Farm

Bird and Bat Utilisation Summary Final Report

Final

December 2025

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Prepared by
Umwelt (Australia) Pty Limited

On behalf of
Environmental Resources Management (ERM) Pty Ltd

Project Director: A. Derry
Project Manager: E. West
Author: T. Headland
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1/112 Hayward Avenue, Torrensville SA 5031

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Executive Summary

International Power (Australia) Holdings Pty Ltd (trading as ENGIE) is proposing to build a wind farm, Willogoleche 2 Wind Farm (the Project), located close to Hallett in South Australia. The proposal is for up to 20 wind turbine generators (herein referred to as WTGs or turbines) along with associated infrastructure, including access tracks, an overhead transmission and underground cabling.

Umwelt has been engaged by Environmental Resources Management Australia Pty Ltd (ERM) on behalf of ENGIE, to undertake seasonal Bird and Bat Utilisation Surveys (BBUS) for the Project.

BBUSs form part of the advice recommended by the Department for Climate Change, Environment, Energy and Water (DCCEEW, 2024), in the Onshore Wind Farm Guidance – Best practice approaches when seeking approval under Australia's national environment law. This document provides guidance for wind farm proponents for assessments under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). BBUSs help to establish an ecological for a proposed wind farm Project to help assess the potential impacts on birds and bats.

BBUSs for the Project were initiated in spring 2023, where 10 BBUS sites, including eight bird and two bat survey sites, were established with the aim of sampling a range of habitats within the Willogoleche 2 Wind Farm Project Area.

Survey methods utilised are consistent with the requirements for bird and bat monitoring as set out in the Onshore Wind Farm Guidance approach (DCCEEW, 2024). At each site, morning and afternoon bird surveys (20 minutes each across 2 ha) were undertaken during the survey period. To supplement the BBUS data, opportunistic records of threatened bird species, bird species not observed at BBUS sites and raptors heard and/or observed outside of the BBUS sites, were recorded across the survey period. Bats were surveyed by using Anabat recorders which detect the high frequency contact and hunting calls of micro-bat species.

To date, eight seasonal BBUSs have been undertaken for the Project, over two years (2023–2025), which is the minimum requirement as specified in the Onshore Wind Farm Guidance approach (DCCEEW - in draft, 2024).

The objective of this BBUS summary report is to:

- Collate all the data from the eight BBUSs, with data and analysis presented for the EPBC Act and *National Parks and Wildlife Act 1972* (NPW Act) listed threatened bird species, including raptors.
- Identify and address bats detected in the Project Area.
- Discuss species that are at risk of collision with WTG.

EPBC Act listed threatened bird species

One EPBC Act listed threatened terrestrial bird species was recorded at Willogoleche 2 Wind Farm:

- Southern Whiteface (*Aphelocephala leucopsis leucopsis*) – Vulnerable.

Southern Whiteface was observed opportunistically at two of the 8 BBUS periods, with the most observations of this species occurring in spring 2023, where a total of 6 birds were recorded. Southern Whiteface is known to occur in open woodland habitat with an understorey of grasses and shrubs, which seldom occurs in the Project Area.

NPW Act listed threatened bird species

Two species listed as threatened under the state NPW Act were recorded in one or more survey periods in the Project Area, as listed below:

- Black Falcon (*Falco subniger*) – Rare.
- Peregrine Falcon (*Falco peregrinus*) – Rare.
- Little Eagle (*Hieraaetus morphnoides*) – Vulnerable.

Migratory species

No migratory species were recorded in the Project Area during the survey periods.

Raptors

Seven raptor species were recorded in one or more survey periods in the Project Area during the eight survey periods:

- Black-shouldered Kite (*Elanus axillaris*).
- Black Falcon (*Falco subniger*) – NPW Act Rare.
- Brown Falcon (*Falco berigora*).
- Little Eagle *(Hieraaetus* morphnoides) – NPW Act Vulnerable.
- Nankeen Kestrel (*Falco cenchroides cenchroides*).
- Peregrine Falcon (*Falco peregrinus*) – NPW Act Rare.
- Wedge-tailed Eagle (*Aquila audax audax*).

The Nankeen Kestrel and Wedge-tailed Eagle were the most common raptor species recorded in the Project Area. The Wedge-tailed Eagle was observed during seven out of the 8 survey periods, while the Nankeen Kestrel was observed during 6 out of the 8 survey periods.

Habitat richness and abundance

Grassland sites accounted for the majority of bird utilisation of habitat across the Project Area. Grassland sites had the highest bird abundance and species richness at BBUS sites, with 1,223 individuals observed across 39 species.

At risk bird species

Twenty-four (24) bird species recorded flight heights that were considered at a height that constitutes being within the rotor-swept area (RSA) of proposed WTGs. Two species listed under the EPBC or NPW Act were observed flying at heights within the RSA which were the Black Falcon and Peregrine Falcon. Out of the 25 bird species whose flight were recorded either at 30 m or above, five were raptors: Brown Falcon, Black Falcon, Nankeen Kestrel, Little Eagle and Wedge-tailed Eagle. Raptors are known to be more susceptible to bird-strike from WTG rotors because of their behaviour and foraging techniques, reduced agility and restricted forward field of view.

Bats

No threatened bat species, listed under either the EPBC of NPW Act, were identified. Overall, a total of four bat species were recorded during the survey program, using echolocation sonograms to identify the following species:

- Gould's Wattled Bat (*Chalinolobus gouldii*).
- Lesser Long-eared Bat (*Nyctophilus geoffroyi*).
- Free tailed-bat species (*Ozimops* sp.).
- Forest Bat species (*Vespadelus* sp.).

For completeness, bats were surveyed by recording calls of bats flying over the Project Area at night. The highest species richness of bats was recorded on the first survey in spring 2023, with all four species (identified throughout the survey program) being identified during the initial survey.

Abbreviations

Term/Abbreviation	Definition
Abundance	The number of individuals recorded at a survey site or a specific location
BBUS	Bird and Bat Utilisation Survey
DCCEEW	Department of Climate Change, Energy, the Environment and Water (Commonwealth)
DEW	Department of Environment and Water (South Australia)
EBS	Environmental and Biodiversity Services Pty Ltd, now trading as Umwelt (Australia) Pty Ltd
ENGIE	The proponent building Willogoleche Wind Farm Stage 2
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)
ERM	Environmental Resources Management Australia Pty Ltd (lead Environmental Approvals Consultant)
GPS	Global Positioning System
MLR	Mount Lofty Ranges
NPW Act	*National Parks and Wildlife Act 1972* (South Australia)
Observation	A record of a bird/bat sighting within the Project Area
Occupancy	The number of sites at which a species is recorded
the Project	Willogoleche Wind Farm 2
Project Area	Incorporates an area of approximately 1550 ha located within the Goyder Regional Council LGA
RSA	Rotor Swept Area
sp.	Species (singular)
Umwelt	Umwelt (Australia) Pty Ltd
WTG(s)	Wind Turbine Generator(s)

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1.0 Introduction

1.1 Background and Purpose

The Willogoleche Stage 2 Wind Farm (the Project) represents an extension to the existing Willogoleche Wind Farm (WWF) located approximately six km north-west of the Hallett township in South Australia. The WWF was constructed in November 2019 and operates 32 wind turbine generators (WTG) with a capacity of 119 megawatts (MW). The Project will comprise up to 20 WTG and ancillary infrastructure with an installed capacity of approximately 110 MW.

Project design updates were provided to Umwelt by Environmental Resources Management Pty Ltd (ERM), on 13 November 2025. The proposed Project consists of up to 20 wind turbine generators (from here on referred to as WTGs or turbines) Overhead Transmission Line (OTL) to nearby external transmission infrastructure, and other infrastructure associated with the wind farm.

Umwelt has been engaged by ERM on behalf of ENGIE to undertake seasonal BBUS for the Project over a two year period. BBUSs form part of the advice recommended by the Department for Climate Change, Environment, Energy and Water (DCCEEW, 2024), in the Onshore Wind Farm Guidance – Best practice approaches when seeking approval under Australia's national environment law. This document provides guidance for wind farm proponents for assessments under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The guidelines recommend monitoring seasonally (up to four survey deployments per year) at a proposed wind farm site for a minimum of two-years (i.e. up to eight surveys over 24 months), prior to the commencement of works, to establish an adequate baseline.

BBUSs determine the potential impacts of a proposed development on birds and bats and contributes to recommendations and mitigation strategies on how best to mitigate against potential impacts.

1.2 Survey Objectives

The objective of this BBUS summary report was to:

- Collate all the data from the eight BBUS, with data and analysis presented for EPBC Act and NPW Act listed bird threatened species, including raptors.
- Identify and address bats detected in the Project Area.
- Discuss species that are at risk of collision with WTG.

