

Final Report

Ecological Assessment for the Proposed Brewster Wind Farm, Trawalla, Victoria

Prepared for
RE Future Pty Ltd

December 2021

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EXECUTIVE SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by RE Future Pty Ltd to undertake an ecological assessment for Brewster Wind Farm at Trawalla, Victoria.

It is understood RE Future Pty Ltd is proposing to develop a seven-turbine windfarm approximately 14 kilometres east of the township of Beaufort. The wind farm development boundary is located directly south of the Western Highway on private property situated between Trawalla Road and Kayleys Lane, Trawalla.

The assessment was undertaken to identify and characterise the vegetation on-site, determine the presence (or likelihood thereof) of any significant flora and fauna species and/or ecological communities, and address any implications under Commonwealth and State environmental legislation and policy.

Methods

Flora

Flora assessments within the windfarm development boundary and swept paths were undertaken between 1 October 2020 and 1 October 2021, to obtain information on terrestrial flora and fauna values within the wind farm development boundary. A habitat hectare assessment was undertaken in conjunction with the flora survey. Vegetation within the wind farm development boundary was assessed according to the habitat hectare methodology, which is described in the Vegetation Quality Assessment Manual.

Swept Path Assessments were undertaken on 10 June, 30 August and 29 September 2021.

Fauna

Initial general fauna surveys were undertaken concurrently with the vegetation assessment undertaken in October 2020, as well as during the bird utilisation surveys.

Additional Fauna surveys included:

- Bird Utilisation Surveys;
- Microbat surveys using Anabat detector units; and,
- Level 1 and Level 2 Brolga *Antigone rubicunda* Assessments to address the potential risk posed to the species by the proposed Wind Farm.

Results

Flora

A total of 37 flora species were recorded within the wind farm development boundary during the field assessments.

Native vegetation in the wind farm development boundary is representative of one EVC; Plains Grassy Wetland (EVC 125). The remainder of the site was actively grazed and/or cropped and comprised typically of improved pastures, with some areas showing outbreaks of noxious weed species.

No significant flora species were recorded within the wind farm development boundary and no flora species of national, state or regional significance are considered likely to frequently utilise habitats within the wind farm development boundary.

Patches of native vegetation are also present at two of the intersections assessed along the proposed transport route, with the nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain*, and a large population of the nationally significant flora Hoary Sunray *Leucochrysum albicans* var. *tricolour* within the south western corner of the intersection at Eurambeen-Streatham Road and Glenelg Highway, Streatham. However, based on a review of the swept path analysis, no impacts are proposed to any native vegetation (EVCs) at any intersections, or the nationally significant Hoary Sunray or *Natural Temperate Grassland of the Victorian Volcanic Plain* ecological community at the Eurambeen-Streatham Road and Glenelg Highway intersection.

Fauna

A total of 64 fauna species were recorded within the wind farm development boundary during the field assessment. Two State significant fauna – Brolga *Antigone rubicunda* and Eastern Bent-wing Bat *Miniopterus orianae oceanensis* were recorded within, or in close proximity to the wind farm development during the field assessments.

Plains Grassy Wetland habitat contains low to moderate quality habitat for the nationally significant Growling Grass Frog *Litoria raniformis*. However, it is considered highly unlikely that the species would inhabit or make significant use of habitats within the wind farm development boundary. In addition, the Plains Grassy Wetland habitat will not be impacted (i.e. no removal of wetland habitat or foraging habitat) by the proposed windfarm development, and therefore, there will not be a significant impact to the species.

Based on the absence or low quality of potential habitats within the wind farm development boundary (including roadsides), landscape context and the proximity of previous records, nationally significant fauna species are considered highly unlikely to occur within the wind farm development boundary, or be impacted by the wind farm development.

The Level 1 and Level 2 Brolga Assessment (i.e. desktop assessment, targeted Brolga surveys and habitat assessments) demonstrate that the proposed Brewster Wind Farm presents a low risk to Brolga, with the likelihood of impacts to the species considered low to negligible.

