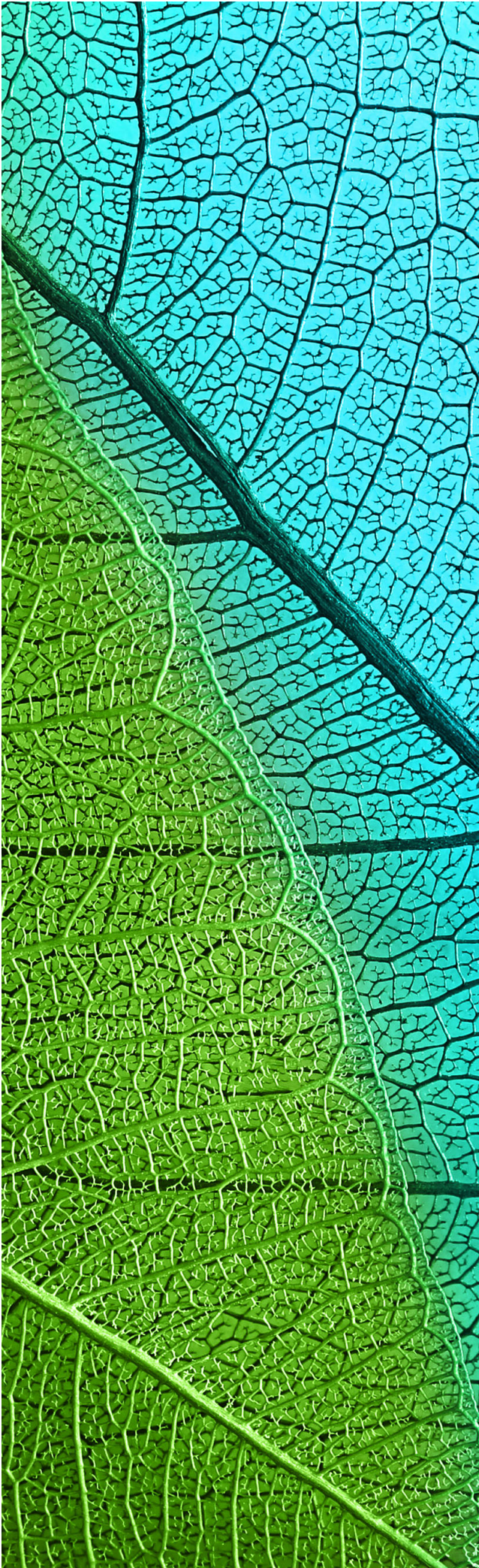

Appendix I

Draft bird and bat management plan



Gelliondale Wind Farm

Bat and Avifauna Management Plan DRAFT

Prepared for Synergy Wind Pty Ltd

July 2026
Report No.14107.14 (1.3)



**Nature
Advisory**

5/61-63 Camberwell Road
Hawthorn East, VIC 3123
PO Box 337, Camberwell VIC 3124
(03) 9815 2111
www.natureadvisory.com.au

Nature Advisory acknowledges the traditional owners and sovereign custodians of the land on which we work from – the Wurundjeri people of the Woi Wurrung language group. We extend our respect to their Ancestors and all First Peoples and Elders, past and present.

Document History

The following table outlines the revisions made to this document.

Version	Date	Description	Prepared By	Reviewed by	Approved by
1.0	28/10/2024	First draft	Dr Robin Leppitt (Senior Zoologist) Dr Sergio Nolasco Plasier (Senior Zoologist)	Kylie Patrick (Senior Ecologist & Project Manager)	Dr Inga Kulik (Director)
1.1	10/12/2024	Second draft	Dr Inga Kulik (Director)		Dr Inga Kulik (Director)
1.2	10/04/2026	Updated in responses to comments from DCCEEW and Client	Dr Danielle Eastick (Senior Zoologist) Dr Robin Leppitt (Senior Zoologist) Mike Hitchcock (Senior Zoologist & Project Manager)	Mike Hitchcock (Senior Zoologist & Project Manager) Jackson Clerke (Operational Monitoring Team Leader)	Dr Inga Kulik (Director)
1.3	24/07/2026	Updates following meeting with NEPA and Client	Dr Robin Leppitt (Senior Zoologist) Michael Cunningham (Senior Zoologist)	Mike Hitchcock (Senior Zoologist & Project Manager)	Bernard O'Callaghan (Managing Director)

Authorisation

In making this declaration, I am aware that Section 491 of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act) makes it an offence in certain circumstances to knowingly provide false or misleading information or documents to specified persons who are known to be performing a duty or carrying out a function under the EPBC Act or the *Environment Protection and Biodiversity Conservation Regulations 2000* (Cth). The offence is punishable on conviction by imprisonment or a fine, or both. I am authorised to bind the approval holder to this declaration and that I have no knowledge of that authorisation being revoked at the time of making this declaration.

Signed

Full name (please print)

Organisation (please print)

Date

Acronyms/Abbreviations

BACI	Before-After-Control-Impact
BAMP	Bird and Avifauna Management Plan
BWP	Blue-winged Parrot (EPBC Act: Vulnerable)
BUS	Bird utilisation survey
Cth	Commonwealth of Australia
CRM	Collision Risk Model
DEECA	(Vic) Department of Energy, Environment and Climate Action (previously DELWP)
DELWP	(Vic) Department of Environment, Land, Water and Planning (dissolved)
DCCEEW	(Cth) Department of Climate Change, Energy, the Environment and Water
DTP	(Vic) Department of Transport and Planning.
EPBC Act	(Cth) <i>Environment Protection and Biodiversity Conservation Act 1999</i>
FFG Act	(Vic) <i>Flora and Fauna Guarantee Act 1988</i>
GHFF	Grey-headed Flying-fox (EPBC Act: Vulnerable; FFG Act: Vulnerable)
GWF	Gelliondale Wind Farm
MNES	Matters of national environmental significance under the EPBC Act
NEPA	(Cth) National Environmental Protection Agency
OH&S	Occupational Health and Safety
RSA	Rotor swept area (40-210 m)
SP	Swift Parrot (EPBC Act: Critically Endangered; FFG Act: Critically Endangered)
WTG	Wind turbine generator
WTNT	White-throated Needletail (EPBC Act: Vulnerable & Migratory; FFG Act: Vulnerable)

Glossary

Action Area	The total area of all lots forming the Project Area, and all portions of crown land utilised for the Project's vehicle access, underground cables and native veg removal.
Carrion	The dead and decaying flesh of an animal that serves as a food source for scavengers such as some raptors.
Commissioning	All activities, including turning of turbines, after the components of the wind turbines are installed.
Construction	The period between the commencement of works on site and the commissioning of the last wind turbine, and the commencement of full operation of the wind farm.
Full operation/operation	Once all wind turbines are commissioned and can operate simultaneously.
Listed species	Any bird/bat species listed as threatened or migratory under the EPBC Act.
Non-listed species	Any bird/bat species not listed as threatened or migratory under the EPBC Act.
Project Area	The area covered by the Project footprint, plus an additional 100m buffer around each WTG and 25m buffer around all other Project infrastructure, other than native vegetation removal.
Project footprint	All proposed infrastructure, including turbines, access tracks, substation and associated construction areas.
Study Area	The area of land encompassed by the relevant study, with the exact areas varying with the survey.
Suitably qualified bird and bat ecologist	A person who has relevant professional qualifications and at least three years of work experience undertaking bird and bat utilisation surveys in Australia and can give an authoritative assessment and advice on bird and bat utilisation surveys using relevant protocols, standards, methods, and/or literature.
Suitably qualified ecologist	A person who has relevant professional qualifications and at least three years of work experience preparing and implementing management plans for the conservation of and habitat improvement for the MNES relevant to the management plan that they are preparing, and can give an authoritative assessment and advice on the habitat requirements of that/those MNES using relevant protocols, standards, methods and/or literature.

Contents

1.	Introduction.....	1
1.1.	Background, Project description and location.....	1
1.2.	Environmental Outcomes.....	1
1.3.	BAMP structure.....	2
2.	Baseline information and monitoring program.....	4
2.1.	Existing site and habitat characterisation	4
2.2.	Monitoring program.....	5
2.2.1.	Bird utilisation surveys.....	6
2.2.2.	Microbat utilisation surveys.....	7
2.2.3.	Targeted surveys	7
2.3.	Species of Concern.....	14
2.3.1.	Bird species	14
2.3.2.	Bat species	16
3.	Operational monitoring.....	17
3.1.	Bird utilisation surveys.....	17
3.2.	Grey-headed Flying-fox targeted surveys	18
3.3.	Carcass monitoring.....	18
3.3.1.	Definition of ‘mortality’.....	19
3.3.2.	Overview of approach.....	19
3.3.3.	Formal carcass search program.....	19
3.3.4.	Incidental carcass detection.....	23
3.3.5.	Wildlife handling protocol	24
3.3.6.	Estimating annual mortality due to collision	25
3.4.	Scavenger (persistence) trials	26
3.5.	Detectability (searcher efficiency) trials.....	27
4.	Adaptive Management	29
4.1.	Impact triggers.....	29
4.1.1.	Impact triggers for listed and migratory bat and avifauna species.....	29
4.1.2.	Impact triggers for non-listed bat and avifauna species	32
4.2.	Mitigation	34
4.2.1.	Preventive mitigation measures.....	34
4.3.	Offsetting a significant impact.....	35
5.	Species-specific management strategies	36

5.1. Swift Parrot management strategy.....	36
5.2. Blue-winged Parrot/White-throated Needletail management strategy.....	39
5.2.1. Impact triggers and mitigation responses	39
5.3. Grey-headed Flying-fox management strategy	46
5.3.1. Impact triggers and mitigation responses	46
6. Reporting and review.....	49
7. Management actions.....	49
8. Roles and responsibilities	50
References.....	51

Tables

Table 1: Specifications for the proposed WTGs at the Gelliondale Wind Farm.....	1
Table 2: Baseline monitoring completed as of March 2026.....	5
Table 3: Vet and wildlife carer details for the local region.....	24
Table 4: Timing for scavenger trials each year of monitoring.....	26
Table 5: Number of replicates for each scavenger trial.....	27
Table 6: Number of replicates per season for detectability trials	28
Table 8: Specific trigger actions in response to Swift Parrot mortalities at GWF.....	37
Table 9: Specific trigger actions in response to BWP/WTNT mortalities at GWF.....	40
Table 10: Turbines within a 1000-meter radius of other turbines.....	45
Table 11: Specific trigger actions in response to GHFF mortalities at GWF.....	47
Table 12: GWF BAMP reporting and review.....	49
Table 13: Timeline for surveys and reporting to NEPA and the Responsible Authority after turbine commissioning at GWF.....	49
Table 14: GWF BAMP implementation – roles and responsibilities.	50

Figures

Figure 1: Proposed layout of Gelliondale Wind Farm.....	3
Figure 2: Location of MNES and bird and bat utilisation survey sites at Gelliondale Wind Farm.....	10
Figure 3: Location of migratory shorebird survey sites at Gelliondale Wind Farm.....	11
Figure 4: Location of White-throated Needletail survey sites at Gelliondale Wind Farm	12
Figure 5: Location of Grey-headed Flying-fox survey sites at Gelliondale Wind Farm.....	13
Figure 6: Inner and outer carcass search zones underneath the turbines	21
Figure 7: Search pattern for scent dog – across the wind turbine search radius.....	22
Figure 8: Decision-making framework for identifying and mitigating impact triggers for threatened species.	31
Figure 9: Operational procedure for mitigating impacts for non-listed species.	33

Appendices

Appendix 1: Carcass datasheet; to be used for any carcass finds (formal or incidental)	54
Appendix 2: Collision Risk Model for White-throated Needletail at Gelliondale Wind Farm	55

DRAFT

1. Introduction

1.1. Background, Project description and location

Synergy Wind Pty Ltd (Synergy) engaged Nature Advisory Pty Ltd to develop a Bat and Avifauna Management Plan (BAMP) for the proposed Gelliondale Wind Farm (GWF; Figure 1). This draft BAMP will accompany the permit application to demonstrate the measures proposed to mitigate the identified collision risk. Any approval conditions will be incorporated into the final BAMP.

The proposed wind farm is located approximately 7 kilometres south-west of Yarram, 3 kilometres west of Alberton, 8 kilometres east of Welshpool, and 167 kilometres south-east of the Melbourne CBD. The site is situated within the Wellington Shire Council and located near the Gippsland Renewable Energy Zone. GWF will incorporate 13 wind turbine generators (WTG) with a total installed capacity of approximately 80 MW (.

Table 1). The site will also support associated utility installations, including an energy storage system, a substation adjacent to an existing 66 kV transmission line, access tracks and underground cables, across approximately 1500 ha of predominantly agricultural land.

Table 1: Specifications for the proposed WTGs at the Gelliondale Wind Farm

Number of turbines	13
RSA minimum height (m)	40 m
RSA maximum height (m)	210 m

GWF will supply renewable energy to the National Electricity Market (NEM) and contribute to Victoria's electricity supply as the generation mix transitions towards renewable energy, representing an annual carbon dioxide reduction of approximately 320,000 tonnes. GWF will generate approximately 300,000 MW hours of renewable energy per annum, which can supply energy to over 37,000 households.

1.2. Environmental Outcomes

This BAMP aims to achieve the following environmental outcomes:

- Minimise the impacts from GWF on threatened fauna listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- An informed understanding of the turbine collision risk to listed threatened fauna that occurs on-site;
- An informed understanding of how threatened fauna use of the site changes in response to wind farm construction and operation;
- Monitoring for the timely identification of turbine collisions and the timely collection and analysis of data;
- Responsive updates to, and regular validation of, the impact assessment framework for listed fauna regularly recorded on site, using monitoring data to support a robust adaptive management approach to reducing impacts, where possible;

- Where applicable, the development and implementation of tangible, on-ground management actions to promote a long-term collision risk reduction on listed threatened and migratory bird and bat species.

These environmental outcomes will be achieved through a combination of ongoing monitoring (of both bat and bird activity and wind farm impacts) and adaptive management and mitigation.

Species of Concern

This BAMP specifically emphasises the following key species of concern that were recorded during baseline assessments or identified as species that may occur on site and may be vulnerable to collisions:

- **Blue-winged Parrot** (EPBC Act: Vulnerable)
- **Swift Parrot** (EPBC Act: Critically Endangered)
- **White-throated Needletail** (EPBC Act: Vulnerable & Migratory)
- **Grey-headed Flying-fox** (EPBC Act: Vulnerable)

Note that mortality of other listed and non-listed species may occur at GWF, but as of this stage, they are not considered to be at high risk of turbine collisions and are covered under the more general framework of the BAMP as outlined in Sections 0 or 4.1.2.

1.3. BAMP structure

This BAMP details the objectives and strategies required and is divided into the following sections:

Section 2 provides a characterisation of the site, habitats, and utilisation by listed bat and avifauna species.

Section 3 details the monitoring program, including pre-construction baseline monitoring, operational phase targeted surveys and impact monitoring.

Section 4 defines impact triggers and procedures for listed and non-listed fauna, mitigation, offsets, and the adaptive decision-making framework for these triggers.

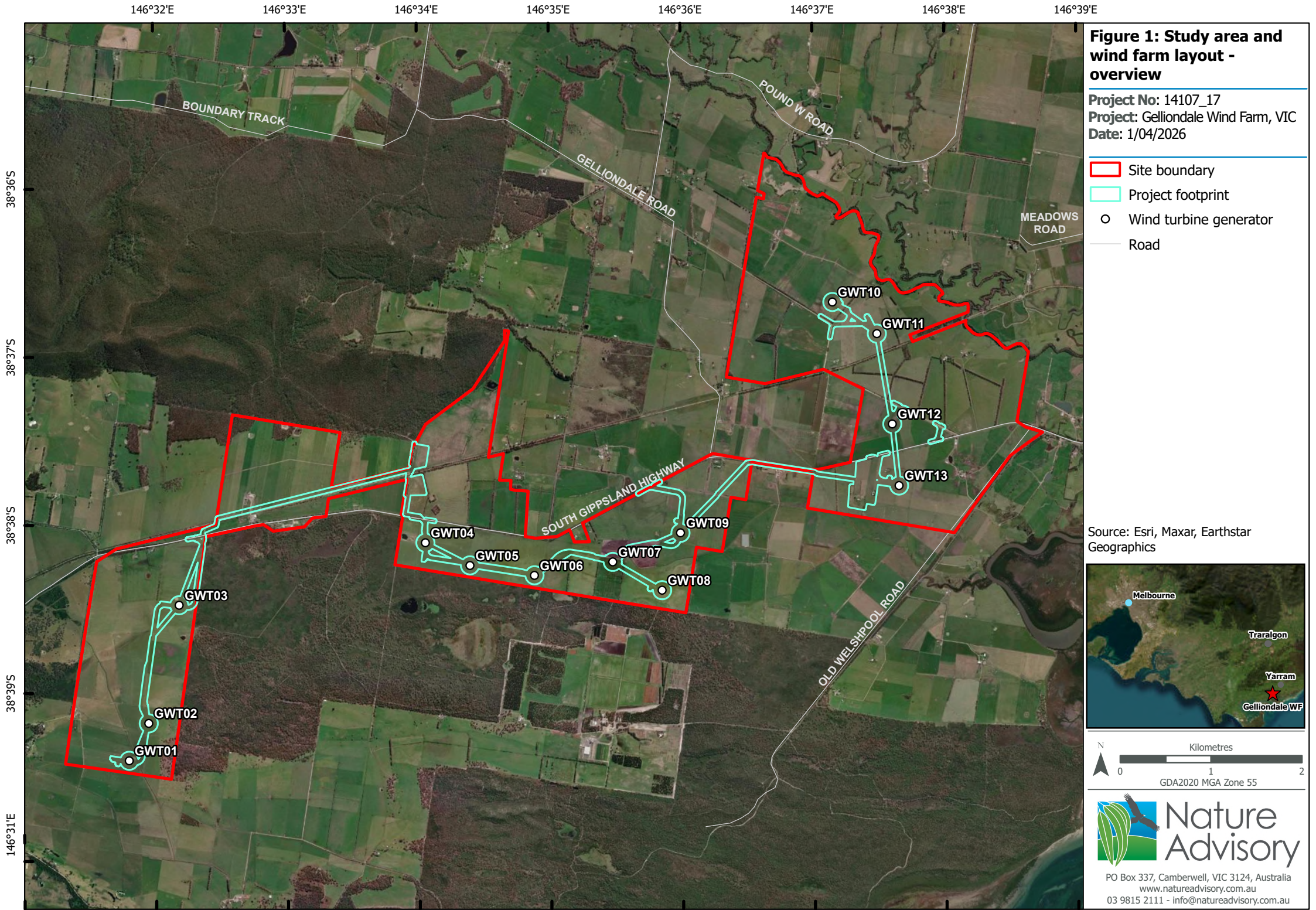
Section 5 provides species-specific management strategies for Swift Parrot, Blue-winged Parrot, White-throated Needletail and Grey-headed Flying-fox.

Section 6 describes the reporting and review process.

Section 7 details the management actions and report timing.

Section 8 describes the roles and responsibilities for BAMP implementation.

This management plan was written and reviewed by a team from Nature Advisory, comprising Dr Sergio Nolasco Plasier (Senior Zoologist), Dr Robin Leppitt (Senior Zoologist), Dr Danielle Eastick (Senior Zoologist), Kylie Patrick (Senior Ecologist & Project Manager), Mike Hitchcock (Senior Zoologist & Project Manager), and Dr Inga Kulik (Director).



2. Baseline information and monitoring program

2.1. Existing site and habitat characterisation

GWF and surrounding land are situated in a region that has been historically cleared of native vegetation for the provision of stock grazing. The Project Area (the area covered by the Project footprint, plus an additional 100m buffer around each WTG and 25m buffer around all other Project infrastructure, other than native vegetation removal) primarily consists of extensive grazing paddocks, supporting an assortment of exotic pasture species. Remnant native vegetation is largely restricted to roadsides and within the extent of windbreaks. The disused Gelliondale Railway, which crosses the Action Area (the total area of all lots forming the Project Area, and all portions of crown land utilised for the Project's vehicle access, underground cables and native veg removal), provided the only narrow, densely vegetated east-to-west wildlife corridor through the otherwise cleared landscape.

The key habitat areas listed below occurred within the broader region.

- **Alberton West State Forest** – This area comprises an extensive forest remnant on the foothills of the Strzelecki Ranges, immediately north-west and contiguous with other remnant forest blocks in the central north-west.
- **Strzelecki Ranges** – The main expanse of remaining remnant native forest covering the Strzelecki Ranges occurs less than 10 km to the north-west. This habitat is somewhat connected via a patchwork of cleared farmland and small to large patches of remnant native forest.
- **Gelliondale State Forest** – This area supports extensive heathy woodlands and other near-coastal vegetation types. It extends southwards.
- **Nooramunga Marine and Coastal Parks** – This area supports extensive coastal banksia woodlands, saltmarshes and other coastal vegetation types, as well as areas of intertidal sand and mud flats and shallow marine waters. It extends southwards from the southern edge of the state forest to Corner Inlet.
- **Corner Inlet** – This is a Ramsar-listed Important Wetland. This area extends westward from the southern end of Nooramunga Marine Coastal Park.
- **Wilsons Promontory National Park** – This area extends southward from Corner Inlet, approximately 15 km south-west of the Action Area.

Fauna habitats

Within the Project Area, three fauna habitats were identified:

- **Agricultural land** – Dominant across the Action Area, these introduced pastures have low habitat value due to limited native vegetation and structural complexity, though some common fauna utilise artificial refuges.
- **Native and introduced treed vegetation** – Linear vegetation (e.g. windbreaks, roadsides) provides foraging habitat and, importantly, enhances landscape connectivity between larger forest blocks, supporting fauna movement.
- **Aquatic habitats (drainage lines, creeks, rivers)** – Mostly degraded and artificial, these habitats provide low-quality refuge for frogs and some migratory species, though intact marshes near permanent watercourses offer higher-value habitat and connectivity.

