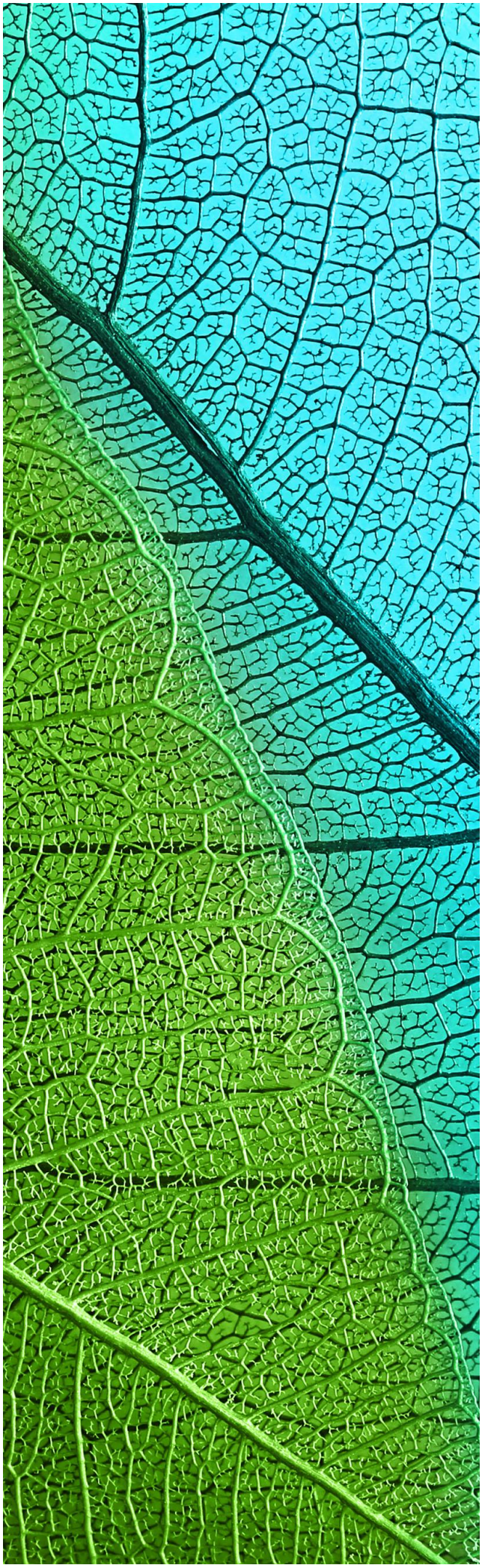


Willatook Wind Farm

Bat and Avifauna Management Plan

DRAFT

Prepared for
Willatook Wind Farm Pty Ltd

May 2026
Report No. 16087.21 (2.1)

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 and Status

The following table outlines the revisions made to this document

Version	Date of Issue	Description	Prepared By	Reviewed by	Approved by
16087.21 (v1.0)	29/09/2022	First draft	Curtis Doughty, Jackson Clerke, Stephen Griffiths	Curtis Doughty & Bernard O'Callaghan	Bernard O'Callaghan
16087.33 (v2.0)	24/04/2026	Major changes to align with the Handbook	Sergio Nolazco Plasier & Danielle Eastick	Mike Hitchcock	Inga Kulik
16087.33 (v2.1)	5/05/2026	Updates with comments from Wind Prospect	Mike Hitchcock & Danielle Eastick	Mike Hitchcock	Inga Kulik

Contents

Tables

Figures

Appendices

Glossary of terms

Term/Acronym	Definition
BACI	Before-After-Control-Impact
BAM Plan	Bat and Avifauna Management Plan
BUS	Bird utilisation survey
Commissioning	All activities, including turning of turbines, after the components of the wind turbines are installed.
Cwth	Commonwealth
DCCEEW	(Commonwealth) Department of Climate Change, Energy, the Environment and Water
DEECA	(Victoria) Department of Energy, Environment and Climate Action
EPBC Act	(Commonwealth) *Environment Protection and Biodiversity Conservation Act 1999*
Full operation	Once all wind turbines have been commissioned and are exporting electricity to the grid, considering the Project is not to be commissioned in stages.
Listed species	Any bird/bat species listed as threatened or migratory under the EPBC Act or listed as threatened under the BC Act.
MNES	Matters of national environmental significance under the EPBC Act
Non-listed species	Any bird/bat species not listed as specially protected, threatened or migratory under the EPBC Act or not listed as threatened under the BC Act.
OH&S	Occupational Health and Safety
RSA	Rotor swept area (typically expressed as metres above ground level).
RSH	Rotor swept height
SCADA	Supervisory Control and Data Acquisition system
Study area	Land parcels that contain the wind turbines proposed for the Willatook Wind Farm.
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 which 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.
WTGs	Wind Turbine Generators
WWF	Willatook Wind Farm

1. Introduction

1.1. Project description

Nature Advisory Pty Ltd was commissioned by Willatook Wind Farm Pty Ltd to develop a Bat and Avifauna Management Plan (BAM Plan), to guide the development and operations of the Willatook Wind Farm (henceforth 'WWF' or 'the Project'). The Project is located approximately 22 km north of Port Fairy and 32 km north-west of Warrnambool, and more locally about 3 km north-east of Orford and 10 km south-west of Hawkesdale. It is situated south of the Woolsthorpe–Heywood Road, between the Penhurst–Warrnambool Road to the east and the Hamilton–Port Fairy Road to the west (Figure 1),

The Project covers more than 3,600 ha of private and public land that is mainly used for agriculture (predominantly sheep and cattle grazing) in the Moyne Shire. As a result of historical clearing for agriculture, native vegetation within the project site is largely restricted to roadside reserves and along watercourses. The proposed wind farm comprises up to 52 wind turbine generators, a battery storage facility and associated infrastructure (Figure 2).

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

Number of turbines	52
Hub height	150 - 166 m
Blade length	86.5 m
RSA minimum height	60 m
RSA maximum height	254 m

The WWF 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. The WWF will generate approximately 1,200 GW hours of renewable energy per annum, which can supply energy to over 120,000 households.

1.2. Environmental Outcomes

This BAM Plan aims to achieve the following environmental outcomes:

- Assessing the impacts from the WWF on threatened and migratory bird and bat species listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and/or the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act);
- Minimising the risk of turbine collision on bird and bat species in the study area;
- Improving understanding of changes in behaviour (if any) of birds and bats due to wind farm construction and operation;
- An effective and efficient monitoring program for the detection of carcasses from turbine collisions, including the collection and analysis of mortality data;
- Adopting an adaptive management approach to the reduction of impacts from the WWF by providing a pathway for updating management responses in response to mortality data; and
- Developing and implementing effective mitigation measures in order to reduce the risk of turbine collisions with birds and bats, when required.

Species of concern

The following key species of concern were recorded during baseline assessments or identified as species that may occur in the study area and may be vulnerable to collisions:

- **Brolga**, *Grus rubicunda* (FFG Act: Endangered)
- **Southern Bent-winged Bat**, *Miniopterus orianae bassanii* (EPBC Act and FFG Act: Critically endangered)

Other listed species have been recorded onsite, but due to a lower risk of collision, will be addressed through the generalised listed species impact triggers and adaptive management strategies.

1.3. BAMP structure

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

Section 2 provides information on the pre-construction baseline monitoring and Species of Concern

Section 3 details the operational phase bird and bat monitoring and the carcass search program

Section 4 outlines the existing application of the mitigation hierarchy to the project

Section 5 defines impact triggers and procedures for listed and non-listed fauna, mitigation, compensatory measures, and the adaptive decision-making framework for these triggers

Section 6 provides species-specific management strategies for target species

Section 7 describes the reporting and review process

Section 8 details the management actions and report timing

Section 9 describes the roles and responsibilities for BAM Plan implementation

This management plan was written and reviewed by a team from Nature Advisory, comprising Curtis Doughty (Senior Zoologist), Jackson Clerke (Operational Monitoring Team Lead), Dr Stephen Griffiths (Senior Zoologist), Dr Danielle Eastick (Senior Zoologist), Dr Sergio Nolazco Plasier (Senior Zoologist), Mike Hitchcock (Senior Zoologist & Project Manager), Bernard O'Callaghan (Managing Director), and Dr Inga Kulik (Director).

Figure 1. Regional location of the Willatook Wind Farm

Project No: 16087.21
Project location: Willatook Wind Farm, VIC
Date: 31/07/2026

Willatook Wind Farm boundary
Town
Roads

BROADWATER
HAWKESDALE
WOOLSTHORPE
ORFORD
ST HELENS
KIRKSTALL
KOROIT
PURNIM
YAMBUK
PORT FAIRY
DENNINGTON
WARRNAMBOOL
ALLANSFORD

Dawson Street
Woolsthorpe - Heywood Road
Warrnambool - Caramut Road
Hamilton - Port Fairy Road
Penshurst - Warrnambool Road
Koroit - Woolsthorpe Road
Warrnambool - Caramut Road
Spencer Road
Penshurst - Port Fairy Road
Koroit - Port Fairy Road
Southern Cross Road
Hopkins Highway
Princes Highway
Caramut Road
Bridge Road
Princes Highway
Raglan Parade
Mortlake Road
Hopkins Highway
Raglan Parade
Princes Highway
Princes Highway

Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community

N

Kilometers
0 2 4 6 8

GDA2020 MGA Zone 54

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

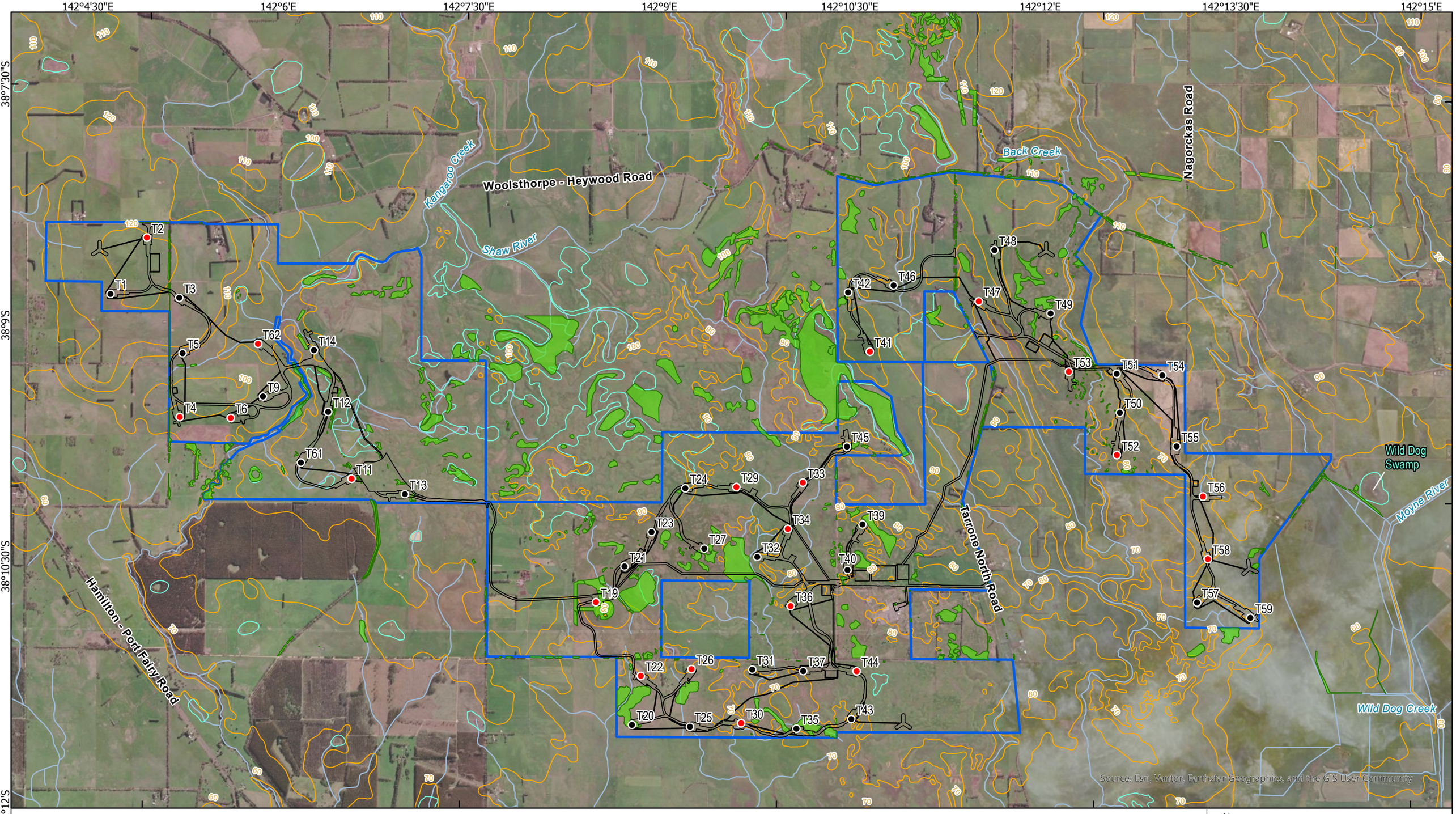


Figure 2. Layout of the Willatook Wind Farm

Project No: 16087.33 **Project location**: Willatook Wind Farm, VIC **Date**: 31/07/2026

- Willatook Wind Farm boundary
- Construction footprint
- Turbine
- Turbine to be searched
- Contour
- Waterway
- Native vegetation
- DEECA mapped wetland

ADVERTISED PLAN

N

Kilometers 0 1 2

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

2. Pre-construction Utilisation Monitoring

2.1. Existing site and habitat characterisation

The WWF is located in the Victorian Volcanic Plain bioregion of western Victoria. The land use of the site and surrounds is agricultural (primarily livestock grazing), and widespread clearing of the WWF study area has resulted in native vegetation being largely restricted to roadside reserves. Vegetation within most private properties around the site consists predominantly of introduced vegetation, which includes areas of improved and unimproved pasture dominated by common, introduced pasture species.

The dominant landscape across the WWF site is rocky outcrops interspersed with lower depressions that hold water ephemerally. The WWF site falls within the Shaw River catchment in the west, and the Moyne River catchment in the east. Aquatic systems within the WWF site include the Moyne River at the eastern extremity, Back Creek (a tributary of the Moyne River) in the east of the site, the Shaw River in the north and west of the site, and the Cockatoo Swamp complex in the centre of the site. Several other smaller ephemeral drainages occur within the site. The site receives an average annual rainfall in excess of 700 mm (BOM 2026).

Much of the site is low-lying and has a poorly defined drainage system, resulting in numerous small, ephemeral wetlands that fill during wet periods. However, much of the original wetland habitat in the study area has been modified or drained, with the limited area of remaining ephemeral wetland habitats being of moderate quality for fauna habitat. Typically lacking floristic diversity and mostly characterised by sedges and rushes, the low-lying areas are typically inundated during the wetter months. These areas are mostly grazed whenever possible. The largest of these habitats is Cockatoo Swamp, which is spread out across agricultural land with limited remnant indigenous vegetation cover. Artificial waterbodies, including farm dams and drains in drained wetlands, exist in the WWF site. Some support aquatic or fringing vegetation, typically surrounded by grazing and cropped land.