Eastern Bent-wing Bat is a cave dwelling bat that forages at and around canopy height in treed areas, and close to the ground in grassy areas. The species has previously been shown to fly consistently below turbine height, with no collision mortalities published in Victoria.

Communities

No significant ecological communities occur within the wind farm development boundary. The nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* is present at the Eurambeen-Streatham Road and Glenelg Highway intersection, but is located outside of the impact footprint.

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Legislative and Policy Implications

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act - Federal)

The proposed action is highly unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not required regarding matters listed under the EPBC Act.

Flora and Fauna Guarantee Act 1988 (FFG Act - Victoria)

One flora 'protected' under the FFG Act (Golden Wattle *Acacia pycnantha*), and two fauna listed as threatened (Brolga and Eastern Bent-wing Bat) were recorded during the ecological assessments.

Based on the requirements under the FFG Act, a permit is not required. However, the Responsible Authority must consider potential impacts to FFG Act matters to ensure decisions and policies are made with proper consideration of the potential impacts on biodiversity.

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The windfarm footprint, including swept paths has been designed to avoid all identified patches of native vegetation.

However, it should be noted that Brewster Wind Farm Pty Ltd are proposing to formalise access to one of the turbines along an existing farm track that passes through a Modelled Wetland at 7 Pin Oak Court. Although no native vegetation was present along the access track at the time of the assessments, as per the requirements under the Guidelines, the impact to the Modelled Wetland has been included as native vegetation, with the modelled condition score assigned to this area.

The study area is within Location 1, with 0.082 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Basic assessment pathway.

The offset requirement for native vegetation removal is 0.015 General Habitat Units.

A permit to remove native vegetation under Clause 52.17 of the Pyrenees Planning Scheme is required.

A permit is required under Clause 52.32 of the Pyrenees Shire Planning Scheme to use and develop a wind energy facility

Other Legislation and Policy

Implications relating to other local and State policy (*Wildlife Act 1975, Catchment and Land Protection Act 1994*, local government authorities) as well as additional studies or reporting that may be required are provided in Section 4.

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Table S1. Application requirements for a permit to remove native vegetation under the Basic Assessment Pathway (Victoria Planning Provisions Clause 52.17 -3; DELWP 2017a).

No.	Application Requirement	Response within this report
1	Information about the native vegetation to be removed, including: <ul style="list-style-type: none"> The assessment pathway and reason for the assessment pathway. A description of the native vegetation to be removed. Maps showing the native vegetation and property in context. The offset requirements that will apply if the native vegetation is approved to be removed. 	Details provided in Section 3.5; Figure 2a and Figure 2b.
2	Topographic and land information relating to the native vegetation to be removed.	Refer to Section 1.3 and Figure 2a and 2b of this report.
3	Recent dated photographs of the native vegetation to be removed.	Refer to Section 3 of this report.
4	Details of any other native vegetation that was permitted to be removed on the same property with the same ownership as the native vegetation to be removed, where the removal occurred in the five-year period before the application to remove native vegetation is lodged.	Not applicable
5	An avoidance and minimise statement.	Refer to Section 6.1
6	A copy of any property vegetation plan that applies to the site.	Not applicable.
7	Where the removal of native vegetation is to create defensible space, a written statement explaining why the removal of native vegetation is necessary. This is not required when the creation of defensible space is in conjunction with an application under the Bushfire Management Overlay	Not applicable
8	If the application is under Clause 52.16, a statement that explains how the proposal responds to the Native Vegetation Precinct Plan	Not applicable
9	An offset statement explaining that an offset that meets the offset requirements for the native vegetation to be removed has been identified and how it will be secured	Refer to Section 3.5.3 and Appendix 4

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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by RE Future Pty Ltd to undertake an Ecological Assessment for the Proposed Brewster Wind Farm, at Trawalla, Victoria.