Within the broader context of the Action Area, the following habitats were present:

- **Eucalypt forest** – Located outside the Action Area, this forest supports diverse eucalypt species with hollow-bearing trees and ground debris, providing important habitat for arboreal fauna and reptiles and influencing fauna in the broader landscape.
- **Heathy woodland** – Occurring adjacent to the Action Area, this relatively intact woodland offers high-quality habitat, and is likely to attract fauna for foraging and roosting due to its structural diversity.

2.2. Monitoring program

All methods and results related to the pre-construction ecological surveys completed are detailed in the *Gelliondale Wind Farm Flora and Fauna Assessment* report prepared for Synergy Wind Pty Ltd in June 2025 (Nature Advisory 2025). An impact assessment of the EPBC-listed birds and bats can be found in the *Gelliondale Matters of National Environmental Significance (MNES) Assessment* prepared for Synergy Wind Pty Ltd in April 2026 (Nature Advisory 2026). These are summarised below.

Baseline (pre-construction) surveys at GWF have been undertaken over multiple years (.

Table 2~~Error! Reference source not found.~~ in accordance with relevant Commonwealth guidelines and industry standards. All methods applied are consistent with those widely adopted at wind farms across eastern Australia and are considered sufficient to meet the baseline information requirements of regulators and decision-makers.

Before and After Control Impact Design

The baseline surveys are designed to be statistically robust, adhering to the guidelines for studies on birds and bats outlined in *Appendix 7: Ecological Assessments of the Best Practice Guidelines for the Australian Wind Industry* (Clean Energy Council 2018). The comparative analysis will provide descriptive and quantitative analyses of changes in species diversity and abundance from before to after construction.

Table 2: Baseline monitoring completed as of March 2026.

Type	Detail	When ¹	Who
General fauna			
Overview assessments (desktop review)	Flora and fauna habitat	2015, 2016	Nature Advisory
Birds			
Bird utilisation surveys (BUS)	Seasonal BUS (234.3 hrs)	Spring 2023; Summer 2024/25; Autumn 2024; Winter 2024; Spring 2024; Summer 2025/26; Autumn 2025; Winter 2025	Nature Advisory
	Birdlife Australia surveys	Summer and Winter 1980 to 2024	Birdlife Australia

¹ Seasonal labels separated by a slash (e.g. Spring/Summer, Summer 2024/25) indicate a survey period comprising one or multiple survey events undertaken across adjacent seasons and/or calendar years.

Type	Detail	When ¹	Who
Migratory shorebirds	(44 years)		
	Targeted field surveys (141.3 hrs)	Summer 2015/16 (x1); Summer 2024/25 (x 4); Winter 2025	Nature Advisory
White-throated Needletail	Targeted surveys (134.7 hrs)	Summer 2021/22; Autumn 2021; Summer 2022/23; Autumn 2022	Nature Advisory
Swift Parrot and Gang Gang Cockatoo	Targeted surveys (187 hrs)	Autumn 2020; Autumn 2021; Winter 2021; Autumn 2024; Winter 2024	Nature Advisory
Bats			
Microbat utilisation surveys	Initial acoustic survey (85 nights)	Summer 2015/16	Nature Advisory
	Seasonal acoustic surveys (3,528 nights)	Spring/Summer 2023; Summer/Autumn 2024; Winter/Spring 2024; Spring/Summer 2024; Summer/Autumn 2025; Autumn/Winter 2025; Winter 2025.	Nature Advisory
Grey-headed Flying-fox	Targeted surveys (4 days)	Summer 2025/26	Nature Advisory

2.2.1. Bird utilisation surveys

Bird utilisation surveys (BUS) were completed using fixed-point count methods consistent with a “Level One” risk assessment under *Wind Farms and Birds – Interim Standards for Risk Assessment* (Australian Wind Energy Association 2005), and aligned with current national guidance for onshore wind farm approvals (DCCEEW 2024a). The aim of these surveys was to identify the species of birds and characterise their utilisation of the Project Area.

Experienced zoologists undertook eight pre-construction bird utilisation surveys between November 2023 and June 2025 (.

Table 2). Each season was sampled twice to account for seasonal differences in bird activity and species presence (e.g., migratory species).

Ten survey sites were classified as impact (within 200 m of the proposed WTG, $N = 8$) or reference (at least 400 m away from the proposed WTG, $N = 2$). At the request of DEECA, an additional reference site was added (summer/winter 2024, autumn/winter 2025) and an extra impact (winter 2024, autumn/winter 2025). The extra impact sites were within proximity of the proposed WTGs, and the reference point was placed within the nearby Gelliondale State Forest. Locations are provided in Figure 2.

Survey sites were positioned on ridges or vantage points with good visibility and within habitats representative of those across the site. All survey sites were visited equally at different times of day to allow for time-of-day differences in bird movements and activity.

The BUS used the 20-minute fixed-point bird count survey methodology. During each survey, the diversity (number) of bird species and the abundance of individuals counted for each species were recorded. For each record, the distance of the bird from the observer and the bird's height when first observed were documented. For species of concern (listed threatened, migratory species and raptor species), the minimum and maximum heights were recorded along with geospatially referenced flight paths. In the circumstances where a flock of birds were observed flying in the same direction and moving closely with each other, these were recorded as one observation.

Incidental observations of species of concern (e.g. threatened species, migratory species, raptors) and birds at RSA were recorded while moving between survey points within and outside the BUS study area.

2.2.2. Microbat utilisation surveys

Microbat utilisation surveys followed *Survey Guidelines for Australia's Threatened Bats* (DEWHA 2010a), using ground-based ultrasonic detectors with subsequent call analysis to determine species presence. Survey effort is provided in .

Table 2. The aim of these surveys was to identify the species of bat and characterise their utilisation of the Project Area.

Ultrasonic bat detectors (Song Meter Mini Bat, Wildlife Acoustics®) were both deployed close to the proposed turbine sites ($N = 13$) and at reference sites ($N = 3$) along the border of the native wooded vegetation areas (Figure 2). Detectors were installed 0.5–2 m above the ground and were programmed to commence operation approximately 30 minutes before dusk, and to cease approximately 30 minutes after dawn. Each detector used a 128GB SDHC card that recorded bat echolocation calls, along with the date and time of each call. Calls from the detectors were analysed by Rob Gration (EcoAerial Environmental Services, Newport, Vic) for identification.

2.2.3. Targeted surveys

Migratory shorebirds

Migratory shorebird analysis was undertaken using a combination of existing data from Birdlife Australia and targeted surveys by Nature Advisory (.

Table 2). The aim was to understand the locations and uses of the nearby Corner Inlet Ramsar site to inform likely flight behaviour that may interact with operating turbines.

Birdlife Australia's Shorebird Monitoring Program is a long-running program where trained observers count migratory shorebirds annually, in both winter and summer, using an established survey methodology (Oldland et al. 2009). An analysis of shorebird count data from 1980 to June 2024 was conducted on existing information obtained for the eastern part of Corner Inlet from the Birdlife Australia Shorebird count database. A total of 714 surveys were included: 394 in summer and 320 in winter. The 15 sites surveyed by Birdlife Australia in Corner Inlet East were mostly near or on outer islands, ranging from 7 to 15 km from the Site Boundary (Figure 3).

Initial field investigations were conducted from 25–27 February 2015 at low tide to identify potential shorebird foraging areas on intertidal sandflats and mudflats, using car, foot, and boat access. Formal shorebird surveys began in 2024 and followed the *Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (DEE 2017). Twenty-three sites

were surveyed based on suitable habitat at nearshore/inner island locations to complement Birdlife Australia shorebird counts (Figure 3). The location of these sites ranged from 3 to 9 km from the site boundary. Each site was surveyed at both high and low tide to capture variation in use across spring, neap, and transitioning tides.

White-throated Needletail

Surveys for the White-throated Needletail followed guidance for migratory swifts in the *Referral guideline for 14 birds listed as migratory species under the EPBC Act* (DoE 2015). The aim was to understand flight behaviour and site utilisation by the species and provide data for CRM modelling.

Surveys were undertaken during the peak season of their visitation to Victoria, between October and April (eBird 2026). Surveys were carried out over five survey periods (.

Table 2), using a variety of sites. The increase in the number of survey points in 2021 ($N=10$), along with a balanced reduction in observation time as the surveys progressed, aimed to increase the likelihood of detecting needletails if they were present in the area. Sites 1 and 2 are now outside the Project Area due to layout changes.

Survey sites were selected based on good visual coverage (>180 degrees of surrounding landscape) and within the wind farm site (Figure 4). Survey sites were chosen to represent a variety of habitats.

The fixed-point bird count method was used for targeted White-throated Needletail surveys. These involved an observer stationed at a fixed point for a period of time (i.e., 30–60 min) and recording all birds within range of 10x binoculars. The number of individual needletails was recorded along with distance/height when first sighted and the minimum/maximum height reached during observation. Flight paths were recorded as accurately as possible using georeferenced mapping tools (FieldMaps by ArcGIS). When a flock was observed, heights and distances were taken as flock averages. A flock was determined as a group of individuals flying in the same direction at the same time and undertaking similar behaviour.

Surveys were undertaken throughout the day to capture variations in activity and abundances at different times of the day.

Swift Parrot and Gang-gang Cockatoo

Swift Parrot and Gang-gang Cockatoo surveys were undertaken using methods consistent with the *EPBC Survey Guidelines for Australia's Threatened Birds* (DEWHA 2010b). The aim was to identify suitable habitat within the area and collect data on the species utilisation of this habitat.

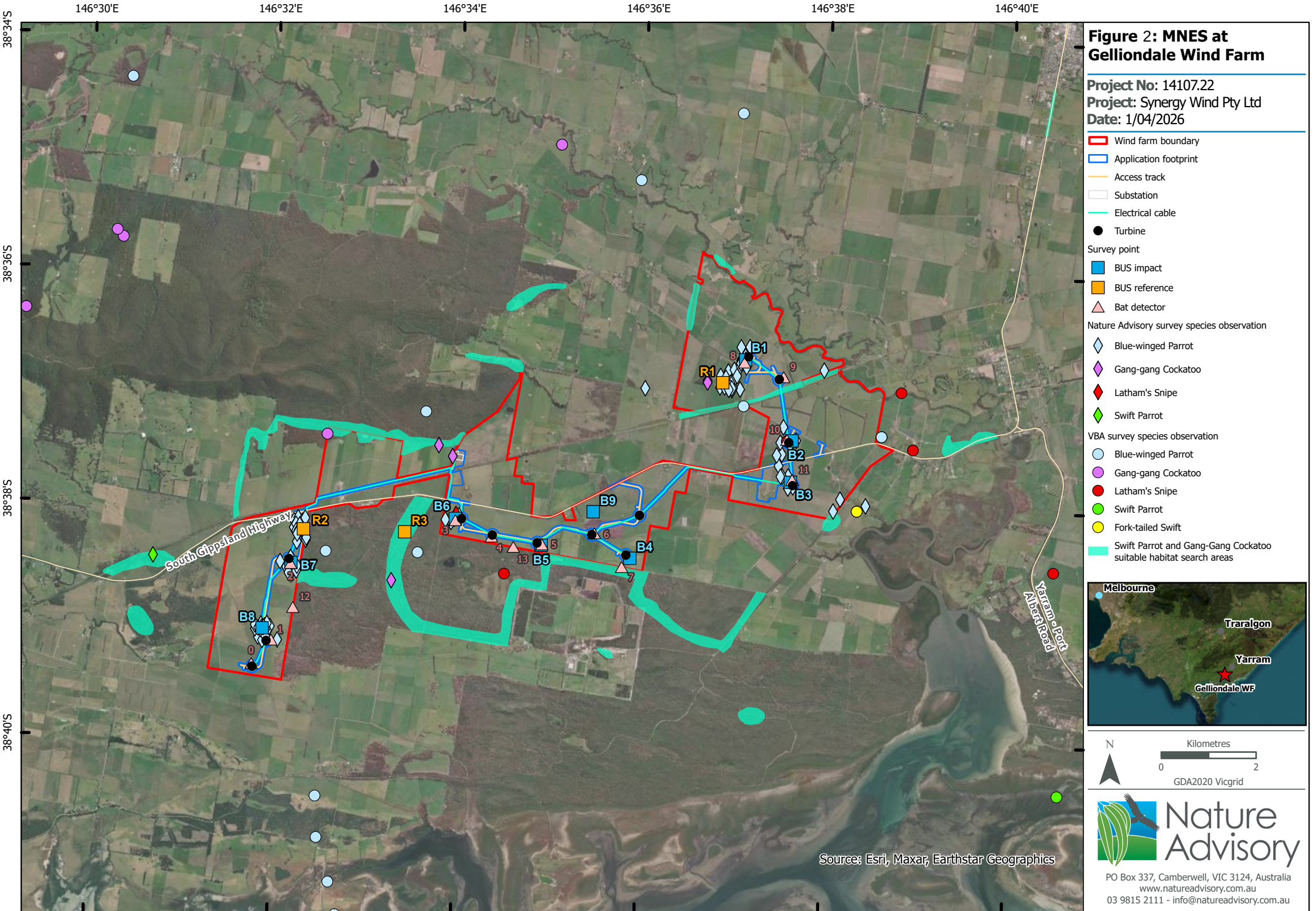
An initial survey addressed the habitat available to Swift Parrots and Gang-gang Cockatoos within 5 km of proposed WTGs. To identify habitat, treed habitat was inspected to ground-truth tree species and to identify potential habitat. The presence of flowering trees or trees carrying lerp infestation was recorded. Suitable foraging trees included patches of planted Southern Blue Gums and Spotted Gums (known winter-flowering foraging resource of Swift Parrot), and larger forest areas containing Swamp Gum, Manna Gum and Saw Banksia may also present suitable for foraging (DCCEEW 2024b).

Eleven targeted surveys were undertaken (.

Table 2). These involved roaming surveys for up to half an hour in each suitable patch of habitat ($N=17$; Figure 2). All surveys were undertaken at times designed to capture the peak abundance of southern Victoria when Swift Parrot are returning from Tasmania to overwinter on the mainland (DCCEEW 2024b) and when Gang-gang Cockatoos are in the area during their winter altitudinal migration (DAWE 2022). The overall weather conditions and timing of the surveys were suitable for maximising species detection and recording their occurrence in the survey study area.

Grey-headed Flying-fox

Initial monitoring of the temporary Grey-headed Flying-fox colony locations followed the guidance in *Survey Guidelines for Australia's Threatened Bats* (DEWHA 2010a). The aim was to identify potential camp locations, characteristics and flight behaviour. Monitoring includes both dusk and daytime surveys at known colony sites (Figure 5). Day-time surveys included inspection of potential camps within 10km of the Action Area and nearby areas for evidence of presence, including roosting Flying-foxes and guano. Dusk surveys involved scanning the sky for flight activity, noting the number of individuals leaving camps and their direction of travel. Surveys were undertaken on 21-22 January and 12-13 May, 2025.



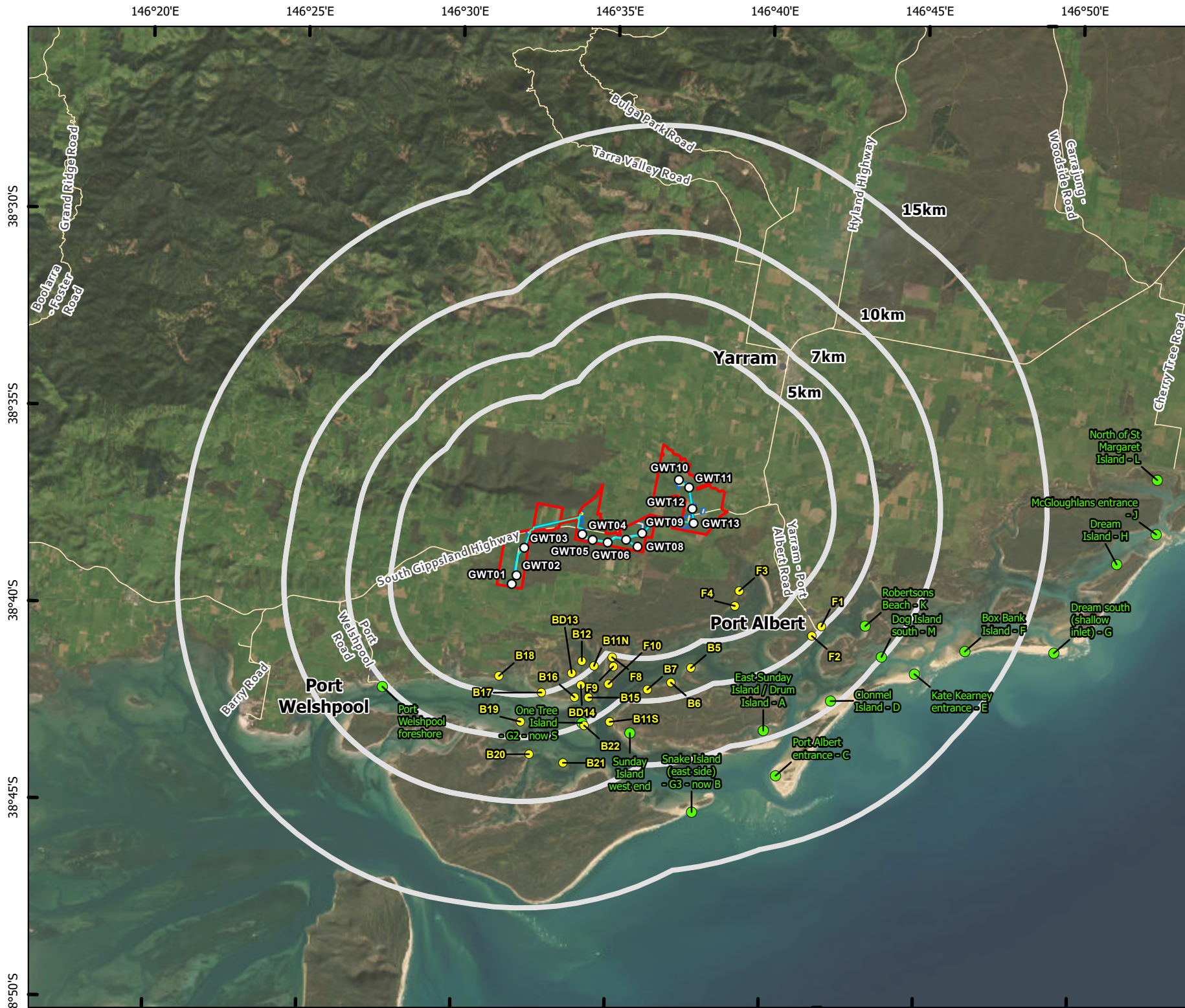


Figure 3: Migratory Shorebird survey sites

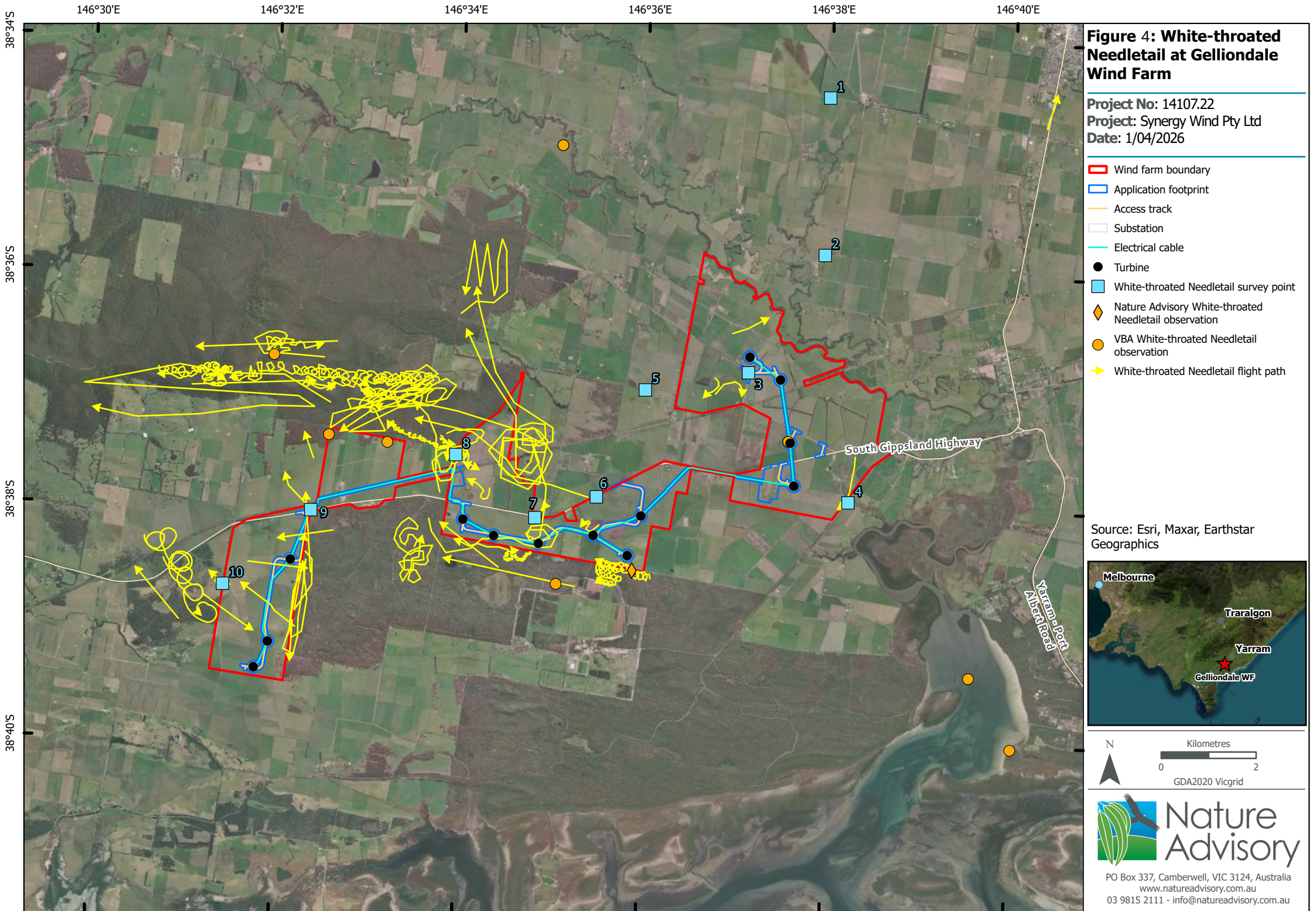
Project No: 14107.17
Project: Synergy Wind Pty Ltd
Date: 1/04/2026