The key fauna habitat areas listed below occurred within the broader region:

- **Modified Native Grassland** – This habitat was largely of moderate quality for fauna, with low plant diversity, limited structural complexity, and few refuge sites. It is largely confined to fragmented roadside remnants within the Project Area. It may be used opportunistically by grassland and farmland bird species and open-space foraging microbats.
- **Modified Woodland and Scattered Trees** – This habitat is of low to moderate quality for fauna, comprising roadside tree lines and scattered paddock trees up to 15 m tall, but lacking mid-storey and understorey structure. It is localised within roadside reserves and grazing land, providing limited connectivity. It may be used by some woodland and farmland bird species and clutter-edge foraging microbats.
- **Rocky Rise / Stony Knoll** – This habitat is of low to moderate quality and occurs primarily in the southern section, consisting of embedded rocks with sparse vegetation cover, often within grazed land. These areas had a high weed invasion and low floristic diversity. It is may provide limited foraging opportunities for some bird species.
- **Rivers, Creeks and Drainage Lines** – These habitats are of moderate quality for fauna and range from permanent waterways to ephemeral drainage lines, with varying levels of aquatic and riparian vegetation. Some hold water year-round and provide more consistent habitat,

while others offer temporary resources following rainfall. These areas provide important connecting habitats and resources for various bird and bat species.

- **Swamps and Marsh** – This habitat is of moderate to high quality, though much of it has been historically modified or drained, with remaining areas characterised by sedges and rushes and seasonal inundation. Occurring in low-lying areas such as Cockatoo Swamp, these habitats are often grazed with degraded native vegetation diversity. They provide suitable breeding and foraging habitat for Brolga, and may be used by other bird and bat species when inundated.
- **Planted Vegetation** – This habitat is of low quality for fauna, consisting of young planted native and exotic trees, typically in windbreaks and an Eucalyptus plantation in the southwest, with little structural diversity and few hollows. It occurs as linear features within agricultural land and lacks key habitat components, such as an understorey. It is unlikely to be an important habitat for birds, but may be used opportunistically by clutter-edge and closed-space foraging microbats.
- **Artificial Waterbodies** – This habitat is of low to moderate quality and includes farm dams and drains, sometimes supporting aquatic or fringing vegetation within agricultural land. These features are scattered across the study area and provide localised water resources. They are unlikely to be important for most birds and bats, but may be utilised on occasion.
- **Exotic Pasture and Crops** – This habitat is of low quality for fauna, dominated by grazed pasture and cropping with minimal structural complexity or shelter. It is widespread across the study area and highly modified for agricultural use. It is unlikely to offer important habitat features for the listed bird and bat species in the area.

2.2. Pre-construction surveys

Baseline (pre-construction) surveys at the WWF have been undertaken over almost a decade (Table 2) in accordance with relevant Commonwealth guidelines and industry standards. These fauna assessments were undertaken by Ecology and Heritage Partners and Nature Advisory, with all methods and results detailed in the following reports:

- Biodiversity Assessment (EHP 2018), report prepared by Ecology and Heritage Partners for Willatook Wind Farm Pty Ltd
- Flora and Fauna Assessment (Nature Advisory 2022), report prepared by Nature Advisory for Willatook Wind Farm Pty Ltd
- Brolga Impact Assessment (Nature Advisory 2026a), report prepared by Nature Advisory for Willatook Wind Farm Pty Ltd
- Bat Species of Concern Assessment (Nature Advisory 2026b) report prepared by Nature Advisory for Willatook Wind Farm Pty Ltd
- Biodiversity Assessment Addendum (Nature Advisory 2026c), report prepared by Nature Advisory for Willatook Wind Farm Pty Ltd

Comprehensive field surveys have been undertaken at the WWF, characterising the utilisation of the Project Area by birds and bats and the likelihood of impacts by the project. A summary of pre-construction bird and bat surveys is presented in Table 2, with descriptions of methods below. Further details are available in the existing reports mentioned above.

Table 2: Baseline (pre-construction) surveys conducted at the WWF

Type	Detail	Timing	Consultancy (reference report)
Overview assessment	Flora and fauna habitat (desktop)	▪ 2018	EHP (EHP 2018)
Birds			
Bird Utilisation Surveys (BUS)	Seasonal BUS (19 days)	Spring ▪ 4 – 6 and 16 – 20 November 2009 (EHP)	EHP (EHP 2018)
		Spring ▪ 15 – 20 October 2018 (NA) Summer ▪ 24 – 28 February 2019 (NA)	NA (Nature Advisory 2022)
Brolga	Flocking surveys (48+ days)	▪ 2009-2010	EHP
		2018 ▪ 2 – 3 May ▪ 31 May – 1 June 2019 ▪ 23 – 24 January ▪ 5 – 6 February ▪ 25 Feb. – 1 March ▪ 25 – 27 March ▪ 30 April – 2 May ▪ 25 – 27 May ▪ 19 – 20 June 2020 ▪ 21 – 24 January ▪ 17 – 21 February ▪ 10 – 13 March ▪ 27 April – 1 May ▪ 19 – 22 May ▪ 15 – 18 June	NA (Nature Advisory 2026a)
Brolga	Breeding survey (70+ days)	▪ 2009 ▪ 2010 (aerial survey) ▪ 2011 ▪ 2012-13	EHP (Nature Advisory 2026a)
		2018 ▪ 30 Jul – 3 August ▪ 13 – 17 August ▪ 24 – 27 September ▪ 22 – 26 October	NA (Nature Advisory 2026a)

Type	Detail	Timing	Consultancy (reference report)
		▪ 25 – 26 October (aerial survey) ▪ 19 – 23 November ▪ 4 – 7 December 2019 ▪ 15 – 18 July ▪ 12 – 15 August ▪ 16 – 19 September ▪ 15 – 18 October ▪ 11 – 14 November ▪ 9 –12 December 2020 ▪ 27 – 28 July ▪ 29 –31 August ▪ 27 – 29 September ▪ 27 – 29 October ▪ 16 – 17 November ▪ 14 –15 December 2021 ▪ 2 – 4 August 2021 2022 ▪ 25 – 28 October 2024 ▪ 13 – 15 August ▪ 11 – 13 September ▪ 14 – 17 October ▪ 11 – 13 November 2025 ▪ 22 – 24 September	
Migratory shorebirds	Habitat and count surveys (12 days)	Summer (NA) ▪ 4-7 November 2018 ▪ 11-13 December 2018 ▪ 11-12 January 2019 ▪ 23-24 January 2019 ▪ 28 February 2018	NA (Nature Advisory 2022)
Bats			
Microbat Utilisation Surveys	Ground-based ultrasonic surveys (3506 nights)	2009 ▪ 30 October – 22 November 2010 ▪ 20 October – 22 November 2011 ▪ 9 February – 31 March	EHP (EHP 2018)

Type	Detail	Timing	Consultancy (reference report)
		2018 ▪ 25 October – 14 December 2019 ▪ 27 February – 1 May 2020 ▪ 19 February – 2- May	NA (Nature Advisory 2026b)
	At-height ultrasonic surveys (1140 nights)	▪ 2 May 2019 – 19 May 2020	NA (Nature Advisory 2026b)

2.2.1. Bird Utilisation Survey (BUS)

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). The aim of these surveys was to identify the species of birds and characterise their utilisation of the Project Area.

Experienced zoologists undertook three pre-construction BUS between November 2009 and February 2019 (Table 2). Eight survey sites were classified as impact (within 200 m of the proposed WTG, $N = 5$) or reference (outside the proposed Project Area by at least 500 m, $N = 3$). Descriptions of the habitat at these sites and specific locations are provided in detail within existing reports (Nature Advisory 2022).

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 15-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. 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 and birds at RSA were recorded while moving between survey points within and outside the BUS study area.

Further details are provided within previous reports (Nature Advisory 2022).

2.2.2. Brolga surveys

Brolga surveys were undertaken in accordance with the Interim Guidelines (DSE 2012), which align with the current methods outlined in Appendix 2 of DEECA's *Handbook for the Development of Renewable Energy in Victoria* (DEECA 2025a). Breeding surveys incorporated both aerial and ground-based approaches, with aerial surveys conducted by two observers in a light aircraft systematically traversing the Project Area and surrounding landscape. Ground-based surveys

targeted suitable wetland habitat and, where required, drones were used to obtain unobstructed views of areas obscured by vegetation or topography. Breeding surveys were undertaken monthly between July and December, recording all Brolga observations, habitat characteristics, and any evidence of nesting behaviour. Flocking surveys were conducted outside the breeding season, targeting all suitable wetlands and adjacent foraging habitats within and surrounding the Project Area.

Further details are provided within previous reports (Nature Advisory 2022).

2.2.3. *Migratory shorebird surveys*

Migratory shorebird surveys were undertaken in accordance with relevant Commonwealth guidance for surveying shorebirds in non-tidal environments (DEE 2017). An initial desktop assessment identified potential habitat within 3 km of the Project Area using existing records, DEECA-mapped wetlands, and habitat features, including wetlands, creeklines, and seasonally inundated areas.

Targeted field surveys were conducted during 2018–2019, with observers systematically traversing areas of suitable habitat during the summer period when migratory shorebirds are most likely to occur. In addition, incidental records of migratory shorebirds were collected during all other avifauna surveys, including monthly Brolga surveys undertaken between winter and summer from 2018 to 2025. This combined approach provides comprehensive temporal coverage across both migratory (summer) and non-migratory (winter) periods and aligns with Commonwealth guidance (DEE 2017).

Further details are provided within previous reports (Nature Advisory 2026a).

2.2.4. *Microbat ultrasonic surveys*

Bat detector surveys were undertaken to determine the microbat species that utilise the study area, particularly the listed threatened species. Between 2009 and 2020, six targeted bat surveys over six years were undertaken at the proposed WWF to determine the presence and activity levels of bats, and inform the assessment of the impacts of the wind farm on bat species. In addition, a year-long survey at height on two meteorological masts was undertaken. Best-practice survey techniques were deployed to detect which bat species occur across the study area (DEWHA 2010; DEECA 2025b). Ultrasonic detectors that passively detect and record echolocation calls emitted by free-flying insectivorous bat species were deployed to identify, through expert opinion, the species occurring at the proposed site.

Deployment of ultrasonic bat detectors occurred for several weeks at a time at 100 unique survey sites during both spring and late summer to early autumn. This targeted times when general bat activity is high, but in particular when the EPBC Act-listed critically endangered Southern Bent-wing Bat (*Miniopterus orianae bassanii*) occurs. Recordings were undertaken at ground level and at heights of 42 – 45 m on meteorological masts to detect species flying at height to investigate which species may be at greater risk of collision with operating wind turbines, which at WWF will have a minimum RSA height of 60 m.

Further details are provided within previous reports (Nature Advisory 2026b).

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

and/or FFG 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 the WWF, 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 BAM Plan, as outlined in Sections 5.1 or 5.1.2.

The following species were identified as potentially vulnerable to collisions at WWF by baseline utilisation surveys:

- **Brolga** (FFG Act: Endangered)
- **Southern Bent-wing Bat** (EPBC Act: Critically Endangered, FFG Act: Critically Endangered)

Other listed bird and bat species are known from the site, but pre-construction utilisation surveys have deteremined these to be of lower risk to collision mortality. See a full detailed assessments in existing reports (Nature Advisory 2026c, 2026b, 2022; EHP 2018).

Risks identified for Species of Concern

The key risks identified for birds and bats during the pre-construction surveys at WWF are:

- **Collision** with renewable energy and transmission infrastructure;
- **Habitat loss** through clearance or displacement;
- **Disturbance;**
- **Displacement** and **barrier effects;** and
- Bird and bat mortality through **electrocution** on new electricity transmission lines.

These risks have been addressed through the mitigation hierarchy and are detailed in the following documents:

- Bats – *Bat Species of Concern Assessment* (Nature Advisory 2026b)
- Brolga – *Brolga Impact Assessment* (Nature Advisory 2026a)
- Other birds - *Flora and Fauna Assessment* (Nature Advisory 2022)

This BAM Plan outlines the procedures to mitigate impacts from risks associated with the operational stage.

2.3.1. Brolga (FFG Act: Endangered)

Since 2009, there have been extensive investigations of Brolga and their habitat for the project (Table 2). This has included review of existing database records and landowner consultation, ground and aerial surveys for Brolga during breeding and flocking periods, and extensive habitat assessment using field observations and hydrological modelling. Full details of these assessments can be found in the *Willatook Wind Farm: Brolga Impact Assessment* (Nature Advisory 2026a).

This assessment occurred within what is referred to as the Brolga 'assessment area' that covered the boundary of the proposed wind energy facility with a 5 km buffer. Early assessments followed the *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population* (DSE 2012). These Interim Guidelines have since been superseded by the *Handbook for the Development of Renewable Energy in Victoria* and its Brolga-specific Appendix 2 (DEECA 2025a). During a reanalysis in 2025 and 2026, the Handbook was used as the most current and informative guidance document.

A summary of the findings on Brolga utilisation is provided below, with full details within the *Brolga Impact Assessment* (Nature Advisory 2026a).

Flocking sites

- The nearest known flocking site is located near Lake Bolac, approximately 28 km north of the project area.
- No unmapped Brolga flocking sites were identified within the 5 km investigation area through desktop review, community consultation, or field surveys. The project is, therefore, unlikely to impact any flocking areas for the species.
- *Conclusion*
    - The Willatook Wind Farm has been sited outside both mapped and unmapped Brolga flocking areas, thereby avoiding the most significant population-level risks associated with wind energy development. This strategic siting minimises potential impacts and means that no additional mitigation is required in relation to flocking behaviour.

Breeding habitat

- Seventy-one wetlands within the 5 km assessment area were considered **unsuitable**, having not met the criteria outlined in the *DEECA Handbook*.
- Fifty-one wetlands met the *Handbook* criteria as **Potential Brolga Breeding Wetlands**.
- Seven wetlands met the *Handbook's* criteria as **Brolga Breeding Wetlands**, which form five clusters of Brolga Breeding Wetland Buffers:
    - *Cockatoo Swamp-W4-6832 Cluster* – this buffer extends over central areas of the wind farm and includes 4 Breeding Wetlands and seven Potential Breeding Wetlands.
    - *Wild Dog Swamp Cluster* – this buffer extends into the eastern boundary of the wind farm and includes one Breeding and one Potential Breeding Wetland.
    - *Mt Misery Road Cluster* – this buffer does not overlap with the wind farm boundary and includes one Breeding and two Potential Breeding Wetlands.
    - *Wetland VWI 25741* – this is an isolated Breeding Wetland within the 5 km assessment area but outside the wind farm boundary.
    - *Wetland VWI 25729* – this is an isolated Breeding Wetland within the 5 km assessment area but outside the wind farm boundary
- *Conclusion*:
    - All proposed wind turbine locaitons inclusive of wind turbines blades, are located outside of Breeding Wetland buffers.
    - The project design has largely avoided buffers around the Breeding Wetlands. Infrastructure has been positioned outside these buffers wherever possible, ensuring protection of the majority of critical breeding habitat. Placement of turbines and other infrastructure was further refined through hydrological assessments, which confirmed the design maintains natural water flows and wetland inundation patterns. This substantially reduces indirect impacts on Brolga breeding habitat and the ecological function of wetlands across the site.

- Areas where the recommended Brolga buffers cannot be fully achieved are limited and have been minimised through iterative design, these include:
- **Cockatoo Swamp-W4-6832 (Breeding Wetland)** – intersected by approximately 1.6 km section of underground cabling and 800 m access track that connects to a formed road, both of which are permitted under the Handbook when implemented with measures to minimise disturbance and habitat loss as agreed to with DEECA and included within a Construction and Management Plan. Following this, these intersecting parts of infrastructure will be constructed outside the breeding season to reduce disturbance and use construction methods to reduce the size of footprints and any downstream impacts. Further discussion of details can be found in the Brolga Impact Assessment (Nature Advisory 2026a).
- **Wetland 12a (Potential Breeding Wetland)** – intersected by one turbine (T31), tracks, cables, and construction footprint. Avoidance of this wetland is not practical due to other environmental and operational constraints. The Handbook's mitigation hierarchy guidance will be followed for further minimising and mitigating impacts, including through construction activities and monitoring on the site. Residual impacts will be addressed through a Compensation Plan developed in agreement with DEECA. Impacts are reduced through specific mitigation measures, and residual impacts are addressed through compensation measures. Further discussion of details can be found in the Brolga Impact Assessment (Nature Advisory 2026a).