It is understood RE Future Pty Ltd is proposing to develop a seven-turbine windfarm approximately 14 kilometres east of the township of Beaufort. The project is proposing to use Vestas V162 – 6.0MW turbines, with a hub height of 166 metres and a blade diameter of 162 metres, with the Rotor Swept Area between 85 metres and 247 metres, and a ground clearance of 85 metres.

The wind farm parcel boundary is located directly south of the Western Highway on three private properties situated between Trawalla Road and Kayleys Lane, Trawalla (Figure 1).

The purpose of this assessment was to identify the extent and type of native vegetation present within the wind farm development boundary, determine the likely presence of significant flora and fauna species and/or ecological communities, and determine potential impacts to ecological values based on the number, location and Rotor Swept Area (RSA) of the turbines.

This report presents the results of the assessment and discusses the potential ecological and legislative implications associated with the proposed action.

1.2 Objectives

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The objectives of the ecological assessments were to:

- Identify flora and fauna values within the wind farm development boundary;
- Review the relevant flora and fauna databases, and available literature;
- Conduct field assessments to identify the extent and quality of native vegetation within the wind farm development boundary;
- Provide maps showing any areas of native vegetation and locations of any significant flora and fauna species, and/or fauna habitat (if present);
- Classify any flora and fauna species, and vegetation communities identified or considered likely to occur within the wind farm development boundary in accordance with Commonwealth and State legislation;
- Document relevant environmental legislation and policy; and,
- Document any opportunities and constraints associated with the proposed works.

Where areas of native vegetation were present, the following tasks were completed to address requirements under the 'Guidelines for the removal, destruction or lopping of native vegetation' (Guidelines) (DELWP 2017a):

- A habitat hectare assessment of any areas of remnant native vegetation within the wind farm development boundary;

- Recommendations to address requirements under the Guidelines to minimise impacts to remnant vegetation; and,
- Provision of offset targets for any native vegetation, scattered trees and habitat for rare or threatened species proposed to be lost because of the proposed works.

1.3 Wind Farm Development Boundary

The wind farm development boundary is located at Trawalla and is approximately 156 kilometres north-west of Melbourne's CBD (Figure 1). The wind farm development boundary covers approximately 396 hectares and is bound by the Western Highway to the north, private property to the south, Kayleys Lane to the east and Spring Hill Creek to the west. It comprises three parcels of land; 295 Trawalla Road, Trawalla (6-A\PP2224); 7 Pin Oak Court, Trawalla (1\PS712949) and 54 Kayleys Lane, Brewster (2\PS712949).

Land within the wind farm development boundary is currently used for agriculture, with the entire site subject to agricultural disturbance via active stock grazing, cropping and improved pastures.

Surrounding land use is consistent with the wind farm development boundary, being predominately agricultural, with scattered dams, sheds and rural dwellings present. The wind farm development boundary is relatively flat, with several minor drainage lines (that were dry at the time of the field assessments) intersecting the wind farm development boundary (Figure 2a).

Significant waterbodies within the broader region include:

- Lake Burrumbeet - located approximately 9.1 kilometres east;
- Spring Hill Creek – along the western boundary; and,
- Lake Goldsmith - located approximately 16 kilometres south-west.

There are no conservation reserves, significant wetlands (Ramsar or nationally-listed) located within, or in close proximity to the wind farm development boundary. Four DELWP-modelled wetlands are located within the wind farm development boundary (Figure 2a).

According to the Department of Environment, Land, Water and Planning (DELWP) NatureKit Map (DELWP 2021a), the wind farm development boundary is located within the Victorian Volcanic Plain bioregion, Glenelg Hopkins Catchment Management Authority (CMA) and Pyrenees Shire Council.

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2 METHODS

2.1 Relevant Commonwealth and State Legislation

Throughout the assessment process, consideration has been given to the following Commonwealth and Victorian environmental policy and legislation.