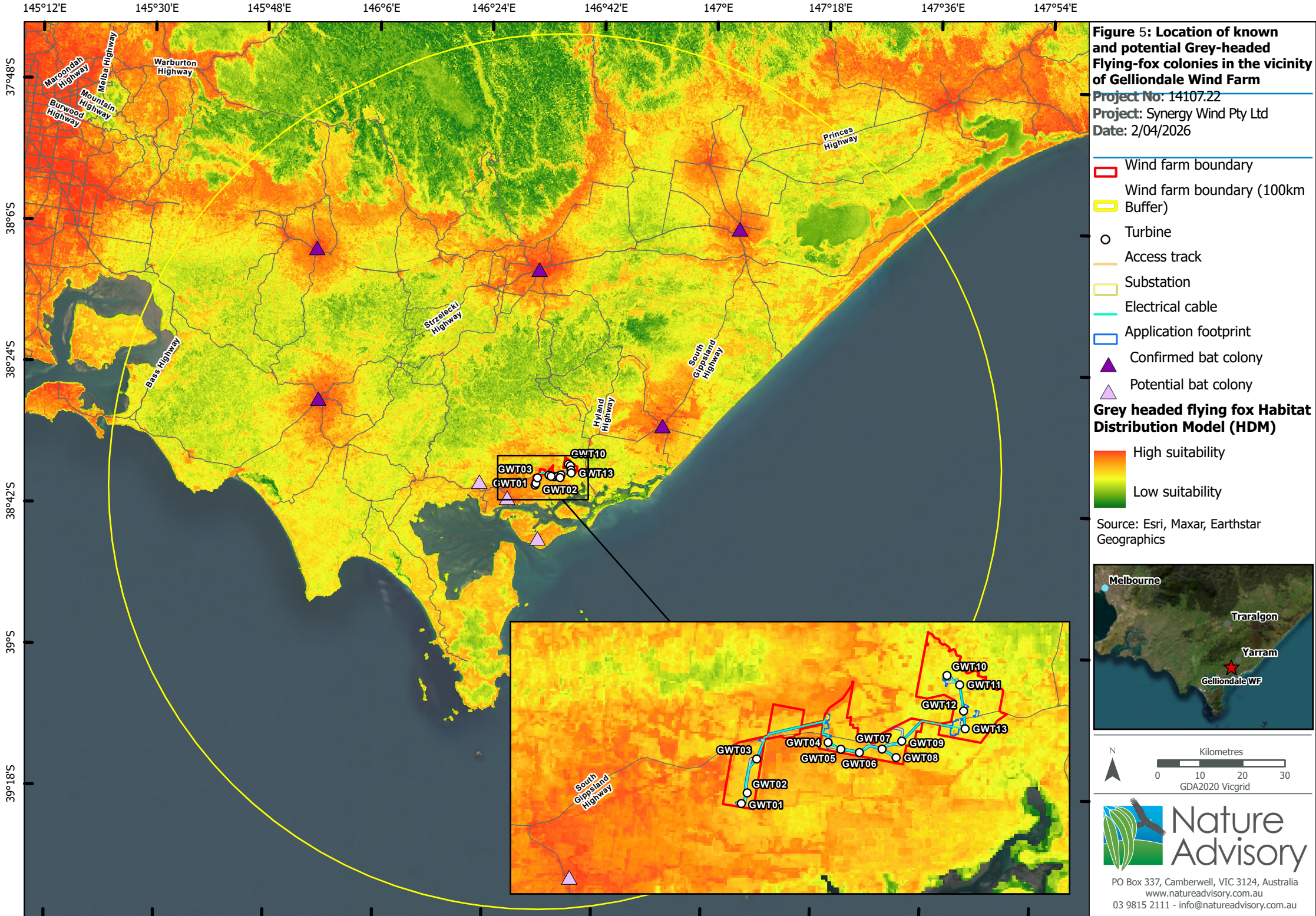
- Wind farm boundary
- Application footprint
- Substation
- Electrical cable
- Access track
- Turbine
- Nature Advisory survey site
- Birdlife Australia survey site

Source: Esri, Maxar, Earthstar Geographics

N
Kilometres
0 2 4 6
GDA2020 Vicgrid

PO Box 337, Camberwell, VIC 3124, Australia
www.natureadvisory.com.au
03 9815 2111 - info@natureadvisory.com.au





2.3. Species of Concern

A species of concern is defined as a species of conservation significance that is thought to be at high risk of turbine collision based on data collected during pre-construction surveys and existing or contextual knowledge. These species are generally listed as threatened under the EPBC Act, though non-listed species can also qualify if they are thought to be at particularly high risk to the impacts of concern. Note that other listed and non-listed species may be involved with turbine collisions at GWF, but as of this stage, they are not considered to be at high risk of turbine collisions and are covered under the more general framework of the BAMP as outlined in Sections 0 or 4.1.2.

The following species were identified as potentially vulnerable to collisions at GWF:

- **Blue-winged Parrot** (EPBC Act: Vulnerable)
- **Swift Parrot** (EPBC Act: Critically Endangered)
- **White-throated Needletail** (EPBC Act: Vulnerable & Migratory)
- **Grey-headed Flying-fox** (EPBC Act: Vulnerable)

Baseline species characterisations for species considered to be potentially vulnerable to collisions at the Gelliondale Wind Farm are summarised below. Full details of their assessment are presented in the MNES and Flora and Fauna reports (Nature Advisory 2025, 2026).

2.3.1. Bird species

*Blue-winged Parrot *Neophema chrysostoma* (Vulnerable)*

The Blue-winged Parrot was once common in south-eastern Australia and Tasmania but has undergone a population decline in recent decades. The estimated population of the Blue-winged Parrot is 10,000 individuals (Garnett and Baker 2021; DCCEEW 2023). Blue-winged Parrots are a partial migrant, where a portion of the population migrates across Bass Strait each spring/summer to breed in Tasmania, while smaller portions remain to overwinter in Tasmania or remain to breed in southeastern mainland Australia (DCCEEW 2023; Higgins 1999). The Gelliondale Wind Farm is within the modelled range, and the species has been recorded in moderately-sized flocks (up to 39 birds) during autumn surveys, and smaller flocks (up to 8 birds) in spring/summer.

A total of 641 Blue-winged Parrot observations were recorded during utilisation surveys conducted from 2023 to 2025. The numbers peaked in autumn (521 observations, in flocks of up to 39 birds). The Action Area was mainly used for foraging, though birds observed in spring/summer may have bred nearby. The greater numbers observed in autumn may reflect both local recruitment and migratory staging as birds prepare to cross the Bass Strait to Tasmania.

Surveys showed that 85.2 % of recorded flights were below RSA, with only 14.8 % of flights at heights that would risk collision with WTGs. Blue-winged Parrot is broadly known to be at some risk of collision, with mortalities reported in small numbers across several Victorian and Tasmanian wind farms (Symbolix 2020; Nature Advisory unpublished mortality data). Data was insufficient to inform a CRM and a heatmap of site utilisation.

*Swift Parrot *Lathamus discolor* (Critically Endangered)*

The Swift Parrot has undergone a sharp decline, with wide estimates of 250 to 2,500 individuals (Garnett and Baker 2021), but the most recent estimate using genetic data showing an effective population of 60 to 338 individuals (Olah et al. 2020). The species overwinters on the Australian mainland, from South Australia, Victoria, New South Wales and into southeastern Queensland

(DCCEEW 2024b). The Gelliondale Wind Farm is within the modelled range, and where they are known to occur.

The Swift Parrot was subject to targeted surveys in 2020, 2021, and 2024. A single bird was observed during targeted surveys in a patch of Swamp Gum/Stringy Bark approximately 2 km west of the proposed site. Existing records show they are occasionally seen in the broader area. It is expected that individuals or small flocks may occasionally pass the Gelliondale wind farm when traversing between the preferred forest areas. Birds may, on occasion, use trees within or in proximity to the wind farm site when food resources are available, but it would be expected that, at those times, similar resources would also be available in the larger, higher-quality patches further afield (e.g. Wilson's Promontory National Park). Commuting flights may take birds through the wind farm itself.

The species typically flies at or below tree canopy height but has been observed in Tasmania to occasionally fly in excess of 100 m (Nature Advisory unpublished observations). Modelling suggests the species may be at some risk of collision at wind farms, but that the risks are relatively low (Smales 2006). This species has not been recorded as a mortality at any operational wind farms in over 17 years of monitoring by Nature Advisory across southeastern Australia (Nature Advisory unpublished mortality data). Data was insufficient to inform a CRM and a heatmap of site utilisation.

*White-throated Needletail *Hirundapus caudacutus* (Vulnerable & Migratory)*

As well as its threatened status, the White-throated Needletail is listed as *Migratory* under the EPBC Act, with additional protections under International migratory agreements between the co-signatories of the Bonn Convention, China-Australia (CAMBA), Japan-Australia (JAMBA), and Korea-Australia (ROKAMBA). The species has undergone an apparent decline over recent years, with current population estimates of 41,000 (Garnett and Baker 2021). The species is a long-distance migrant – breeding in Siberia and Japan over the austral winter and migrating through South-East Asia to reach Australia in late spring (Chantler and Kirwan 2020; Higgins 1999). They typically migrate north by mid-Autumn. The Gelliondale Wind Farm is located within their non-breeding range, where they were recorded during summer and autumn BUS and targeted surveys.

White-throated Needletail were recorded in the BUS study area during autumn and summer BUS 2024. Targeted surveys were conducted by Nature Advisory in 2020, 2021, and 2024. The species was recorded on 45 occasions, with flocks ranging from a single bird up to 160. The species abundances observed during surveys matched patterns in the existing records from the broader Gippsland region; birds arrived in late spring, peaked in abundance over high summer and dropped sharply mid-autumn.

The species is known to be at some risk of colliding with WTGs at several southeast Australian wind farms (Symbolix 2020; Nature Advisory unpublished mortality data). Recent evidence from automated cameras installed at an operational wind farm suggests that, while there is some collision mortality, the species shows a much higher avoidance rate than previously assumed (Reid and Rogers 2026).

A collision risk model was applied to the field data collected on this species (Appendix 2: Collision Risk Model for White-throated Needletail at Gelliondale Wind Farm). This model suggests an annual mortality rate of 1.404 birds, which represents 42 birds over the life of the wind farm without mitigation measures. We note this model is an estimate and may not represent the number actually hit by the wind farm. Heatmapping undertaken by Symbolix (Figure 6 in Appendix 2: Collision Risk Model for White-throated Needletail at Gelliondale Wind Farm) showed that the species was more likely to fly above wooded vegetation, particularly above the ridgelines of Alberton State Park.

2.3.2. Bat species

Grey-headed Flying-fox Pteropus poliocephalus (Vulnerable)

The Grey-headed Flying Fox is listed as *Vulnerable* under the EPBC Act. Grey-headed Flying Foxes are endemic to the south-eastern forested areas of Australia, principally east of the Great Dividing Range, and have an estimated population of between 330,000 and 990,000 individuals (McKeown et al. 2024). The Gelliondale Wind Farm is within the range for the species, with several potential and confirmed camps within 100 km.

On-ground investigations of possible camps occurred in January and May 2025, and ongoing liaison with the University of Western Sydney and their Flying-fox tracking program will continue. Several confirmed colonies were located within foraging distance (~100 km) from the Gelliondale Wind Farm, with the closest at Woodside, Bruthen Crescent – approximately 23 km east (McKeown et al. 2024). Investigations showed that two potential camps are within 7.5-13 km from the Action Area, however, current knowledge of these camps has not identified them as nationally important.

The species regularly flies at RSA height and is known to occasionally collide with turbines at operational wind farms in south-eastern Australia (Symbolix 2020). However, targeted surveys did not provide sufficient data to inform a site-specific CRM or heatmap for the species.

3. Operational monitoring

Operational phase monitoring will include BUS, Grey-headed Flying-fox, and carcass monitoring. Should these surveys indicate that further targeted surveys are required, they will be undertaken with results incorporated and validated against carcass monitoring findings to enable the timely implementation of corrective actions if the findings suggest that environmental outcomes (outlined in Section 0) are not met or may not be achieved.

No operational microbat surveys are currently recommended as survey results indicate no detections of Species of Concern, and a Likelihood of Occurrence assessment (Nature Advisory 2025) found that no listed species are likely to occur or have the potential to occur within the Project Area. However, any trigger events for microbats, as described in Section 4.1, will require microbat surveys to be undertaken. Any microbat surveys undertaken will follow the same methodology and sites as used in baseline monitoring (see Section 2.2.2) and will include an analysis of activity levels related to time of day and weather conditions (e.g. wind speed, humidity).

Targeted bird or Flying-fox surveys may be required if specific trigger events occur (refer to Section 0 and 5 for details).

3.1. Bird utilisation surveys

The baseline and operational BUS are designed for a 'Before and After Control Impact' (BACI) analysis as outlined in the *Ecological Assessments of the Best Practice Guidelines for the Australian Wind Industry*, Appendix 7 (Clean Energy Council 2018). Operational BUS will add context to mortality findings (direct effects) and investigate the indirect effects of the wind farm by gathering data on the diversity, species composition and site use of local bird and bat populations.

Two years of operational BUS will commence once the wind farm is fully commissioned. The timing of these surveys will cover the relevant seasons for Species of Concern (refer to Section 2.3), including timing surveys with peaks in White-throated Needletail occurrence. These surveys aim to identify changes, if any, in the use of the site compared to the pre-construction period and whether any turbines pose a particular risk to listed species.

The survey methodology applied to baseline BUS (refer to Section 2.2.1) will be replicated in operational BUS, including using the same 12 survey sites (subject to accessibility) and number of replicates at each site. The following data will be recorded for all bird species:

- Species and abundance (count of individuals);
- Observation type (visual or auditory);
- Distance from the observer;
- Initial height above ground level (AGL in metres) of the observed bird/s (to the nearest metre beneath 100 m and in 10 m increments thereafter);
- If the observed bird/s are observed to fly at or above RSA height during the observations:
 - Minimum and maximum heights above ground level in metres of the observed bird/s (to the nearest metre beneath 100 m and in 10 m increments thereafter).
- Comments (e.g., direction of flight, pattern or behaviour if relevant to turbine risk).

The following additional data are to be collected for all listed species:

- Minimum and maximum height AGL for all observed listed bird species and raptors (to the nearest meter beneath 100 m and in 10 m increments thereafter);

- Flight pattern (i.e., not flying, local movement, directional flight, circling, swooping, varied, or other);
- Behaviour (i.e., flight, foraging, perching, mating, aggressive interactions, hollow inspection, nesting, or on station);
- Duration of flight;
- Geospatially referenced flight paths showing directions of travel; and

Other occasional behaviours or notes included feeding, territorial displays, fighting, perching and use of hollows or nests.

3.2. Grey-headed Flying-fox targeted surveys

Because the GHFF is expected to appear sporadically and unpredictably at the Project Area, monitoring is anticipated to be challenging and indirect. The presence of this species is influenced by fruiting and flowering events, especially the flowering of Sugar Gum in SE Victoria, which is known to attract these bats to the region. Given these factors and the distance of permanent camps to the Project Area, establishing an effective regular monitoring program is not feasible. Instead, the monitoring program will be based on an alternative strategy as follows, and during the first three operational years of the wind farm.

- **Habitat surveys:** Undertake annual habitat suitability assessments within the wind farm and at seasonally relevant locations in the immediate vicinity to identify resources (e.g., presence of flowering gums, or other fruiting trees, presence of water).
- **Species database monitoring:** Annual reviews of relevant databases, including the National Flying-fox monitoring viewer² to get up-to-date information on camp locations and numbers.
- **Site utilisation observations engagement:** Regular discussions with wind farm personnel, landholders, and NEPA regarding the species presence, and assess its potential increase in prevalence within the site and its surroundings. This information will guide the qualified ecologist in scheduling field visits to confirm its presence, estimate numbers, and potentially map flight paths within the wind farm layout to identify areas prompt for collisions.

3.3. Carcass monitoring

To manage potential long-term mortality impacts on relevant species as a result of turbine collision, this BAMP includes a long-term carcass monitoring approach that aligns with the minimum requirements of the *Onshore Wind Farm Guidance - Best practice approaches when seeking approval under Australia's national environment law* (DCCEEW 2024a).

Ongoing monitoring of blade strike mortality at GWF will:

1. Provide data that can inform adaptive management of the collision risk (i.e., patterns of mortality related to seasonal changes, local conditions, or turbine operating periods), and
2. Detect and estimate the general mortality of listed and non-listed fauna, which can be used to understand actual impacts.

² <https://data.csiro.au/collection/73482>

Recorded mortality during carcass searches of a listed species may indicate spatial variation in risk levels based on the location and frequency of the carcasses found. Specifically, repeated collisions at the same or adjacent turbines (but not at others) are useful in identifying high-risk turbines or clusters. Such information will be assessed and incorporated into adaptive mitigation measures as part of the impact trigger process.

3.3.1. Definition of ‘mortality’

Mortality is defined as any dead bird or bat detected within the specified search radius (Figure 6**Error! Reference source not found.**). Detection occurs during formal carcass searches (designed to generate an estimate in accordance with a statistically rigorous sampling design) or at other times (incidental observation, often by operational staff). A protocol is triggered whenever a carcass is found to collect consistent and useful data on the fatality event (see below).

In the absence of any other cause of death, any carcass or bird feather spot (defined as a clump of five feathers or more), detected beneath an operating turbine, will be categorised as a turbine blade collision. Feather spots are assumed to be remains of a bird carcass after scavenging and the scavenger correction factor will not be applied (see Section 3.4**Error! Reference source not found.**).

3.3.2. Overview of approach

The GWF carcass monitoring program will consist of the following two methods:

- **Incidental carcass detection** (refer to Section 3.2.4); and
- **Formal carcass searches** (Section ☐) – to be implemented after all turbines operate and export electricity simultaneously. This program will run for at least three years.

3.3.3. Formal carcass search program

The formal carcass search program will commence within three months of the commissioning of all Project activities, including turning of turbines/within one month of the completion of reliability tests of all turbines, and the wind farm is in full operation and supplying electricity. This operational monitoring program will be undertaken for a minimum of five years. At the conclusion of each year of monitoring, a detailed report will be prepared to review the mortality detection program and to provide recommendations in response to any identified issues (see Section 6 for reporting requirements). The regulator will review this report to determine how the monitoring program will continue to be congruent with the identified issues.

The GWF carcass monitoring program aims to provide reliable estimates of fauna mortality rates with an estimate of sampling precision. Several factors, such as carcass scavenging and carcass detectability, can affect mortality rate estimates and will be measured and included in any estimate of overall mortality rates. To account for the effects of these factors, scavenger and detectability trials will be conducted (see Sections 3.3.5 and 3.5). Human (or canine) detectability of carcasses is also a potential confounding variable, and protocols have been developed to control this factor in the final mortality estimates (Section 3.3.6).

The following informed the design of the carcass search program and associated trials:

- Carcasses of a suitable range of sizes for scavenger and detectability trials are difficult to source and usually involve a combination of carcasses found under operating turbines and those found along roads and other legal sources. Note that it is illegal to source uncleaned carcasses from poultry producers; and
- Annual scavenger and detectability correction factors will be generated and applied to estimate mortality rates, as there is no evidence in the literature for significant (or detectable)

seasonal differences in scavenger activity at Victorian wind farms (Symbolix 2020). However, scavenger and detectability trials will be undertaken during short and long grass periods. This precautionary sampling design intends to capture seasonal variability, ensuring more accurate annual mortality estimates. However, detectability, at least for humans, is easier in short grass than in longer grass, therefore, detectability trials will capture this variability.

This protocol is valid for five years after commissioning and will be reviewed after this time. Any changes will be incorporated into future BAMP reviews and updates.

[Search protocol](#)

Search regime

All turbines will be searched out to 130 metres once per month in an ‘initial’ search. The order of turbines searched will be randomised between searches.

To maximise detections, particularly for species prone to quicker scavenging, such as small birds and bats, a secondary ‘pulse’ search will be undertaken every month during the first 12 months of the carcass monitoring program. Pulse searches entail searching the ‘inner zone’ (out to 70 metres) one to three days after the initial search. This will increase detections of most species of concern.

Following the initial 12-month pulse search period, the requirement for another 12 months of pulse searches will be reviewed in the first annual report, depending on the species and number of carcasses found, in consultation with the regulator.

Human-based search protocol

All searches will be undertaken by qualified ecologists or personnel trained in carcass searches and regularly assessed by the supervising ecologist.

Based on applying the Hull and Muir model (Hull and Muir 2010) to the GWF turbine model, 95 % of bat carcasses are expected to be found within 74 m of the turbine, and carcasses of medium to large birds are expected to be reasonably evenly distributed out to 122 m. Carcasses of very large birds (e.g., Wedge-tailed Eagle) may be found a little further out, but 95 % are expected to be within 130 m of the turbine. This has been used to determine the inner and outer circular search zones, as follows:

- The **inner zone** targets the detection of carcasses of bats and small to large-sized birds. The zone is a circle with a 70m radius from the turbine and transects are spaced every 6m (Figure 6Error! Reference source not found.).
- The **outer zone** targets the detection of carcasses of medium to large-sized birds. The zone is a circle between 70m and 130m radius circles from the turbine. Search transects are spaced at 12m and carried out from the edge of the inner zone to the edge of the outer zone (Figure 6Error! Reference source not found.).