Existing mitigation of collision risk

Two key measures have been adopted to reduce collision risks for Brolga. First, exclusion of turbines around confirmed Breeding Wetlands has been applied, ensuring turbines are located away from areas confirmed as supporting nesting, foraging, and movement.

Second, turbine design incorporates an increased minimum tip height, from 40 m to 60 m, which exceeds the flight height of 97 % of local Brolga flights, significantly reducing the likelihood of collisions. All turbine-to-substation cables will be trenched underground, and the overhead transmission line has been shortened by 4.2 km from the initial proposal, now only ~300 m, positioned away from all Breeding Wetlands. These changes substantially reduce collision risk and avoid population-level risk to the species. In addition, line-marking is proposed on this overhead section to enhance visibility for birds, providing further risk reduction consistent with the Handbook's mitigation hierarchy (DEECA 2025a).

For additional application of the mitigation hierarchy, see Section 4.

2.3.2. Southern Bent-winged Bat (SBWB) (EPBC Act and FFG Act: Critically Endangered)

A total of 4,646 detector-nights of survey were undertaken over five years between 2009 and 2020 at 107 unique sites. A total of 160 confirmed calls were recorded over the five years. A further 3,696 calls were assigned to a species complex (i.e., SBWB-complex) that comprises echolocation calls with characteristics that could have been produced by SBWB, Little Forest Bat, or Chocolate Wattled Bat.

SBWB activity was primarily associated with native riparian vegetation and a eucalypt plantation adjacent to the Shaw River to the west of the WWF and at a planted grove of trees near a wetland to the east of the site, indicating these areas were likely the main foraging habitats for this species within the study area. A few other locations that yielded one or two confirmed and/or complex calls. indicating that SBWB may occasionally utilise roadside and windbreak vegetation and farm dams on the site, but this would be infrequent, given the low-quality habitat and low SBWB activity levels.

A low level of activity by this species on the site was consistently observed over a number of years of recording on the site. This observation was made notwithstanding the presence of one non-breeding cave within 23 km of the site and three others between 20 and 35 km away.

The latest analysis of available information (Nature Advisory 2026b) informed the final WTG layout, which involved micro-siting turbines, reducing the number of turbines from an initial 190 to 52, and implementing 200 m blade-to-habitat buffers around key habitat features, including areas with higher SBWB call activity.

Existing mitigation of collision risk

Three key measures have been adopted to reduce collision risks for SBWB. First, the application of nighttime cut-in speeds of 4.5 m/s across all turbines from September to May (from 30 minutes before sunset to 30 minutes after sunrise when temperatures exceed 10°C). Second, nighttime blade feathering to minimise blade rotation at wind speeds below the cut-in threshold. Third, the tip height of blades will be increased from 40 m to 60m, above the known heights typically flown by SBWB as determined from available site-specific monitoring and regional studies (Nature Advisory 2026b). These measures align with those recommended within the Handbook's mitigation hierarchy (DEECA 2025b).

For additional application of the mitigation hierarchy, see Section 4.

2.3.3. Other species at high risk of collision

The following species were identified as potentially vulnerable to collisions during pre-construction surveys, as they are known to occur at the study area and are known to regularly collide with operating turbines.

Diurnal raptors

Diurnal raptors account for a disproportionate number of fatalities at wind farms compared to their relatively small population sizes (Smales 2006). Their flight and foraging behaviour (e.g. soaring, hovering, contouring, diving) within RSA contribute to the relatively high fatality rates (Smallwood et al. 2009). Additionally, raptors are generally not deterred by turbines and are known to nest within 200 m of operating turbines. The unlisted Brown Falcon, Nankeen Kestrel and Wedge-tailed Eagle were all recorded at WWF and are the most common fatalities at wind farm sites in south-eastern Australia. The Wedge-tailed Eagle is recognised as a culturally important species to the Traditional Owners of the area, the Eastern Maar people.

These species will be addressed through the impact triggers for non-listed species (Section 5.1.2).

Gould's Wattled Bat (*Chalinolobus gouldii*)

The Gould's Wattled Bat is an edge-adapted species that regularly flies at RSA height and has a widespread distribution across Australia (Australasian Bat Society 2026d). The species roosts in hollows, and is found in dense forest, open woodland, mallee, tall shrubland, and open areas (Lumsden et al. 2021).

Gould's Wattled Bat is the second-most frequently observed bat species found to collide with turbines (Moloney et al. 2019; Nature Advisory 2025a) in eastern Australia. This species was detected during pre-construction surveys at WWF, therefore likely commutes, roosts and forages across the study area.

This species will be addressed through the impact triggers for non-listed species (Section 5.1.2).

White-striped Freetail Bat (*Austronomus australis)*

White-striped Freetail Bat is an open-space-adapted species that typically flies high above the ground (Rhodes and Richards 2023) and have a widespread distribution across Australia (Australasian Bat Society 2026f). They can occur over a variety of habitats, including urban areas, forests, woodland, shrubland, open farmland with scattered stands of trees, grasslands and deserts (Churchill 2008), and foraging areas are not restricted to remnant treed areas (Rhodes and Wardell-Johnson 2006). They are a fast flyer (median speed of more than 40 km/h, but up to 61 km/h) and forage in open areas, capturing flying insects as prey 50 m or more above the ground (Bullen and McKenzie 2001; Churchill 2008; Rhodes and Catterall 2008). When commuting across the landscape, they fly very fast in a relatively straight line (Rhodes and Catterall 2008).

This species was detected during pre-construction surveys at WWF. The White-striped Free-tailed Bat frequently flies at rotor-swept area (RSA) heights and accounts for approximately 67% of all bat collisions at monitored wind farms (Moloney et al. 2019). It is known to collide regularly with wind turbines (Moloney et al. 2019; Nature Advisory 2025a; Symbolix 2020). The greatest risk to this species appears to occur during late summer and early autumn, although collisions have been reported at other times of the year as well (Nature Advisory, *unpublished data*).

This species will be addressed through the impact triggers for non-listed species (Section 5.1.2).

3. Post-construction monitoring

This section describes the methods for the operational phase of the bird and bat monitoring program once the WWF is commissioned and operational, covering post-construction utilisation surveys and mortality monitoring, in addition to scavenger and detectability trials.

3.1. Post-construction utilisation surveys

3.1.1. Bird utilisation surveys (BUS)

The 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, with two replicate surveys undertaken in all four seasons. The timing of these surveys will cover the relevant seasons for Species of Concern (refer to Section 2.3). 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 pre-construction BUS (refer to Section 2.2.1) will be replicated in the operational BUS, including using the same 8 survey sites (subject to accessibility) and the 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.

Limitations

Fixed-point count bird utilisation surveys provide a robust and standardised assessment of avian activity at defined locations, effectively capturing spatial and temporal patterns in site use. While limited to discrete observation periods, the approach is well-established, is considered sufficient to characterise bird utilisation at wind farm sites, and follows recommendations within guidance documents (DCCEEW 2024; DEECA 2025d).

3.1.2. Microbat utilisation surveys

During the first two years of operational-phase monitoring, bat detectors will be used to passively record the echolocation calls of free-flying bats, with a focus on SBWB. Survey locations will include both operational turbines and the same survey points used during pre-operational surveys.

Selection of operational turbines for monitoring

Bat detector surveys will be conducted at a minimum of 19 % of the operating turbines. The WWF project has proposed the construction and operation of up to 52 turbines, so this would currently equate to approximately 10 turbines. The 10 turbines selected for bat detector surveys will be a subset of those used for monthly carcass searches (see Section 3.2), and will be stratified across the study area. At each turbine, paired detectors will be installed, one placed at ground level (1 m) within 50 m of the tower and the other on the nacelle (with the microphone behind the blades facing away from the blades). Data will be recorded concurrently by the paired detectors located at ground-level and at nacelle-height to investigate the relative activity of target bat species below and within the Rotor Swept Area (RSA).

A critical component of the post-construction bat detector surveys is to use weather data recorded at ground level and nacelle to test how variation in a range of environmental factors, such as wind speed, air temperature and rainfall, influences bat activity to further inform the smart curtailment regime (as outlined in Section 4.2.2). A two-year survey period combining site-specific information on weather conditions, bat echolocation call activity and bat mortalities could generate sufficient data to refine the smart curtailment algorithm for WWF. Research in the Northern Hemisphere has shown smart curtailment algorithms that make predictions about the level of risk to bats at wind energy facilities under various environmental conditions, and then use this information to guide curtailment decisions, have great potential in reducing bat fatalities while also reducing energy loss when compared to employing blanket turbine curtailment (Barré et al. 2023, Behr et al. 2017, Hayes et al. 2023, 2019).

Pre-existing survey points

This survey method will follow that of pre-construction ground-based survey methods, see also Section 2.2.4 and existing reports (Nature Advisory 2026b). Bat detectors will be placed at ground level at a minimum of 10 previously surveyed points located across the WWF site. The specific survey points will be selected based on (i) habitat type (to represent the range of habitats present on the WWF site, i.e. pasture, water bodies, woodland) and (ii) previous records of SBWB and/or YBWB activity. Continuing bat detector surveys at these pre-construction sites will facilitate direct comparison of the relative activity and distribution (presence/absence across the site) of target bat species before and after the wind farm becomes operational (i.e. a BACI study design).

Operational-phase bat detector surveys at turbines and pre-existing survey points will run for a minimum of six consecutive weeks per survey during the same two periods monitored during the 2019–2020 pre-construction surveys at WWF:

- Late spring – early summer (October–November)

- Late summer – early autumn (February–March).

The data analysis from the bat detectors will be focused on the listed Species of Concern recorded at WWF: Southern Bent-wing Bat and the Yellow-bellied Sheath-tail Bat.

Limitations

Ultrasonic detector surveys provide a robust and widely accepted method for characterising bat activity, effectively capturing temporal patterns and relative levels of site use, including for cryptic and nocturnal species that are otherwise difficult to observe. While detection is influenced by species call characteristics and equipment limitations, with some calls of SBWB only being able to be identified to a species complex, the approach is well-established, considered sufficient to assess bat utilisation at wind farm sites, and follows that recommended within guidance documents (DEECA 2025b; DEWHA 2010).

3.1.3. Brolga surveys

Operational phase targeted surveys will be implemented post-commissioning, and run monthly during the Brolga breeding season (June to December) at all wetlands within 2 km of wind turbine locations. Comparisons between pre-construction and operational surveys will elucidate whether Brolga continue to utilise the area for flocking and/or breeding. To this end, the aims of the operational Brolga monitoring are:

- Confirm that Brolga continues to occur within the identified Breeding Wetlands and foraging corridors;
- Confirm that Brolga continue to breed within the identified Breeding Wetlands;
- Determine whether Brolga are observed demonstrating “risk behaviour”, such as flying at rotor swept heights; and
- Determine whether Brolga exhibit disturbance behaviour during construction and quarry blasting.

The following survey methodology should be utilised for operational monitoring of Brolga:

- Monthly breeding surveys to be undertaken during the Brolga breeding season (July to December) for the first two years of operation;
  - Wetlands monitored each month are those that are within 2 km of wind turbines (Figure 3; Nature Advisory 2026a);
  - Each wetland will be searched for the presence of Brolga and any breeding activities recorded, including courting, nest building, incubation and rearing young; and
  - All Brolga observations to be recorded, including breeding success, behaviour (inc. potential disturbance), observed flights (time, path, altitude, and interaction with any WWF infrastructure).
- Monitoring when construction and quarry blasting operations occur within the breeding season:
  - Formal monthly surveys undertaken by a qualified Ecologist of wetlands within 300 m of construction and quarry blasting activities; and
  - Ongoing monitoring outside of the monthly efforts, focused on wetlands within 300 m of the quarry and construction activities by WWF Staff/Contractors, with engagement

of a qualified Ecologist to confirm and investigate disturbance behaviour and site utilisation if/when any Brolga are observed

- Should breeding activity be observed, then regular surveys will be conducted to collect the following information.
  - Observations of breeding behaviour;
  - Observed flights, including start and end times, as well as flight path (mapped), height (including range), interaction with any WWF infrastructure (e.g. turbines, metmasts, powerlines) and habitat and activity at destination (where observable); and
  - The number of young successfully fledged.

This information will be compiled, analysed and included in annual reports (see Section 7). This will include a comparative analysis to determine if any of the identified Breeding Wetlands continue to be used as breeding habitat by Brolga. This will provide an assessment and recommendations for additional surveys that will be provided to DEECA.

Figure 3. Wetlands to be monitored for breeding Brolga

Project No: 16087.33
Project location: Willatook Wind Farm, VIC
Date: 31/07/2026

- Willatook Wind Farm boundary
- Willatook WF 5km buffer
- Wetlands for operational monitoring
- Turbine
- Breeding wetland buffer

Wetland assessment

- Breeding
- Potential breeding

N

Kilometers
0 1 2 3 4

GDA2020 MGA Zone 54

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

3.2. Post-construction mortality monitoring

To manage potential long-term mortality impacts on relevant species as a result of turbine collision and barotrauma, this BAM Plan 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 2024) and the Handbook's Appendix 5: Guidance for Developing Bat and Avifauna Management Plans for Onshore Wind Energy Facilities (DEECA 2025c).

Ongoing monitoring of blade strike mortality at WWF 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.

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.

3.2.1. Definition of 'mortality'

Mortality is defined as any dead bird or bat detected within the specified search radius (Figure 5 and Figure 6). 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 3.3).

3.2.2. Length of monitoring period

The carcass monitoring program will require five years of monitoring once the wind farm is fully commissioned. It should continue at five-year intervals after the initial five years of carcass monitoring (e.g., year 10, 15, etc), for the life of the project.

3.2.3. Overview of approach

The WWF carcass monitoring program will consist of the following approaches:

1. **Formal carcass search program** (refer to Section 3.2.4) – to be implemented after all turbines operate and export electricity simultaneously. This program will run for five years, with the program continuing at five-year intervals.
2. **Incidental carcass detection** (refer to Section 3.2.5)

3.2.4. 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 five years, and continue at five-year intervals for the life of the windfarm. 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 7 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 WWF 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). Dog (or human) detectability of carcasses is also a potential confounding variable, and protocols have been developed to control this factor in the final mortality estimates (Section 3.2.6).

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 three years after commissioning and will be reviewed after this time. Any changes will be incorporated into future BAMP reviews and updates.

Timing

Formal mortality monitoring will be conducted once per month immediately following commissioning. A second, follow-up search ('pulse search') will be undertaken within the inner zone (70 m) once per month, 2-3 days after the initial search, to detect additional mortality of small birds and bats. This ensures species of concern, such as Southern Bent-wing Bat, are unlikely to be missed during a search round and helps to promptly identify any collisions during wind farm operations, enabling efficient and timely responses if needed.

Turbine selection

The project has proposed the construction and operation of up to 52 turbines. It is proposed that a minimum of 20 operating turbines will be searched monthly (i.e., 38 % of all turbines). This exceeds the level recommended by the Handbook (DEECA 2025c), and meets the Minister's Recommendations (Minister for Planning 2023).

A stratified sampling approach was adopted to ensure representation of selected turbines across habitat categories while prioritising turbines associated with higher SBWB activity. Four turbines identified as being close to higher bat activity were arbitrarily included in the carcass search program. The remaining 16 turbines were selected randomly, in proportion to the number of

turbines within each habitat category. However, three turbines were manually substituted with others within the same habitat type to achieve a more even spatial distribution across the wind farm (i.e., T50 was substituted for T47, T31 for T30, and T13 for T11). No additional stratification based on topography was applied since the project area is generally flat.

Initially selected turbines are shown in Table 3, along with the habitat types immediately surrounding them, as shown in Table 3.