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Environmental Effects Act 1978* (EE Act);
- *Flora and Fauna Guarantee Act 1988* (FFG Act);
- *Planning and Environment Act 1987* (P&E Act);
 - The Guidelines for the removal, destruction and lopping of native vegetation (DELWP 2017a);
- Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (DELWP 2017b);
- Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population (DSE 2012);
- Pyrenees Shire Planning Scheme; including,
 - Clause 52.17 Native Vegetation; and,
 - Clause 52.32 Wind Energy Facility.
- *Wildlife Act 1975* (Wildlife Act); and,
- *Catchment and Land Protection Act 1994* (CaLP Act).

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2.2 Desktop Assessment

Relevant literature, online-resources and databases were reviewed to provide an assessment of flora and fauna values associated with the wind farm development boundary. The following information sources were reviewed:

- The DELWP NatureKit Map (DELWP 2021a) and Native Vegetation Information Management (NVIM) Tool (DELWP 2021b) for:
 - Modelled data for location risk, native vegetation patches, scattered trees and habitat for rare or threatened species; and,
 - The extent of historic and current Ecological Vegetation Classes (EVCs).
- EVC benchmarks (DELWP 2021c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DELWP 2021d);

- The Illustrated Flora Information System of Victoria (IFLISV) (Gullan 2017) and Atlas of Living Australia (ALA) (ALA 2020) for assistance with the distribution and identification of flora species;
- Birdlife New Atlas Bird Data for additional Brolga records within 10 kilometres of the wind farm development boundary (BirdLife Australia 2021);
- South West Brolga Flocking Database (Sheldon 2004);
- AusWEA (2005) Wind Farms and Birds: Interim Standards For Risk Assessment;
- Guidelines for bat surveys in relation to wind farm developments (Lumsden 2007);
- The Commonwealth Department of Agriculture, Water and the Environment (DAWE) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DAWE 2021);
- The online VicPlan Map (DELWP 2021e) to ascertain current zoning and environmental overlays in the wind farm development boundary;
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened (DELWP 2021f) and Protected (DELWP 2019a) Lists; and,
- Aerial photography of the wind farm development boundary.

Database searches covered a minimum search radius of 10 kilometers from the project area boundaries.

2.3 Flora Assessment

A flora assessment within the wind farm development boundary was undertaken on 1 October 2020, 10 June 2021, 30 August 2021 and 1 October 2021 by ecologists accredited in the VQA Assessment methodology (DSE 2004) to obtain information on flora values. The entire properties at 7 Pin Oak Court, and 54 Kayleys Lane were walked and/or driven. Within the property at 295 Trawalla Road, the infrastructure footprint, plus a buffer of 20 metres either side of the footprint was assessed. Areas of native vegetation outside of the assessed area were broadly mapped to confirm extent, however, a detailed habitat hectare assessment was not undertaken in these areas.

Commonly observed vascular flora species were recorded, significant records mapped, and the overall condition of vegetation and habitats noted. Ecological Vegetation Classes (EVCs) were determined with reference to DELWP pre-1750 and extant EVC mapping (DELWP 2021a) and their published descriptions (DELWP 2021c).

Swept Path Assessments were undertaken on 10 June, 30 August and 29 September 2021

Where native vegetation was identified a habitat hectare assessment was undertaken following methodology described in the Vegetation Quality Assessment Manual (Department of Sustainability and Environment (DSE) 2004).

2.4 Fauna Assessment

Concurrently with the flora assessment, a fauna assessment was undertaken to obtain information on terrestrial fauna values within the wind farm development boundary. The wind farm development boundary was visually assessed and active searching under and around ground debris for small mammals, reptiles and

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frogs was undertaken. Binoculars were also used to scan the area for birds, and observers listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Potential habitat for fauna was assessed, with a particular emphasis on habitats that may provide shelter, food or other resources for significant species.

The surveys sought primarily to assess the extent and condition of native vegetation communities and potential flora and fauna habitat, with particular consideration given to significant ecological communities and species of conservation concern, such as threatened and migratory species.