All turbines, once operational, will be searched once per month (initial and pulse). Each search and carcass found will be documented in the form provided in Appendix 1.

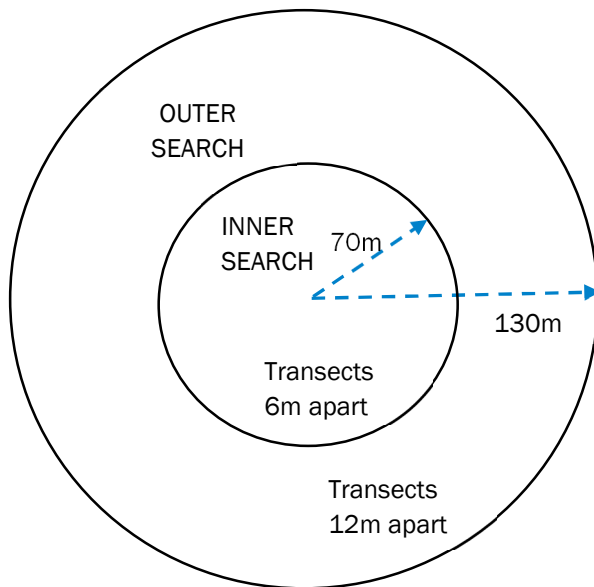


Figure 6: Inner and outer carcass search zones underneath the turbines

Scent dog-based search protocol

This section has been added to allow more flexibility for GWF and aligns with industry best practice. Detection dog searches are the recommended methodology for mortality surveys, as they are proven to be more effective than human-only searches, particularly for microbat and smaller bird carcasses (Lentini et al. 2025) and improve confidence in mortality estimates (Moloney et al. 2019).

If dogs are used for the searches, a suitable method has been developed with guidance from the *Handbook for the development of renewable energy in Victoria* (DEECA 2025). This will generally involve:

1. The dogs will work on a reference transect line from downwind to upwind.
2. The handler should commence surveys downwind of the survey area and work perpendicular to the prevailing wind allowing the dog to freely zigzag across the searcher's transects, using whistle commands to control how far the dog moves to each side of the transect (i.e., 20 m). This maximises the probability of encountering a scent cone produced by a carcass and is best practice (Figure 7 **Error! Reference source not found.**).
3. The dog does not 'look' for carcasses but finds them by scent. Therefore, it does not need to cover as much ground as if it were looking with its eyes. It only needs to cover enough ground to encounter all possible 'scent cones' within the search radius.
4. Carcasses found outside the defined search area will be recorded and collected as an incidental find.
5. The scent cone is the area downwind of the target, in this case, a carcass, in which the scent will drift with the wind. So, if the wind is strong; the scent will drift further but in a narrower scent cone, and if the wind is light, the scent cone will be wider but will not drift as far. In the case of strong wind, then transects will need to be narrow to ensure scent cone areas are encountered. Whereas transects of approximately 20 m wide will be adequate to cover an area in moderate wind conditions, this will be reduced to 10 or 15 m in conditions with no wind or strong wind.

6. A GPS collar will be fitted to the dog which will allow the handler to track movements in real-time and allow the handler to ensure the entire search area has been effectively covered by the dog.
7. Search areas will be loaded onto GPS prior to commencing searches to allow the handler to see the exact borders of the area and the dog's movements within it.
8. GPS data will be made available to regulators on request.

Dog handler(s) must have demonstrated the capacity to identify bird and bat species of south-east Australia. When field constraints limit the application of this search method, other search patterns are acceptable, such as walking into and with the wind direction. This search method (and other adapted methods) can be used in the presence of OH&S issues, such as areas with dense rocky terrain, steep slopes, tall crops and very wet flooded ground. Transects can also be widened in the presence of these OH&S obstacles for handler and dog safety. The search method is at the discretion of the handler and if altered, must be recorded as a limitation in the data sheet.

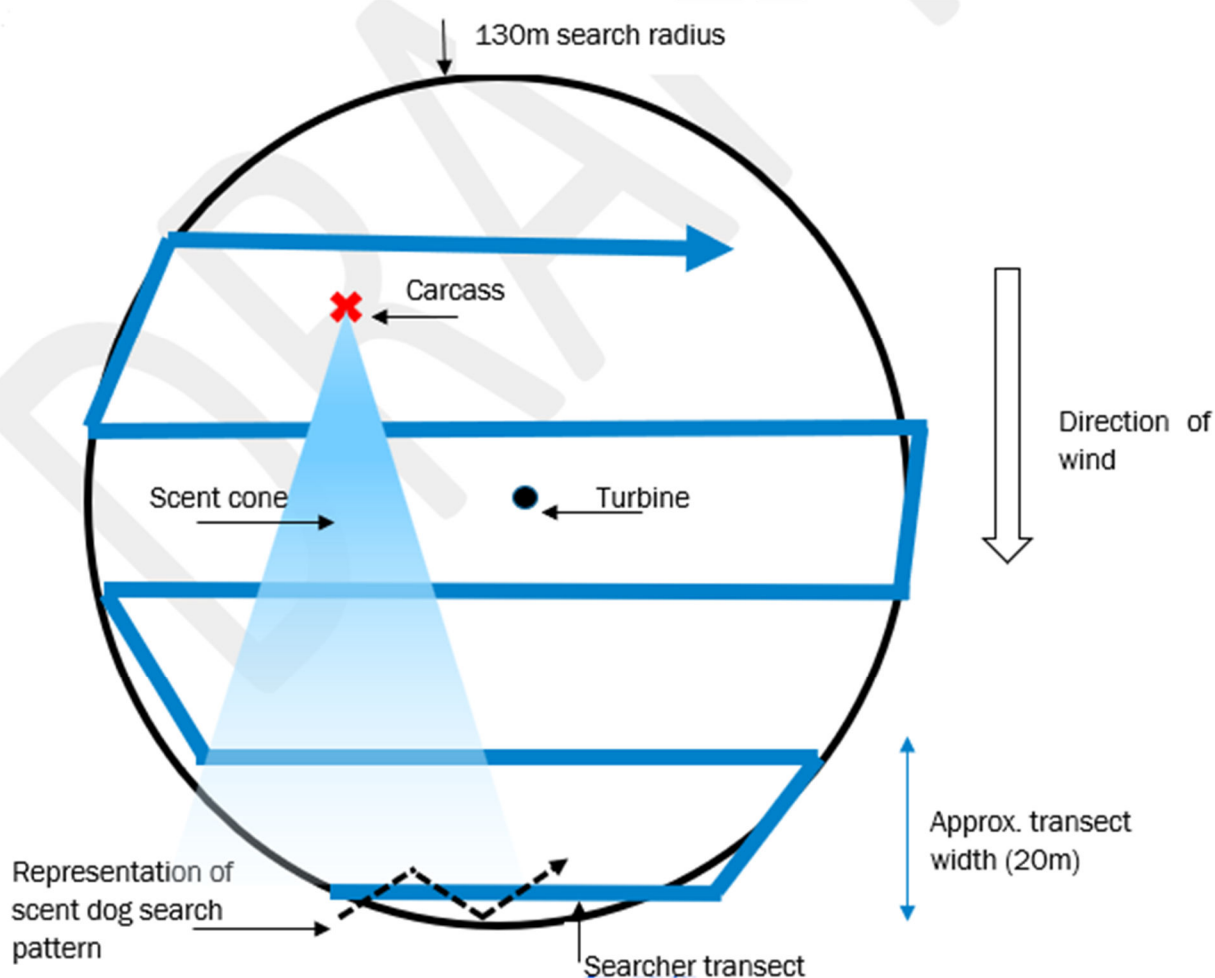


Figure 7: Search pattern for scent dog – across the wind turbine search radius

Turbine selection

All 13 turbines will be searched for carcasses. This will maximise the accuracy of the estimated mortality rates.

All turbines will be used for scavenging and detector trials.

Information collected at each turbine will include the number of carcasses found, location, any relevant details on vegetation and habitats, and any relevant observations indicating risk behaviours involving listed species.

Carcass detection protocol

This carcass detection protocol applies to both incidental carcass finds and the formal carcass search program. If a carcass is detected (a 'find'), the following variables will be recorded in the Carcass Search Data Sheet (Appendix 1):

- Position of the carcass relative to the turbine (i.e., distance in metres and compass bearing of the carcass from the base of the turbine);
- Substrate and vegetation;
- Species, age, number, sex (if possible), signs of injury and estimated date of collision;
- Weather (including recent extreme weather events, if any), visibility, maintenance of the turbine and any other factors that may affect carcass discovery; and
- If the species cannot be immediately identified (e.g., an incidental find, and there is no ecologist on site), photographs must be provided to the qualified ecologist immediately for identification purposes. The ecologist must reply within two business days for the possible reporting of an impact trigger. If carcass identification is not possible and there is a suspicion that it may be a listed species or Species of Concern, samples will be sent for DNA analysis by a qualified consultant or institution.

The carcass will be handled according to the following standard protocol (see also Section 3.3.5):

1. The carcass will be removed from the turbine site;
2. Personnel will wear appropriate PPE (e.g. rubber gloves) *Note – the carcass handler will adhere to all health and safety protocols detailed by their respective organisations;*
3. Personnel will place the carcass into a plastic bag, then into a second plastic bag;
4. A copy of the completed Carcass Search Data Sheet will be placed in the second plastic bag;
5. The double-bagged carcass will be transferred to a designated carcass freezer (at the GWF Site office) for storage. This freezer will not be used for anything other than animal carcass storage; and
6. The carcass will be stored for a second opinion on the species identity, if necessary, and for use in scavenger and detectability trials.

The wind farm operator is required to have a permit under the Victorian *Wildlife Act 1975* to handle and keep native wildlife (even dead wildlife) as part of the monitoring program. An application for this permit will be submitted by the operator in a timely manner to ensure approval has been obtained prior to turbine commissioning.

Any carcasses not required for searcher efficiency and scavenger trials will be retained for 12 months before disposal.

3.3.4. Incidental carcass detection

A low fauna risk exists during the commissioning phase, once turbine components are installed but not operating. At this stage, GWF is an active construction site and subject to strict safety requirements, which can restrict formal carcass searches. Therefore, during this time, there will be

increased worker activity on and around turbine hardstands and surrounding areas as commissioning activities are occurring. These protocols will be detailed to construction and operation personnel during site training and induction programs.

The wind farm operator's approved personnel and contractors will conduct incidental carcass detection around the hardstands:

- Any carcasses detected during this period will be recorded in accordance with the incidental carcass protocol as described below. Awareness training will be provided to the wind farm operator and contractor teams to ensure effective protocol implementation;
- The incidental carcass detection will continue as the primary carcass detection method until the full carcass search program commences (within 3 months of operation). This will ensure impacted birds and bats can be recorded before the implementation of the full carcass search program, despite site access still being limited by construction activities; and
- Incidental carcass detection will continue for the duration of the wind farm's operation and will occur as per the Carcass Detection Protocol (Section □) and the Wildlife Handling Protocol (Section 3.3.5).

3.3.5. Wildlife handling protocol

All on-site staff and monitoring personnel will be advised of the correct procedure for assisting injured wildlife. Construction and operations personnel who find injured wildlife will report the find to the Project's site manager, who will organise recovery of, and treatment for the animal.

If safe to do so, place the animal immediately into a dark place (e.g., box or cloth bag) for transfer to the nearest wildlife carer or veterinarian (.).

Table 3). For injured native animal collection, contact Wildlife Victoria.

All persons who handle injured or dead animals must wear gloves and adhere to health and safety protocols detailed by their respective organisations. Particular care³ will be taken to avoid bat-borne viruses (i.e., Australian Bat Lyssavirus and Hendra Virus), and only people with appropriate vaccinations will handle bats (living or deceased).

Table 3: Vet and wildlife carer details for the local region

Name	Phone	Location/Address	Bats?
Gippsland Veterinary Group	(03) 5682 2757	15 Court Street, Foster	Yes
Yarram Veterinary Centre	(03) 5182 1225	40 Commercial Rd, Yarram	No
Moonshadow Flying-fox and Microbat Rescue and Rehabilitation Centre	0429 930 138	Sale	Yes
Wildlife Victoria (24 hours)	1300 094 535	Victoria	Yes

³ Bats and human health (<https://www.qld.gov.au/health/condition/infections-and-parasites/viral-infections/bats-human-health> accessed October 2024).

3.3.6. Estimating annual mortality due to collision

The results of the carcass searches will be analysed to provide information on:

- The species, number, age, and sex (if possible) of birds and bats being struck by the turbine blades;
- Results of scavenger and detectability trials;
- Separate estimated annual mortality rates for all birds and all bats (and for listed species with available data), including an estimate of the number of carcasses per turbine per year; and
- Any detected spatial or temporal variation in the number of bird and bat strikes.

The search results will be detailed in the first annual report. In addition to cumulative search results, the analysis and mortality estimates will be detailed in the second annual reports. The latter reports will also identify if further investigations or mitigation measures are required.

In addition to the annual reports, an incident report will be prepared and provided to the Commonwealth National Environmental Protection Agency (NEPA) if an EPBC Act-listed species is found dead or injured during carcass searches.

Mortalities will be estimated by simulations based on the observed carcass finds using a Horvitz-Thompson style estimator (Huso 2011), with an extract of the equations provided below.

$$\hat{M}_{ij} \cong \frac{C_{ij}}{(\hat{g}_{ij})} \quad (1)$$

where

- $\hat{M}_{ij}$ is the estimated mortalities at turbine i during search j
- C_{ij} is the number of carcasses found
- $\hat{g}_{ij}$ is the estimate of the detection probability for that search and turbine

For a given turbine, $\hat{g}_{ij}$ is a function of

$$\hat{g}_{ij} \cong a_i r_{ij} p_{ij} \quad (2)$$

- a_i is the fraction of total carcasses within the searched area (note this is *not* the same as the fraction of area searched)
- r_{ij} is the fraction of the carcasses that arrived at turbine i but have not been lost to scavenger or decay before search j
- p_{ij} is the probability that an existing carcass will be detected by the searcher

Therefore, a robust mortality program requires the following components:

- a formal mortality monitoring survey where found carcasses are recorded, to determine C_{ij}
- an estimate of the fall zone of carcasses to determine a_i (this also accounts for potentially only searching a subset of all turbines)
- scavenger trials to estimate r_{ij}
- searcher efficiency trials to estimate p_{ij}

3.4. Scavenger (persistence) trials

Ascertaining the rate at which carcasses are removed by scavengers can help develop a ‘correction factor’ that informs the estimate of the Project’s impacts on birds and bats (mortality rate). Scavengers include ground-based animals, such as feral cats, foxes, dogs, and pigs (more likely to detect carcasses by scent), as well as aerial scavengers such as birds of prey and ravens (more likely to detect them visually). The scavenger trials described below are designed to ascertain the scavenging rate, usually expressed as the average carcass duration in the field.

The scavenger trial design is a necessary compromise between high numbers of trials and practicality, whilst ensuring a statistically valid trial design without altering either the behaviour of scavengers or the number of birds that may collide with turbines. The second-year report will provide the first estimate based on real, site-specific data of the precision of the estimates of the various parameters required to estimate the mortality rate, including scavenging rate and searcher efficiency.

This protocol defines scavenged carcasses as follows:

- **Intact carcass** is defined as a carcass that does not appear to have been scavenged by a vertebrate scavenger; and
- **Partially eaten carcass** is any skeletal or flesh remains found. Feather and fur spots will be defined by their presence and the absence of any other remains (a feather spot being a cluster of five or more feathers).

Intact or partial carcasses and feather/fur spots will be recorded as a ‘find.’ However, the scavenger correction factor will not be applied to fur and feather spots, as these most likely represent the remains of carcasses after they have been scavenged and not to do so would significantly bias mortality estimates upwards.

Scavenger trials will be undertaken twice per year during the first five years of monitoring. Two trial timings will account for different vegetation conditions, principally related to significant seasonal differences in grass height (Table 4). Conducting scavenger trials at seasonally contrasting times accounts for occasional seasonal changes in carrion use by some scavenger species. Previous studies have found that Red Foxes are reliant on rabbits and carrion in agricultural and forested areas (Molsher et al. 2000; Brunner et al. 1975; Catling 1988). Feral cats show uniform use of carrion throughout the year, whereas the fox prey type is dependent on availability (Catling 1988). Catling (1988) found that foxes ate more carrion in winter/spring compared with summer/autumn, when they fed on adult rabbits. However, Molsher et al. (2000) found that there was no overall significant difference between seasons for carrion use by foxes. Seasonal differences only occurred in other prey types (not carrion), such as dead young stock, invertebrates, and reptiles, as these are only available at certain times of the year. Given these uncertainties, conducting scavenger trials at seasonally contrasting times is considered appropriate.

Scavenger trials for large raptors, in contrast, will only be conducted once per year due to the lack of availability of suitable carcasses for a technically sound trial. Experience from other wind farms indicates a low level of scavenging of these carcasses and an elevated level of detectability that is consistent across the year during all seasons, as larger carcasses are easier to find in long vegetation.

Table 4: Timing for scavenger trials each year of monitoring

Grass height	Timing	Replicates
Short	Autumn and Winter	2
Long	Spring	2

Each scavenger trial will be undertaken by a trained person to determine the rate of loss by scavengers. The search area for scavenger trials will be limited to 70 m from the base of the turbine (the inner search zone) and will be located at the operating turbines that are searched regularly.

To identify potentially different scavenging rates, three categories of carcass will be used (Table 5). If insufficient large birds (raptor size) can be sourced, the data will be substituted with data from previous grouped studies undertaken on other wind farms. For each scavenger trial, thirty carcasses will be randomly placed under different turbines. This will represent a minimum of 10 carcasses in each size class per trial (two trials per year).

Table 5: Number of replicates for each scavenger trial

Microbat	Medium-sized birds	Large birds (large raptor size)
10	10	10

Infrared cameras are used to monitor scavenging activity. These are more accurate than traditional human checks as they show the exact day and time the carcass was removed and by which scavenger.

Infrared motion detector cameras will be installed within 1-2 m of each carcass and will operate for thirty days (if the carcass remains). The images will be downloaded and analysed by qualified Ecologists.

Additional information on scavenger trials is provided below.

- The timing of searches is based on experience and regulatory approval at several other wind farms where trials have shown almost all carcasses have been scavenged within ten days. More frequent monitoring than that proposed herein will not significantly affect the estimated scavenging rate or impact on mortality estimates;
- A mix of carcass sizes (if available) will be obtained for use in the trials. Where carcasses of a species group cannot be found, a similar-sized and coloured substitute (i.e., mice substituted for bats, pest birds collected from control programs Common Myna/Common Starling substituted for medium-sized birds) will be used to reduce bias by visual predators;
- Latex gloves will always be worn while handling carcasses to minimise contact with human scent, which may alter predator responses around carrion and to minimise disease risk to the handler;
- At each trial site, one carcass (or more) will be placed randomly within the 70-metre search area. Carcasses will be thrown in the air and allowed to land on the ground to simulate at least some of the fall and allow for ruffling of fur or feathers;
- Carcasses used in the trials will have their coordinates recorded to ensure that they are not confused with an actual collision mortality;
- Comprehensive notes will record evidence remaining at sites where carcasses have been scavenged (e.g., scavenger scats, bones, feathers, animal parts and type of scavenging if visible, such as tearing, pecking, complete removal of carcass, partial removal of carcass, bird, or mammal predator evidence); and
- Notes will be taken on the state of carcasses in each search.

3.5. Detectability (searcher efficiency) trials

The best use of available carcasses is to conduct the detectability trials concurrently with the scavenger trials during the first day of placing the carcasses. Two trials per year over the first five years of monitoring will be conducted; one in short grass and one in long grass periods.

To account for searcher variability in detecting carcasses, any searchers who have carried out monthly searches at the Project Area will participate in the detectability (searcher efficiency) trials. Detection efficiency (i.e., the percentage of carcasses detected by each searcher) will then be incorporated into later analyses that derive mortality estimates.

Table 6 summarises the number of carcasses to be employed in each trial. The carcass controller (i.e., a person not involved in monthly carcass searches) will throw each carcass into the air and allow it to land on the ground to simulate at least some of the fall and the potential ruffling of fur and feathers. The searchers will not be aware of the timing of this trial. Even if searchers become aware of the trial, for example, due to an increased number of carcasses, this would not impact the searcher efficiency results, as searches will be undertaken in the same manner. The carcass controller will note the placement of carcasses (via GPS) and is free to decide where and how many are deployed under each turbine. However, all carcasses will be located within the inner 70-metre search zone.

Table 6: Number of replicates per season for detectability trials

Season	Microbat	Medium-sized birds	Large birds (large raptor size)
Spring - long grass	10	10	10
Autumn to winter - short grass	10	10	10

Analysis of past trials from other wind farms indicates a large confidence interval on the estimate of searcher efficiency, even for a high number of trials (plus or minus 10 %, even with 50 replicates) (Symbolix 2020). This means that only relatively large seasonal changes in detection (~20-30 % or more) will be resolvable from normal background variation. Sampling will be undertaken during the two periods that represent the greatest change in vegetation cover (therefore visibility) over three years. Statistical confidence analysis indicates that this will result in a reasonably precise detectability estimate after one year, and optimal precision after two.

Any substitute carcasses for these trials will be of both comparable size, colour and form to the species being represented or species of concern (e.g., brown mice rather than birds should be substituted for bats as birds do not have the same body shape, colour and appearance).

4. Adaptive Management

This adaptive management section aims to achieve the environmental outcomes of this BAMP (Section 0) by establishing effective and timely response measures to mortality detections. The key points include:

- Impact trigger definitions for listed and non-listed species;
- Implementation of an adaptive decision-making framework for these triggers;
- Establishment of a framework that integrates investigations, monitoring, and reporting; and
- Adoption of mitigation measures, including corrective actions and offsets, to ensure environmental outcomes are achieved.

All phases of operational monitoring will be incorporated into the adaptive management of potential impacts at GWF. The data from operational BUS and microbat surveys will inform how species are using the site once operational, whilst the carcass monitoring may identify high-risk turbines and times of year when collisions are more likely. This adaptive management will take place in response to the detection of impact triggers of a given species.