1.3 Project Area and Land Use

The Project Area occurs near the top of the northern Mount Lofty Ranges (MLR), South Australia, in the Mid-North Region (**Figure 1.1**). The northern MLR extends from near Kapunda in the south to just north of Peterborough in the north-east. The MLR have been extensively cleared for agriculture (e.g. grazing for sheep and cattle and cropping) and the areas of remnant vegetation that do remain in the region are small and often located upon disproportionally unproductive land, such as rocky ridges and slopes. Furthermore, due to their small size, remnant vegetation has been degraded through over-

grazing by native and introduced herbivores, weed invasion and water flux (e.g. rising water tables and damming of creeks) (Paton, Rogers, & Harris, 2004). As a result, many of the woodland bird species of the MLR are in decline (Nature Conservation Society of South Australia, 2014).

The Project Area covers approximately 1,550 ha and extends approximately 7 km in a north to south direction, centred on ridgelines. The Project Area is comprised of two private properties primarily used for farming and is located within the Goyder LGA and the Northern and Yorke Landscape Management Region. The Project Area predominantly contains native shrublands or grasslands along the western side, while smaller areas of cropping and pasture dominate the eastern side. Large trees are sparsely scattered within the Project Area, with the majority of areas that are vegetated having been planted and consisting of non-local native flora species within close proximity to homesteads (**Figure 1.2**). Due to the lack of remnant vegetation and large, tall trees, the diversity of birds present within the Project Area was considered to be low.

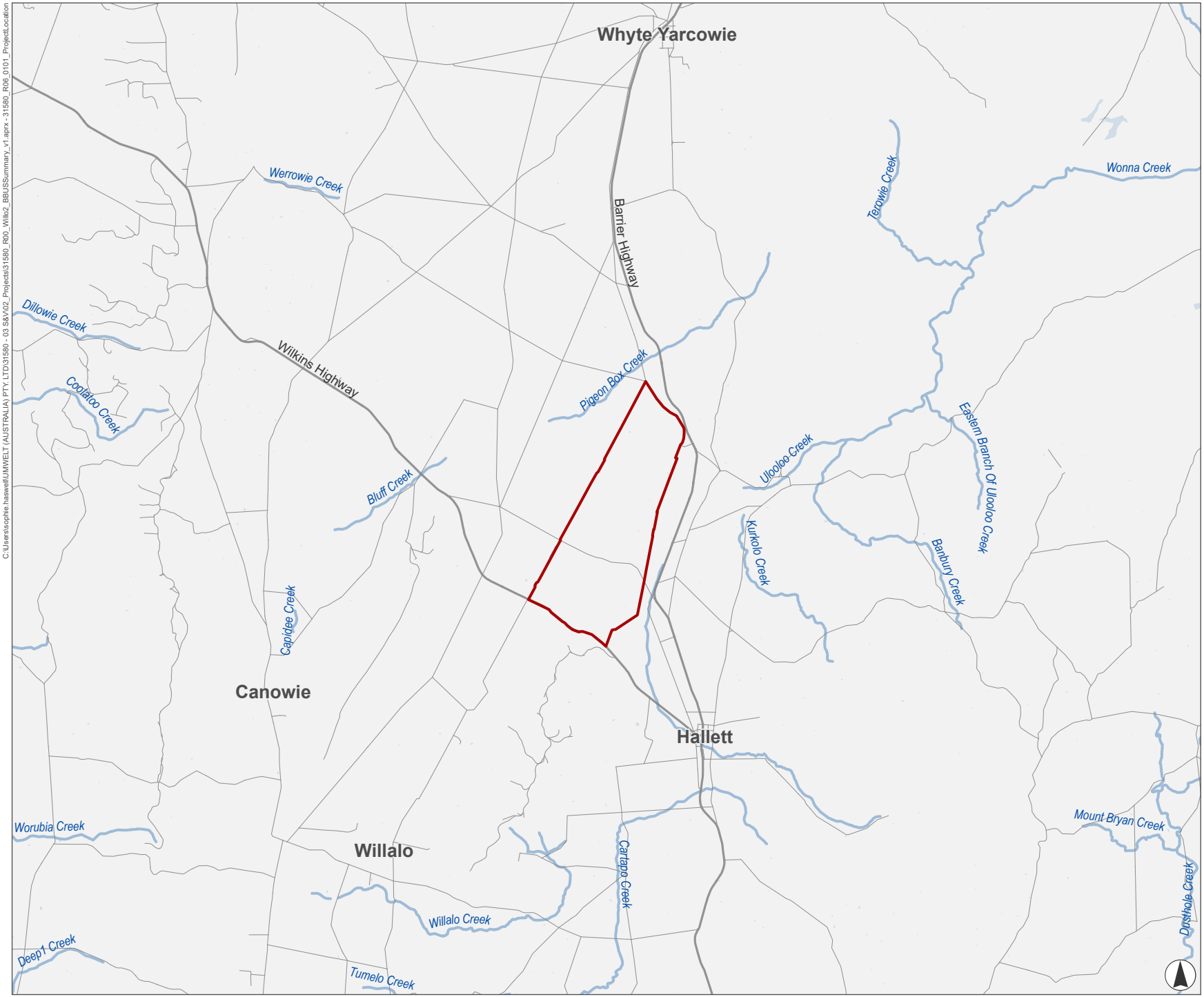

FIGURE 1.1

Location of the Project Area

Legend

- Wind Farm Project Area
- Main road
- Local road
- Watercourse
- Waterbody

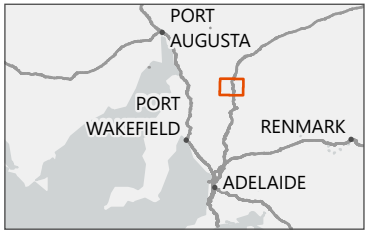

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Image Source: ESRI Basemap (2025) | **Data Source:** NSW DFSI (2025)

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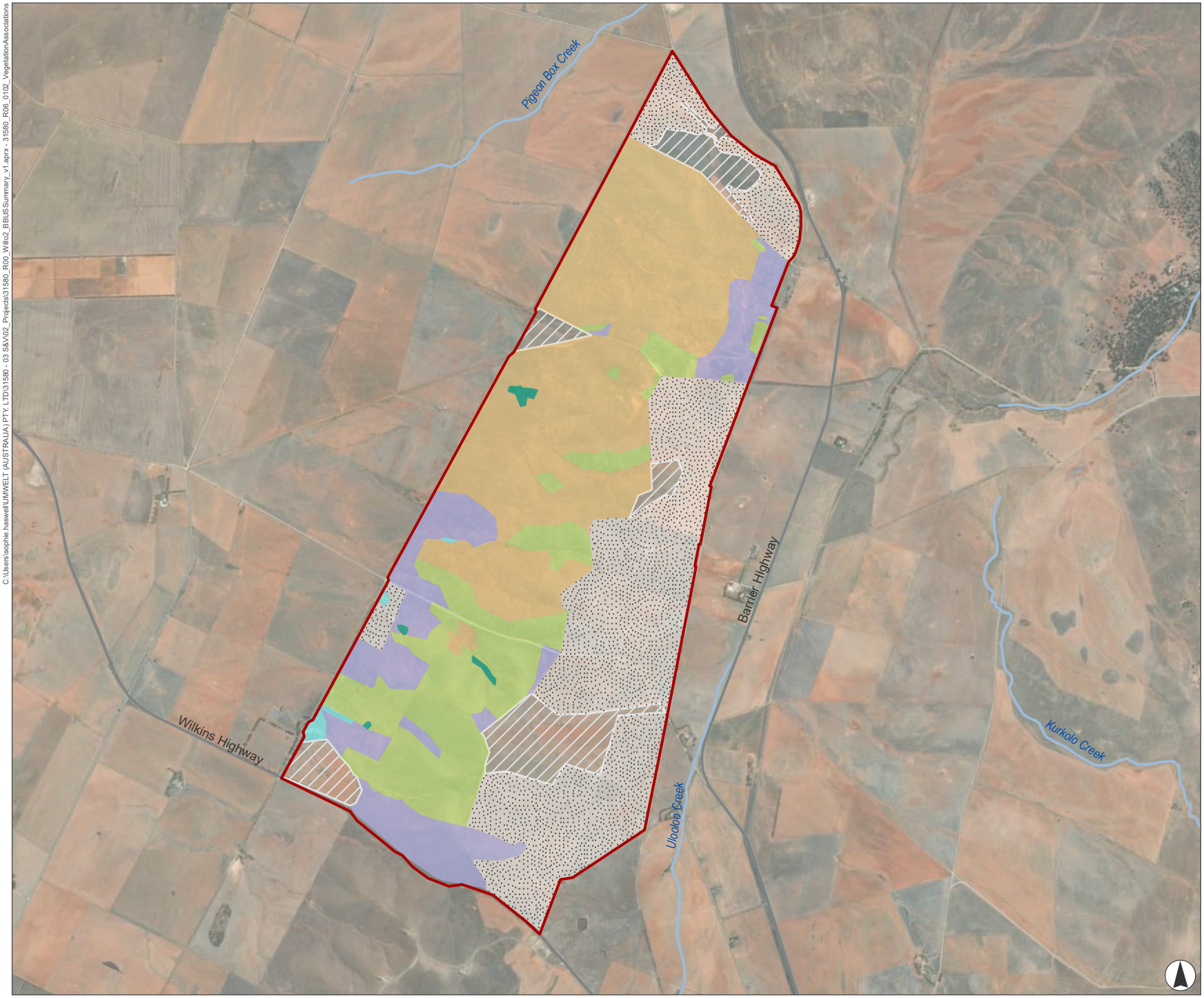