All fieldwork was carried out under the appropriate licences, including a Research Permit (10008283) and Scientific Procedures Fieldwork Licence (SPFL 20005) issued by DELWP under the *Wildlife Act 1975*, and an Animal Research permit issued by the Wildlife and Small Institutions Animal Ethics Committee (05.17).

2.4.1 *Brolga Assessment*

Due to the potential risk posed to Brolga *Antigone rubicunda* by wind farms in Victoria, DELWP developed the Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population (DSE 2012). These guidelines outline a conservative approach to assessing and managing the effects of both individual wind farms and the cumulative impacts of the wind industry on the Victoria Brolga population. The objective of the guidelines is to ensure that there is no 'net effect' of wind farms on the Brolga, with the goal of achieving a positive effect for the population as a whole. The guidelines identify key habitat features for Brolga which require consideration and protection—these being breeding sites and flocking sites (DSE 2012). An assessment of the potential impacts of the Brewster Wind Farm on the Brolga was undertaken with reference to the guidelines.

Level 1 Assessment – Desktop Analysis and Landowner Liaison

A detailed desktop database assessment of Brolga records within 10 kilometres of the wind farm development boundary was undertaken. Databases searched include: Birdlife New Atlas (Birdlife Australia 2020), Sheldon's Brolga Database (Sheldon 2004) and DELWP's Victorian Biodiversity Atlas (VBA) (DELWP 2021d).

Local landowners were also contacted (where contact details were provided) to determine confirmed or potential Brolga observations not documented on biological databases (e.g. VBA) and to obtain further information on the availability of suitable breeding habitats across the locality.

As several historical breeding Brolga records are located within the project locality (i.e. within 10 kilometres of the wind farm development boundary), a Level 2 Assessment was also triggered.

Level 2 Assessment – Targeted Brolga Surveys and Habitat Assessments

A Level 2 Brolga Assessment was conducted by a qualified Zoologist consistent with the '*Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population*' (DSE 2012). Specifically, we sought to collect data on the location, extent and condition of Brolga habitats, and patterns of habitat use and behaviour at breeding and foraging sites within the area of investigation (if and where Brolga are observed).

Stage 1 – Roaming Surveys

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The Level 2 roaming surveys were undertaken between 28 and 30 October, and on 4 and 11 November 2020 (i.e. during the species’ breeding season) to detect Brolga within the area of investigation and to assess the availability of suitable breeding habitat.

The roaming surveys were undertaken across the area of investigation to:

- Determine the extent and quality of Brolga breeding habitat; and,
- Locate Brolga and confirmed or potential nest sites.

Habitat quality was assessed using the criteria detailed below, based on information on Brolga breeding habitats in Western Victoria (Marchant and Higgins 1993, Du Guesclin 2003):

High: Habitat components listed below are usually all present.

- Shallow freshwater marsh or shallow freshwater meadow less than 0.5 metres deep;
- Wetlands with large areas of aquatic and emergent vegetation (e.g. Annual herbs, rushes, Juncus spp. or tussock grass Poa spp.);
- Little or no signs of changed water regimes (e.g. drained wetlands);
- Little or no signs of disturbance (e.g. cultivation, native vegetation removal, grazing).

Moderate: Some habitat components are often missing although wetlands still provide some characteristics to provide nesting opportunities.

- Waterbody likely to hold water throughout breeding season (July-December) (i.e. permanent, or largely permanent);
- Water body with some aquatic and emergent vegetation (e.g. Annual herbs, rushes Carex spp. or Juncus spp. or tussock grass Poa spp.);
- Some changes to water regime may have occurred (drainage lines);
- Wetland shows some signs of disturbance (such as limited access to stock, cultivation, feral predators).

Low: Many habitat elements have been lost. Wetland habitats that are:

- Likely to be ephemeral or drained (only hold water for limited time of the year);
- Little or no aquatic or emergent vegetation;
- Changed water regime, little water present;
- Showing signs of disturbance (such as heavily grazed by stock, cultivated, feral predators).