Where operational data is sufficiently available, the results of baseline CRMs for given species will be validated, which will inform adaptive management and mitigation. There will be an annual review of the sufficiency of data to undertake this validation in line with annual reporting timeframes (see Section 6).

4.1. Impact triggers

This section identifies the circumstances that will result in notification, further investigation, and additional mitigation for impact triggers, as well as reporting to NEPA. The procedure to respond adaptively to impact triggers documented in this section will apply for the duration of the GWF life cycle.

In response to a triggered impact, the cause will be investigated, and more frequent carcass monitoring will occur to determine if the impact is ongoing or a one-off occurrence. Additional mitigation measures, informed by the evidence, may also occur.

The approval holder will be responsible for BAMP implementation, with technical support provided by an approved expert.

4.1.1. Impact triggers for listed and migratory bat and avifauna species

Definition of impact trigger

An **impact trigger** for a listed species occurs if a bird or bat (or recognisable parts thereof) listed as threatened and/or migratory under the EPBC Act is found dead or injured within the specified search radius during any mortality search or incidentally during commissioning or operation. Once triggered, the decision-making framework detailed in Figure 8Error! Reference source not found. is applied.

In addition to the standard protocols for listed species, strategies are provided for key species of concern (Section 5) identified during the pre-construction studies (Blue-winged Parrot, Swift Parrot, White-throated Needletail, and Grey-headed Flying-fox).

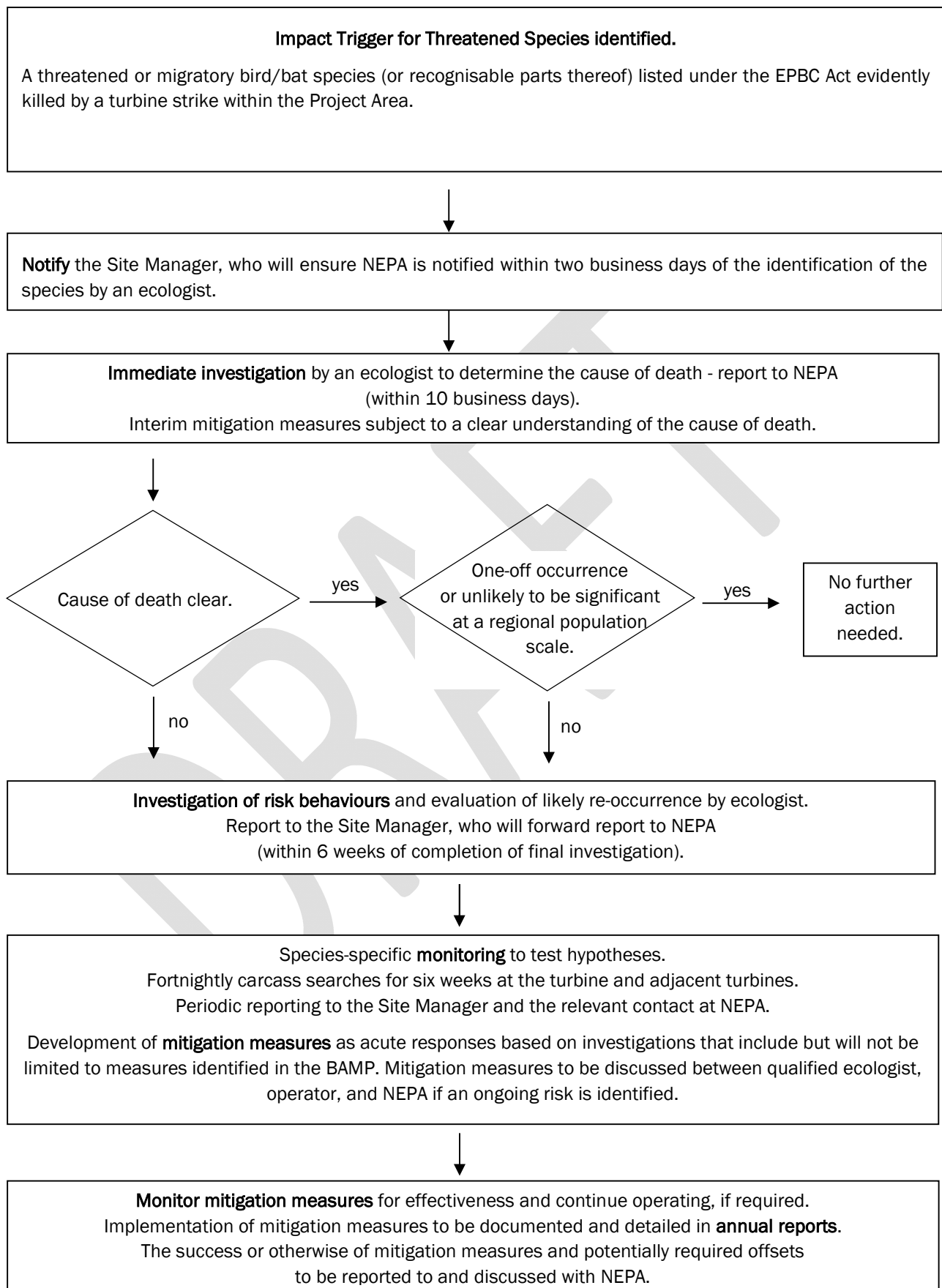
Operational procedure

If a listed species **impact trigger** occurs, the decision-making framework detailed in Figure 8Error! Reference source not found. is applied, and the following occurs:

1. Immediate reporting to the GWF Site Manager, who will report it to NEPA within two business days.
2. Immediate investigation (within 10 business days) by an appropriately qualified ecologist to identify any particular risk behaviours that could have led to the collision or could lead to further collisions. This investigation aims to:
 - Determine the actual cause of death/injury.
 - Focus on determining the likelihood of further occurrences (e.g., through engagement with key species experts, undertaking a literature review, assessment of habitat, etc).
 - Identify suitable mitigation measures for immediate implementation, if required.
3. If the fatality is deemed to be a one-off occurrence (e.g., an extremely unlikely occurrence given a species' usual behaviour) or unlikely to result in a significant impact, no further action will be necessary.
4. If the cause of the impact trigger is unclear, onsite investigation of risk behaviours and evaluation of likely recurrence will be required for up to six weeks. If these investigations suggest that the impact trigger was a one-off or unlikely to result in a significant impact, no further action will be necessary.
5. If the onsite investigation suggests that the impact trigger may be a regular occurrence or is likely to result in a significant impact, species-specific monitoring may be required. During the monitoring period, periodic (three-monthly at first) reports will be provided to NEPA.
6. Responsive mitigation measures will be promptly developed and implemented as needed in consultation with NEPA. Examples of mitigation measures may include, but are not limited to, those outlined in Section 4.2.
7. If mitigation measures are not possible or effective, offsetting measures will be implemented, as outlined in Section 4.3. In some circumstances, both mitigation and offsetting may be required.

Following an impact trigger, the assessment of potential impacts will, where possible, consider estimated mortality of individuals across the whole wind farm (not only carcasses observed or those found within the sampling area).

All investigations and subsequent decision-making will be undertaken in consultation with NEPA.

Figure 8: Decision-making framework for identifying and mitigating impact triggers for threatened species.

4.1.2. *Impact triggers for non-listed bat and avifauna species*

Definition of impact trigger

An **impact trigger** for a non-listed species occurs if a bird or bat (or recognisable parts thereof) is found dead or injured within the specified search radius during any mortality search or incidentally during commissioning or operation more than four times under the same or adjacent turbine (within 1 km, see Table 9) during two successive searches in two months. Once triggered, an appropriate response is initiated, and reporting requirements are outlined in the decision-making framework, as outlined in Figure 9.

An impact trigger for non-listed species **will not apply to ravens, magpies or introduced species** such as Common Starling; however, any detected mortalities for these species will still be reported as part of the annual reporting process.

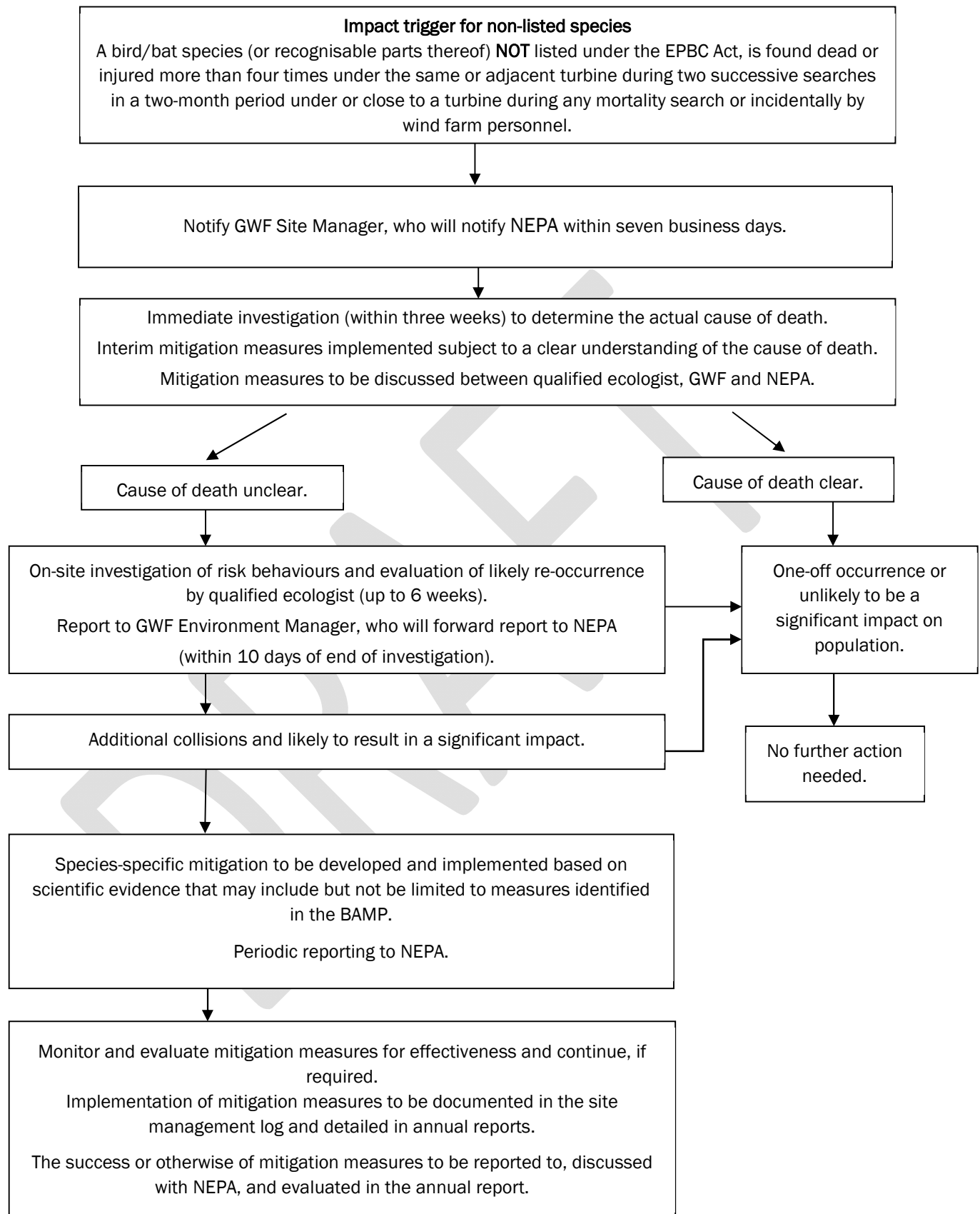
Operational procedure

If a non-listed species **impact trigger** occurs, the decision-making framework detailed in Figure 9 is applied, and the following occurs:

1. NEPA will be notified within seven business days of recording the event.
2. An appropriate scale to consider population effects (e.g., local, regional, entire population) will be agreed between NEPA and the wind farm operator on a case-by-case basis, with consideration given to the species in question.
3. A report on the investigation will be delivered to NEPA within three weeks.
4. If the evaluation indicates that the event was a one-off occurrence or is unlikely to have a significant impact at a relevant population scale for the species in question, no further action will be necessary.
5. If the event is deemed to be a potentially regular occurrence or likely to be a significant impact at a relevant population scale for the species in question, species-specific monitoring may be required.
6. If further monitoring confirms that impacts are likely to be significant at a relevant population scale, mitigation measures will be required. Potential mitigation measures are outlined in Section 4.2. However, species-specific mitigation measures will be determined based on the investigation outcomes.

Following an impact trigger, the assessment of potential impacts will, where possible, consider estimated mortality of individuals across the whole wind farm (not only carcasses observed or those found within the sampling area).

All investigations and subsequent decision-making will be undertaken in consultation with NEPA.

Figure 9: Operational procedure for mitigating impacts for non-listed species.

4.2. Mitigation

Mitigation aims to ensure that the environmental outcomes listed in Section 0 will be achieved. Any evaluation of impacts and decisions regarding mitigation and investigations will be undertaken in consultation with NEPA. Annual reports will detail the effectiveness of mitigation applied and the outcomes of any investigations completed.

Depending on the nature, cause and significance of the impact trigger, mitigation and offsetting may be required. The objective of mitigation and offset measures is to ensure that GWF does not lead to significant impacts on listed or non-listed bats and/or birds over the life of the wind farm.

Appropriate mitigation will be developed, implemented and guided by the results of monitoring outcomes, mortality estimates, and/or impact triggers. Mitigation may include, but not be limited to, the following:

- Habitat modification, vegetation planting/removal;
- Changes in land use practices (including stock management, stock grain-feeding) near turbines, subject to negotiation with landowners;
- Cessation or reduction of cropping/sowing around or near turbines;
- Bird deterrence;
- Increasing turbine and powerline detectability (e.g. visual or audio deterrents);
- Changes to turbine lighting (noting the general requirements below);
- Temporary turbine curtailment for high-risk periods/locations;
- Using ultrasonic deterrents to deter bats at night; and
- Bird protection systems that automatically curtail turbines on approach to reduce raptor fatalities (e.g., Bioseco®, IdentiFlight®).

Immediate mitigation will be implemented (within seven days) if a significant impact is detected and the cause is evident (e.g., a particular land use practice). Further investigation will commence where the cause is not evident. If investigations indicate that the available mitigation is incongruent, offsetting measures will be implemented (Section 4.3). For species of particular concern, additional mitigation and monitoring measures will be implemented adaptively in accordance with the species-specific management strategies outlines in Section 5, in consultation with NEPA. Appropriate mitigation actions will be implemented with updates in available technology and scientific knowledge of impacted species.

The final BAMP will include the required investigations and recommended mitigation consistent with the consent conditions of the Planning Permit Approval. Mitigation effectiveness will be assessed using data collected from a monitoring program of appropriate duration and frequency.

4.2.1. Preventive mitigation measures

Most mitigation will be triggered by collisions, however, the following preventive strategies to avoid and reduce the risk of an impact trigger occurring will be implemented.

Carcass removal

This will reduce the attractiveness of the site to scavenging raptors and reduce the risk of collision with this bird group and other scavengers. Procedures will include:

- A designated Carrion Removal Coordinator will ensure:

- Weekly inspections of the entire wind farm site by on-site personnel are undertaken to locate any deceased animals;
 - The weekly inspections are undertaken via a vehicle or motorbike and searches of the entire wind farm site prioritise the area within 250 m of turbines; and
 - During lambing season, any lamb carcasses are immediately removed.
- Any incidental finds of birds and bats will follow the Incidental Carcass Protocol (depending on carcass location; Section 3.2.4);
 - Any carcasses and/or remains found will be reported immediately to the site manager who will organise for the immediate collection and disposal of the carcass;
 - Carcasses will be disposed of in treed areas, or pits, at least 500 m from the nearest turbine;
 - All carcass occurrence and removal will be recorded in a logbook maintained by site personnel; and
 - The annual report will summarise all carcass occurrences and removals for the reporting period.

Lighting avoidance or reduction

Turbine lighting will be restricted to the requirements defined by the regulatory authority, and facility lighting will be avoided within 500 m of turbines. Minimising lighting will help reduce the bird and bat attraction by reducing insect activity.

4.3. Offsetting a significant impact

In the unlikely event that a significant impact occurs to any EPBC Act-listed species due to GWF operations, offsetting may be required. The EPBC Act Environmental Offset Policy (DSEWPaC 2012) will guide any required offsetting and will be developed in consultation with, and approved by, NEPA.

The suitability of offset measures will be considered on a case-by-case basis, including whether they achieve ecological equivalence and contribute effectively to species conservation outcomes. Offset measures and calculated values generated using the offsets calculator will be discussed and agreed with NEPA.

5. Species-specific management strategies

The following management strategies have been developed for the following species of concern:

- **Swift Parrot** (EPBC Act: Critically Endangered)
- **Blue-winged Parrot** (EPBC Act: Vulnerable)
- **White-throated Needletail** (EPBC Act: Vulnerable & Migratory)
- **Grey-headed Flying-fox** (EPBC Act: Vulnerable)

These strategies will focus management efforts and improve mitigation effectiveness in response to impact triggers for those species identified as matters of concern, aiming to avoid significant impact at the population level.

5.1. Swift Parrot management strategy

The SP breed in Tasmania and migrates to the mainland of Australia for the autumn, winter, and early spring months. It lives mostly north of the Great Dividing Range, passing through two areas of Victoria on migration: the Port Phillip district and Gippsland (Kennedy and Tzaros 2005; Emison et al. 1987; Higgins 1999). They could occur occasionally during dispersive movements, particularly when in transit between large, forested areas. This species has been recorded once in 1991 over 3 km from the Project Area, and only once on-site during targeted surveys in 2024, and is therefore expected not to occur regularly within the Project Area. The habitat available to the SP in the Project Area is small relative to that available in the larger forested blocks to the north in the Great Dividing Range and elsewhere along their winter range. Therefore, this species is unlikely to experience significant impact from the proposed wind farm. Any risk-mitigation measures for the SP presented in this BAMP will only apply during the times they are most likely to be in Victoria (i.e. from March to July).

Table 7: Specific trigger actions in response to Swift Parrot mortalities at GWF.

Impact Trigger	Actions	Description	Timing
A single or several Swift Parrots are recorded dead under a turbine within a single event.	Label the turbine as a “high risk – impact trigger level one (T1)” turbine.	This event activates the species-specific management strategy as follows. Notify NEPA of mortality.	Immediately following mortality.
	Additional monitoring	Commence additional monthly carcass monitoring over three months, or during the remaining time that the species is expected on site (i.e. March to July, whichever is lesser, at T1 and all turbine locations within a 1 km radius of it.	First monthly monitoring within two weeks of the mortality event for three months or the remaining duration of the expected time the species is present on site.
		If, for three consecutive months after the mortality event, or the remaining of the period in which SPs are expected on site, no additional fatality events occur at the T1 turbine, and in conjunction, no observations are made during the targeted survey described below, it is concluded that any previous fatality was an isolated incident and that the turbine does not pose a high risk to the listed species, no further mitigation actions will be required.	Within three months from the date of the mortality.
		If, following an investigation by a qualified ecologist, the fatality is suggested to be part of an ongoing impact and is significant for the species, the T1 turbine and other turbines within a 1 km radius will continue with the additional 70 m radius pulse searches for one year or for the remaining period that SPs are expected to be present on site.	For one year from the date of the mortality, or for the remaining period that species are expected to be present on site.
	Targeted surveys	Begin an investigation by a trained ecologist into the ongoing risk of turbine collision on SPs. This will include a targeted SP survey of all identified SP habitats (mature eucalypt woodland/forest) within/adjacent the wind farm boundary (see Figure 2), with primary focus on the vicinity of the mortality event turbine and adjacent turbines.	Within 10 days of the date of the carcass detection.
	Mitigation	If SPs are located, mitigation measures may be implemented until SPs are not detected within the suitable habitat that is <1 km from the wind farm, with consultation with the regulator. New and existing mitigation measures, including but not limited to those outlined in	Measures requiring procurement or installation will be implemented within a reasonable timeframe; other

Impact Trigger	Actions	Description	Timing
		Section 4.2. Implementation is expected as soon as reasonably possible, considering effectiveness, procurement and implementation requirements, and logistical timeframes.	measures to be applied immediately following mortality or as interim measures if needed.
	Incident Investigation	Submit a report to the Responsible Authority. The investigation will seek to assess any relevant attributes associated with the mortality event. The report will include: ▪ Date and time of mortality, ▪ Identify, if possible, wind direction and speed when the bird was struck, ▪ Weather conditions, ▪ Location of mortality relative to habitat, vegetation, and water sources, ▪ Analysis of any other mortality on the site. ▪ Results of targeted survey, including location and number of any observed SPs, behaviour when observed ▪ Conclusions of investigation regarding risk to the species and likelihood of further mortalities on site, ▪ Recommendations for future actions to mitigate impacts on the species, and Options for other mitigation, including deterrents	Within 10 days of conclusion of targeted surveys and carcass monitoring

5.2. Blue-winged Parrot/White-throated Needletail management strategy

5.2.1. *Impact triggers and mitigation responses*

This species-specific management strategy outlines a hierarchical set of trigger responses to mitigate the impacts of the operational GWF on two bird species of concern, identified during pre-construction surveys: the Blue-winged Parrot (BWP) and White-throated Needletail (WTNT). Reporting will follow the requirements in Section 6, as well as incident-specific correspondence and reports to NEPA, which will require discussion and feedback from the Department.

Whilst this section covers two species together, the management strategy will be applied to each species independently. Whilst the BWP is present in Victoria year-round, the WTNT is a summer migrant to Australia, undertaking a trans-equatorial migration to breed in the Northern Hemisphere summer and to feed in the Southern Hemisphere summer. Each year, the WTNTs generally arrive in Australia in October before migrating north in March and April. Numbers peak in Victoria in late summer and early autumn, which, based on advice from DCCEW, coincides with most recorded wind turbine collisions. Any risk-mitigation measures for the WTNT presented in this management strategy will only apply during the times they are likely to be in Victoria, i.e. from November to April.