FIGURE 1.2

Vegetation Associations within the Project Area

Legend

- Wind Farm Project Area
- Main road
- Watercourse
- Waterbody

Vegetation Association

- A1: *Lomandra multiflora* with *Austrostipa* sp. grassland ± *Cryptandra campanulata* ± exotic grassland ± *Lomandra effusa*
- A2: *Maireana aphylla* shrubland with *Lomandra multiflora* ± exotic grasses ± *Cryptandra campanulata* ± *Austrostipa sp.*
- A3: *Austrostipa* sp. and *Rytidosperma* sp. grassland with emergent *Maireana aphylla* ± exotic grasses
- A4: *Cryptandra campanulata* shrubland ± *Lomandra multiflora* ± *Bursaria spinosa* and *Chrysocephalum* sp.
- A5: Exotic grassland / Pasture
- A6: Cropping
- A7: Planted vegetation / infrastructure

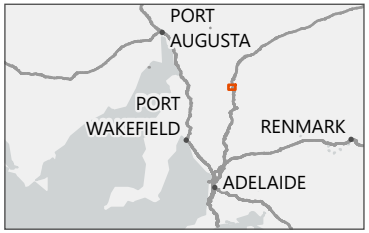

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Image Source: ESRI Basemap (2025) | **Data Source:** NSW DFSI (2025)

2.0 Methods

2.1 Scientific Permits

Surveys were undertaken under the following permits:

- Scientific Research Permit No. K25613-27 (Department of Environment, Water and Natural Resources).
- Wildlife Ethics Committee Permit No. 27/2022 (Wildlife Ethics Committee).
- Scientific Licence No. 158 (Animal Welfare, National Parks and Wildlife South Australia).

2.2 Monitoring Program

The survey methodology implemented across the two year survey program is consistent with the requirements for bird and bat monitoring as outlined in the Guidelines (DCCEEW, 2024), which specifies the following:

- Undertake bird and bat utilisation surveys to identify species at risk of collision with turbines and/or displacement (particularly listed threatened species).
- The Guidelines suggest monitoring of the following utilisation indicators for birds:
    - species on site
    - the numbers present
    - the height that birds fly; and utilisation across the site including a description of bird behaviour (e.g. feeding, resting or moving).
- If any species listed as nationally threatened under the EPBC Act are detected on site, then additional targeted searches are recommended to be undertaken in that vicinity, during the BBUS, to determine their use of the landscape where possible. If required, additional methodology may be proposed.

An overview of the eight surveys completed for the Project is provided below in **Table 2.1**.

Table 2.1 The Two Years of BBUS Monitoring Completed for Willogoleche 2 Wind Farm from 2023 to 2025

Season	Year	Month	Survey Dates	Reference
Spring	2023	September	11 September 2023 to 15 September 2023	(EBS Ecology, 2023)
Summer	2024	February	7 February 2024 to 8 February 2024	(EBS Ecology, 2024a)
Autumn	2024	May	6 May 2024 to 7 May 2024	(EBS Ecology, 2024b)
Winter	2024	July	16 July 2024 to 17 July 2024	(Umwelt, 2024c)
Spring	2024	September	16 September 2024 to 17 September 2024	(Umwelt, 2024d)
Summer	2025	March	19 March 2025 to 20 March 2025	(Umwelt, 2025a)

Season	Year	Month	Survey Dates	Reference
Autumn	2025	May	27 May 2025 to 28 May 2025	(Umwelt, 2025b)
Winter	2025	August	12 August 2025 to 13 August 2025	(Umwelt, 2025c)

2.3 BBUS Sites

Ten (10) BBUS sites (eight bird and two Anabat survey sites) were established in spring 2023 (EBS Ecology, 2023), to sample a range of habitats and to achieve a spread of sites within the Project Area. Site locations were selected to ensure that relevant habitat types were represented in the survey design at the time, and to optimise the detection of bird and bat assemblages. A list of vegetation associations of the BBUS sites and their locations is summarised in **Table 2.2** and **Figure 2.1.**

Table 2.2 BBUS Site Locations in the Project Area along with Vegetation Associations and Broad Habitat Types

Site ID	Vegetation Association	Vegetation Association Description	Habitat	Latitude	Longitude
1	*Lomandra multiflora* grassland	A1: *Lomandra multiflora* with *Austrostipa* sp. grassland ± *Cryptandra campanulata* ± exotic grassland ± *Lomandra effusa*	Grassland	-33.3707	138.8489
2	*Maireana aphylla* shrubland	A2: *Maireana aphylla* shrubland with *Lomandra multiflora* ± exotic grasses ± *Cryptandra campanulata* ± *Austrostipa* sp.	Shrubland	-33.3558	138.8691
3	*Austrostipa* sp. grassland	A3: *Austrostipa* sp. and *Rytidosperma* sp. grassland with emergent *Maireana aphylla* ± exotic grasses	Grassland	-33.3396	138.8852
4	Planted trees	A7: Planted vegetation / infrastructure	Amenity trees	-33.3699	138.8442
5	*Austrostipa* sp. grassland	A3: *Austrostipa* sp. and *Rytidosperma* sp. grassland with emergent *Maireana aphylla* ± exotic grasses	Grassland	-33.3712	138.8580
6	*Maireana aphylla* shrubland	A2: *Maireana aphylla* shrubland with *Lomandra multiflora* ± exotic grasses ± *Cryptandra campanulata* ± *Austrostipa* sp.	Shrubland	-33.3530	138.8630
7	*Maireana aphylla* shrubland	A2: *Maireana aphylla* shrubland with *Lomandra multiflora* ± exotic grasses ± *Cryptandra campanulata* ± *Austrostipa* sp.	Shrubland	-33.3446	138.8736
8	Exotic grassland	A5: Exotic grassland / Pasture, A6: Cropping	Pasture / Cropping Land	-33.3685	138.8636

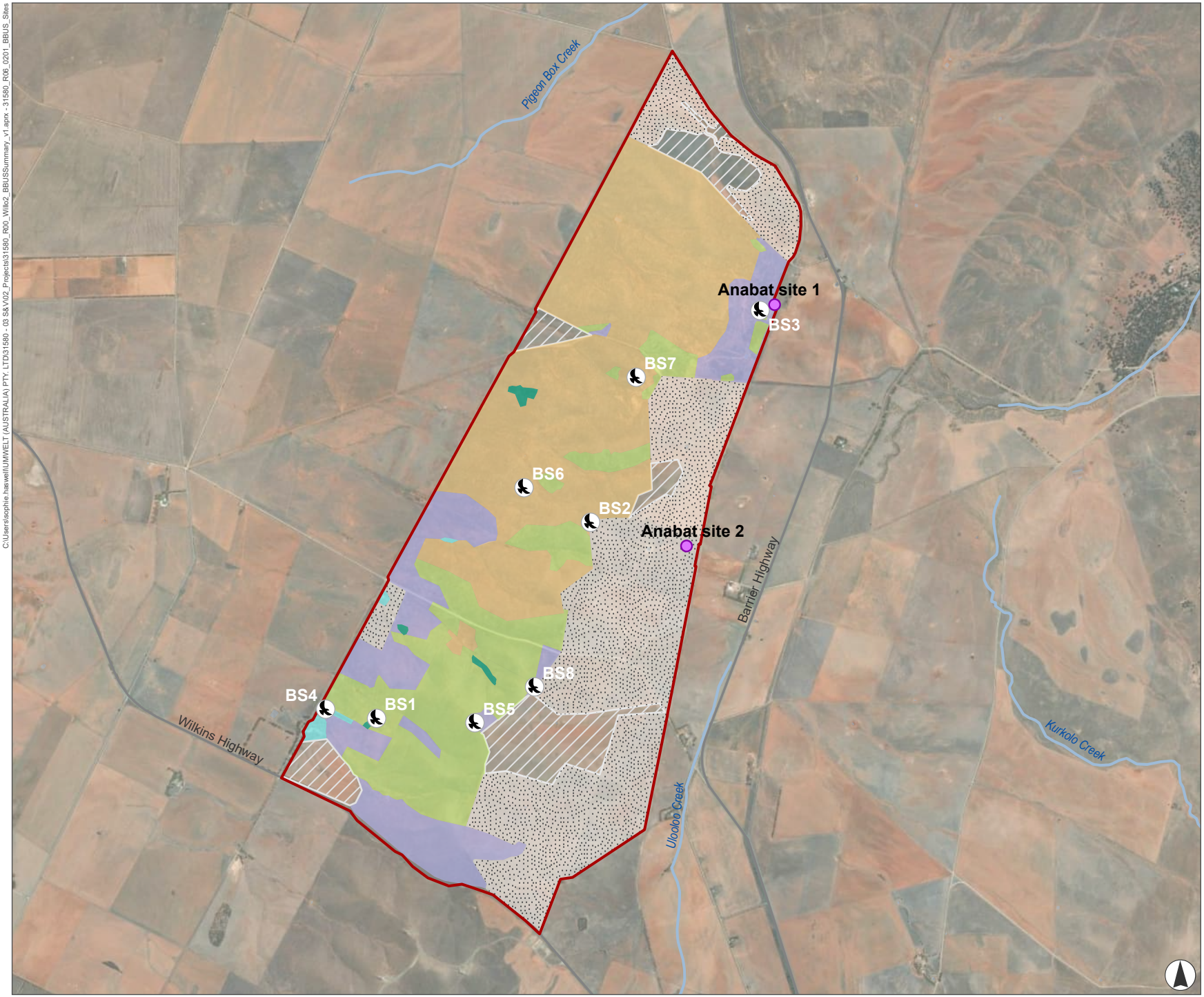

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FIGURE 2.1

Location of BBUS Sites and Anabat Sites Within the Project Area in Relation to Vegetation Associations