During the site surveys the following data were recorded for each nest located (Table 1).

Table 1. Data recorded at each nest site

Data	Format
Site/Pair ID	Number or label that will be used to identify the pair in future
Nest Location	Easting/Northing
Land Use Type	Grazing/cropping/other (provide details)
Wetland size	Hectares

Data	Format
Chick Present	Y/N
Location of Brolgas	Easting/Northing (if flushed/disturbed, note this)
Notes on nest, including condition, location etc.	

Stage 2 - Flight Behaviour Studies

Each Brolga pair identified during the roaming surveys will be observed and their locations recorded during the breeding/fledgling season.

Flight behaviour studies aim to identify Brolga flight paths and movement patterns in order to determine buffer location and design.

The observations will be far enough apart (in time) that the movement in any one observation can be considered independent of the previous observation. Observations will be undertaken at least twice, and up to three times daily - morning (7-11am), midday (12-3pm) and evening (4-8pm), depending on the number of sites to be covered and the travel time between them.

During each time period, all nests will be observed, recording the locations of focal birds (parents for nests) on high resolution aerial photographs. The focal group will be watched for 20 minutes recording all new locations of birds, flight heights, lengths and frequencies along with mapping patterns of movement within (and between) breeding sites to gain an estimate of the aerial extent of bird activity, the distances and height of flights, and habitat utilisation. Observations will stop after 20 minutes and move to the next nest site.

Observation times will be staggered for each pair, so that the observations are representative of the pair's movement throughout the day. This can be simply achieved by cycling or randomising the first pair. Start, end and break times may also be staggered to ensure that the pairs are sampled throughout the day with appropriate coverage.

The following data will be recorded as part of the flight behaviour investigation (Table 2).

Table 2. Flight and behaviour data to be recorded.

Data	Format
Survey Info:	
Site/Pair ID:	As previously recorded
Date:	
Survey Start Time & End Time:	Recording Survey duration even if no bird is observed may allow accounting for false absences better.
Chick present?	Y/N
Precipitation:	Clear / Cloudy / Light Rain / Heavy Rain
Temperature:	Degrees
Observations:	
Bird 1: Observed Time:	
Observed Location:	Easting / Northing
Flight Direction	
Flight Distance	

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Data	Format
Flight Height	
Flight Destination	Easting/ Northing
Behaviour or other notes:	Time spent grazing, nesting etc.
Bird 2: Observed Time:	
Observed Location:	Easting/Northing
Flight Direction	
Flight Distance	
Flight Height	
Flight Destination	Easting/ Northing
With Bird 1?	Y/N
Behaviour or other notes:	Time spent grazing, nesting etc.

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2.4.2 Operational Impacts to Birds and Bats

The Clean Energy Association has developed *Best Practice Guidelines for Implementation of Wind Energy Projects in Australia* (Clean Energy Association 2013). The guidelines suggest a structured approach for ecological assessments that includes potential operational impacts on birds and bats. This approach was followed for the assessment and includes:

- Desktop review;
- Field surveys;
- Species-specific studies, if required;
- Development of avoidance, mitigation and offset strategies to minimise impacts on species if required; and;
- Development and implementation of monitoring programs for the construction and operational phases of the wind farm development.

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2.4.3 Bird Assessments

Bird Utilisation Surveys

Bird utilisation surveys are the most commonly used method for generating quantitative data on bird use of a potential wind farm site. The methods employed for the proposed Brewster Wind Farm bird utilisation surveys have been designed to comply with the guidelines described in *AusWEA – Wind Farms and Birds: Interim Standards for Risk Assessment (2005)*. According to these guidelines, bird utilisation surveys are undertaken to ascertain:

- The species composition of birds that use the study area;
- The frequency with which each of those species use the study area;
- The height at which each of these species fly in the study area; and,
- The distribution of these species across the landscape.