A subset representing 5 % of all turbines (three turbines) will be rotated randomly each month from the selected turbines, commencing after the first three months of the carcass search program. This rotation is designed to increase the likelihood of detecting turbines that may represent high-risk locations ('hotspots') that could otherwise be overlooked, while keeping turbines already associated with recorded collisions of listed species in the fixed subset. The remaining subset of 17 turbines will remain the same for the duration of carcass monitoring to reduce sampling error, enabling more accurate estimates of bird and bat mortality rates.

Table 3: Selected turbines for carcass searches at WFF by habitat types

Habitat type	Turbine ID	Description
Areas of higher bat activity	T2, T6, T26, T56	Closest turbines to areas showing higher SBWB activity during pre-construction surveys (Appendix 1).
Open areas with low or no native vegetation	T4, T19, T29, T30, T33, T34, T36, T44, T58	Turbines located in open landscapes with scattered, limited, or no native vegetation.
Watercourses/wetlands	T41, T62	Turbines located near watercourses or wetlands.
Watercourses/wetlands & native vegetation	T47, T52, T53	Turbines located near areas combining watercourses or wetlands with native vegetation.
Native vegetation	T22	Turbines located near areas of native vegetation.
Forestry plantation	T11	Turbines located near forestry plantations.

Search area

The inner and outer circular search zones have been designated based on the (Hull and Muir 2010) model (see calculations below). The inner zone, a circle with a 70 m radius, is designed to detect most carcasses of bats and small birds. Medium- and large-sized birds may also be recorded in this area. The outer zone extends from 70 m to 130 m from the turbine base and provides additional coverage for these species, which may fall further from turbines.

To provide guidance on the spatial distribution of bird and bat carcasses around turbines at WWF, maximum fall distances for bats (microbats) and small- and large-sized birds were estimated in the R statistical software (R Core Team 2025) using the *hullMuirMaxDistance()* function from the *windAC* package (Rabie and Riser-Espinoza 2023). This function is based on the (Hull and Muir 2010) model, which estimates the furthest distance carcasses of different size groups could travel from the turbine base following a collision, based on turbine hub height and blade length. Hull and Muir's work was published over 15 years ago, when turbines were smaller, and no validated empirical data are available for modern, larger turbines, so this provides a conservative baseline based on extrapolation.

The Hull and Muir model assumes a triangular distribution, or linear decrease in the relative density of fatalities with respect to distance from the base turbine (i.e., the probability density function, or PDF). This approximation is intended to inform search radius design and should not be used alone to estimate mortality, as this also requires application of coverage factors and corrections for searcher efficiency and carcass persistence (Section 3.2.6).

Applying the above approach to the WWF proposed turbines (~150 m hub height and ~90 m rotor radius from hub centre to blade tip) results in maximum estimated fall distances of 121 m for bats, 136 m for small birds, and 174 m for large birds. At least 82 % of bat carcasses are expected within 70 m of the turbine base, while 99.8 % and 94 % of small- and large-sized birds (e.g. Wedge-tailed Eagle) are expected within 130 m, respectively (Figure 4). The hullMuirMaxDistance() function does not provide estimates for medium-sized birds, but values would be expected to fall between those for small and large bird size classes.

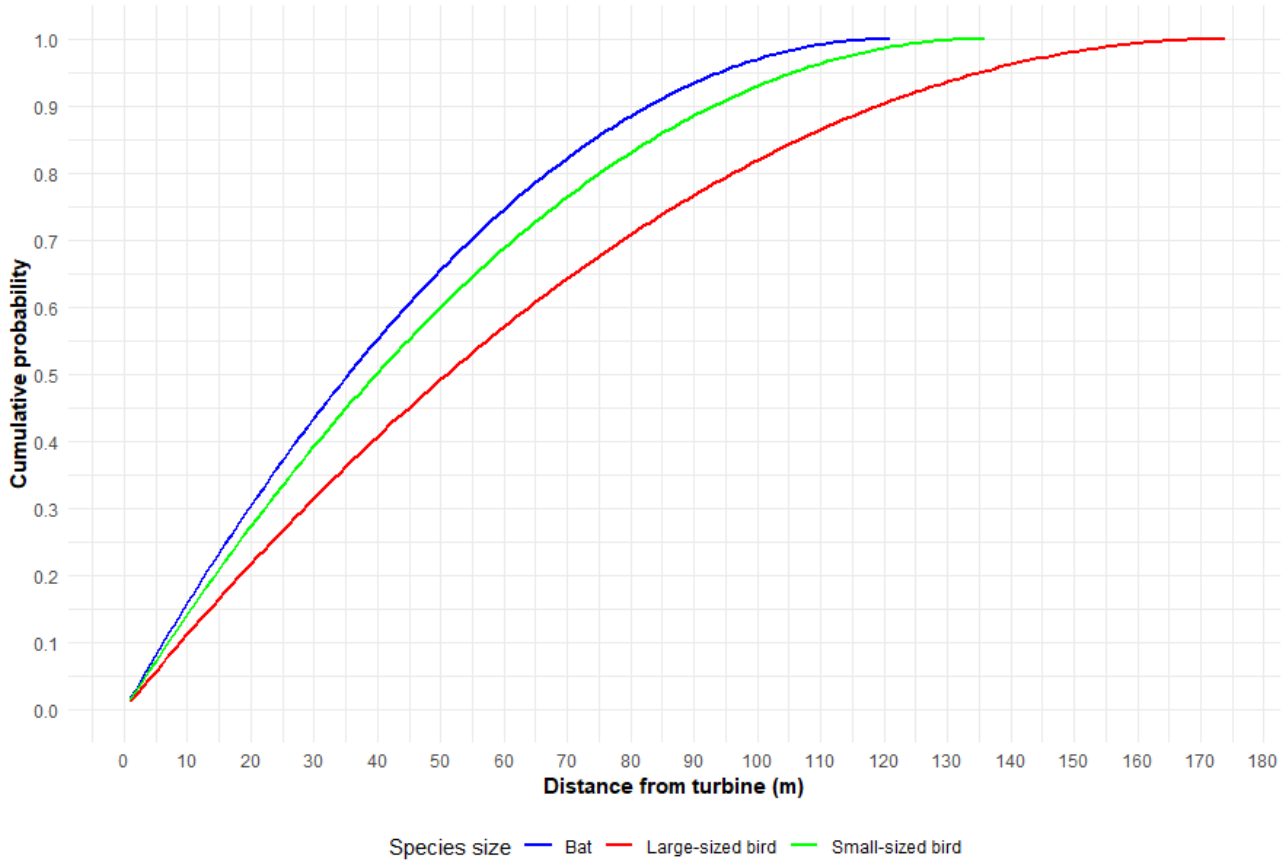


Figure 4: Cumulative probability of carcasses falling at different distances from wind turbines for bats, small- and large-sized birds based on the Hull and Muir triangular model.

Search protocol

Searches are to be undertaken on a monthly basis by experienced dog handlers with scent dogs, or, where scent dogs are unavailable, trained human searchers. All personnel undertaking searches will be regularly assessed by the supervising ecologist. For each search, detected carcasses will be documented in the form found in the carcass data sheet (Appendix 3).

Information collected will include, but not be limited to:

- Search start and finish times;
- Turbine number;
- Date of find;
- Position of carcass (distance (m) and compass bearing from the base of the turbine);
- Species, age, and sex (if possible);
- Description of visible injuries;
- Estimated date of strike (based on decomposition);
- Weather conditions influencing carcass detectability; and

- If the species cannot be immediately identified, photos of the carcass will be used for consultation with a qualified ecologist. If carcass identification is still not possible, samples may be sent for DNA analysis.

Scent dog (primary option)

The use of trained scent dogs in carcass searches improves the detection rate of carcasses (Bennett et al. 2022), and will therefore be the primary search method. All dogs employed will have demonstrated experience in wind farm carcass searches and detection efficiencies at least similar to average estimates reported for Victorian wind farms (Symbolix 2020). Dog handlers will also be trained to identify bird and bat species of southeastern Australia.

Dog search methods have been developed with guidance from the *Handbook for the development of renewable energy in Victoria* (DEECA 2025d). 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 5).
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.

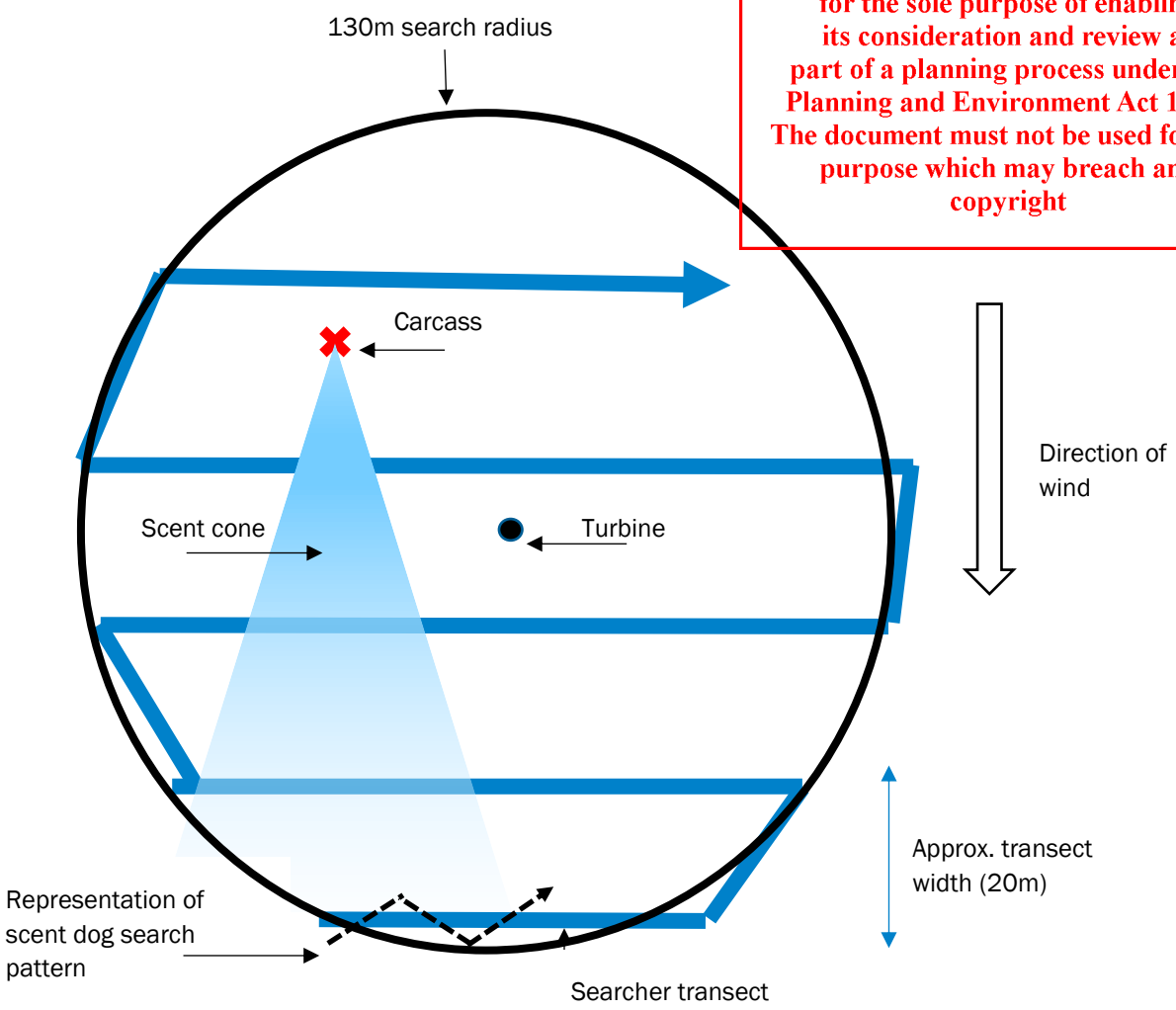


Figure 5: Search pattern for scent dog-assisted carcass search.

Human search (secondary option)

Human searchers are not as effective at locating carcasses as dog searches, particularly for microbat species that are easily overlooked. As a microbat is one of the key Species of Concern at WWF, human searches should be a secondary option behind the use of dogs.

All human 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 WWF 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 6).
- 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 6).

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 3.

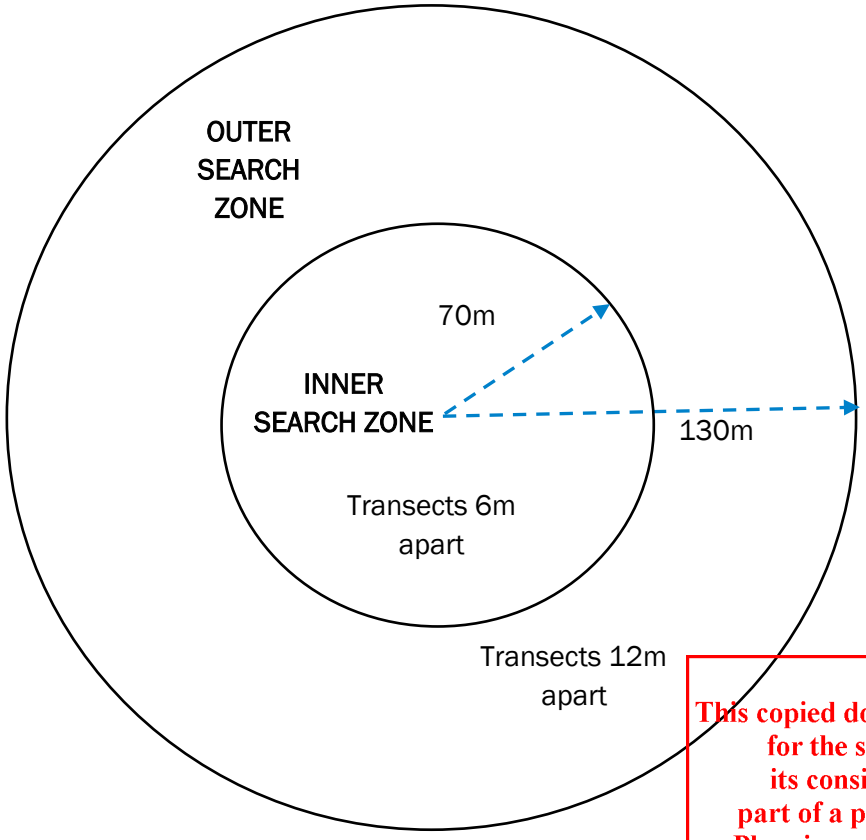


Figure 6: Inner and outer carcass search zones underneath the turbines

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 3):

- 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 Appendix 4):

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.

3.2.5. Incidental carcass detection

A low fauna risk exists during the commissioning phase, once turbine components are installed but not operating. At this stage, the WWF 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 Handling and Injured Wildlife Protocol (Appendix 4).

3.2.6. 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 Department of Climate Change, Energy, Environment and Water (DCCEEW) and DEECA if an EPBC Act-listed species is found dead or injured during carcass searches.

Mortalities will be estimated with 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 scavenge 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}

3.3. Scavenger Trials and Searcher Efficiency Estimates

Carcasses of animals killed by turbine collisions are often removed by scavengers (e.g. foxes, dogs, ravens) before they can be detected, resulting in only a proportion of carcasses found during

searches. The rate at which a carcass is scavenged (expressed as the number of days a carcass is present before it is removed by a scavenger) can be used to estimate the total impact on birds and bat at WWF.

Instead of conducting on-site searcher efficiency and carcass persistence trials, the results of the Symbolix report *Post-construction Bird and Bat Monitoring at Wind Farms in Victoria* (Symbolix 2020, summarised in Table 4 and Table 5) will be used to correct for searcher efficiency and scavenger removal rates when estimating mortalities at WWF. This approach is preferred because it is based on larger sample sizes comprising 10 operational wind farms across Victoria, providing more robust and reliable estimates. This decision is informed by the extensive experience of the Nature Advisory team in conducting carcass searches across Australian wind farms, whereas site-specific trials are often constrained by the limited availability of suitable surrogate carcasses of different sizes at individual sites.