Legend

- Wind Farm Project Area
- Main road
- Watercourse
- Waterbody
- Bird survey site
- Bat survey site

Vegetation Association

- A1: *Lomandra multiflora* with *Austrostipa* sp. grassland ± *Cryptandra campanulata* ± exotic grassland ± *Lomandra effusa*
- A2: *Maireana aphylla* shrubland with *Lomandra multiflora* ± exotic grasses ± *Cryptandra campanulata* ± *Austrostipa sp.*
- A3: *Austrostipa* sp. and *Rytidosperma* sp. grassland with emergent *Maireana aphylla* ± exotic grasses
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- A5: Exotic grassland / Pasture
- A6: Cropping
- A7: Planted vegetation / infrastructure

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Image Source: ESRI Basemap (2025) | **Data Source:** NSW DFSI (2025)

2.4 Bird Survey Methodology

Bird surveys were conducted utilising the recommended survey method of Birdlife Australia Systematic Bird surveys (2 ha, 20-minute search) (Birdlife Australia, 2025) (as per the Guidelines for Detecting Birds Listed as Threatened under the EPBC Act (DEWHA, 2010)) and the Department of Environment and Water (DEW) biological survey methods (Owens, 2000).

Each survey was conducted twice at each site, once in the morning and once in the afternoon.

Data collected for each observation were as follows:

- Species observed.
- Number of individuals.
- Height above ground (m) (minimum and maximum).
- Distance from observer (in m).
- Behaviour, including:
    - flying in a single direction.
    - flying (hovering or circling) over or around a single point.
    - foraging (feeding) on ground.
    - foraging on or resting on shrubs.
    - perching/resting/walking on ground.
    - perching/resting/climbing on trees.
- Direction of flight, where relevant.

Wind turbine specifications was provided to Umwelt in December 2025, and are as follows:

- Maximum blade tip height of up to 300 m
- Up to 209 m hub height
- 182 m rotor diameter
- 91 m blade length.

All birds observed or heard while traversing the monitoring site were recorded, including those that were observed directly outside of the 2 ha area within the same vegetation association up to a distance where a positive species ID could be obtained. Birds outside of the 2 ha area were also recorded as being offsite.

Behaviour was assigned to birds as per the activity undertaken upon initially being observed, or if disturbed by surveyors, prior to being disturbed. For example, for birds commonly observed for the first time after being flushed, behaviour would be recorded as resting on ground or foraging on ground. If a bird flew off (such as leaving the area or flying between trees) subsequent flying information was also collected, such as maximum and minimum flight height.

Recording flight height details can assist with assessing at-risk collision of bird species with turbines. As such, flight height and direction details were recorded for all bird species observed flying during the BBUSs with results discussed in Section **3.6.1**.

2.5 Opportunistic Observations

Opportunistic bird observations were recorded separately to the 2 ha 20-minute searches. These observations were used to supplement survey site observations and to detect any species that was not recorded during the BBUS. The only opportunistic call playback survey for the Southern Whiteface was undertaken in spring 2024.

All opportunistic records of raptors, threatened species, and species not already observed during BBUS were recorded while moving between sites/traversing the Project Area. For each opportunistic observation, the following information was recorded:

- Species.
- Number of individuals.
- Flight height (where relevant).
- GPS location.
- Detection method (i.e. sight or sound).
- Habitat (as grassland, shrubland, woodland, pasture, etc.).

2.6 Bat Surveys

Bats were surveyed by recording calls of bats flying over the Project Area at night. Anabat recorders were used to detect the high frequency contact and hunting calls of micro-bat species. Two recorders were placed at locations, likely to be used by bats as flyways, or that provide roosting habitat. This included areas such as drainage lines that provide clear flight paths and are surrounded by tree hollows and larger trees.

The Anabat recorders were set to record continuously between sunset and sunrise and were placed securely at or near ground level with the microphone aimed towards the sky.

Sonograms collected by the Anabat recorders were analysed using Analook software. They were compared to reference calls of bat species known to occur in the relevant region of South Australia for identification.

Anabat recorder locations in the Project Area are provided in **Table 2.3** and are mapped in **Figure 2.1.**

Table 2.3 Anabat Locations in the Project Area along with Site Characteristics

Site ID	Anabat	Latitude	Longitude	Comment	Site Characteristics
Anabat Site 1	Anabat 1	-33.3392	138.8866	Near BBUS Site 3	Located near Eucalyptus trees in grazed shrubland.
Anabat Site 2	Anabat 2	-33.3578	138.8780	East of BBUS Site 2	Located in a creek line within a grazed paddock, close to two scattered Eucalyptus trees.

2.7 Data Analysis

The results detailed in this report consist of descriptive statistics (i.e. not inferential statistics) that display and summarise the avian and bat observations and data collected at specific sites at a given point in time, over two years.

Data is provided according to vegetation associations (i.e. woodland, grassland, etc), bird activity (i.e. flying, foraging, resting, etc) and flight height (i.e. within the height of the rotor-swept area of proposed WTGs).

2.8 Survey Limitations

Where possible, the BBUS undertaken from 2023 to 2025 were scheduled to be undertaken on days with favourable seasonal weather conditions, which included days of low wind and clear skies. However, scheduling surveys in these conditions was not always possible, and occasionally surveys were undertaken during inclement weather, which is likely to have impacted observations. Seasonality and variation in local weather conditions may have impacted on avian activity, and therefore the richness and abundance of species observed across the survey program.

Estimation of flight height is prone to observer error and may not accurately represent the actual risk of bird collision with WTGs, based on their actual distance from the ground and the altitude of the WTGs. Additionally, the survey methods do not account for time spent within the rotor-swept risk area, which is likely to influence the actual level of risk (e.g. the greater the amount of time a bird spends within the rotor risk area, the higher the risk level).

The survey period for each individual BBUS is considered relatively short (two days), and such conditions at the time of the survey represent a snapshot in time. The eight seasonal BBUS undertaken over a period of two years are deemed sufficiently robust to collect adequate information on bird and bat species that occur and utilise the Project Area.

2.8.1 Spatial Data Limitations

All spatial data has been captured or converted to the following coordinate reference system.

- Datum: Geocentric Datum of Australia 2020 (GDA2020).
- Projection: Map Grid of Australia 2020 (MGA2020), Zone 54.

All location coordinates listed in this report are expressed using this system. Spatial data converted from other coordinate reference systems may have accuracy limitations.

3.0 Results

3.1 Bird Survey Result

3.1.1 Summary

In total, 3,133 individuals from 41 bird species were observed at BBUS sites from 2023 to 2025.

A total of 1,844 individuals from 40 species were opportunistically recorded from 2023 to 2025.

Fifty (50) species were recorded at BBUS sites and opportunistically, with a total of 4,977 individuals observed.

A summary of the avian species richness and abundance across all BBUS sites for the eight survey periods is provided in **Table 3.1**.

Table 3.1 Avian Species Richness, Abundance, Threatened Species and Raptors Recorded during each BBUS Survey Period

Survey Period	Avian Species Richness	Avian Species Abundance	Threatened Bird Species Recorded	Raptor Species Recorded
Spring 2023	34	412	3	6
Summer 2024	32	823	1	5
Autumn 2024	24	309	0	1
Winter 2024	25	971	1	2
Spring 2024	26	386	2	4
Summer 2025	30	618	0	3
Autumn 2025	28	1,133	1	4
Winter 2025	25	325	0	2

The species richness, abundance and occupancy at each BBUS site across all eight survey periods is provided in **Appendix 1**.

3.1.2 Seasonal Variation

The highest bird diversity was recorded during the spring 2023 survey period where 34 bird species were recorded, while species richness was lowest during the autumn 2024 survey period where 24 bird species were recorded.

Species abundance varied over the eight surveys; species abundance was highest in autumn 2025 with 1,133 individuals recorded, while it was the lowest during the autumn of 2024 with 309 individuals recorded.

3.1.3 Native Birds

A total of 36 native bird species were recorded at BBUS sites, including species identified to the genus level (e.g. *Corvus* sp.). The most abundant native species recorded were the Galah (*Eolophus*

roseicapilla) (513), Australian Magpie (*Gymnorhina tibicen*) (365) and Australian Raven (*Corvus coronoides*) (252). This accounted for 16.3%, 11.7% and 8.0% of all sightings, respectively.