Table 8 details the specific trigger actions in response to avian mortalities involving these two species of concern.

Table 8: Specific trigger actions in response to BWP/WTNT mortalities at GWF.

Impact Trigger	Actions	Description	Timing
Level 1: A single or several individuals of the species of concern are recorded dead under a turbine within a single event.	Label the turbine as a “high risk – impact trigger level one (T1)” turbine.	This event activates the species-specific management strategy as follows. Notify regulator of carcass detection.	Immediately following mortality.
	Adaptive mitigation and process of assignment and re-assignment of risk	Commence additional monthly pulse carcass search for carcasses (to 70 m radius) over three months, or during the remaining time that the species is expected on site, whichever is lesser, at T1 and all turbine locations within a 1 km radius of it.	First monthly monitoring within two weeks of the mortality event for three months or the remaining duration of the expected time the species is present on site.
		If, for three consecutive months after the mortality event, or the remaining of the period in which migratory species are expected on site (WTNT), no additional fatality events occur at the T1 turbine, and it is concluded that any previous fatality was an isolated incident and that the turbine does not pose a high risk to the listed species, no further mitigation actions will be required.	Within three months from the date of the mortality.
		If, following an investigation by a qualified ecologist, the fatality is suggested to be part of an ongoing impact and is significant for the species, the T1 turbine and other turbines within a 1 km radius will continue with the additional 70 m radius pulse searches for one year or for the remaining period that migratory species are expected to be present on site (WTNT). If no further mortalities are found within 12 months of the trigger event, the turbine will be reassigned as ‘low risk’ (the default risk classification).	For one year from the date of the mortality, or for the remaining period that species are expected to be present on site.

Impact Trigger	Actions	Description	Timing
	Incident Investigation	Submit a report to the Responsible Authority. The investigation will seek to assess any relevant attributes associated with the mortality event. The report will include: ▪ Date and time of mortality, ▪ Identify, if possible, wind direction and speed when the bird was struck, ▪ Weather conditions, ▪ Location of mortality relative to habitat, vegetation, and water sources, ▪ Analysis of any other mortality on the site. ▪ Conclusions of investigation regarding risk to the species and likelihood of further mortalities on site, ▪ Recommendations for future actions to mitigate impacts on the species, and ▪ Options for other mitigation, including deterrents	Within 10 business days of the mortality.
Level 2: Second strike (a single or several individuals of the species of concern are recorded dead under a turbine assigned as “high risk” under Trigger 1) during a subsequent search, within 12 months of the previous level trigger.	Label the turbine as a “high risk – impact trigger level two (T2)” turbine.	This event activates the species-specific management strategy as follows. Notify regulator of carcass detection.	Immediately following mortality.
	Adaptive mitigation and process of assignment and re-assignment of risk	Commence additional monthly pulse search for carcasses (to 70 m radius) over three months, or during the remaining time that the species is expected on site, whichever is lesser, at T2 and all turbine locations within a 1 km radius of it.	First monthly monitoring within two weeks of the mortality event for three months or the remaining duration of the expected time the species is present on site.
		If, for three consecutive months after the mortality event, or the remaining period in which migratory species are expected on site (WTNT), no additional fatality events occur at the T2 turbine, and it is	Within three consecutive months from the date of the mortality.

Impact Trigger	Actions	Description	Timing
		concluded that the turbine does not pose a high risk to the listed species, no further mitigation actions will be required.	
		If, following an investigation by a qualified ecologist, the fatality is suggested to be part of an ongoing impact and is significant for the species, the T2 turbine and other turbines within a 1 km radius will continue with the additional 70 m radius pulse searches for one year or for the remaining period that migratory species are expected to be present on site (WTNT). New and existing mitigation measures, including but not limited to those outlined in Section 4.2, will be considered for implementation and testing on small-sized and fast-flying species. Implementation is expected as soon as reasonably possible, considering effectiveness, procurement and implementation requirements, and logistical timeframes. If no further mortalities are found within 12 months of the trigger event, the turbine will be reassigned as 'low risk'.	For one year from the date of the mortality, or for the remaining period that species are expected to be present on site.
	Incident Investigation	Submit a report to the Responsible Authority. The investigation will seek to assess any relevant attributes associated with the mortality event. The report will include: ▪ Date and time of mortality, ▪ Identify, if possible, wind direction and speed when the bird was struck, ▪ Weather conditions, ▪ Location of mortality relative to habitat, vegetation, and water sources, ▪ Analysis of any other mortality on the site. ▪ Conclusions of investigation regarding risk to the species and likelihood of further mortalities on site,	Within 10 days of the mortality.

Impact Trigger	Actions	Description	Timing
		- Recommendations for future actions to mitigate impacts on the species, and - Options for other mitigation, including deterrents	
Level 3: Third strike (a single or several individuals of the species of concern are recorded dead under a turbine assigned as “high risk” under Trigger 2) during a subsequent search, within 12 months of the previous level trigger.	Label the turbine as a “high risk – impact trigger level three (T3)” turbine.	This event activates the species-specific management strategy as follows. Notify regulator of carcass detection.	Immediately following mortality.
	Adaptive mitigation and process of assignment and re-assignment of risk	Commence additional monthly pulse search for carcasses (to 70 m radius) over three months, or during the remaining time that the species is expected on site, whichever is lesser, at T3 and all turbine locations within a 1 km radius of it..	First monthly monitoring within two weeks of the mortality event for three months or the remaining duration of the expected time the species is present on site.
		If, for three consecutive months after the mortality event, or the remaining of the period in which migratory species are expected on site (WTNT), no additional fatality events occur at the T3 turbine, and it is concluded that the turbine does not pose a high risk to the listed species, no further mitigation actions will be required.	Within three consecutive months from the date of the mortality.
		If, following an investigation by a qualified ecologist, the fatality is suggested to be part of an ongoing impact and is significant for the species, the T3 turbine and other turbines within a 1 km radius will continue with the additional 70 m radius pulse searches for one year or for the remaining period that migratory species are expected to be present on site (WTNT). New and existing mitigation measures, including but not limited to those outlined in Section 4.2, will be implemented and tested, with a	For two years from the date of the mortality.

Impact Trigger	Actions	Description	Timing
		focus on small-sized and fast-flying species. Implementation is expected as soon as reasonably possible, considering effectiveness, procurement and implementation requirements, and logistical timeframes.	
		An assessment of population-level impacts will be conducted to evaluate the effectiveness of the applied mitigation measures and the estimated impact over the current year. The results will be presented and discussed with NEPA to determine if a new set of actions is necessary if evidence indicates that a significant impact at the population level is anticipated.	Within four months from the date of the mortality.
	Incident Investigation	Submit a report to the Responsible Authority. The investigation will seek to assess any relevant attributes associated with the mortality event. The report will include: ▪ Date and time of mortality, ▪ Identify, if possible, wind direction and speed when the bird was struck, ▪ Weather conditions, ▪ Location of mortality relative to habitat, vegetation, and water sources, ▪ Analysis of any other mortality on the site, ▪ Conclusions of investigation regarding risk to the species and likelihood of further mortalities on site, ▪ Recommendations for future actions to mitigate impacts on the species, and ▪ Options for other mitigation, including deterrents.	Within 10 days of the mortality

Table 9: Turbines within a 1000-meter radius of other turbines.

Turbine	Turbines within 1000m
GWT-01	GWT-02
GWT-02	GWT-01
GWT-03	No turbines
GWT-04	GWT-05
GWT-05	GWT-04, GWT-06
GWT-06	GWT-05, GWT-07
GWT-07	GWT-06, GWT-08, GWT-09
GWT-08	GWT-07, GWT-09
GWT-09	GWT-07, GWT-08
GWT-10	GWT-11
GWT-11	GWT-10, GWT-12
GWT-12	GWT-11, GWT-13
GWT-13	GWT-12

5.3. Grey-headed Flying-fox management strategy

This species-specific management strategy sets out a hierarchical set of trigger responses to mitigate the impacts of the operational GWF on the Grey-headed Flying-fox (GHFF), based on a precautionary principle approach. Reporting will follow the requirements in Section 6, as well as incident-specific correspondence and reports to NEPA, which will require discussion and feedback from the Department.

5.3.1. *Impact triggers and mitigation responses*

Specific trigger actions in response to GHFF mortalities will be implemented as detailed in Table 10. Reporting will follow the requirements in Section 6, as well as incident-specific correspondence and reports to NEPA, which will require discussion and feedback from the Department.

Table 10: Specific trigger actions in response to GHFF mortalities at GWF.

Impact Trigger	Actions	Description	Timing
Impact Trigger: A single or several GHFF are recorded dead under a turbine within a single event (i.e. over the length of one search period or as incidental).	Carcass search	Immediately increase the frequency of carcass search monitoring of all wind turbines. Report carcass detection to the regulator.	Every three days for one month after the mortality.
	Investigation	Investigate the location, presence, and timing of flying fox activity to understand the factors that may have led to the collision and whether they are still occurring (e.g., weather patterns, location, food availability, active camps, etc.).	Immediately following the mortality.
	Monitoring and risk categorisation	Intensive carcass monitoring (every three days) at the mortality event turbine for one month. If, within three months of the mortality, no additional fatality events occur at the turbine, and it is concluded that any previous fatality was an isolated incident and that the turbine does not pose a high risk to the listed species, no further mitigation actions will be required.	Within one month of the mortality.
	Post- investigation (ongoing impact identified)	Targeted monitoring will be undertaken immediately to increase understanding of species movements/patterns at specific locations.	TBD
	Mitigation effectiveness	Implement specific mitigation based on targeted monitoring observations (e.g., consistent 'at risk' presence is observed at a particular location, or multiple collision events occur at a turbine). Mitigation will be implemented as soon as reasonably possible, depending on equipment procurement and installation timing. Mitigation measures may include, but are not limited to, those outlined in Section 4.2. Alternative deterrent mitigation measures will also be considered for implementation and trialled on-site as proven technologies become available, depending on equipment procurement and installation timing.	TBD (informed by targeted monitoring).

Impact Trigger	Actions	Description	Timing
		If mitigation proves ineffective at reducing collisions, intensified mitigation measures, and/or additional mitigation will be considered and implemented, in consultation with NEPA, which may include the use of remote sensing technologies such as radar, thermal imaging, etc. During this period, the wind farm operator will: ▪ Monitor and review mitigation effectiveness; ▪ Regularly consult with NEPA on findings and the feasibility of mitigation; and ▪ Follow the reporting protocols and lines of responsibility in Sections 6, Error! Reference source not found. and 7 of this BAMP.	TBD

6. Reporting and review

This section of the plan outlines the reporting arrangements for this BAMP. Further to the schedule detailed in Table 11, the GWF operator, in consultation with the qualified ecologist and/or the regulator, may convene reporting and reviewing meetings as required.

Following the completion of five years of monitoring/reporting, results will be reviewed by NEPA to determine if further monitoring and reporting are required. If it is deemed that the program should continue as is, providing reliable and adequate data to meet the objectives of the monitoring program, the methodology and scope will be similar to that outlined in this report. If changes are required, an amended method will be developed in consultation with, and with the approval of NEPA.

Table 11: GWF BAMP reporting and review.

Report Type	Timing	Detail	Who
First, Second, Third, and Fourth year annual report	Within 3 months of the first, second, third, and fourth years of mortality monitoring.	These reports will present the results from carcass monitoring and will include, but not be limited to, the following. ▪ Summary of post-construction carcass search results, including scavenger and detectability trials and total survey days; ▪ Discussion of any identified seasonal or yearly variation in the number of bird or bat strikes within that year of monitoring; ▪ Summary of bird utilisation surveys, microbat surveys, and targeted monitoring; ▪ Summary of any additional targeted monitoring surveys required (if relevant) as part of mitigation measures or species-specific monitoring in response to impact triggers; ▪ Review of sufficiency of operational data to validate baseline CRM; ▪ Changes to protocols and methods (e.g., changed duration, frequency, and areas sampled); and ▪ Raw data will be amended to the annual report. ▪ Review the adequacy of the BAM plan in detecting and managing impacts to birds and bats Submitted to: NEPA and the Responsible Authority.	Qualified ecologist, in consultation with the wind farm operator
		Once available, these reports will be presented at a review meeting with the Regional Manager at NEPA (or their delegate) and the Responsible Authority. The results of the carcass searches (including the scavenger and observer efficiency trials) will be	Qualified ecologist Wind farm operator NEPA Responsible Authority

Report Type	Timing	Detail	Who
		reviewed, and refinements to the monitoring program (if necessary) will be agreed upon.	
Fifth annual report	Within 3 months of the fifth year of mortality monitoring.	This will present the results from carcass monitoring and will include, but not be limited to, the following: ▪ Detailed monitoring methods (including a list of observers, dates, and times of observations); ▪ Summary of post-construction carcass search results, including scavenger and detectability trials and total survey days; ▪ Overall mortality estimates for birds and bats, including estimates by size classes and for specific species where statistically possible, analysed by a suitably qualified statistician, and detected numbers for all species recorded during the carcass searches; ▪ Any other mortality recorded on site but not during designated carcass searches (i.e., incidental records by site personnel, etc.); ▪ Comparison of bird utilisation surveys with pre-construction surveys, and a summary of microbat and targeted monitoring; ▪ Summary of any additional targeted monitoring surveys that were required (if relevant) as part of mitigation measures or species-specific monitoring in response to impact triggers; ▪ Review of sufficiency of operational data to validate baseline CRM; ▪ A discussion of the results, including the following: ▫ Whether the level of mortality was ecologically significant or affected listed species of birds or bats (including species of concern to NEPA). If a Population Viability Assessment exists for the affected species, it will be used in consultation with species experts to provide an objective and quantifiable approximation of the consequences of impacts; ▫ Any differences between years that may have arisen due to wet and dry conditions; ▫ Any recommendations for reducing mortality, if necessary; and ▫ Any mitigation or offset measures implemented, and the success or otherwise of these measures. ▪ Raw data will be amended to the annual report.	Qualified ecologist, in consultation with the wind farm operator

Report Type	Timing	Detail	Who
		Review the adequacy of the BAM plan in detecting and managing impacts to birds and bats Submitted to: NEPA and the Responsible Authority.	
Impact trigger notification	Within 2 working days for listed species; or 7 working days for non-listed species	If an impact trigger is detected, GWF will notify via email of the impact trigger being recorded, as per Section 0 of this BAMP. Submitted to: NEPA.	Wind farm operator
Investigation reports	Within 3 weeks of investigation conclusion	Following the investigation, a report will be prepared that will aim to: - Determine the actual cause of death/injury; - Focus on determining the likelihood of further occurrences (e.g., through engagement with key species experts, undertaking a literature review, assessment of habitat, etc); and - Identify suitable mitigation measures for immediate implementation. Submitted to: NEPA and the Responsible Authority.	Qualified ecologist, in consultation with the wind farm operator

7. Management actions

Management actions and survey details for post-construction bird and bat impact monitoring are summarised in Table 12. Error! Reference source not found..

Table 12: Timeline for surveys and reporting to NEPA and the Responsible Authority after turbine commissioning at GWF.

Management action	Details	Report timing	Responsible
Operational BUS (Section 3.1)	Two years of operational BUS will commence post-construction and be completed in consecutive seasons. The survey methodology applied to baseline monitoring will be replicated in operational BUS, including using the same 12 survey sites, the number of replicates at each site, and broadly the same data will be collected.	Annual reports.	Qualified ecologist
Carcass searches (Section 3.3)	All turbines (i.e., 13) will be searched every month, initially for a minimum of five years. The methodology will be subject to a review after a year, with any refinements to the method implemented in consultation with and with the approval of NEPA. Continuation of searches after five years would depend on the extent of significant impacts on bird and bat populations of concern.	Annual reports.	Qualified ecologist
Scavenger trials (Section 3.4)	Experimental trials in each of the first five years to determine the scavenging rate when the grass is long and when the grass is short.	Annual reports.	Qualified ecologist
Detectability trials (Section 3.5)	Experimental trials twice in the first five years to determine the detection rate.	Annual reports.	Qualified ecologist

8. Roles and responsibilities

Table 13 identifies all stakeholders involved in the implementation and oversight of this BAMP and their respective responsibilities.

Table 13: GWF BAMP implementation – roles and responsibilities.

Organisation	Responsible for
Synergy Wind Pty Ltd (wind farm operator)	Implementation of all aspects of this BAMP and related decision, with technical support provided by a qualified ecologist.
Qualified ecologist	Provide advice on and oversee BAMP implementation.
	Prepare all technical reports for NEPA.
	Assist in the development and implementation of mitigation and consult with NEPA on the suitability and feasibility of management approaches.
DEECA and NEPA	Review reports from the wind farm operator arising from the routine (e.g., annual reports or reports of listed species impacts) or impact trigger response reporting.
	Provide feedback to the operator on BAMP implementation and wind farm operations.
	Participate in discussions about proposed mitigation and comment on their suitability and effectiveness.
Minister for Planning (responsible authority)	Determine the acceptability of impact mitigation and offset measures.
	Review reports from the wind farm operator arising from the routine (e.g., annual reports or reports of listed species impacts) or impact trigger response reporting.

References

Australian Wind Energy Association 2005, Wind Farms and Birds: Interim Standards for Risk Assessment. Report No. 2003.35(2.2), *Report prepared by: Brett Lane and Associates and AIRA Professional Services*.

Brunner H, Lloyd J and Coman B 1975, Fox Scat Analysis in a Forest Park in South-Eastern Australia., *Wildlife Research*, 2(2):147–154, doi:10.1071/WR9750147.

Catling PC 1988, Similarities and contrasts in the diets of foxes, *Vulpes vulpes*, and cats, *Felis catus*, relative to fluctuating prey populations and drought, *Wildlife Research*, 15(3):307–317, doi:10.1071/WR9880307.

Chantler P and Kirwan G 2020, White-throated Needletail (*Hirundapus caudacutus*), in *Birds of the World*, Cornell Lab of Ornithology, Ithaca, NY, USA.

Clean Energy Council 2018, Best Practice Guidelines—For implementation of Wind Energy Projects in Australia, *Clean Energy Council*, Melbourne.

DAWE 2022, Conservation Advice for *Callocephalon fimbriatum* (Gang-gang Cockatoo), *Department of Agriculture, Water and the Environment*, Canberra.

DCCEEW 2023, *Conservation advice for Neophema chrysostoma (blue-winged parrot)*, Department of Climate Change, Energy, the Environment and Water, Canberra.

— 2024a, Onshore Wind Farm Guidance Best practice approaches when seeking approval under Australia's national environmental law, *Department of Climate Change, Energy, the Environment and Water*, Canberra.

— 2024b, *National Recovery Plan for the Swift Parrot Lathamus discolor*, Department of Climate Change, Energy, the Environment and Water, Canberra.

DEE 2017, *EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species*, Department of Environment and Energy, Commonwealth of Australia, Canberra, <https://www.dcceew.gov.au/sites/default/files/documents/bio4190517-shorebirds-guidelines.pdf>.

DEECA 2025, *The handbook for the development of renewable energy in Victoria*, Department of Energy, Environment, and Climate Action, Victoria.

DEWHA 2010a, *Survey Guidelines for Australia's Threatened Bats*, Department of the Environment, Water, Heritage and the Arts, Canberra.

— 2010b, *Survey Guidelines for Australia's Threatened Birds*, *Department of the Environment, Water, Heritage and the Arts*, Canberra, <https://www.dcceew.gov.au/environment/epbc/publications/survey-guidelines-australias-threatened-birds>.

DoE 2015, *Referral guidelines for 14 birds listed as migratory species under the EPBC Act (draft)*, Department of the Environment, Canberra, <https://www.dcceew.gov.au/sites/default/files/documents/migratory-birds-draft-referral-guideline.pdf>.

DSEWPac 2012, *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy*, Department of Sustainability, Environment, Water. Populations and Communities, Commonwealth of Australia, Canberra.

DTP 2023, Planning Guidelines for the Development of Wind Energy Facilities, *Department of Transport and Planning, East Melbourne*.

eBird 2026, *An online database of bird distribution and abundance*, eBird, Cornell Lab of Ornithology, Ithaca, New York, <http://www.ebird.org>.

Emison W, Beardsell C, Norman F and Loyn R 1987, *Atlas of Victorian Birds*, Department of Conservation, Forests and Lands, and the Royal Australasian Ornithologists Union, Melbourne.

Garnett S and Baker G (eds) 2021, *The Action Plan for Australian Birds 2020*, CSIRO Publishing.

Higgins P (ed) 1999, *Handbook of Australian, New Zealand and Antarctic birds, volume 4: parrots to dollarbird*, Oxford University Press, Melbourne.

Hull CL and Muir S 2010, Search areas for monitoring bird and bat carcasses at wind farms using a Monte-Carlo model, *Australasian Journal of Environmental Management*, 17(2):77–87, doi:10.1080/14486563.2010.9725253.

Huso MMP 2011, An estimator of wildlife fatality from observed carcasses, *Environmetrics*, 22(3):318–329, doi:10.1002/env.1052.

Kennedy S and Tzaros C 2005, Foraging ecology of the Swift Parrot *Lathamus discolor* in the box-ironbark forests and woodlands of Victoria, *Pac Conserv Biol*, 11(3):158–173, doi:<https://doi.org/10.1071/PC050158>.

Lentini PE, Lumsden LF and van Harten E 2025, *Assessment, mitigation and monitoring of onshore wind turbine collision impacts on wildlife: A systematic review of the international peer-reviewed literature, and its relevance to the Victorian context*, Arthur Rylah Institute for Environmental Research report for the Department of Climate Change, Energy, the Environment and Water.

McKeown A, Vanderduys E and Wescott D 2024, *National Flying-fox Management Program data v2*, CSIRO, Data collection, <https://doi.org/10.25919/322q-q171>.