Symbolix (2020) found no evidence for significant seasonal variation in scavenger and carcass detection rates across Victorian wind farms. This lack of substantial seasonal variation is supported by previous studies. Red Foxes are known to rely primarily on rabbits and carrion in agricultural and forested areas (Brunner et al. 1975; Catling 1988; Molsher et al. 2000). Feral cats exhibit relatively uniform use of carrion throughout the year (Catling 1988), and ravens, which are abundant year-round residents, are also important scavengers. Catling (1988) reported that foxes consumed more carrion in winter and spring, shifting to adult rabbits in summer and autumn; however, (Molsher et al. 2000) found no overall significant seasonal difference in carrion use by foxes, with seasonal differences occurring only for other prey types, such as lambs, invertebrates, and reptiles. Given these patterns, general scavenger and detectability correction factors will be applied rather than seasonal estimates.

In accordance with DEECA's *Handbook* guidance (DEECA 2025d), where searcher efficiency estimates from comparable sites or conditions are available, these may be used as a proxy for trial-derived estimates. Based on the justification presented in previous paragraphs, and considering the lack of significant differences in searcher efficiency and scavenger removal rates across Victorian wind farms (Symbolix 2020), as well as the widespread occurrence of the same scavengers in agricultural landscapes where wind farms are typically located, it is considered appropriate to apply these existing estimates rather than conducting site-specific trials, which are often limited and less reliable.

Table 4: Searcher efficiency of humans and dogs (Symbolix 2020)

Observer/Searcher	Species Type	Searcher Efficiency	Confidence Interval
Human	Bird	88 %	[85 %, 91 %]
Human	Bat	52 %	[44 %, 61 %]
Dog	All (Bird or Bat)	84 %	[80 %, 88 %]

Table 5: Average number of days before a carcass is scavenged for birds and bats, or scavenger rate (Symbolix 2020)

Category	Average number of days to be scavenged	Confidence Interval
Large birds (Wedge-tailed Eagle)	287 days	[130.1, 634.5]
Other birds	5.68 days	[4.75, 6.79]
Bats	2.69 days	[2.11, 3.43]

4. Existing application of the mitigation hierarchy

4.1. Environmental outcomes

Specific environmental outcomes are intended to be achieved to allow a long-term approach to the mitigation and management of risk to birds and bats at wind farms. Environmental outcomes include the following:

- Minimise the number of collisions with birds and bats by implementing monitoring and mitigation. This will be achieved by implementing the following:
  - Turbine blade feathering and low wind-speed curtailment of all turbines to reduce the amount of bat fatalities (outlined sections 4.2.1 and 4.2.2);
  - Investigating the feasibility of acoustic deterrent trials, in conjunction with other evidence-backed measures, in response to trigger events (section 4.2.3);
  - Carrion removal to make the area less attractive for raptors (outlined section 4.2.4);
  - Reduce or avoid lighting to reduce attractiveness to birds and bats at night (outlined section 4.2.5);
  - Limit grain feeding under turbines to make the area less attractive to grain-feeding birds, including Brolga, parrots and cockatoos (outlined section 4.2.6); and
  - Design and implementation of a long-term carcass monitoring program (outlined section 3.2)
  - Identifying impact triggers and adaptive management (outlined section 4)
  - Outlining species-specific management strategies for species of concern (outlined section 6)
- Measure if there are any changes in bird utilisation across the site by implementing a long-term bird monitoring program. This will be achieved by implementing the following:
  - Bird utilisation surveys (Section 3.1.1);
  - Bat utilisation surveys (Section 3.1.2); and
  - Brolga breeding surveys (Section 3.1.3).

4.2. General environmental management activities and mitigation measures

Design-based avoidance and minimisation measures were incorporated during project layout development and will also be applied during construction, with particular focus on the key species of concern. These include increasing turbine ground clearance, micro-siting to avoid key bat and Brolga habitats through application of recommended buffer distances in accordance with the *Handbook for the Development of Renewable Energy in Victoria* (DEECA 2025d), and managing construction-phase activities through management plans (Construction Environmental Management Plan, Blast Management Plan, Sediment, Erosion and Water Quality Management Plan). Details of design-stage and construction-phase measures are provided in the *Bat Assessment* (Nature Advisory 2026b) and the *Brolga Impact Assessment* (Nature Advisory 2025b). These measures are not discussed further in this BAM Plan.

The mitigation and management measures presented herein relate only to potential residual impacts and are intended for implementation during wind farm operations, including both preventive measures, as outlined below, and responsive (trigger-based) actions, as detailed in Section 4.

4.2.1. Blade feathering

Turbine blades can still rotate below the cut-in speed when electricity is not being generated. 'Feathering' is the act of preventing the turbine blades from free-spinning below the cut-in speed, which is achieved by locking the turbine blades or angling the blades to be parallel to the wind (Barré et al. 2023). In some cases, the blades may still move a minimal amount (e.g. 1–2 rotations/minute). This reduces the risk of bats colliding with spinning turbine blades (Whitby et al. 2024).

The wind farm will feather turbine blades below the cut-in speed (see Section 4.2.2) from the commissioning of the wind farm to mitigate residual impacts to bats.

4.2.2. Low wind-speed curtailment

Low wind-speed curtailment is the process whereby the speed at which the turbines begin to turn is increased (i.e. low-wind speed cut-in). Studies have shown that increasing turbine cut-in speeds reduces bat fatalities at wind farms (Bennett et al. 2022; Whitby et al. 2024). As a precautionary measure, the baseline cut-in speed will be increased from 3 m/s to 4.5 m/s for all turbines across the WWF during periods of higher bat activity to reduce potential bat collisions. Justification for this curtailment program is outlined in the Bat Assessment (Nature Advisory 2026b).

This measure will be applied during periods of higher bat activity, under the following conditions:

- **Time of year**: 1 September to 31 May (inclusive)
- **Time of night**: 30 minutes before sunset to 30 minutes after sunrise
- **Cut-in speed**: Turbines curtailed (feathered below cut-in) when hub-height wind speed <4.5 m/s
- **Climatic conditions**: Low wind speed curtailment to be implemented when the ambient temperature is above 10 °C.

Wind speed and temperature measurement protocol

The following methods will be used to ensure measurements are representative of bat activity risk within the rotor swept area (RSA):

- Meteorological data source – wind speed and temperature will be derived from perimeter meteorological (met) masts;
- Measurement height – wind speed data will be taken at hub height (as the most representative height for the RSA);
- Selection of met masts for measurements:
  - The met mast located in the prevailing upwind direction relative to the wind farm will be used as the primary control input; and
  - Where wind direction is variable, a hierarchical or averaged mast selection approach may be implemented (to be finalised during commissioning).
- Data integration – real-time data will be fed into the Supervisory Control and Data Acquisition (SCADA) system, which will:
  - Dynamically adjust turbine cut-in speeds; and
  - Apply feathering logic under qualifying conditions.

Operational Implementation via SCADA

The curtailment regime will be automated through SCADA according to the following logic:

- Continuous monitoring of:
  - Wind speed (hub height equivalent);
  - Temperature; and
  - Time of day/season.
- Automatic transition between:
  - Normal operation mode;
  - Curtailment mode (increased cut-in speed + feathering);
  - Turbine-level control applied consistently across the project; and

Nacelle-mounted anemometer wind data recordings will be used in the event of met mast data loss.

4.2.3. Acoustic deterrents

Ultrasonic acoustic deterrent systems may reduce activity of echolocating bats to mediate bat-human conflicts (Zeale et al., 2016), including close to wind turbines. These systems generate ultrasonic sound within the frequency range used by bats that is designed to mask returning echoes from the bat's echolocation signal, forcing them to leave the airspace (Arnett et al.,2016). Findings presented by Weaver et al. (2020) and Good et al. (2022) provide promising evidence that ultrasonic acoustics deterrents can reduce bat collisions, but the effectiveness appears to be species-specific. While this technology has the potential to play a role in impact reduction for at least some bats species, its efficacy for reducing impacts to Australian bats needs to be systemically tested.

In response to the impact triggers detailed in this BAM Plan, Willatook Wind Farm Pty Ltd is committed to trialling acoustic deterrent and evaluating their deployment as a mitigation measure. It is acknowledged that as an emerging technology, the application and effectiveness of these devices is largely inconclusive, particularly for specific species such as SBWB. However, it is also recognised that efficacy trials of available technologies may yield acceptable results for future implementation.

Willatook Wind Farm Pty Ltd is committed to considering the feasibility of these types of devices in response to impacts triggers detailed in Table 6.

4.2.4. Carrion removal program and stock forage control

Land-use and stock management below and around turbines can influence the presence and behaviour of native birds on site. Examples that could elevate bird collision rates include:

- Carrion can attract raptors; and
- Grain feeding of stock can attract Brolga, parrots and cockatoos.

Mitigation measures to address these matters are proposed below.

Raptors forage for carrion (the fresh or decaying flesh of a dead animal) and also on small mammals and rabbits. To reduce the risk of raptors colliding with turbine blades, a carrion removal protocol will be implemented during commissioning and operations, to reduce the attractiveness

of the WWF site to raptors and therefore reduce the potential for fatal collisions by this group of birds. This protocol will focus on areas within 200 m around turbines.

The procedures below will be adopted for the WWF.

- A designated suitable person will be appointed (such as an Operations team leader) to perform the function of Carrion Removal Coordinator, who will ensure the activities described below
    - Educate project staff and landowners to report any stock, introduced or native mammal carcasses within 500 m of any turbine
    - Any carcasses and/or remains found that are within 500 m of turbines, will be collected and disposed or relocated within 24 hours of discovery, in a manner that will avoid attracting raptors close to turbines
    - Consult with the Project's Responsible Officer in relation to the appropriate disposal of collected carrion
    - Construction and Operations personnel will be required to notify the Carrion Removal Coordinator immediately following identification of carrion on site
    - Carcasses will be recorded in a dedicated carrion removal register maintained by the Project's Responsible Officer.
- Feral animal control on the WWF site will involve removal or relocation of resulting carcasses located within 500 m of a turbine within 24 hours
- An annual summary of carcass removal based on the Project's 'dedicated carcass removal register' will be provided in the annual reports.

4.2.5. Lightning avoidance or reduction

To reduce features within the wind farm that may attract additional bats or avifauna, there will be no turbine lighting unless specifically requested by regulatory authorities. If facility lighting is required on the wind farm, lighting will be avoided or minimised within 500m of turbines, and baffled lighting will be used where necessary to avoid light spill towards turbines.

4.2.6. Stock forage control

Land-use and stock management around turbines can potentially influence the presence and behaviour of Brolga. It is plausible that feeding stock with grain around turbines may attract Brolga close to turbine locations, thus elevating collision risk. The BAM Plan will address and monitor this risk through measures, including, but not limited to:

- Educating project staff and landowners about stock management, and
- Recording instances when grain-feeding occurs within the swept area of turbines.

5. Adaptive management triggers and actions

This section identifies the circumstances that will result in notification, further investigation and additional mitigation for threatened bats ('impact triggers'). If an impact trigger is met, there must be an investigation into the cause of the impact, immediate stepped-up carcass monitoring to determine if the impact is ongoing and the development of mitigation measures informed by scientific studies.

The procedure to respond adaptively to impact triggers documented in this section will be implemented at any time an impact trigger is detected for the life of the project, from the commencement of operations until decommissioning. The aim is to understand how the impact happened or may have happened, and to identify and design targeted mitigation measures. If scientific uncertainty results in an incomplete understanding of whether an unacceptable impact is occurring, this will not prevent the implementation of mitigation measures.

Ultimately, the WWF approval holder will be responsible for implementation of the BAM Plan and the decision-making that goes with it, with technical support provided by the approved expert. Importantly, a clear basis for informing and consulting with DEECA and DCCEEW is documented and will be followed.

5.1. 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 DEECA and DCCEEW. The procedure to respond adaptively to impact triggers documented in this section will apply for the duration of the WWF project.

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 BAM Plan implementation, with technical support provided by an approved expert.

5.1.1. Impact trigger for EPBC Act and FFG Act listed species

Definition of impact trigger

An **impact trigger for a listed species** occurs if a single bird or bat (or recognisable parts thereof) listed as threatened and/or migratory under the EPBC Act or FFG 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 7 is applied.

In addition to the standard protocols for listed species, strategies are provided for key species of concern (Section 2.3) identified during the pre-construction studies.

Operational procedure

If a listed species impact trigger occurs, the decision-making framework detailed in Figure 7 is applied, with responses scaled according to species' listing status, likelihood of further occurrence, and risk level. This ensures that triggers, investigations, and mitigation measures are defined early to allow prompt and effective responses. The following general strategy will be applied:

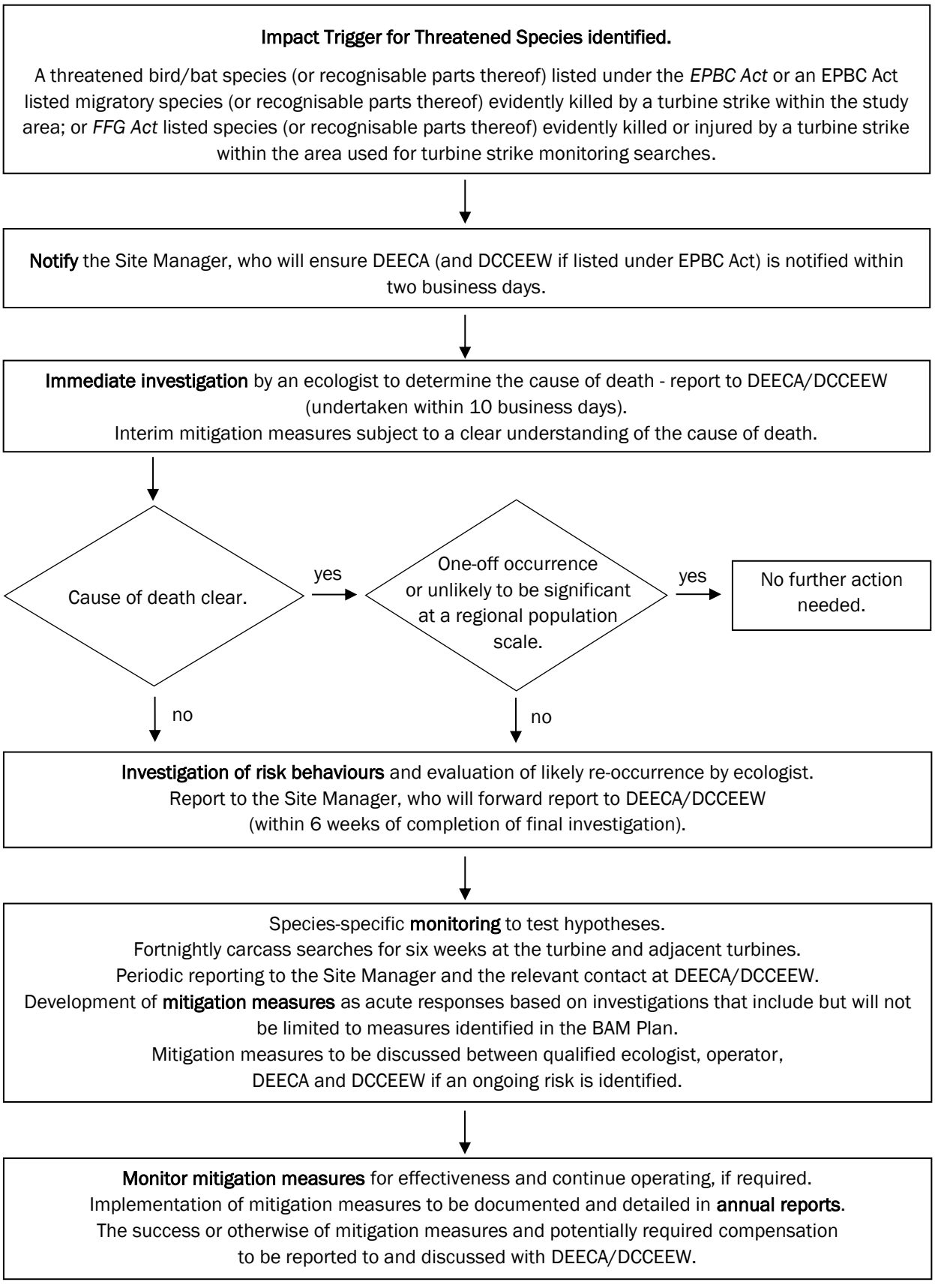
1. Immediate reporting to the WWF Site Manager, who will report it to DEECA (and DCCEEW if listed under the EPBC Act) within two business days.