3.1.4 Introduced Birds

Five introduced species were recorded during the survey program: Common Starling (*Sturnus vulgaris vulgaris*), Eurasian Skylark (*Alauda arvensis arvensis),* House Sparrow (*Passer domesticus domesticus*), Rock Dove (*Columba livia*) and Spotted Dove (*Spilopelia chinensis*) were observed at BBUS sites and accounted for 21.0%, 3.5%, 4.3%, 0.9% and 0.1% of sightings respectively.

3.1.5 Opportune Bird Observations

A total of 36 native bird species were observed opportunistically across the Project Area. Of these opportune records, the most abundant native species included the Grey Teal (563), the Australian Magpie (109) and the Galah (105), which accounted for 30.6%, 5.9% and 5.7% of opportunistic sightings respectively. Four introduced species were observed opportunistically; Common Starling (345), House Sparrow (110), Rock Dove (10) and Eurasian Skylark (1).

Nine bird species were sighted opportunistically across the Project Area that were not observed at BBUS sites (**Appendix 1**). This included two threatened bird species; the Southern Whiteface and the Peregrine Falcon. More details on the observations of these threatened bird species within the Project Area are provided in **Section 3.2** and **Section 3.3** below.

3.2 EPBC Act Listed Species

One species listed as Vulnerable under the EPBC Act was observed during the survey program, the Southern Whiteface (*Aphelocephala leucopsis leucopsis*). This species was not observed at any of the BBUS sites, but was observed opportunistically only during the spring 2023 (six individuals) and spring 2024 surveys (two individuals) (**Figure 3.1**). In spring 2023 (14 September 2023), a small group of six birds were seen foraging in grassland habitat with sparsely planted trees around a dwelling. In spring 2024 (17 September 2024), a pair of Southern Whiteface were observed at the same dwelling utilising exotic vegetation and responded to playback calls.

3.3 NPW Act Listed Species

One species listed as Vulnerable, the Little Eagle (*Hieraaetus morphnoides*), and two species listed as Rare, the Black Falcon (*Falco subniger*) and the Peregrine Falcon (*Falco peregrinus*), were observed over one or more of the survey periods in the Project Area (**Figure 3.1**).

A Little Eagle was observed at BBUS site 8 (mapped as cropping land) during the spring 2023 survey (14 September 2023), flying over the Project Area. The bird was flying low at a minimum of 5 m and a maximum of 15 m above ground.

A Little Eagle was also observed at BBUS site 6, which consists of shrubland, during the summer 2024 survey (8 February 2024), and at BBUS site 5, which consists of grassland, during the winter 2024 survey (16 July 2024) Both individuals were observed soaring with the individual at BBUS site 6 circling low at a minimum of 5 m and a maximum of 15 m above the ground, and the individual at BBUS site 5 soaring at a minimum of 30 m and a maximum of 60 m above ground.

An opportunistic sighting of a Little Eagle occurred during the spring 2024 survey (16 September 2024), close to a dam near BBUS site 6. The individual was resting on a shrub and flew low at a height of 5 m above ground in a northerly direction.

Three Black Falcons were observed at BBUS site 5 during the spring 2023 survey (13 September 2023) and were observed soaring over grassland at a minimum height of 2 m and a maximum height of 45 m above ground.

An individual Black Falcon was observed opportunistically during the summer 2024 survey (8 February 2024), soaring at a minimum height of 5 m and a maximum height of 50 m.

A single Peregrine Falcon was observed opportunistically during the autumn 2025 survey (27 May 2025) and was observed soaring down from the top of a nearby hillside. It was observed close to the ground level of the hill, before briefly landing on the ground, after which it was seen flying off at great speed, at approximately 20 m above ground height.

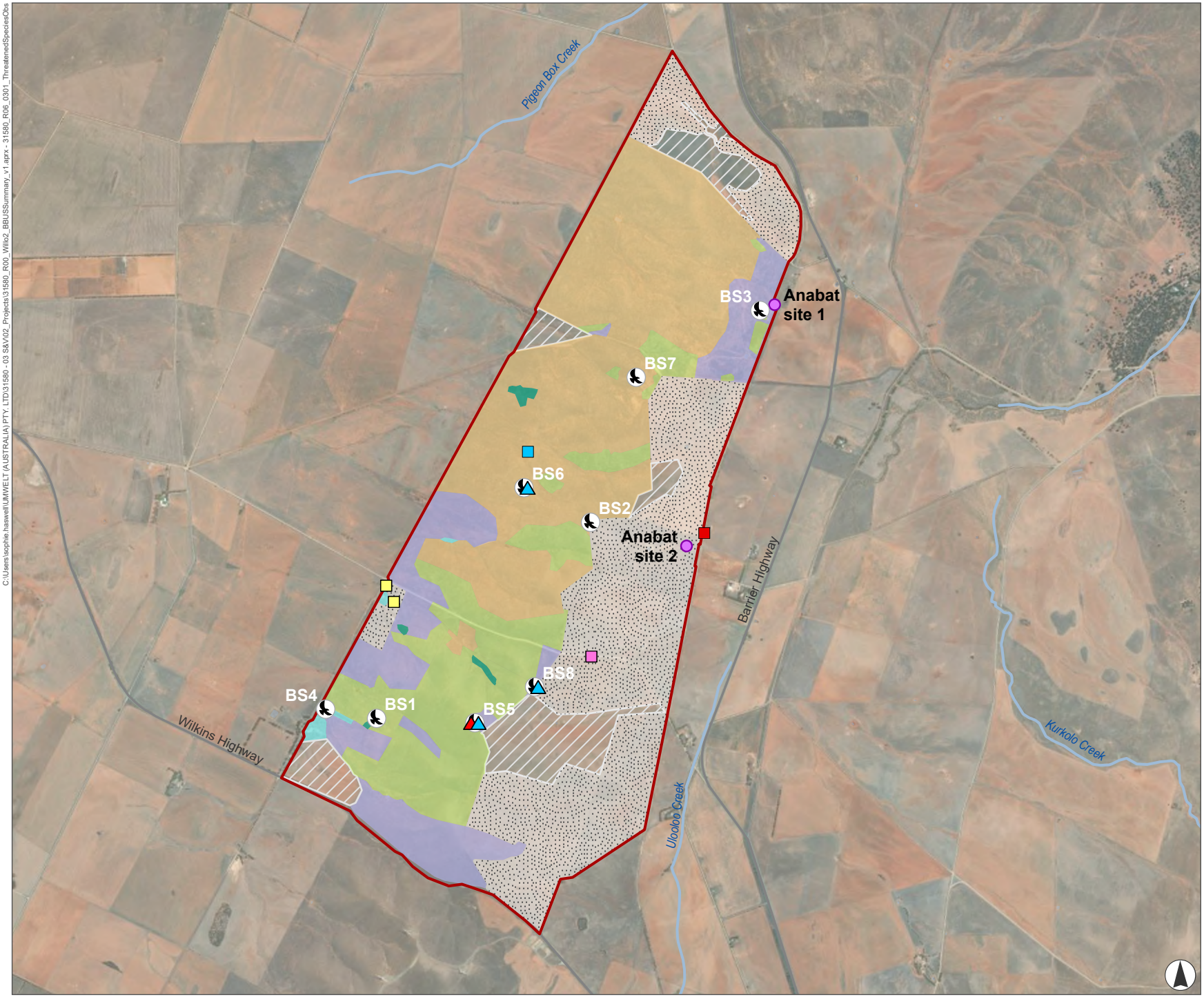


FIGURE 3.1

Threatened Species Observed within the Project Area

Legend

- Wind Farm Project Area
- Main road
- Watercourse
- Waterbody
- Bird survey site
- Bat survey site

BBUS site observation

- Black Falcon
- Little Eagle

Opportunistic observation

- Black Falcon
- Little Eagle
- Peregrine Falcon
- Southern Whiteface

Vegetation Association

- A1: *Lomandra multiflora* with *Austrostipa* sp. grassland ± *Cryptandra campanulata* ± exotic grassland ± *Lomandra effusa*
- A2: *Maireana aphylla* shrubland with *Lomandra multiflora* ± exotic grasses ± *Cryptandra campanulata* ± *Austrostipa sp.*
- A3: *Austrostipa* sp. and *Rytidosperma* sp. grassland with emergent *Maireana aphylla* ± exotic grasses
- A4: *Cryptandra campanulata* shrubland ± *Lomandra multiflora* ± *Bursaria spinosa* and *Chrysocephalum* sp.
- A5: Exotic grassland / Pasture
- A6: Cropping
- A7: Planted vegetation / infrastructure

0 1 2

Kilometres

Scale 1:45,000 at A4
GDA2020 MGA Zone 54

umwelt

Image Source: ESRI Basemap (2025) | **Data Source:** Umwelt (2025), ERM, DIT, DEW (2024)

3.4 Migratory Species

No migratory species were observed across the eight survey periods undertaken from spring 2023 to winter 2025.