Moloney S, Lumsden L and Smales I 2019, *Investigation of existing post-construction mortality monitoring at Victorian wind farms to assess its utility in estimating mortality rates*. Arthur Rylah Institute for Environmental Research Technical Report Series No. 302, Department of Environment, Land, Water and Planning, Melbourne.

Molsher RL, Gifford EJ and McIlroy JC 2000, Temporal, spatial and individual variation in the diet of red foxes (*Vulpes vulpes*) in central New South Wales, *Wildlife Research*, 27(6):593–601, doi:10.1071/WR99015.

Nature Advisory 2025, *Gelliondale Wind Farm: Flora and Fauna Assessment*, Melbourne.

— 2026, *Gelliondale Wind Farm: Matters of National Environmental Significance (MNES) Assessment*, Melbourne.

— unpublished mortality data, Carcass search data 2004–2024.

Olah G, Stojanovic D, Webb M and Heinsohn R 2020, Comparison of three techniques for genetic estimation of effective population size in a critically endangered parrot, *Animal Conservation*, 24(3).

Oldland J, Clemens R, Haslem A and Weston M 2009, Shorebirds 2020: a program to monitor shorebird population trends in Australia, *Stilt*, 55:43–48.

Reid K and Rogers D 2026, Automated monitoring of the occurrence and flight behaviours of White-throated Needletails *Hirundapus caudacutus caudacutus* at an operational wind farm in Tasmania, *Australian Field Ornithology*, 43:60–66.

Smales I 2006, Wind farm collision risk for birds: cumulative risks for threatened and migratory species. Report to Australian Government Department of the Environment and Heritage, *Biosis Research Pty. Ltd.*

Symbolix 2020, *Post construction bird and bat monitoring at wind farms in Victoria. Public report Version 1.0*, Symbolix Pty Ltd, North Melbourne, Victoria.

DRAFT

Appendix 1: Carcass datasheet; to be used for any carcass finds (formal or incidental)

Gelliondale Wind Farm – MORTALITY MONITORING PROGRAM: CARCASS DATA-SHEET				
Fill out all details above the heavy line for each site searched. All details below the line are required if a carcass is found.				
Collector:	Date:	Start time:	Finish time:	
Turbine identifier:				
Temperature:	Wind direction/speed:		Humidity:	
Search purpose (e.g. scavenger trial):	If scheduled search; search completed: Yes / No			
On-site works in the last 5 days:				
Weather conditions in the last 5 days:				
Comments:				
Carcass details	Time:	Coordinates:	Substrate:	
Distance from tower(m):	Bearing from tower (deg):			
Species common name:			Sex/age? :	
Scientific name:				
Photo taken*	Yes / No			
Carcass condition: Intact, Scavenged, Feather spot:	Describe:			
Signs of injury:				
Estimated age of the carcass (✓):	<24 hrs	1-3 days	> 3 days	Other
Other notes: (incl. presence of stock)				
Post carcass find actions: 1. Place carcass in sealable plastic bag then place in a second sealable bag and take to freezer at the site office. 2. Send a copy of this completed form to the site manager within seven days of the date of the carcass find. 3. Complete one form per carcass found. 4. *Attach photo to this form				

Appendix 2: Collision Risk Model for White-throated Needletail at Gelliondale Wind Farm

DRAFT

Gelliondale Wind Farm White-throated Needletail Collision Risk Model

Ver. 0.9

Submitted to Synergy Pty Ltd



symbolix

making your data work harder

Website: www.symbolix.com.au

Twitter: [@SymbolixAU](https://twitter.com/SymbolixAU)

3 Queensberry Pl

North Melbourne

VIC 3051



Acknowledgements

Symbolix would like to acknowledge and thank the following people for their valuable insights, contributions and feedback in the preparation of this report and its contained analyses.

Version Control

Version	Status	Date	Approved For Release	Issued To	Copies	Comments
0.1	Draft	2025-06-03	-	-	-	-
0.9	Draft	2026-06-06	Internal	Internal	-	For review

Approved for release:

INSERT SIGNATURE PIC 2025-06-06

Your Name Here

Date

Limitation: This report has been prepared in accordance with the scope of services described in communications between Symbolix Pty Ltd and Synergy Pty Ltd. Any findings, conclusions or recommendations only apply to the aforementioned circumstances and no greater reliance should be assumed or drawn by Synergy Pty Ltd. Furthermore, the report has been prepared solely for use by Synergy Pty Ltd and Symbolix Pty Ltd.

Copyright: The concepts and information contained in this document are the property of Symbolix Pty Ltd. Use or copying of this document in whole or in part without the written permission of Symbolix Pty Ltd constitutes an infringement of copyright.

The Symbolix logo is a registered trademark of Symbolix Pty Ltd.



Contents

1 Executive summary	1
1.1 Summary of results	1
2 Methodology	3
2.1 Collision risk model overview	3
2.2 Activity rate	3
2.3 Distance modelling	4
2.4 Spatial flight density	5
2.5 Probability of collision given turbine interaction	5
3 Dataset summary	6
3.1 Survey summary	6
3.2 Observation summary	8
4 Distance detection models	9
4.1 Corrected flight activity rates	11
5 Spatial mapping	12
5.1 Methods - kernel smoothing	12
5.2 Results	13
6 Annual collision rates	14
References	16

List of Tables

1 Summary of survey effort at Gelliondale WF.	6
2 Summary of observations and survey effort at Gelliondale.	9
3 Turbine inputs for the NA-BAND model (provided by Synergy).	11
4 White-throated Needletail inputs for the NA-BAND model (provided by Nature Advisory).	11
5 Predicted long-term average collision rate by avoidance rate.	14

List of Figures

1 Survey and turbine locations.	7
2 WTNT sightings from ebird data (provided by Nature Advisory) in Wellington and South Gippsland counties with the survey times on top in grey.	8
3 Empirical (grey bars) and fitted (black line) observed-distance distributions for White-throated Needletails at Gelliondale. Distances were taken from GIS data.	10



4	Recorded observed distance distribution.	10
5	Schematic of kernel methods. The contributions of individuals points (small vertical lines along the x axis) are smoothed using a kernel (red dashes curves). The overall density is the combination of all the kernels (blue curve).	12
6	Contour map of WTNT utilisation, overlaid on the study area (boundary line). This combines the spatial mapping / kernel smoothing with the observed metres of WTNT flights over the whole farm. The kernel was calculated over the area within 2000 metres (90th percentile of the recorded observation distances) from the observation sites (i.e. the area of assumed complete visibility).	14
7	Plausible range of collisions for the WTNT at a 92% avoidance rate.	15



1 Executive summary

This document summarises the activity rate and collision risk forecasts for the White-throated Needletails (WTNT) at the proposed Gelliondale Wind Farm site, South East Victoria. This analysis was undertaken for Synergy using data collected by Nature Advisory.

Nature Advisory collected flight data from February 2021 to November 2024 across 22 sites (12 general Bird Utilisation Survey (BUS) sites and 10 WTNT targeted sites) at Gelliondale. Observations of WTNT were recorded during these surveys, including location, distance from the observer, flight height (starting, minimum and maximum) and flock size. A total of 613 surveys have been completed, with 435 general bird utilisation surveys (20 minutes each) and 178 targeted WTNT surveys (30 minutes each in 2021 and 40 minutes each in 2024). This equated to 16 to 41 bird utilisation surveys per site and 8 to 22 targeted surveys per site.

We report here an overview of the data used for analysis and an assessment of flight activity and collision risk with wind turbines at the proposed site. This analysis aims to provide quantitative data that can be considered as a part of an ecological risk analysis.

This includes:

- A summary of the survey effort, and the recorded WTNT observations (Section 3).
- A distance-corrected flight activity rate, in flights per hectare per hour. We use distance correction models (Buckland et al. 1993) to obtain an overall estimate of WTNT flight density, accounting for the fact that it's harder to spot flights that are further from the observer (Section 2.3). This measure does not take into account spatial variation in activity, but provides a measure of average activity over the whole study area.
- A spatial map of WTNT utilisation over the Gelliondale site (Section 5). This complements the previous measure by providing information on the spatial variation, but not on the likelihood of a flight in the first place.
- Results of predicted collisions of WTNT with turbines, using the Nature Advisory BAND collision risk model. This model combines the distance-corrected activity rate, the spatial map, a geometric model incorporating physical turbine and bird parameters, and proposed turbine locations.

1.1 Summary of results

A total of 250 survey hours were completed over 56 days of observations across the proposed site. This includes 435 (145 survey hours) BUS and 178 (105 survey hours) targeted WTNT surveys. These surveys captured the following:

- A total of 1103 individual flights in 49 total observations.
- A maximum recorded observation distance at first observation of 2500 meters.
- An effective detection radius of 1664 metres¹ (this radius was calculated using the

¹The effective detection radius is the radius of a circle, such that if 100% of flights were observed within this circle, then the expected number of flights detected is the same as for the actual survey (which has decaying detectability with



distances calculated from the GIS files provided by Nature Advisory²).

- A distance-corrected activity rate for WTNT of 0.0077 flights per hectare per hour with a 95% confidence interval of [0.0073, 0.0082].
- An expected annual collision rate for WTNT of 1.4, 0.9 or 0.4, for a 92%, 95% or 98% avoidance rate, respectively³.

distance).

²WTNT_Flightpaths_250210.zip and sites_14107.12.zip

³The avoidance rate is the probability that the individual will fly around the turbine infrastructure through alterations in flight path through the subject site or to fly through the risk zone of the turbine (i.e. the envelope of the tower and blade sweep) and avoid the turbine infrastructure.



2 Methodology

2.1 Collision risk model overview

Collision risk modelling (CRM) can be modelled by a step-wise risk model (Reason 1997), where the total risk is the probabilistic combination of the risk of each step in the process. The process can be summarised by the equation:

$$N_{\text{collision}} = F \times P(I|F) \times P(C|I) \times (1 - \text{AR})$$

where:

- $N_{\text{collision}}$ is the estimated number of flights ending in collision
- F is the estimated activity rate of flights in the region (flights / area / time)
- $P(I|F)$ is the probability of a flight interacting with a turbine or power line (given a flight in the region)
- $P(C|I)$ is the probability of collision, given an interaction occurs
- AR is the avoidance rate

The probability of collision given interaction (the final dot point above) is generated using the exact model published by Band Madders and Whitfield (2007), and Band (2012).

The probability of interaction component in Band Madders and Whitfield (2007) and Band (2012) (the third dot point above) includes an unreasonable assumption that every flight interacts with every turbine. The Nature-Advisory Band model (NA-BAND) uses distance sampling to get a background activity rate and uses this to estimate the expected number of interactions at each turbine over a given period of time, removing the reliance on the Band Madders and Whitfield (2007) and Band (2012) assumption. This modification of Band (2012) has subject to review as part of the approvals process for sites such as St Patrick Plains Wind Farm (Symbolix 2021), and Golden Plains Wind Farm (Symbolix 2017).

2.2 Activity rate

The ability of an observer to sight and record flights is influenced by multiple factors including the object's size, colouring, volume, and weather conditions on the day. We also assume that an observer's ability to detect an object will decrease the further the object is from the observer.

Simply taking the number of objects observed and dividing it by the time spent surveying gives a naive "encounter rate", which is flights on the site per unit time. However, this doesn't account for unsurveyed area and the relationship between distance and detectability. Naive encounter rate is thus poor estimate of true flight activity.

Instead, distance sampling can be applied to the encounter rate to correctly scale it to an activity rate. The key concept of this is the "detection function", which provides a model describing the probability of detecting an object (flight) given that is a certain distance from the observer



(Buckland et al. 1993). The “detection function” was modelled using the combined dataset. We calculated an activity rate for the WTNT across the site.

2.3 Distance modelling

To correct for imperfect visibility as distance from the field observer increases, we apply distance sampling (Buckland et al. 1993) methods to convert the raw encounter rate into an estimate of total flights per square km per year.

From the distance models, we obtain the effective detection radius (EDR), which provides a measure of the detectability in the study area. Larger EDRs suggest that detection is good at large distances, and the encounter rate requires a smaller correction for undetected flights. In this case the recorded distances were binned significantly, with bin widths of 50m or more. Because of this a smooth detection curve could not be fit to the recorded distances so distances were calculated from the observation site to the first point on the flight path for each observation.

Detection efficiency decreases as the distance between the observer and bird increases. Buckland et al. (1993) provides a method to estimate an “effective detection area” (EDA), which is a circular area with radius = EDR. The EDA is obtained by integrating the detection efficiency function. It represents a theoretical observed area with an expected number of flights observed within (based on the survey data) in which flights are observed with 100% probability. In essence, if in a survey, n flights were observed in t time, then the flight rate within that survey could be calculated as to be $\frac{n}{t \cdot \text{EDA}}$ flights per unit time per unit area.

It should be noted that although distance sampling can be applied to smaller sample sizes (i.e. observations), at least 50-70 positive observations of the target species is recommended by Buckland et al. (1993) for a robust detection function. Poor resolution of the detection function and the EDA will translate directly to a poor estimate of the activity rate.

We modelled the detection function using both half-normal and hazard-rate distributions (with and without cosine adjustments) as well as a uniform distribution with cosine adjustments. Models were run with and without desktop truncation, which can improve the fit of the detection function as it is not forced to fit the long tail rather than the main body of the distribution (Buckland et al. 1993, pg. 151). As the distances were taken from the flight paths, they were not binned so no cutpoints were applied. Models were compared and selected using the Akaike Information Criterion (AIC) (Burnham and Anderson 2002) and visual inspection.

To obtain a measure of uncertainty on the activity rate, we use the bootstrap (Buckland et al. 1993). The bootstrap is a stochastic technique involving resampling of the dataset in order to obtain “replicate” sets. The variation in replicate sets can be used to estimate the variance of the parameter estimate (activity rate).



2.4 Spatial flight density

Analysing spatial flight utilisation requires

- 1) relatively even observer visibility of the whole study area and
- 2) geolocated flight path data for each flight observed.

With 48 flight paths recorded the data is just sufficient to conduct a spatial CRM. However a custom area (defined by a buffer of the 90th percentile of the observation distances around each observation site) will be needed to account for the unusual shape of the wind farm (Section 5.1).

2.5 Probability of collision given turbine interaction

Turbine collision risk was estimated using an avian collision risk model, based directly on Band Madders and Whitfield (2007) and Band (2012). The NA-BAND application updates the model to accept spatial data inputs where available. This modification also extends Band (2012) to more correctly calculate the probability that a flight will interact with a turbine (if a flight occurs onsite) for general sites. The probability of collision after interaction is a geometric calculation using Band (2012). The NA-BAND model has previously been applied to assess collision risk for Moorabool Wind Farm, Dundonnell Wind Farm, and Golden Plains Wind Farm (Victoria).

There are a number of important assumptions of these models that must be met to ensure reliability of the model results. Firstly, the model assumes that the surveys are conducted at times throughout the year and locations across the site that are representative of the site as whole. For example, if the species activity rates substantially varies across the year (e.g. due to breeding or migratory behaviours), then the surveys must capture this variability and on average, represent of the species yearly utilisation of the site. Similarly, if there is spatial variability in species utilisation, the survey sites must capture the site average utilisation. This means that if utilisation is much higher in one region of the site, survey sites are not clustered in this region, but are evenly spread across areas of high to low utilisation.

Another important note is that the NA-BAND model has no assumption about the upper limit of the number of birds present in the area and available to collide with a given turbine. The model estimates the number of flights that are at risk of collision under the assumption that any individual bird is immediately replaced. This estimate of flight collisions may be higher than the number of individuals present in the area at risk of collision.



3 Dataset summary

Survey and observation data were provided to us from Nature Advisory through White & Case LLP.

3.1 Survey summary

- 613 surveys (435 BUS surveys and 178 targeted WTNT surveys) were performed at Gelliondale between 2021-02-22 and 2024-11-16, across 7 seasons (targeted surveys were conducted in Summer and Autumn in 2021 and 2024).
- Surveys were conducted at 22 sites (12 BUS sites and 10 targeted sites).
- The number of survey hours per site for BUS sites was 13.3, except sites B9 and R3 which had 5.3 survey hours (due to only being added in 2024).
- The number of survey hours per site for targeted sites was 12, except sites WTNT1 and WTNT2 which had 4 survey hours (due to only being used in 2021) and site WTNT8 which had 13 survey hours (two extra surveys in 2021).
- Totalling to 250 survey hours across all sites. This equates to an average of 36 hours per season.

The location of the 22 sites are shown in Figure 1. The survey effort is summarised in Table 1.

Table 1: Summary of survey effort at Gelliondale WF.

Year	Season	Start date	End date	Number of surveys	Total survey hours
2021	Summer	2021-02-22	2021-02-26	42	21.00
2021	Autumn	2021-03-22	2021-03-26	40	20.00
2023	Spring	2023-11-13	2023-11-16	80	26.67
2024	Summer	2024-02-12	2024-03-01	127	52.00
2024	Autumn	2024-03-01	2024-04-18	147	71.33
2024	Winter	2024-08-05	2024-08-12	97	32.33
2024	Spring	2024-11-12	2024-11-16	80	26.67

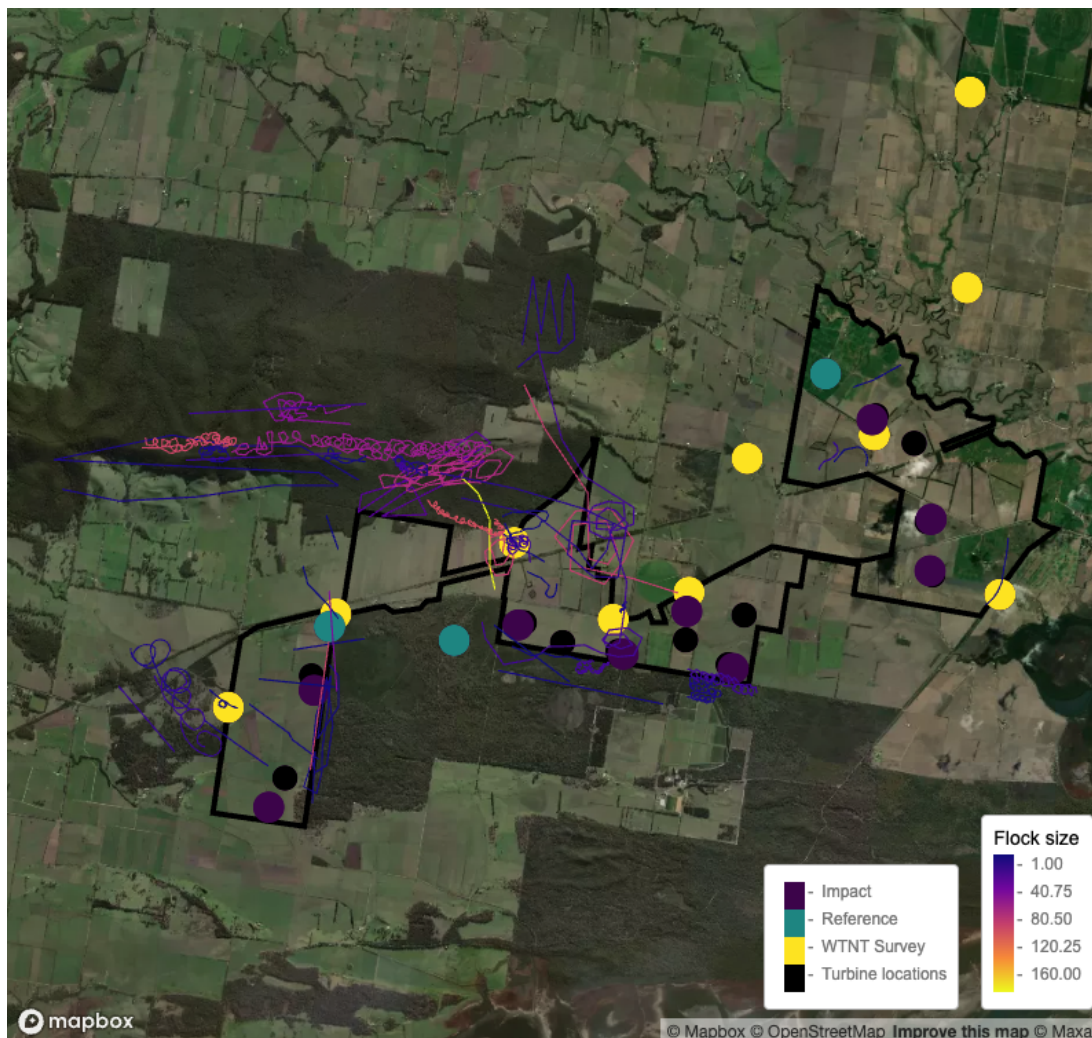


Figure 1: Survey and turbine locations.

3.1.1 Temporal Coverage

Ideally, CRM data collection surveys would have equal survey effort across the entire period a species is expected to be onsite. Our goal is to estimate the expected rate of flights on the site when the species is present which requires the surveys be representative of the site's spatial extent and the time period. This is particularly important when a species activity varies throughout the survey period.

In Figure 2 it is clear that the surveys only covered about 50% of the time that WTNT are onsite, however it appears that the peak and right tail of WTNT activity have been covered. As a result we have chosen to treat the activity rate captured in the surveys conducted in February, March and April as representative of the average activity across the whole period.