2. Immediate investigation (undertaken 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.
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 it 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 DEECA (and DCCEEW, if listed under the EPBC Act).
6. Responsive mitigation measures will be promptly developed and implemented as needed in consultation with DEECA (and DCCEEW, if listed under the EPBC Act). Examples of mitigation measures may include, but are not limited to those outlined in Section 5.2.
7. If mitigation measures are not possible or effective, compensatory measures will be implemented, as outlined in Section 5.2. In some circumstances, both mitigation and compensation 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 DEECA (and DCCEEW, if listed under the EPBC Act).

Figure 7: Decision-making framework for identifying and mitigating impact triggers on listed species or Species of Concern



5.1.2. Impact trigger for non-listed species

Definition of impact trigger

An **impact trigger** for a non-listed species occurs if a total of four or more carcasses of the same species of a bird or bat (or recognisable parts thereof) is found dead or injured in two successive searches at the same turbine. Once triggered, an appropriate response is initiated, and reporting requirements are outlined in the decision-making framework, as outlined in Figure 8.

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

Operational procedure

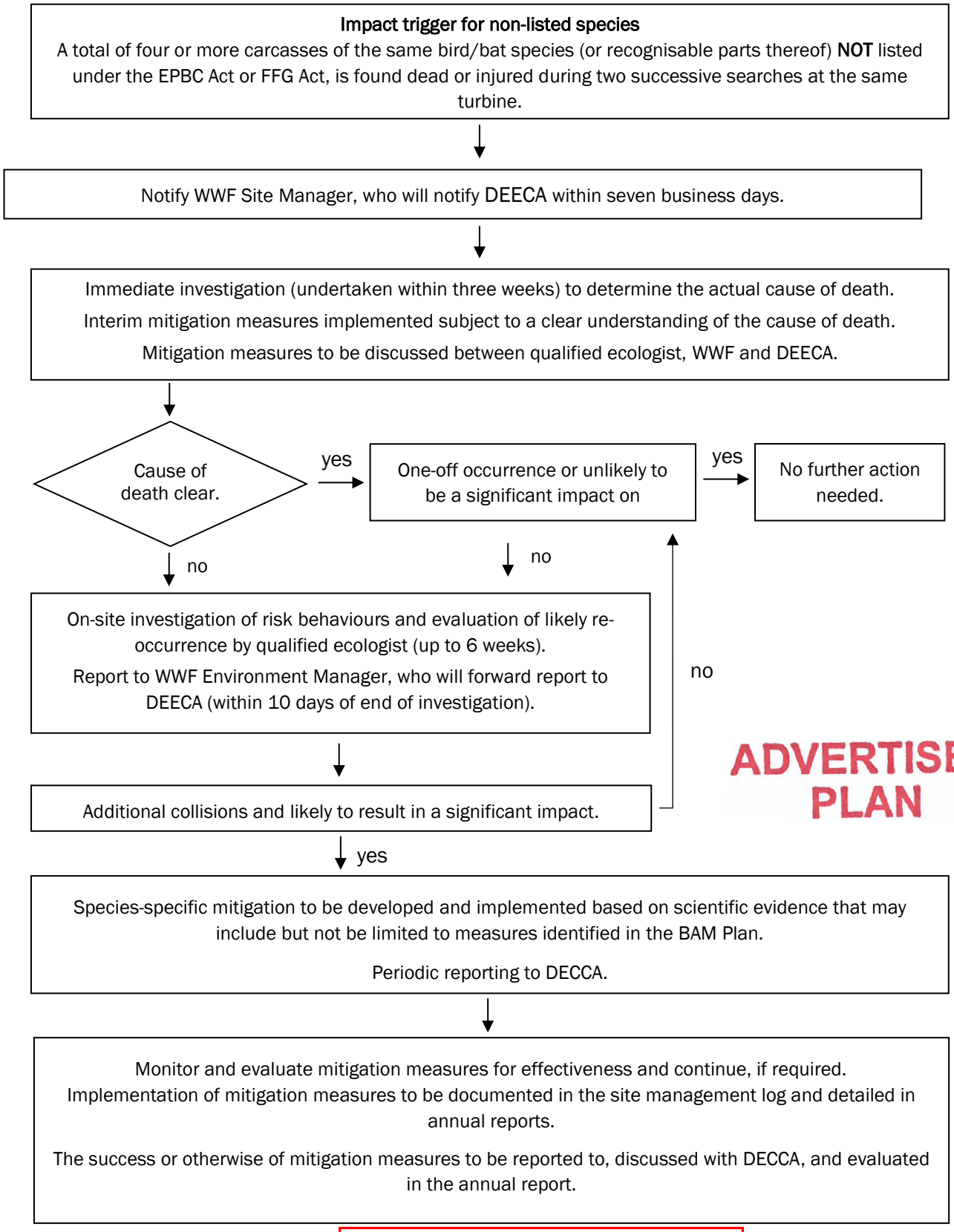
If a non-listed species **impact trigger** occurs, the decision-making framework detailed in Figure 8 is applied and the following occurs:

1. DEECA 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 DEECA and the wind farm operator on a case-by-case basis with consideration given to the species in question.
3. Immediate investigation (undertaken within three weeks) by an appropriately qualified ecologist to identify any particular risk behaviours that could have led to the collision or could lead to further collisions.
4. If the evaluation indicates that the event was a one-off occurrence (i.e., an isolated event that is not part of a recurring, seasonal, or intensive pattern) 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, 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 DEECA.

Figure 8: Operational procedure for mitigating impacts for non-listed species.



5.2. Compensation (Offsets)

Brolga

The *Handbook for the development of renewable energy in Victoria* (DEECA 2025) states that, under the mitigation hierarchy, if residual impacts remain after mitigation, compensation measures will be required. During pre-construction investigations, potential impacts on Brolga that could not be avoided, minimised or mitigated were identified. Accordingly, a Brolga Compensation Plan was developed by Odonata (Odonata 2026), which are provided in Appendix 2.

As several turbines, tracks, and cables are located within the Brolga Breeding and Potential Breeding Wetland Buffers (Nature Advisory 2025b), compensation is required under the guidance of the *Handbook* (DEECA 2025d, p. 43). The nature and extent of compensatory measures are determined in the Compensation Plan.

The nature of overlap with Breeding Wetland Buffers qualifies as acceptable as per the *Handbook* (DEECA 2025d) as impacts consist of the development of an underground cable and the construction of a new internal access track. The overlap does not involve overhead powerlines or turbine infrastructure. Potential impacts are expected to be temporary and will be mitigated by construction outside of breeding season and a design that does not change existing surface water flows. Other measures will be captured within the Environmental Management Plan (EMP), such as sediment control. The proponent commits to seeking agreement with DEECA on the suitability of these measures and actions. Provided this is agreed to with DEECA, compensation for these overlaps will not be required.

The Brolga Compensation Plan applies to two Potential Breeding Wetland buffers that overlap with turbine infrastructure. The Plan will be implemented in consultation with, and to the satisfaction of DEECA. This approach, together with ongoing monitoring, enables adaptive management to ensure that potential impacts are addressed in a manner commensurate with the ecological risk posed by the project and to evaluate the effectiveness of the measures over time.

The Compensation Plan does not exempt the requirement to mitigate residual impacts, as the BAM Plan must prioritise impact-triggered, effective responses in line with the mitigation hierarchy, which applies to all listed species under the EPBC Act and/or FFG Act, or non-listed species for which a significant impact is determined. In the unlikely event that a significant impact occurs on any native species, as a demonstrated result of the operation of the WWF, offsetting will be investigated and implemented. Offsets will be implemented in accordance with the EPBC Act *Environmental Offset Policy 2012* (DSEWPaC 2012), and the EPBC Act offsets calculator will be applied to estimate the quantum of offset requirements, where applicable. Any offset will be developed in consultation with, and subject to approval by, DEECA and/or DCCEEW, as required.

Southern Bent-wing Bat

In the unlikely event that a significant impact occurs on SBWB due to WWF operations, compensatory measures may be required. The EPBC Act *Environmental Offset Policy 2012* (DSEWPaC 2012) will guide any required compensation and will be developed in consultation with, and approved by, DCCEEW.

Significant impact triggers for SBWB will occur when 0.1 % or greater of the population is affected (or 40 individuals)[1]. The 0.1 % population threshold is derived from the EPBC Act policy statement on listed migratory species and the definition of an important population at a national level (DEE 2017). This threshold will be updated if revised population estimates become available.

Where the annual threshold is estimated to be reached for this species, the required level of contribution for compensatory measures will be determined in consultation with DCCEEW and using the Department's offsets calculator to ensure alignment with the EPBC Act *Environmental Offset Policy 2012* (DSEWPaC 2012). The offsets calculator and related policy guidance are available at:

https://www.dcceew.gov.au/environment/epbc/publications/epbc-act-environmental-offsets-policy

In addition to these policy-aligned requirements, WWF has committed to the following financial compensatory measures in response to SBWB:

- If there is a mortality event at an individual wind turbine that exceeds Trigger 3 (Section 6.1) or 8 or more SBWB are found during the course of formal mortality searches or incidentally across the wind farm, a one-off contribution of $50,000 will be made to a SBWB species recovery or research program.

Some examples of possible compensation for SBWB impacts could include contributing funds to:

- Habitat restoration projects. Including those designated for private land via organisations such as the Trust for Nature;
- The Southern Bent-wing Bat Recovery Team (SBWBRT) to help fund research and management objectives;
- Research programs designed to improve the knowledge base about SBWB (e.g. diet, reproduction, flight dynamics, etc.);
- Funding measures to maintain or improve known SBWB roosts; and
- Technologies to better monitor populations and their activity.

The Conservation Advice outlines several priority conservation and management actions that could potentially be funded by contributions from wind farm proponents under an offset agreement (TSSC 2021):

- *Implement management actions to increase the condition and extent of foraging habitat, especially within foraging range of key roosting sites.*
- *Establish conservation covenants or management agreements on private land containing important roost or foraging sites.*
- *Investigate and trial options for restoring caves previously used by the Southern Bent-wing Bat but rendered unsuitable due to guano mining or other anthropogenic activities.*

There are also a number of conservation actions detailed in the SBWB Action Statement (DEECA 2023, pp 4-6) that may benefit from industry support and offsetting measures, including programs relating to:

- Community engagement and awareness

[1] The population of SBWB is estimated at 40,000 (DCCEEW 2021a)

- Controlling feral cats and foxes
- Identifying and protecting key habitat
- Investigating voluntary agreements and/or covenants
- Managing built infrastructure
- Managing public access
- Research into pathogens and disease
- Restoration and/or revegetation
- Surveys and monitoring.

In any instance SBWB compensation is being considered, DEECA/DCCEEW and the SBWB Recovery Team will be consulted.

5.3. Assessment, consultation, and adaptive mitigation

Independent of impact trigger levels, an assessment of population-level impacts will be conducted on an annual basis to evaluate the effectiveness of any applied mitigation measures and the estimated annual impact. While the hierarchy of impact triggers is designed as a precautionary approach to initiate immediate management actions, the evaluation of annual mortality patterns and population-level estimates will be used independently to determine whether additional mitigation is required, the spatial extent of such measures, or whether wind-farm-level actions are warranted. The results will be presented and discussed with DEECA/DCCEEW to determine if a new set of actions is necessary. Population-level impacts may also trigger compensatory measures that will be discussed with DEECA/DCCEEW to identify the appropriate type and value (refer to Section 5.2).

6. Species-specific management strategies

If an *impact trigger* occurs, an adaptive management framework will be triggered and the decision-making framework (Figure 7) outlined below and in Table 6 will be followed.

Since two groups/species of concern (listed bat species and Brolga) have been identified as being at higher risk due to their threatened status and propensity for collisions, pre-established strategies from the general responsive action framework described above have been adapted to provide more effective and timely responses, reducing delays in decision-making and enabling prompt implementation of mitigation actions when required. These strategies are detailed below.

6.1. Southern Bent-wing Bat management strategy

This species-specific management strategy outlines a hierarchical set of trigger responses to mitigate the impacts of the operational WWF on Southern Bent-wing Bat (SBWB) and Yellow-bellied Sheath-tailed Bat (YBSB). Reporting will follow the requirements in Section 7, as well as incident-specific correspondence and reports to DEECA/DCCEEW, which will require discussion and feedback from the Department.

The incident investigation following each trigger event will seek to assess any relevant attributes associated with the mortality event. An incident report is to be submitted to the Responsible Authority within 28 days of the mortality.

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.

Adaptive Curtailment Framework

This framework establishes a mortality-triggered adaptive management approach to mitigate collision risk to SBWB. Impact triggers are based on confirmed mortality events, with a structured process of investigation, monitoring and progressively escalated mitigation (outlined in Table 6).

The focus of the adaptive management regime is that it can be reviewed in-line with best practice approaches. This review, together with an analysis of operational-phase bat monitoring data (Section 3.1.2), will inform a refined smart curtailment strategy to adjust the low-wind speed cut-in during periods when bat species of concern are most active.

Where the upper limits of operational mitigation are reached and impacts persist, compensatory measures will be implemented.

Table 6: Specific trigger actions in response to Bat Species of Concern mortalities at WWF

Impact Trigger	Actions	Description	Timing
Level 1: A single or several individuals of SBWB or YBSB are recorded dead under a turbine within a single event	1. Label the turbine as a "high risk – impact trigger level one (T1)" turbine	This event activates the species-specific management strategy as follows.	Immediately following mortality
	2. Increase carcass search coverage around the trigger turbine	An additional one-off 70 m radius search of T1 and all turbines within 1 km of T1 ("T1 cluster"). If one or more carcasses are detected at another turbine within a 1 km radius, the management strategy outlined in this table will apply independently. The findings of the searches will be recorded and reported to DEECA/DCCEEW within 28 days as detailed above.	Within 10 days of the mortality
	3. Adaptive management and mitigation	*Investigation* An investigation will be undertaken by a suitably qualified ecologist to confirm the cause of death and assess contributing factors, including turbine operation, wind speed, temperature and habitat context. The findings of this investigation will be reported to DEECA/DCCEEW within 28 days as detailed above.	Immediately following mortality
		Low wind speed curtailment – T1-targeted The cut-in parameters of T1 and all turbines within 1 km of T1 ("T1 cluster") will be increased from 4.5 m/s to 5.5 m/s between sunset and sunrise for the September to May (inclusive) period (this being the period when bat activity is likely to be highest. This cut-in speed will remain as an operational setting unless evidence determines it is not warranted. If the trigger occurs outside of September to May, curtailment will be applied across all seasons.	Immediately following mortality
		Inclusion in carcass monitoring Inclusion of the T1 turbine in the monthly carcass monitoring if it is not already being monitored, with a 70 m radius search.	Immediately

Impact Trigger	Actions	Description	Timing
Level 2: Second strike (a single or several individuals of SBWB or YBSB are recorded dead under a turbine assigned to a "T1 cluster" under Trigger 1) during a subsequent search	1. Label the turbine as a "high risk – impact trigger level two (T2)" turbine	This event activates the species-specific management strategy as follows.	Immediately following mortality
	2. Increase carcass search coverage around the trigger turbine	Additional carcass search on T2 and turbines within 1 km of T2 ("T2 cluster") to assess the extent of the impact, minimise the chances of scavenging and maximise carcass detections, as outlined under Trigger 1. The findings of the searches will be recorded and reported to DEECA/DCCEEW within 28 days as detailed above.	Within 10 days of the mortality.
	3. Adaptive management and mitigation	*Low wind speed curtailment – T2 buffer & bat deterrents* The cut-in speed of T2 and all turbines within a 1 km radius of T2 ("T2 cluster") will be increased from 5.5 m/s to 6 m/s between sunset and sunrise for the September to May (inclusive) period (this being the period when bat activity is likely to be highest). This cut-in speed will remain as an operational setting unless evidence determines it is not warranted. A trial of bat deterrents will be conducted across the wind farm, including both treatment and control turbines, with different cut-in speeds established during a one-two year trial to assess effectiveness for all microbat species. This trial is intended not only to determine deterrent effectiveness but also to inform whether localised or farm-wide deployment is warranted, and whether the combination of increased cut-in speeds and acoustic deterrents is effective, which may allow for a reduction in cut-in speeds when deterrents are incorporated. **Note** – these devices and other relevant emerging technologies have not undergone rigorous testing at Australian wind farms to determine effectiveness. However, WWF are committed to trialling as part of this impact trigger.	Curtailment: immediately following mortality. Deterrents: within a reasonable implementation period (following study design, procurement and installation).