3.5 Raptors

Raptors were recorded during each of the eight survey periods. The survey period with the highest recorded number of raptor species was spring 2023 (five raptor species) (**Table 3.2).** The majority of raptor observations also occurred during either spring or summer, which aligns with a peak in raptor activity during the breeding season, where adult birds are regularly foraging to provide for juveniles.

The Wedge-tailed Eagle was recorded during seven out of eight BBUS periods, while the Nankeen Kestrel was recorded during six of the survey periods. The Black-shouldered Kite (*Elanus axillaris*) and Little Eagle were observed during four out of the eight survey periods, the Brown Falcon (*Falco berigora*) was recorded during three of the eight survey periods, and the Black Falcon and Peregrine Falcon were observed during two and one of the survey periods, respectively.

The BBUS site with the highest observation count was BBUS site 5, where 16 individuals were observed, and the BBUS site with the lowest observation count was BBUS site 7, with three individuals observed (**Graph 3.1**). BBUS site 5 is located on top of a ridgeline, where raptor species are commonly observed soaring utilising natural air currents, which aligns with the high observation count at this site. Meanwhile, BBUS site seven is located in *Maireana sp.* shrubland, which may provide less suitable habitat for some raptor species at this site. Refer to **Appendix 2** for site photographs.

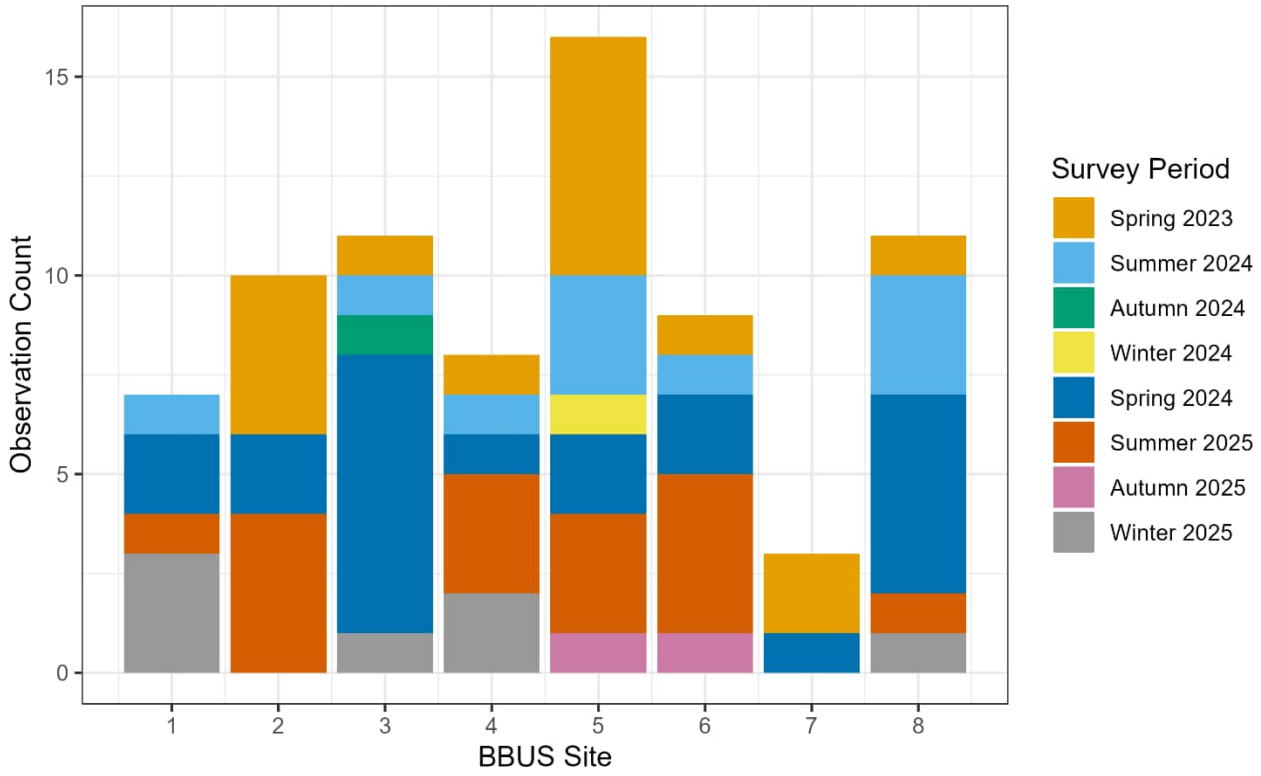
The Nankeen Kestrel and the Wedge-tailed Eagle were the most observed raptors across the BBUS survey program, with 68 and 25 observations, respectively. Nankeen Kestrel observations were highest in spring 2024 (25), and Wedge-tailed Eagle observations were highest in summer 2025 (7) (**Table 3.2**).

Species abundance and occupancy at each BBUS site across all eight survey periods is provided in Appendix 1.

Table 3.2 Number of Observations of Raptors During each of the eight BBUS Periods

Scientific Name	Common Name	Spring 2023	Summer 2024	Autumn 2024	Winter 2024	Spring 2024	Summer 2025	Autumn 2025	Winter 2025	TOTAL
Aquila audax audax	Wedge-tailed Eagle	5	5	1	0	3	7	1	3	**25**
Elanus axillaris	Black-shouldered Kite	1	1	0	1	0	0	1	0	**4**
Falco berigora	Brown Falcon	6	0	0	0	5	1	0	0	**12**
Falco cenchroides cenchroides	Nankeen Kestrel	11	14	0	0	25	13	1	4	**68**
Falco peregrinus	Peregrine Falcon	0	0	0	0	0	0	1	0	**1**
Falco subniger	Black Falcon	3	1	0	0	0	0	0	0	**4**

Scientific Name	Common Name	Spring 2023	Summer 2024	Autumn 2024	Winter 2024	Spring 2024	Summer 2025	Autumn 2025	Winter 2025	TOTAL
Hieraaetus morphnoides	Little Eagle	1	1	0	1	1	0	0	0	**4**
	Total	**27**	**22**	**1**	**2**	**34**	**21**	**4**	**7**	



Graph 3.1 **Total Abundance of Raptors Observed over the Survey Periods at Each BBUS Site in the Project Area**

3.6 At Risk Species

3.6.1 Flight Heights Bird Species

For the purpose of this report, flight height relative to Rotor Swept Area (RSA) height is presented as:

- Below RSA (<30 m above ground).
- At RSA (30–300 m above ground).
- Above RSA (>300 m above ground).

Flight height data was collected for 44 bird species when BBUS site data and opportunistic data is combined. All raptor species from **Table 3.2** had flight heights recorded, and of the 44 species flight height data was collected for, only raptor species were threatened species – Black Falcon, Peregrine Falcon and Little Eagle.

Of these, 24 bird species were recorded flying at a height that constitutes being within the rotor-swept area of proposed WTGs (**Table 3.3**).

Out of the 24 bird species whose flight were recorded either at 30 m or above, five were raptors:

- Wedge-tailed Eagle.
- Brown Falcon.
- Nankeen Kestrel.
- Black Falcon.
- Little Eagle.

The remaining at-risk species were common non-threatened bird species that are frequently observed in grasslands and shrublands.

The Wedge-tailed Eagle was observed with the greatest maximum flight height of 400 m. Whilst this is greater than the maximum blade tip height of 300 m, there were other instances of Wedge-tailed Eagles flying within the RSA at a maximum ranging between 30 m to 200 m above ground level. The Eurasian Skylark, Australian Raven, *Corvus* sp., Nankeen Kestrel and Australian Magpie were all observed flying at a maximum height of 100 m. Species such as the Australian Pipit (*Anthus australis australis*), White-fronted Chat (*Epthianura albifrons*), Yellow-throated Miner (*Manorina flavigula flavigula*), Noisy Miner (*Manorina melanocephala*), Horsfield's Bushlark (*Mirafra javanica*) and White-plumed Honeyeater (*Ptilotula penicillata*) were all recorded at the minimum height of the RSA of 30 m above ground.