Bird utilisation surveys are a minimum requirement for all wind farm sites and are used to inform the design of higher-level investigations, if required.

AusWEA Wind Farms and Birds: Interim Standards for Risk Assessment

The Australian Wind Energy Association (AusWEA 2005) has developed interim standards for risk assessment of birds for wind farm developments in Australia. This document outlines the type of investigations required, the order in which they should be undertaken and a systematic approach for assessing risk of bird impact at wind farms. This process allows for more detailed studies should a potentially significant risk be identified during preliminary studies.

The AusWEA (2005) interim standards recommend three levels of investigations, with each level involving increasing levels of detail. These levels include:

- Level 1 investigations provide an initial assessment of the risk of significant bird impacts from the operation of the proposed wind farm; Level One investigations involve a regional overview, review of existing data, and indicative bird utilisation surveys and roaming surveys.
- Level 2 investigations refine the risk assessment from the Level One investigation, using more intensive methods. Level Two investigations involve roaming surveys and risk modelling.
- Level 3 investigations are initiated if the results of the Level Two investigations indicate a greater than low level of residual risk of significant bird impacts from the operation of the proposed wind farm. Level Three investigations involve population assessment and population viability analysis.

The interim standards also recommend consultation with the wind farm developer and key representatives of agencies that assess and approve development to:

- Agree on the issues, questions and objectives of bird impact risk assessment studies;
- Agree on the consequence and, where relevant, likelihood criteria that apply to the results of the studies; and,
- Where required, agree on the nature and effectiveness of mitigation measures.

Fixed Point Bird Counts

Field zoologists, experienced in bird identification, undertook the fixed-point count surveys to the specifications outlined below. 10 × 42 binoculars were used to identify the bird to species, or for some species, generic level (e.g. non-calling Raven species).

The following was undertaken as part of the fixed-point bird counts:

- Four locations were established at which to undertake fixed point counts, with two of these located outside of the windfarm development footprint. The locations chosen were to ensure that the entire range of habitats within close proximity to the windfarm development boundary were sampled and that a range of habitat types represented in that sample (Figure 3);
- The search radius from the point was at least 100 metres for small birds and up to 800 metres for large birds (e.g. birds of prey, waterbirds), or further, if accurate identification to species level was achievable, using prominent landmarks;

- The duration of each fixed-point count was 20 minutes;
- The height at which each bird flew through the survey area was estimated to the nearest 10 metres;
- The direction of flight of each bird was recorded to the nearest 45 degrees of the compass;
- Each point was surveyed at different times of day (e.g. early morning, late morning, early afternoon and late afternoon) to account for diurnal differences in bird activity; and,
- Each point was surveyed five times over the course of each survey period (early-August, mid-October and late-November 2021).

Incidental observations and roaming surveys

In addition to bird species recorded during the fixed-point count surveys, incidental observations of bird species were recorded while travelling between point counts and during other field based activities. Birds seen adjacent to the study area were also recorded.

A total of three Bird Utilisation surveys were conducted at Brewster Wind Farm (Table 3).

Table 3. Bird utilisation survey dates

Survey #	Survey dates
Survey #1 (Winter)	4-6 August 2021
Survey #2 (early Spring)	20-22 October 2021
Survey #3 (late Spring)	29 November – 1 December 2021

Statistical Analyses

Species accumulation curves were generated from the point count data and are presented as graphs. This, along with a measure of completeness provides an overall account of the survey efficacy in predicting the species likely to occur within the study area.

Completeness follows the methods of Watson (2003) which is widely used in the manufacturing industry and ecology-based projects (Watson 2003) and is calculated as the actual richness (A) divided by the predicted richness (P) expressed as a percentage. The predicted species richness was calculated with the EstimateS 9.1.0 program, using the Michaelis–Menten richness estimator (MMMeans) using 1000 runs and estimates of 85, which uses the ratio of species seen once (singletons) to the species seen more than once (doubletons) to predict species richness (Raaijmakers 1987; Colwell 2004; Colwell 2013).