Impact Trigger	Actions	Description	Timing
Level 3: Third strike (a single or several individuals of SBWB or YBSB are recorded dead under a turbine assigned to a "T2 cluster" under Trigger 2) during a subsequent search	1. Label the turbine as a "high risk – impact trigger level three (T3)" turbine	This event activates the species-specific management strategy as follows.	Immediately following mortality.
	2. Increase carcass search coverage around the trigger turbine	Additional carcass search on T3 and all turbines within a 1 km radius of T3 ("T3 cluster") to assess the extent of the impact, minimise the chances of scavenging and maximise carcass detections, as outlined under Trigger 1. The findings of the searches will be recorded and reported to DEECA/DCCEEW within 28 days as detailed in Section 5.5.2.	Within 10 days of the mortality.
	3. Adaptive management and mitigation	*Assessment, consultation, and adaptive mitigation* An assessment of population-level impacts will be conducted after a T3 impact trigger 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 DEECA/DCCEEW to determine if a new set of actions is necessary, which may include further curtailment if evidence indicates that a significant impact at the population level is anticipated. Population-level impacts may also trigger compensatory measures that will be discussed with DEECA/DCCEEW to identify the appropriate type and value (refer to Section 5.2).	Within four consecutive months from the date of the mortality.

6.2. Brolga management strategy

Impact triggers and adaptive mitigation measures for Brolga may follow, but are not limited to:

- The occurrence of an impact trigger will be reported immediately to the Project's Responsible Officer, who will report it to the relevant statutory planner at DEECA within five business days of the impact trigger being detected;
- Carcass searching will be immediately expanded around known and potential areas of Brolga spatial utilisation (in terms of turbine coverage and frequency) in the subsequent six weeks to determine if the Brolga collided more than once;
- Immediate investigation will occur (to be completed within ten business days) by an ecologist to determine, if possible, the circumstances that led to the impact trigger, including confirming if the death is due to turbine blade collision and, if so, what risk behaviours and environmental conditions led to the collision and whether they are continuing;
- This rapid investigation will aim to provide a clear understanding of the cause of the impact, informed by on-site investigations of the occurrence of the species on the WWF site, leading to a recommendation, where possible, of effective mitigation actions;
- This will identify the most effective available mitigation measures to be implemented with those measures to be implemented as soon as practicable, based on the information collected during the investigation (e.g. increased mortality searches);
- Following this investigation, further action is not considered necessary if Brolga are no longer in the area or displaying species-specific risk behaviour (as agreed in consultation with DEECA);
- If the cause of the impact trigger is not clear and the definition of effective mitigation measures is not feasible, further investigation of Brolga behaviour will be required over the following six weeks (in parallel with the stepped-up carcass searches). This investigation will also consider the following.
    - Any recent data/information on the species (e.g. academic literature, policy statements),
    - Available information from implementation and monitoring from other wind farms, and
    - A review of the effectiveness of management measures.
- If these investigations suggest that the impact was not continuing (e.g. the Brolga had left the site), then no further action would be necessary. This decision will be determined in consultation with DEECA, based on the collected evidence and adopting the most effective of the mitigation measures indicated in Table 7.
- If the onsite investigation suggests that the impact trigger indicates the potential for an unacceptable impact, Brolga monitoring and mitigation will be required. During Brolga monitoring and mitigation, periodic reports will be provided to DEECA, and, additionally, fully evaluated for their ongoing effectiveness in annual reports
- Examples of mitigation measures that will be evaluated include, but are not limited to, those outlined in Table 7. As wind turbine collision mitigation studies are ongoing worldwide, new knowledge on the nature and effectiveness of mitigation will be incorporated into this evaluation as it is generated.

Table 7: Adaptive mitigation measures in the event of repeated collisions or risky behaviour by Brolga.

Hypothetical cause of impact	Possible Adaptive Mitigation Measure
Foraging source identified that attracts Brolga to impact areas	The use of acoustics (i.e. loud music/irregular noise) to discourage birds from foraging in this location, where such noise would not impact landowners or neighbours.
	Encourage species into alternative areas outside of the WWF boundary, where available, through the use of social attraction techniques off-site (decoys and audio playback systems), as well as supplementary feeding (e.g. grain) where practicable.
Farming practice attracts threatened species to risky areas (e.g. grain feeding of stock)	Investigate whether farming practice is a contributing factor, and if so, subject to landowner agreement, relocate farming further from turbines to reduce risk.
Wind/rain/fog causing low visibility	Carcass searches will be repeated during periods of low visibility to measure mortality rates. Temporary shutdown of those turbines found to generate repeated impact triggers will be necessary during periods of extreme low visibility.
Nest site close to a turbine	Conduct an assessment by a qualified ecologist and, depending upon the clear risk identified, develop options for mitigation measures for consultation with DEECA. Agree on Brolga-appropriate actions to discourage nesting close to turbines. Specific action to be agreed between DEECA and WWF, with advice from a qualified ecologist.
Ongoing Brolga turbine collisions are assessed as having a significant impact on the population	Investigate new and emerging technology in reducing collision risk at high-risk turbines. This may include various deterrents and/or automated bird detection systems.

Any evaluation of impacts and decisions regarding mitigation measures and further investigations required will be undertaken in consultation with DEECA and DCCEEW. Any required investigation, and recommended mitigation measures and their effectiveness will be detailed in the annual reports.

7. Reporting and review

This section of the plan outlines the reporting arrangements for this BAM Plan. Further to the schedule detailed in Table 8, the wind farm operator, in consultation with the qualified ecologist and/or the regulator, may convene reporting and reviewing meetings as required.

Table 8: WWF BAM Plan reporting and review

Report Type	Timing	Detail	Who
First annual report	Within 2 months of the conclusion of first 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 and total survey days. ▪ Discussion of any identified seasonal or yearly variation in the number of bird or bat strikes within the first year. ▪ Summary of BUS, 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. ▪ Changes to protocols and methods (e.g., changed duration, frequency, and areas sampled). ▪ Raw data will be appended to the annual report. **Submitted to**: DEECA/DCCEEW and the Responsible Authority.	Qualified ecologist, in consultation with the wind farm operator
		Once available, this report will be presented at a review meeting with the Regional Manager at DEECA/DCCEEW (or their delegate) and the Responsible Authority. The results of the carcass searches will be reviewed and refinements to the monitoring program (if necessary) will be agreed.	Qualified ecologist Wind farm operator DEECA/DCCEEW Responsible Authority
		The annual report will be published on the wind farm website for public view.	Wind farm operator
Second to fifth year annual reports, and any	Within 2 months of the second, fourth, and fifth years 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 and total survey days.	Qualified ecologist, in consultation with the wind farm operator

Report Type	Timing	Detail	Who
subsequent monitoring periods		▪ 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 BUS with pre-construction surveys, and a summary of microbat surveys 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. ▪ 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 DEECA/DCCEEW). 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. – Any mitigation or compensatory measures implemented, and the success or otherwise of these measures. ▪ Raw data will be appended to the annual report. ▪ A review of the BAM Plan to ensure that the WWF impacts are still being addressed in line with new techniques and technology. **Submitted to**: DEECA/DCCEEW and the Responsible Authority.	
		The annual report will be published on the wind farm website for public view.	Wind farm operator
Impact trigger notification	Within 2 working days for listed species and Species of Concern; or 7 working days for non-listed species	If an impact trigger is detected, WWF will notify via email of the impact trigger being recorded, as per Section 5 and 6 of this BAM Plan. **Submitted to**: DEECA/DCCEEW.	Wind farm operator

Report Type	Timing	Detail	Who
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). ▪ Identify suitable mitigation measures for immediate implementation. **Submitted to**: DEECA/DCCEEW and the Responsible Authority.	Qualified ecologist, in consultation with the wind farm operator

8. Management actions and report timing

Management actions, survey details and report timelines for post-construction bird and bat impact monitoring are summarised in Table 9.

Table 9: Timeline for surveys and reporting to DEECA/DCCEEW and the Responsible Authority after commissioning of turbines at the Willatook Wind Farm.

Management action	Details	Report timing	Responsible
Operational BUS (Section 3.1.1)	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
Operational microbat surveys (Section 3.1.2)	Two years of operational microbat surveys will commence post-construction and be completed in consecutive seasons. The survey methodology applied to baseline monitoring will be replicated in operational surveys, including using the same survey sites, and broadly the same data will be collected.	Annual reports.	Qualified ecologist
Operational Brolga surveys (Section 3.1.3)	Two years of operational Brolga breeding surveys will commence post-construction and be completed in consecutive seasons. The survey methodology applied to baseline monitoring will be replicated in operational surveys, including identified breeding and potential breeding wetland sites, and broadly the same data will be collected.	Annual reports.	Qualified ecologist
Carcass searches (Section 3.2)	All turbines (i.e., 13) will be searched every month, initially for a minimum of three 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 DEECA/DCCEEW. Continuation of searches after three years would depend on the extent of significant impacts on bird and bat populations of concern.	Annual reports.	Qualified ecologist
Scavenger trials (Section 3.3)	Experimental trials in each of the first three years to determine the scavenging rate when the grass is long and when the grass is short.	Annual reports.	Qualified ecologist
Detectability trials (Section 3.3)	Experimental trials twice in the first three years to determine the detection rate.	Annual reports.	Qualified ecologist

Management action	Details	Report timing	Responsible
Impact triggers (inc. species of concern) (Sections 5 and 6)	Investigation of the circumstances surrounding the detected mortality of a listed species, as defined in Section 5.1.1.	Inform DEECA within 2 business days of an impact trigger. Initial report delivered to DEECA within one week of impact trigger	Proponent
	Investigation of the circumstances surrounding the detected mortalities of non-listed species, as defined in Section 5.1.2.	Inform DEECA within 7 business days of recording the potential impact. Initial report delivered to DEECA within three weeks of impact trigger.	Proponent

9. Roles and responsibilities

Table 10 identifies all stakeholders involved in the implementation and oversight of this BAM Plan and their respective responsibilities.

Table 10: WWF BAM Plan implementation – roles and responsibilities.

Organisation	Responsible for
Willatook Wind Farm Pty Ltd (wind farm operator)	Implementation of all aspects of this BAM Plan and related decisions, with technical support provided by a qualified ecologist
Qualified ecologist	Provide advice on and oversee BAM Plan implementation.
	Prepare all technical reports for DEECA/DCCEEW.
	Assist in the development and implementation of mitigation and consult with DEECA/DCCEEW on the suitability and feasibility of management approaches.
DEECA and DCCEEW	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 BAM Plan 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 compensatory 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.

10. 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*.

Barré K, Froidevaux JSP, Sortillo A, Roemer C and Kerbiriou C 2023, Drivers of bat activity at wind turbines advocate for mitigating bat exposure using multicriteria algorithm-based curtailment, *Science of the Total Environment*, 866, doi:161404.%20https://doi.org/10.1016/j.scitotenv.2023.161404.

Bennett EM, Florent SN, Venosta M, Gibson M, Jackson A and Stark E 2022, Curtailment as a successful method for reducing bat mortality at a southern Australian wind farm, *Austral Ecology*, 47(6):1329–1339, doi:10.1111/aec.13220.

BOM 2026, *National monthly and seasonal climate summaries*, https://www.bom.gov.au/climate/current/, accessed 10 February 2026.

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.

Bullen R and McKenzie NL 2001, Bat airframe design: flight performance, stability and control in relation to foraging ecology, *Australian journal of zoology*, 49(3):235–261, doi:10.1071/ZO00037.

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.

Churchill S 2008, *Australian Bats*, Allen & Unwin, Australia.

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

DCCEEW 2024, 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*.

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 2023, Southern Bent-winged Bat Action Statement.

—— 2025a, *Appendix 2: Species specific guidance for onshore wind energy facilities - Victorian Brolga*, Department of Energy, Environment, and Climate Action, Melbourne, https://www.environment.vic.gov.au/__data/assets/pdf_file/0024/752082/Appendix-2-Guidance-for-Onshore-Wind-Energy-Facilities-Victorian-Brolga.pdf.

—— 2025b, *Appendix 3: Species specific guidance for onshore wind energy facilities - Bat species of concern*, Department of Energy, Environment, and Climate Action, Melbourne, https://www.environment.vic.gov.au/__data/assets/pdf_file/0022/752080/Appendix-3-Guidance-for-Onshore-Wind-Energy-Facilities-Bat-Species-of-Concern.pdf.

—— 2025c, *Appendix 5: Guidance for developing Bat and Avifauna Management (BAM) Plans for Onshore Wind Energy Facilities*, Department of Energy, Environment, and Climate Action, Melbourne,

https://www.environment.vic.gov.au/__data/assets/pdf_file/0020/752060/Appendix-5-Guidance-for-BAM-Plans-for-Onshore-Wind-Energy-Facilities.pdf.

—— 2025d, *The Handbook for the Development of Renewable Energy in Victoria - Guidance to Avoid, Minimise, Mitigate and Compensate for Impacts on Threatened Bird and Bat Species*, Department of Energy, Environment, and Climate Action, Victoria.

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

DSE 2012, *Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population 2011*, Department of Sustainability and Environment, Melbourne., https://www.swifft.net.au/resources/Brolga-Guidelines_2011_Final_online-v2.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.

EHP 2018, *Biodiversity Assessment: Willatook Wind Farm*, Report prepared for Willatook Wind Farm Pty Ltd.

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.

Minister for Planning 2023, *Minister's Assessment of the Willatook Wind Farm Environmental Effects Statement*, Victorian Government, Melbourne.

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 2022, *Willatook Wind Farm: Flora and Fauna Assessment - Report No. 16087 (7.9)*, consultant report prepared for Willatook Wind Farm Pty Ltd, Nature Advisory Pty Ltd, Hawthorn East.

—— 2025a, Bat mortality at Australian wind farms: long-term trends and mitigation strategies, *International Bat Research Conference*, Cairns, Australia.

—— 2025b, *Hexham Wind Farm: Brolga Impact Assessment - Report Number 18088 (8.16)*, consultant report prepared for Hexham Wind Farm Pty Ltd, Nature Advisory Pty Ltd, Hawthorn East.

—— 2026a, *Willatook Wind Farm: Brolga Impact Assessment - Report No. 16087.28 (2.4)*, consultant report prepared for Wind Prospect, April 2026, Nature Advisory Pty Ltd, Hawthorn East.