Table 3.3 Minimum and Maximum Flight Height Details of Bird Species Observed Within the Project Area across all Eight Survey Periods

Scientific Name	Common Name	EPBC Act	NPW Act	Minimum Flight Height	Maximum Flight Height	BBUS Site Occupancy
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	-	-	0	8	3
Alauda arvensis arvensis	Eurasian Skylark	-	-	0	100	7
Anas gracilis gracilis	Grey Teal	-	-	0	50	0 (Only opportune)
Anthochaera carunculata	Red Wattlebird	-	-	5	15	2
Anthus australis australis	Australian Pipit	-	-	0	30	7
Aphelocephala leucopsis leucopsis	Southern Whiteface	VU	-	Not Available	Not Available	0 (Only opportune)
Aquila audax audax	Wedge-tailed Eagle	-	-	5	400	7
Barnardius zonarius	Australian Ringneck	-	-	1	5	1
Chenonetta jubata	Australian Wood Duck	-	-	20	40	0 (Only opportune)
Cincloramphus cruralis	Brown Songlark	-	-	1	50	8
Columba livia	Rock Dove	-	-	4	10	1
Coracina novaehollandiae	Black-faced Cuckooshrike	-	-	5	40	2
Corvus coronoides	Australian Raven	-	-	0	100	8
Corvus mellori	Little Raven	-	-	0	70	8
Corvus sp.	Ravens, Crows	-	-	0	100	8
Coturnix pectoralis	Stubble Quail	-	-	0	2	5
Egretta novaehollandiae	White-faced Heron	-	-	4	6	1
Elanus axillaris	Black-shouldered Kite	-	-	3	15	0 (Only opportune)
Eolophus roseicapilla	Galah	-	-	0	80	4

Scientific Name	Common Name	EPBC Act	NPW Act	Minimum Flight Height	Maximum Flight Height	BBUS Site Occupancy
Epthianura albifrons	White-fronted Chat	-	-	0	30	6
Epthianura aurifrons	Orange Chat	-	-	0	8	2
Falco berigora	Brown Falcon	-	-	0	50	5
Falco cenchroides cenchroides	Nankeen Kestrel	-	-	0	100	8
Falco peregrinus	Peregrine Falcon	-	-	5	20	0 (Only opportune)
Falco subniger	Black Falcon	-	R	2	50	1
Gavicalis virescens	Singing Honeyeater	-	-	Not Available	Not Available	2
Grallina cyanoleuca cyanoleuca	Magpielark	-	-	0	15	3
Gymnorhina tibicen	Australian Magpie	-	-	0	100	8
Hieraaetus morphnoides	Little Eagle	-	V	1	60	3
Hirundo neoxena neoxena	Welcome Swallow	-	-	0	25	3
Lalage tricolor	White-winged Triller	-	-	Not Available	Not Available	0 (Only opportune)
Malurus leucopterus leuconotus	White-winged Fairywren	-	-	0	5	5
Manorina flavigula flavigula	Yellow-throated Miner	-	-	0	30	3
Manorina melanocephala	Noisy Miner	-	-	4	30	1
Mirafra javanica	Horsfield's Bushlark	-	-	0	30	2
Ocyphaps lophotes lophotes	Crested Pigeon	-	-	0	40	3
Pardalotus striatus	Striated Pardalote	-	-	3	5	2

Scientific Name	Common Name	EPBC Act	NPW Act	Minimum Flight Height	Maximum Flight Height	BBUS Site Occupancy
Passer domesticus domesticus	House Sparrow	-	-	1	15	3
Petrochelidon nigricans	Tree Martin	-	-	0	25	1
Petroica goodenovii	Red-capped Robin	-	-	0	1	0 (Only opportune)
Psephotus haematonotus	Red-rumped Parrot	-	-	Not Available	Not Available	1
Ptilotula penicillata	White-plumed Honeyeater	-	-	4	30	2
Rhipidura leucophrys leucophrys	Willie Wagtail	-	-	0	15	5
Smicrornis brevirostris	Weebill	-	-	2	5	0 (Only opportune)
Spilopelia chinensis	Spotted Dove	-	-	Not Available	Not Available	1
Sturnus vulgaris vulgaris	Common Starling	-	-	0	50	5
Tachybaptus novaehollandiae	Australasian Grebe			Not Available	Not Available	0 (Only opportune)
Tadorna tadornoides	Australian Shelduck	-	-	0	80	2
Taeniopygia guttata castanotis	Zebra Finch	-	-	0	10	5
Vanellus tricolor	Banded Lapwing	-	-	0	15	3

EPBC (*Environment Protection and Biodiversity Conservation Act 1999*). NPW: South Australia (*National Parks and Wildlife Act 1972*). Conservation Codes: CE: Critically Endangered. EN/E: Endangered. VU/V: Vulnerable. R: Rare
Highlighted cells indicate the species flew within the RSA and is at collision risk with the WTG

3.7 Bat Survey Results

3.7.1 Species

Bats were surveyed by recording calls of bats flying over the Project Area at night. A total of four bat species were recorded over the eight surveys from spring 2023 to winter 2025 (**Table 3.4**).

No bats listed as threatened under the EPBC Act or NPW act were recorded in the Project Area. The Anabat units did not record any sonograms in during the winter 2024 and autumn 2025 surveys due to unit failure. The highest species richness of bats was recorded during the spring 2023 survey, with four

species being identified. Autumn 2024 experienced the lowest bat species richness, whereby only two of the four species were recorded. Species results can be summarised as follows:

- Gould's Wattled Bat (*Chalinolobus gouldii*) was recorded during six of the eight survey periods.
- Lesser Long-eared Bat (*Nyctophilus geoffroyi*) was recorded during six of the eight survey periods.
- Free tailed-bat species (*Ozimops* sp.) was recorded during four of the eight survey periods
- A Forest Bat species (*Vespadelus* sp.) was recorded on the initial survey in spring 2023 but was not recorded again during the survey program.

Table 3.4 Bat Species Recorded in the Project Area

Scientific Name	Common Name	EPBC Act	NPW Act	Spring 2023	Summer 2024	Autumn 2024	Winter 2024	Spring 2024	Summer 2025	Autumn 2025	Winter 2025
Chalinolobus gouldii	Gould's Wattled Bat	-	-	✓	✓	✓	-	✓	✓	-	✓
Nyctophilus geoffroyi	Lesser Long-eared Bat	-	-	✓	-	✓	-	✓	✓	-	✓
***Ozimops* sp.**	Free-tailed Bat	-	-	✓	-	-	-	✓	✓	-	✓
***Vespadelus* sp.**	Forest Bat	-	-	✓	-	-	-	-	-	-	-

4.0 Discussion and Recommendations

4.1 Overview

Eight seasonal BBUSs have been undertaken at the proposed Willogoleche 2 Wind Farm to satisfy the requirements of Onshore Guidance (DCCEEW – *in draft*, 2024). As a part of the BBUS, bird surveys were undertaken at eight bird sites across the eight survey periods to record the presence of birds, as well as metrics such as activity and flight height. Two Anabat Units were set up at two locations to record the presence of bats flying over the Project Area at night. Locations were chosen according to their suitability as flyways or roosting habitat.

A total of 50 native bird species were recorded across the eight bird survey periods at BBUS sites and opportunistically, inclusive of birds recorded at the species level (e.g. *Corvus sp.*). The most abundant native species recorded at BBUS sites and opportunistically were the Galah (618), Grey Teal (563), and Australian Magpie (474). Five introduced species were also observed, namely the Common Starling, Eurasian Skylark, House Sparrow, Rock Dove and Spotted Dove. The Common Starling was the most observed bird species during the survey period, with 1,004 individuals observed, while the House Sparrow (244) and Eurasian Skylark (110) also featured in the top 10 most observed species. The spring 2023 survey period experienced the greatest species richness, with 34 bird species recorded. This included six raptor species (Black Falcon, Black-shouldered Kite, Brown Falcon, Little Eagle, Nankeen Kestrel, Wedge-tailed Eagle) and three threatened bird species (Southern Whiteface, Black Falcon, Little Eagle) listed as threatened under the EPBC Act or NPW Act.

4.2 EPBC Act Species

The nationally Vulnerable Southern Whiteface was observed opportunistically during two survey periods: spring 2023 and spring 2024, and not any other seasons. The observation count for this species was low, with six individuals observed during spring 2023 and two individuals observed during spring 2024. This species is known to occur in open woodland and shrubland habitat with an understorey of grasses and/or low shrubs (Deparment of Climate Change, Energy, the Environment and Water (DCCEEW), 2023). Whilst the Project Area is dominated by grassland and shrubland, it lacks any open woodlands or chenopod shrub species that Southern Whiteface prefer, which may explain the low observation count. It is believed that Southern Whiteface are sedentary, and/or locally nomadic, but there is a paucity of data to underpin these hypotheses. The lack of regular consecutive observations of this species at any of the BBUS sites suggests that the species does not commonly reside within habitat within the Project Area. Furthermore, Southern Whiteface require hollow bearing trees for nesting, and the habitat within the Project Area lacks remnant habitat with an overstorey of hollow-bearing trees.

4.3 NPW Act Species

Two species listed as Rare under the NPW Act were observed during the eight survey periods: the Black Falcon and the Peregrine Falcon. The Black Falcon was observed at BBUS site 5 in spring 2023 and opportunistically in summer 2024. A single Peregrine Falcon was observed opportunistically during the autumn 2025 survey. The habitat in the Project Area is suitable for both of these species, which inhabit grasslands, shrublands and agricultural areas across their range, but the low frequency of sightings suggests that these birds are not resident, and therefore the risk presented to the two species is low.

4.4 Seasonal Variation and Habitat Sites

Among birds observed in BBUS sites, 1,223 individuals were observed in grassland habitat sites, the highest amongst the site types. This is followed by amenity trees, with 1,061 individuals observed, shrubland, with 684 individuals observed, and cropping/pasture, with 165 individuals observed.

Grassland sites also had the highest avian species richness, with 39 different species observed in this site type. Species such as the Nankeen Kestrel, Galah and Australian Magpie that were observed in grassland habitat may have a higher risk of bird-strike (Smales 2006). The preservation of this habitat and its resources will be important for continued persistence of avian diversity within the Project Area.