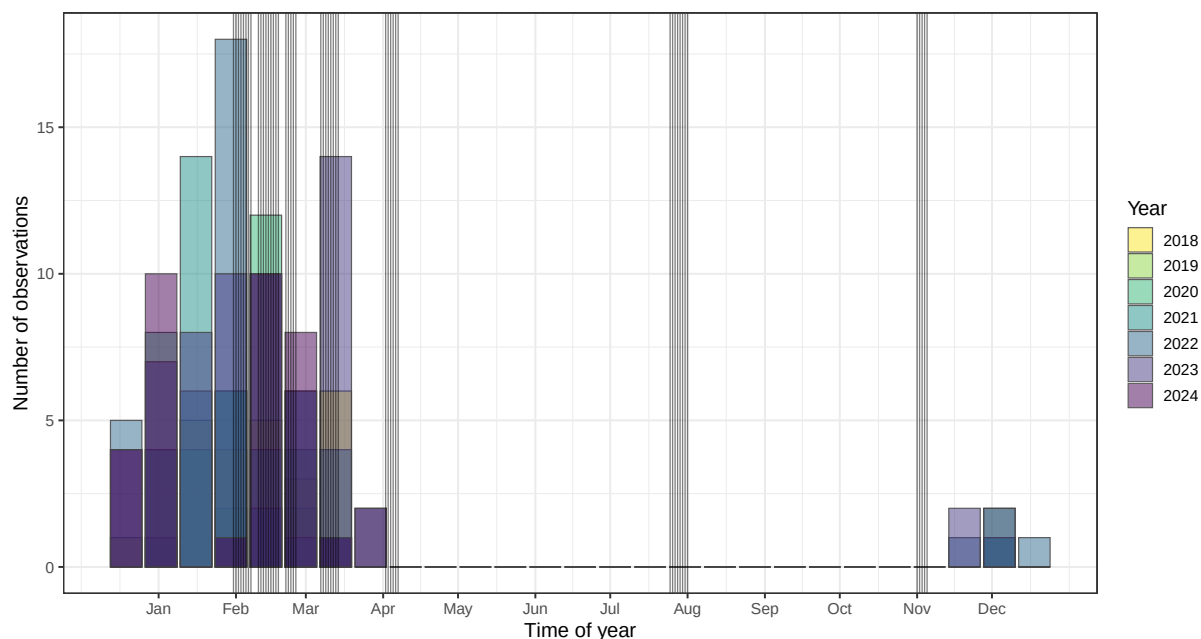


Figure 2: WTNT sightings from ebird data (provided by Nature Advisory) in Wellington and South Gippsland counties with the survey times on top in grey.

3.2 Observation summary

Analysis was based off:

- 49 observations at Gelliondale, with a total of 1103 flights sighted.
- Observations at heights between 10 and 800 metres above ground and between 0 and 2500 metres from the observer (between 54 and 3585 metres when calculated from the flight paths).
- All observations were recorded with height above ground and distance from the observer recorded, and therefore could be used for calculations of activity rates.

The WTNT observations are summarised in Table 2.

**Table 2: Summary of observations and survey effort at Gelliondale.**

Year	Season	Observations	Individuals	Median Flight Duration (mins)	Surveys	Survey hours	Encounter rate
2021	Summer	11	469	NA	42	21.00	22.33
2021	Autumn	6	75	31	40	20.00	3.75
2023	Spring	0	0	0	80	26.67	0
2024	Summer	21	488	1.92	127	52.00	9.38
2024	Autumn	11	71	1.76	147	71.33	1
2024	Winter	0	0	0	97	32.33	0
2024	Spring	0	0	0	80	26.67	0

4 Distance detection models

The most parsimonious model was a half-normal distribution without cosine adjustments. Since the distances were taken from the GIS data the data was not binned so no cutpoints were needed, and the models did not benefit from desktop truncation. As such a half-normal distribution with no cosine adjustment terms, truncation or cutpoints was chosen. The distribution of distances from GIS is displayed in Figure 3 with the selected fitted model (curve) against the empirical distances (histogram). The recorded distances are also shown in Figure 4 for comparison.

The effective detection radius (EDR) provides a measure of detectability and is used to distance-correct the raw activity rate. Here, the EDR was found to be 1664 meters.

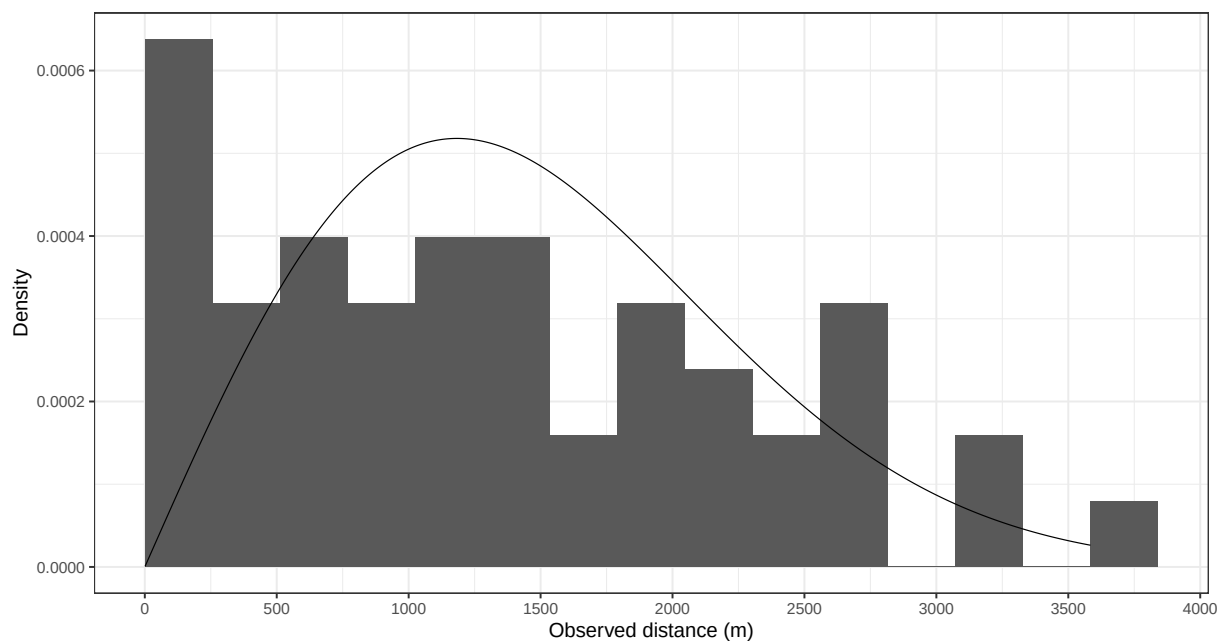


Figure 3: Empirical (grey bars) and fitted (black line) observed-distance distributions for White-throated Needletails at Gelliondale. Distances were taken from GIS data.

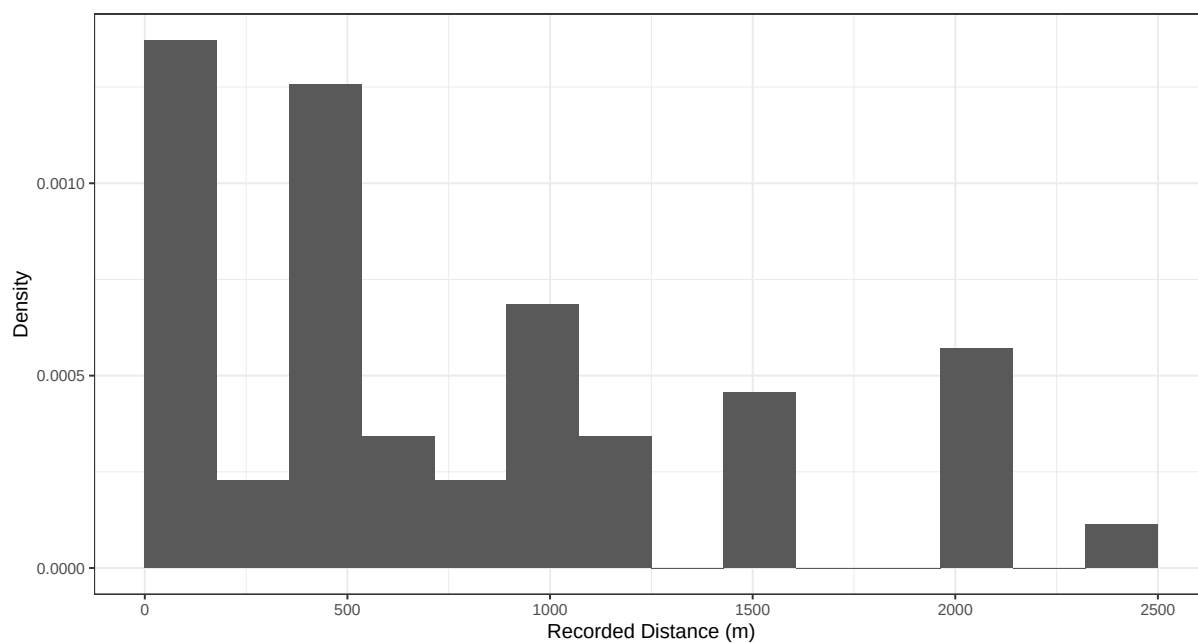


Figure 4: Recorded observed distance distribution.



4.0.1 CRM inputs

Additionally to an activity rate, the NA-BAND model requires a number of turbine-related and bird-related inputs, which are summarised in Tables 3 and 4 respectively. Species parameters were provided by NA based on published literature. The activity rate is calculated as **flights / ha / hour**.

Table 3: Turbine inputs for the NA-BAND model (provided by Synergy).

Parameter	Value
Model	V162
Hub height (m)	129
Blade length (m)	81
Max chord (m)	4.32
Pitch (deg)	25
Rotation period (s)	7.5
Proposed number of turbines	13

Table 4: White-throated Needletail inputs for the NA-BAND model (provided by Nature Advisory).

	White-throated Needletail
Bird length (m)	0.2
Bird wingspan (m)	0.46
Flight speed (m/s)	10
Percentage of year on site	40*
Percentage of daytime active	100
Percentage of nighttime active	20

* Updated during analysis from 50% to 40% based on Figure 2

4.1 Corrected flight activity rates

We applied the distance sampling to the number of observations of WTNT to obtain the final estimate of distance-corrected activity rates.

The distance-corrected activity rate of WTNT at Gelliondale was **0.0077 flights per hectare per hour** with a 95% confidence interval of **[0.0073, 0.0082]**.

5 Spatial mapping

Flight tracks were recorded by Nature Advisory and provided as GIS set. The tracks were then “smoothed” over the surrounding area using kernel functions, which then provides a two-dimensional probability map over the study area.

5.1 Methods - kernel smoothing

To understand the relative spatial patterns in flight density we need to transform the individual flight tracks into a smoothed probability map for the whole area. The flight points are “smoothed” using a kernel function (Figure 5 illustrates the concept with a simpler 1-dimensional method, whereas our method operates in 2 dimensions)⁴. For an introduction to kernel methods in ecology see Worton (1989) or Fulk and Quinn (1996) for more detailed mathematics.

The resulting maps are a visualisation of the conditional likelihood that a flight will be seen at a particular location, relative to the other locations. That is, it answers the question: “if a flight exists in the study area, where is it likely to be?”

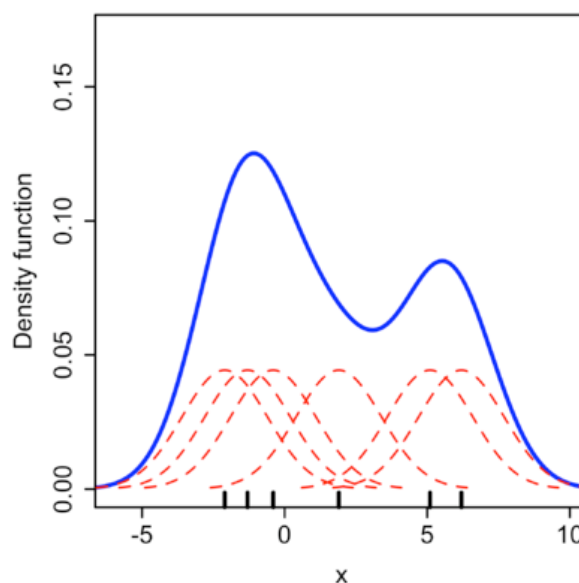


Figure 5: Schematic of kernel methods. The contributions of individuals points (small vertical lines along the x axis) are smoothed using a kernel (red dashes curves). The overall density is the combination of all the kernels (blue curve).

We used a W4 kernel function with smoothing parameter $h = 750$ metres. This kernel function has a Gaussian-like shape, but compact support - a single point on a flight path is smoothed to no more than $2 \times h$ metres away from the original point. While the smoothing, to some degree, provides a safety buffer to account for the difficulty of recording exact flight tracks, mostly we

⁴“Comparison of 1D histogram and KDE”. Created by Drleft and edited by A. Jackson (Symbolix). Available under the Creative Commons Attribution-Share Alike 3.0 Unported license.



smooth to account for natural flight variability, to answer: “even though an eagle flew here today, if it flew again, where is it likely to be?”

Prior to smoothing, we re-spaced the points on the flight path to a consistent distance (10 metres). The raw flight paths had point spacing from anywhere between 8.03 and 1126 metres, which meant that if we smoothed on the raw data, some flight paths would erroneously contribute more weight to the spatial map than others. Once re-spaced, the contribution of each flight to the spatial map was proportional to its length.

Due to the unique shape of the site we needed to define “study area” over which to calculate the relative flight utilisation. The study area was defined as using a buffer of the 90th percentile of the recorded observation distances (2000 metres) around the observation sites, this is the area where we can reasonably assume complete visibility. Outside of this area, where the likelihood of detecting a WTNT is approaching zero, there is ambiguity between what is a true “zero” and what is just “N/A” (i.e. we don’t know if there were no flights or just no flights *detected* due to poor visibility). Assuming no detections means no flights at distances greater than 2000 metres would bias the estimate down.

5.2 Results

Figure 6 plots the contours of utilisation for WTNT. The green and yellow contours have the higher levels of utilisation, and the utilisation level decreases as the colour tends towards blue and purple.

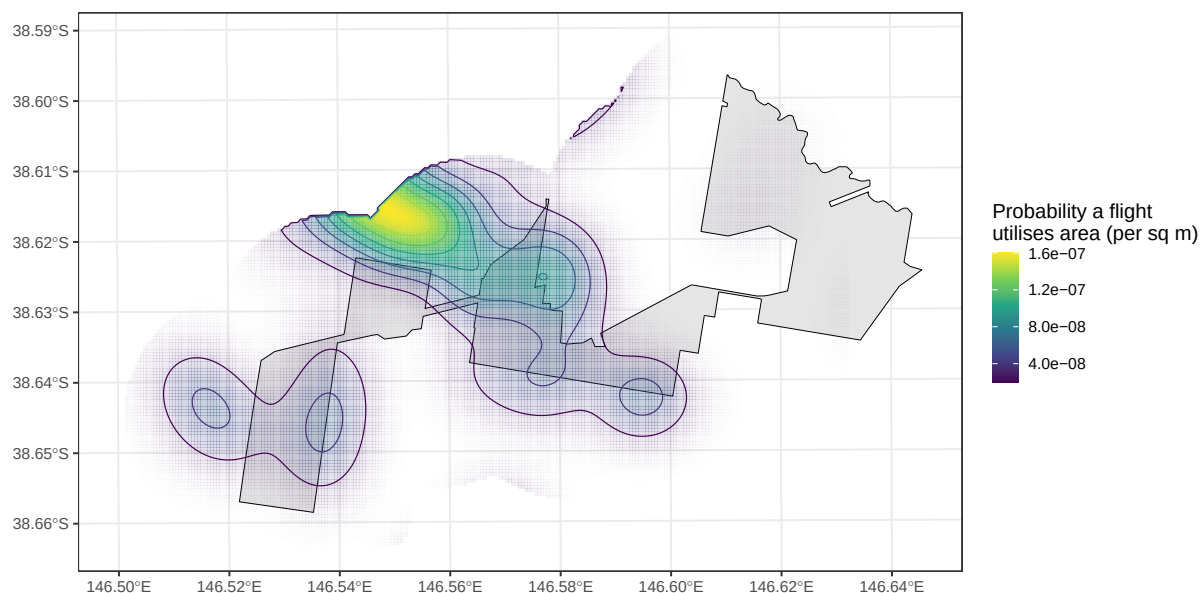


Figure 6: Contour map of WTNT utilisation, overlaid on the study area (boundary line). This combines the spatial mapping / kernel smoothing with the observed metres of WTNT flights over the whole farm. The kernel was calculated over the area within 2000 metres (90th percentile of the recorded observation distances) from the observation sites (i.e. the area of assumed complete visibility).

In Figure 6, we can see that WTNT density is concentrated in the centre-North over the forest, with some activity in the South-West and almost none in the North-East section of the site.

6 Annual collision rates

Annual collision rates (based on the turbine and bird parameters in Tables 3 and 4, the turbine locations in Figure 1 and the activity rates in Section 4.1) are summarised in Table 5.

Table 5: Predicted long-term average collision rate by avoidance rate.

Avoidance rate	0.92	0.95	0.98
Annual collisions	1.404	0.878	0.351

The plausible range of cumulative mortalities (over a 30 year period assuming 92% avoidance) is shown in Figure 7. These counts represent the potential yearly manifestation of the long-term rate. Over time, the long-term rate should regress to the values in this Figure.



Gelliondale Wind Farm White-throated Needletail Collision Risk Model

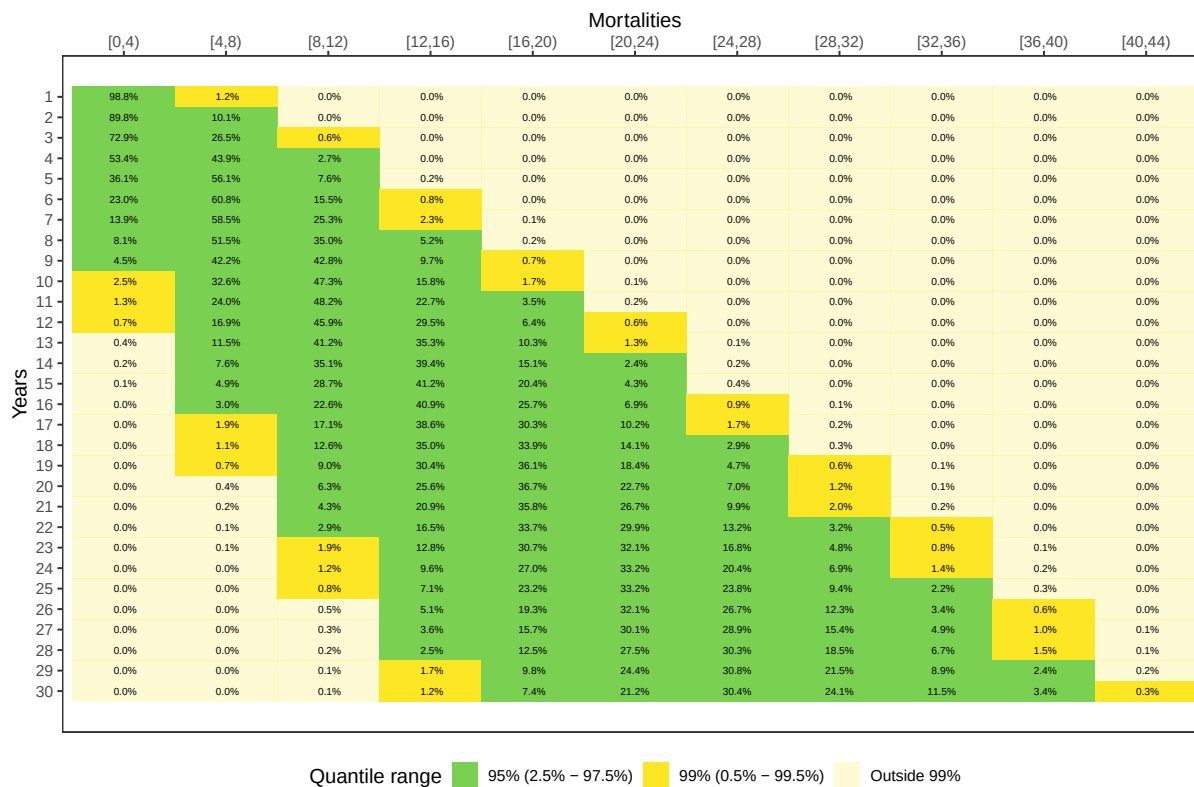


Figure 7: Plausible range of collisions for the WTNT at a 92% avoidance rate.



References

- Band. 2012. "Using a Collision Risk Model to Assess Bird Collision Risks for Offshore Wind Farms." SOSS report, The Crown Estate. http://www.bto.org/sites/default/files/u28/downloads/Projects/Final_Report_SOSS02_Band1ModelGuidance.pdf.
- Band, Madders, and Whitfield. 2007. "Developing Field and Analytical Methods to Assess Avian Collision Risk at Wind Farms." In *Birds and Wind Farms: Risk Assessment and Mitigation*, edited by Janss de Lucas M., 259–75. Quercus Books: Madrid.
- Buckland, Stephen T, David Raymond Anderson, Kenneth P Burnham, Jeffrey L Laake, et al. 1993. "Distance Sampling: Estimating Abundance of Biological Populations."
- Burnham, Kenneth P, and David R Anderson. 2002. "A Practical Information-Theoretic Approach." *Model Selection and Multimodel Inference* 2: 70–71.
- Fulk, David, and Dennis Quinn. 1996. "An Analysis of 1-d Smoothed Particle Hydrodynamics Kernels." *Journal of Computational Physics* 126 (1): 165–80.
- Reason, James. 1997. *Managing the Risks of Organisational Accidents*. Ashgate Publishing Ltd: Aldershot England.
- Symbolix. 2017. "Brolga Collision Risk at Golden Plains Wind Farm." Appendix to Brett Lane & Associates (2017) Golden Plains Wind Farm EES Referral Initial Brolga Impact Assessment. <https://www.planning.vic.gov.au/environmental-assessments/browse-projects/golden-plains-wind-farm>.
- . 2021. "St Patrick Plains Wind Farm Eagle Flight Analysis." Appendix to North Barker (2021) St Patricks Plains Wind Farm: Threatened Avian Fauna - Site Utilisation; submitted as Appendix B in support of the EIS application. <https://epa.tas.gov.au/business-industry/assessment/proposals-assessed-by-the-epa/st-patricks-plains-wind-farm-pty-ltd-st-patricks-plains-wind-farm-central-highlands-tasmania>.
- Worton, Brian J. 1989. "Kernel Methods for Estimating the Utilization Distribution in Home-Range Studies." *Ecology* 70 (1): 164–68.