—— 2026b, *Willatook Wind Farm: Bat species of concern assessment - Report Number. 16087.29 (2.4)*, consultant report prepared for Wind Prospect, April 2026, Nature Advisory Pty Ltd, Hawthorn East.

—— 2026c, *Willatook Wind Farm: Biodiversity Assessment Addendum - Report No. 16087.32 (1.2)*, consultant report prepared for Wind Prospect, April 2026, Nature Advisory Pty Ltd, Hawthorn East.

Odonata 2026, *Willatook Wind Farm: Compensation proposal for residual impact to Broga habitat*, report prepared for Wind Prospect, April 2026.

R Core Team 2025, *A Language and Environment for Statistical Computing. R Foundation for Statistical Computing, Vienna, Austria*, *R Foundation for Statistical Computing, Vienna, Austria*, https://www.R-project.org/.

Rhodes M and Catterall C 2008, Spatial foraging behavior and use of an urban landscape by a fast-flying bat, the Molossid Tadarida australis, *Journal of Mammalogy*, 89(1):34–42, doi:10.1644/06-MAMM-A-393.1.

Rhodes M and Richards G 2023, White-striped Free-tailed Bat *Austronomus australis*, (Grey 1838), in *Strahan's Mammals of Australia*, Reed New Holland Publishers, NSW, Australia.

Rhodes M and Wardell-Johnson G 2006, Roost tree characteristics determine use by the white-striped freetail bat (Tadarida australis, Chiroptera: Molossidae) in suburban subtropical Brisbane, Australia, *Austral Ecology*, 31(2):228–239, doi:10.1111/j.1442-9993.2006.01587.x.

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*.

Smallwood K, Rugge L and Morrison M 2009, Influence of behavior on bird mortality in wind energy developments, *The Journal of Wildlife Management*, 73:1082–1098.

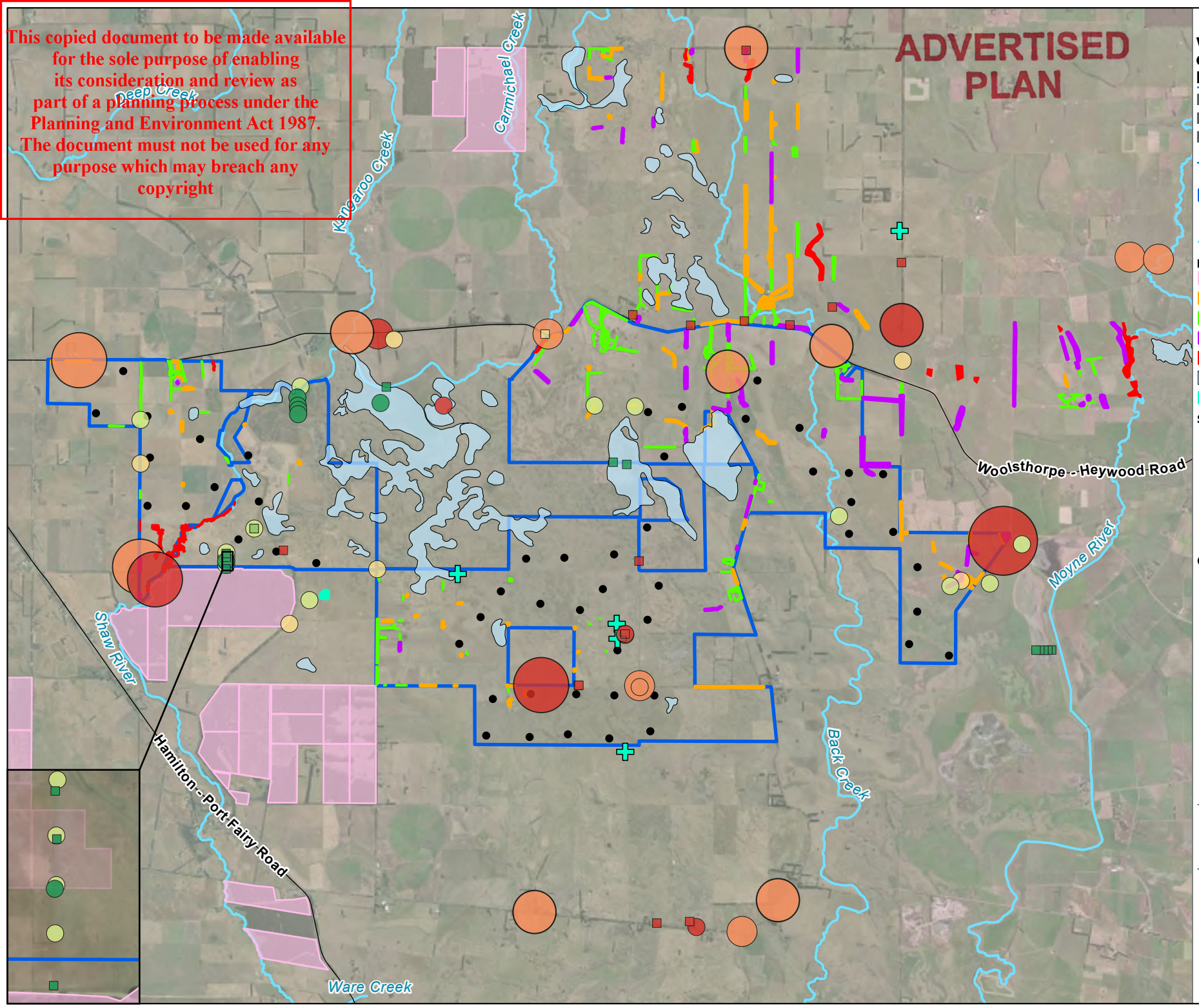
Symbolix 2020, *Post construction bird and bat monitoring at wind farms in Victoria. Public report Version 1.0*, Symbolix Pty Ltd, North Melbourne, Victoria.

TSSC 2021, *Conservation Advice for the* Miniopterus orianae bassanii *(Southern Bent-wing Bat)*, Threatened Scientific Species Committee Established under the Environment Protection and Biodiversity Conservation Act 1999, Canberra.

Whitby MD, Teague O'Mara M, Hein CD, Huso MMP and Frick WF 2024, A decade of curtailment studies demonstrates a consistent and effective strategy to reduce bat fatalities at wind turbines in North America, *Ecological Solutions and Evidence*, 5(3):e12371, doi:https://doi.org/10.1002/2688-8319.12371.

Appendices

Appendix 1: Location of Southern Bent-winged Bat calls between 2009 - 2020 (extracted from Nature Advisory 2026b)



Location of Southern Bent-winged Bat combined definite and complex calls between 2009 -2020.

Project No: 16087_29
Project: Willatook Wind Farm, VIC
Date: 28/11/2025

- Turbines
- Wind farm boundary
- Survey site (EHP, 2009)
- River

Habitat features

- Forestry plantation
- Planted trees
- Pine tree row
- Planted Eucalypts
- Remnant native trees / woodland
- Wetland - Periodically Inundated
- Farm dam

Survey season

- Spring 2010
- Autumn 2011
- Spring 2018
- Summer/Autumn 2019
- Autumn 2019 - Autumn 2020
- Summer/Autumn 2020

Combined definite-complex calls per night

No calls recorded | < 1 | 1 - 5 | 5 - 15 | 15 - 35 | > 35

N

Kilometres
0 0.5 1 1.5 2 2.5

GDA2020 MGA Zone 54

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

Appendix 2: Draft Compensation plan for Willatook Wind Farm Brolga (Odonata 2026)

Willatook Wind Farm

Compensation proposal for residual impact to Brolga habitat

April 2026

Contact

Amy Cockroft
Advisory Lead
amy.cockroft@odonata.org.au | 0425 805 316

Background

Odonata Advisory has been engaged by Willatook Wind Farm Pty Ltd to prepare and document proposed compensatory measures in response to residual impacts identified in the Brolga Impact Assessment (Nature Advisory, 2025; Report No. 16087 v2.3).

That assessment identifies infrastructure overlap within Potential Breeding Wetland 12A. While there are no confirmed breeding records for this wetland, it meets the definition of a Potential Breeding Wetland under the *Handbook for the Development of Renewable Energy in Victoria* (DEECA, 2025). In accordance with Appendix 2, Section 4.4 of the Handbook, compensatory measures are therefore required.

This submission outlines the compensation framework and to address those requirements.

About Odonata

Odonata Advisory is an independent environmental advisory organisation specialising in the design, delivery and monitoring of offset and compensation programs for renewable energy projects. Odonata has acted as an independent delivery partner for two approved Brolga Compensation Plans associated with wind farm developments in western Victoria, with responsibilities including landholder engagement, wetland restoration design, predator control coordination, monitoring and reporting. This experience has informed the development of the compensation approach outlined in this submission.

Proposed compensation framework

The compensation measures proposed in this submission are intended to deliver a clear and measurable outcome that addresses the residual impact associated with Potential Breeding Wetland 12A, as identified in the Brolga Impact Assessment (Nature Advisory, 2025; Report No. 16087 v2.3).

The proposed approach is structured around the delivery of a flexible package of compensatory actions, rather than reliance on a single prescribed outcome. While identification and restoration or enhancement of a potential breeding wetland represents one possible pathway, effective compensation may also be achieved through an appropriate combination of hydrological improvement, vegetation management, provision of nesting materials and targeted predator control.

Implementation of the proposed actions will result in an increase in the availability and quality of breeding habitat within the broader Brolga landscape. Additional fox and cat control in the area will reduce predation pressure on nests, eggs and chicks, thereby increasing the likelihood of successful breeding attempts.

Collectively, these actions will result in a net improvement in potential breeding habitat condition and function, beyond what would occur in the absence of the project, and will address known limiting factors to Brolga breeding success.

On this basis, the proposed compensation package provides an appropriate and proportionate response to the residual impacts to Potential Breeding Wetland 12A and meets the compensation requirements of the Handbook.

Compensation actions

The compensatory response to Potential Breeding Wetland 12A will comprise a tailored combination of actions informed by site-specific constraints and opportunities.

The actions outlined below represent the suite of measures available under Appendix 2, Section 4.4 of the Handbook. Not all actions will necessarily be applied at a single site, and not all actions are required to be implemented concurrently. Rather, the selected combination will be designed to collectively achieve the required compensatory outcome.

Identification of suitable Brolga breeding wetland

Suitable potential breeding wetland will be identified in the local area, using existing landholder relationships and engagement with local Landcare groups.

Wetland selection will be informed by site-specific assessment and will consider:

- hydrological capacity, or restoration potential, to support seasonal inundation suitable for Brolga breeding;
- existing or restorable wetland vegetation condition;
- proximity and functional relationship to other shallow, vegetated wetlands in the landscape;
- landholder willingness to enter into management arrangements; and
- a location outside a 5 km radius of wind turbines, ensuring the compensatory outcome is spatially independent of the project footprint.

This selection process is consistent with the approach documented in the Willatook Wind Farm – Brolga Options Paper and supports the delivery of a clearly defined addition to potential breeding habitat at a landscape scale.

Hydrological restoration and enhancement

Where required, hydrological works will be undertaken to improve inundation frequency and duration to better meet Brolga breeding requirements. Measures may include:

- modification or closure of artificial drains;
- adjustment of sill levels or low points within wetlands; and
- management of controlled inflows from adjacent water sources.

Hydrological works will be designed to avoid adverse impacts on upstream or downstream water processes.

Habitat management and revegetation

Habitat conditions will be enhanced through measures such as:

- controlled grazing and seasonal stock exclusion during periods of inundation to protect soil structure encourage native seed setting;
- encouragement of native wetland vegetation regeneration; and
- supplementary planting of suitable local native species where required.

These actions are intended to improve habitat structure, availability of nesting materials and shelter for chicks.

Provision of nesting materials

Where natural nesting resources are limited, additional nesting material may be introduced to support breeding attempts, particularly where Brolga are known to frequent or in a restored habitat area.

Predator (fox and cat) control

Targeted fox and cat control programs in collaboration with landholders and local Landcare groups will be supported, both in the identified habitat compensation area, and in other areas identified by Landcare. Predator control will be prioritised during the breeding season to reduce the risk of egg and chick predation, consistent with Handbook guidance identifying predator management as a key component of effective compensation.

Appendix 3: Carcass data sheet

WILLATOOK WIND FARM CARCASS DATA-SHEET*				
Please fill out all details above the heavy line for each site searched All details below the line are required if a carcass is found **Do not move a carcass until the details below have been completed**				
Reference number				
Date:				
Start Time:				
Finish Time:				
Turbine Number:				
Wind direction and strength in preceding 24 hours:				
Any unusual weather conditions in last 48 hours?				
Distance of Carcass from Tower (m):				
Bearing of Carcass from Tower (magnetic deg):				
Preliminary Species Identification:				
Photo Taken**	Yes / No			
Signs of injury:				
How old is carcass estimated to be (tick category):	<24 hrs	1-3 days	> 3 days	Other
Other Notes (i.e. sex/age of bird) and substrate:				
Post Find Actions: 1. Place carcass in sealable plastic bag then wrap it in newspaper and into another plastic bag (with copy of this sheet within) and take to freezer at site office. 2. Contact project ecologist to confirm identification of carcass				
* One form should be completed for each carcass found				
** Please attach photos to this form				

Appendix 4: Carcass handling and injured wildlife protocols

Carcass handling protocol

Detected carcasses will be documented on the mortality data sheet (Appendix 1) with the following information collected:

- GPS location
- Condition of carcass
- Substrate and vegetation type
- Position of carcass (distance (m) and compass bearing from the base of the nearest turbine)
- Species, age, and sex (if possible)
- Description of visible injuries
- Estimated date of strike (based on decomposition)
- Weather conditions influencing carcass detectability and
- if the species is not able to be immediately identified, photos of the carcass for consultation with a qualified ecologist. If carcass identification is not possible, samples may be sent for DNA analysis.

Detected carcasses will be removed from the turbine search area to avoid re-counting. The wind farm operator will obtain and supply any required permit to handle and keep native wildlife (even dead wildlife) prior to the start of the monitoring program. Handling carcasses has health risks, and as such, carcass handling will follow the following protocol:

- The carcass will be handled with rubber gloves, packed into a plastic bag, then placed in a second plastic bag.
- The carcass bag will be clearly labelled with the time and date the carcass was found, the turbine it was found under, and the species name.
- Carcass of all positively identified and unidentified species will be initial retained in the freezer. It will be to the suitably qualified bird and bat ecologist discretion as to the timing of carcass disposal. Noting carcasses are often used and may be required for scavenger rate and searchers efficiency trials (see Section 3.3).
- The freezer will only be used for holding carcasses and not for other uses.

Injured wildlife response

All on-site staff will be advised of the correct procedure for assisting injured wildlife. Staff who find injured wildlife will be required to report the find to the Project's Responsible Officer to organise a response.

- If safe to do so, the animal will be placed into a dark box or cloth bag for transfer to the nearest wildlife carer or veterinarian.
- Injured animals must be handled with rubber gloves.

Special care will be taken to avoid bat borne viruses (i.e., Australian Bat Lyssavirus and Hendra Virus). Only staff with appropriate vaccinations will handle bats (living or deceased).

Victoria's Help for Injured Wildlife Tool also provides information on safety considerations and helpful contacts: https://www.wildlife.vic.gov.au/injured-native-wildlife/wildlife-tool.

Contact details of local veterinary staff and wildlife carers are provided in the table below to ensure that if injured wildlife is found and cannot readily be released back to the wild, they are treated accordingly and in a timely manner.

Name	Phone	Location/Address
Mosswood Wildlife Rescue and Rehabilitation	0409 090 840	Not available
Koroit Veterinary	(03) 5559 0260	105 Commercial Road Koroit VIC 3282
Warrnambool Veterinary	(03) 5559 0222	514 Raglan Parade Warrnambool VIC 3280
Help for Wildlife	0477 555 611	State-wide
Wildlife Victoria	(03) 8400 7300	State-wide