4.5 Collision Risk Species

A total of 24 bird species (**Table 3.3**) recorded at-risk flight heights that constitutes being within the rotor-swept area of proposed WTGs. This included five raptor species (Wedge-tailed Eagle, Brown Falcon, Nankeen Kestrel, Black Falcon, Little Eagle), two of which are listed under the NPW Act as Rare, and other commonly observed bird species such as the Galah, Australian Magpie and Little Raven. Raptors are more susceptible to bird strike from WTG rotors due to their soaring habits high above ground for foraging, as well as their limited agility and restricted forward field of view (Duriez, Pilard, Saulnier, Boudarel, & Besnard, 2023; Smales, 2006). Therefore, mitigating the risk of collision for these species, as well as other species that regularly fly within the rotor-swept area is imperative to reduce collision instances.

4.6 Other Likely Species

The Southern Whiteface was the only species recorded during the BBUS that was classified as possible, likely, highly likely or known to occur during a previous desktop assessment (EBS Ecology, 2024). Other species that were classified as possibly occurring but were not observed over the eight surveys from spring 2023 to winter 2025 included the nationally Vulnerable Blue-winged Parrot (possible) and the nationally Vulnerable Diamond Firetail (possible). However, for the case of the Blue-winged Parrot and the Diamond Firetail, the Project Area does not contain suitable habitat, and therefore the likelihood of detecting these species in the Project Area is low.

4.7 Bat Species

The highest species richness of bats was recorded in spring 2023, with all four species being identified. This peak in species richness is likely due to bats exiting hibernation. Bats need to hibernate to overcome a critical energy shortage during winter, as their primary food source, insects, becomes scarce (Turbill 2008). No bats listed as threatened under either of the EPBC Act or NPW Act were recorded in the Project Area. Bats are at an increased risk of rotor strike when traversing between woodlands, which is similar to woodland bird species. The proximity of turbines to woodlands and the minimum blade tip height are likely to be the main risk factors for strikes. Most of the Project Area is grassland and shrubland, however higher risk areas include BBUS site 4 and the Anabat sites, where large *Eucalyptus* trees are present.

4.8 Recommendations

This BBUS summary report serves to determine whether a BBAMP must be submitted for approval by DCCEEW during the EPBC referral process. Additionally, it is advised that construction activities be minimised, particularly during the breeding season should nests be identified in proximity, as birds of prey are highly sensitive to anthropogenic disturbance and may experience nest failure as a result (Umwelt, 2025).

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Appendix 1

Bird Surveys: Species Abundance and Occupancy 2023–2025

umwelt

Scientific Name	Common Name	EPBC Act	NPW Act	BBUS Site	1	2	3	4	5	6	7	8	Opportunistic Abundance	Total Abundance	BBUS Site Occupancy
Acanthiza chrysorrhoa	Yellow-rumped Thornbill				5	0	9	2	0	0	0	0	45	61	3
Alauda arvensis arvensis	Eurasian Skylark				11	8	7	0	27	10	19	27	1	110	7
Anas gracilis gracilis	Grey Teal				0	0	0	0	0	0	0	0	Only opportune 563	563	0
Anthochaera carunculata	Red Wattlebird				0	0	2	2	0	0	0	0	-	4	2
Anthus australis australis	Australian Pipit				10	15	7	0	40	34	33	24	30	193	7
Aphelocephala leucopsis leucopsis	Southern Whiteface	VU			0	0	0	0	0	0	0	0	Only opportune 8	8	0
Aquila audax audax	Wedge-tailed Eagle				3	6	2	3	2	1	0	5	3	25	7
Barnardius zonarius	Australian Ringneck				0	0	0	4	0	0	0	0	6	10	1
Chenonetta jubata	Australian Wood Duck				0	0	0	0	0	0	0	0	Only opportune 74	74	0
Cincloramphus cruralis	Brown Songlark				8	6	12	1	1	1	7	2	1	39	8
Columba livia	Rock Dove				0	0	28	0	0	0	0	0	10	38	1
Coracina novaehollandiae	Black-faced Cuckooshrike				1	0	0	4	0	0	0	0	4	9	2
Corvus coronoides	Australian Raven				43	19	34	50	13	42	13	38	0	252	8
Corvus mellori	Little Raven				51	16	12	24	13	13	5	3	87	224	8
***Corvus* sp.**	Ravens, Crows				6	10	6	16	17	6	14	13	0	88	8
Coturnix pectoralis	Stubble Quail				2	1	1	0	3	0	3	0	0	10	5
Egretta novaehollandiae	White-faced Heron				0	0	1	0	0	0	0	0	0	1	1
Elanus axillaris	Black-shouldered Kite				0	0	0	0	0	0	0	0	Only opportune 4	4	0
Eolophus roseicapilla	Galah				153	7	39	314	0	0	0	0	105	618	4
Epthianura albifrons	White-fronted Chat				0	31	3	0	1	10	8	1	9	63	6

Scientific Name	Common Name	EPBC Act	NPW Act	BBUS Site	1	2	3	4	5	6	7	8	Opportunistic Abundance	Total Abundance	BBUS Site Occupancy
Epthianura aurifrons	Orange Chat				0	0	0	0	23	36	0	0	17	76	2
Falco berigora	Brown Falcon				0	1	2	0	2	1	1	0	5	12	5
Falco cenchroides cenchroides	Nankeen Kestrel				4	3	7	5	8	6	2	5	28	68	8
Falco peregrinus	Peregrine Falcon		R		0	0	0	0	0	0	0	0	Only opportune 1	1	0
Falco subniger	Black Falcon		R		0	0	0	0	3	0	0	0	1	4	1
Gavicalis virescens	Singing Honeyeater				0	0	6	0	0	0	3	0	0	9	2
Grallina cyanoleuca cyanoleuca	Magpielark				4	0	3	19	0	0	0	0	7	33	3
Gymnorhina tibicen	Australian Magpie				47	78	27	124	32	13	13	31	109	474	8
Hieraaetus morphnoides	Little Eagle		V		0	0	0	0	1	1	0	1	1	3	3
Hirundo neoxena neoxena	Welcome Swallow				0	0	0	7	1	1	0	0	6	15	3
White-winged Triller	Lalage tricolor				0	0	0	0	0	0	0	0	Only opportune 2	2	0
Malurus leucopterus leuconotus	White-winged Fairywren				0	12	5	0	0	21	26	4	30	98	5
Manorina flavigula flavigula	Yellow-throated Miner				1	0	2	71	0	0	0	0	3	77	3
Manorina melanocephala	Noisy Miner				0	0	0	11	0	0	0	0	0	11	1
Mirafra javanica	Horsfield's Bushlark				0	0	0	0	2	0	13	0	1	16	2
Ocyphaps lophotes lophotes	Crested Pigeon				4	0	4	6	0	0	0	0	100	114	3
Pardalotus striatus	Striated Pardalote				0	0	4	8	0	0	0	0	12	24	2
Passer domesticus domesticus	House Sparrow				0	0	65	47	0	22	0	0	110	244	3
Petrochelidon nigricans	Tree Martin				0	0	2	0	0	0	0	0	5	7	1

Scientific Name	Common Name	EPBC Act	NPW Act	BBUS Site	1	2	3	4	5	6	7	8	Opportunistic Abundance	Total Abundance	BBUS Site Occupancy
Petroica goodenovii	Red-capped Robin				0	0	0	0	0	0	0	0	Only opportune 2	2	0
Psephotus haematonotus	Red-rumped Parrot				0	0	16	0	0	0	0	0	0	16	1
Ptilotula penicillata	White-plumed Honeyeater				0	0	11	38	0	0	0	0	0	49	2
Rhipidura leucophrys leucophrys	Willie Wagtail				0	2	4	7	1	2	0	0	14	30	5
Smicrornis brevirostris	Weebill				0	0	0	0	0	0	0	0	Only opportune 8	8	0
Spilopelia chinensis	Spotted Dove				0	0	3	0	0	0	0	0	0	3	1
Sturnus vulgaris vulgaris	Common Starling				123	10	214	297	0	15	0	0	345	1,004	5
Tachybaptus novaehollandiae	Australasian Grebe				0	0	0	0	0	0	0	0	Only opportune 1	1	0
Tadorna tadornoides	Australian Shelduck				0	0	3	0	0	0	0	5	27	35	2
Taeniopygia guttata castanotis	Zebra Finch				0	18	2	0	0	18	26	6	37	107	5
Vanellus tricolor	Banded Lapwing				0	0	14	1	0	0	2	0	20	37	3

Appendix 2

Bird and Bat Site Photographs

Bird survey site 1, facing south

Bird survey site 2, facing north

Bird survey site 3, facing north

Bird survey site 4, facing south

Bird survey site 5, facing south

Bird survey site 6, facing south

Bird survey site 7, facing south

Bird survey site 8, facing south

Anabat site 1, facing east

Anabat site 2, facing west

umwelt

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

NSW | ACT | WA | QLD | VIC | SA ABN 18 059 519 041