The analysis was based on 60 bird point counts and 46 bird species.

Observations of birds were classified, according to their height, into four categories:

- ground;
- Below (RSA (1–85 metres);
- Within RSA (between 85 - 247 metres); and,
- Above RSA (> 247 metres).

Results of the bird utilisation statistical analysis is provided in Section 3.8.

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2.4.4 Microbat Surveys

Anabat bat detectors linked to CF Storage Zcaims (Titley Electronics, Ballina NSW) are the standard equipment used to survey microbat species. These instruments record the high frequency echolocation calls produced by microbats when they are in flight, and save these calls directly to a memory card. Different bat species produce distinguishable calls; therefore, detectors can be used to identify the species present in a given area. However, there is considerable variation within and between species, and all call identification needs to be undertaken by qualified personnel who have access to reference calls for that region and experience in identifying call characteristics.

Four Anabat bat detectors were deployed throughout the windfarm development between 1 and 21 October 2021 (Figure 3).

Units were placed in areas likely to be utilised by foraging bats, for example adjacent to farm dams, near native vegetation (e.g. along waterways) and planted windrows. Weller and Zabel (2002) found detectors placed at a height of 1.4 metres recorded 30% more calls than those placed on the ground. This method was adopted at all locations within the study area, with all units placed within the forks of trees or branches at a height of at least 1.8 metres to allow call detectability over a greater height.

A total of 40 nights during the current survey recorded bat calls.

Call Analysis

Identification of bat calls collected throughout the Brewster Wind Farm site were analysed by Greg Wood of Balance! Environmental, a recognised expert in bat call analysis. All nights of data were assessed for the calls of all bats, with a particular focus on the potential detection of significant bat species.

Call analysis involved the allocation of every data file to a species, and then counting the number of call records for each species. Results of the Anabat call analysis is provided in Section 3.9 and Appendix 5.

2.5 Removal, Destruction or Lopping of Native Vegetation (the Guidelines)

Under the *Planning and Environment Act 1987*, Clause 52.17 of the Pyrenees Planning Scheme requires a planning permit from the Responsible Authority to remove, destroy or lop native vegetation. The assessment process for the clearing of vegetation follows the '*Guidelines for the removal, destruction or lopping of native vegetation*' (the Guidelines) (DELWP 2017a). The '*Assessor's handbook: Applications to remove, destroy or lop native vegetation*' (Assessor's handbook) (DELWP 2018a) provides clarification regarding the application of the Guidelines (DELWP 2017a).

2.5.1 Assessment Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using an assessment-based approach. Two factors – extent risk and location category – are used to determine the risk associated with an application for a permit to remove native vegetation. The location category (1, 2 or 3) has been determined for all areas in Victoria and is available on DELWP's NVIM Tool (DELWP 2021b). Determination of assessment pathway is summarised in Table 4.

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Table 4. Assessment pathways for applications to remove, destroy or top native vegetation (DELWP 2017a).

Extent		Location		
		1	2	3
Native Vegetation	Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
	Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
	0.5 hectares or more	Detailed	Detailed	Detailed

Notes: For the purpose of determining the assessment pathway of an application to remove native vegetation the extent includes any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before an application to remove native vegetation is lodged.

2.5.2 Vegetation Assessment

Native vegetation (as defined in Table 5) is assessed using two key parameters: extent (in hectares) and condition. For the purposes of this assessment, both condition and extent were determined as part of the habitat hectare assessment.

Table 5. Determination of a patch of native vegetation (DELWP 2017a).

Category	Definition	Extent	Condition
Patch of native vegetation	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; OR An area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy; OR any mapped wetland included in the <i>Current Wetlands map</i> , available in DELWP systems and tools.	Measured in hectares. Based on hectare area of the native patch.	Vegetation Quality Assessment Manual (DSE 2004). Modelled condition for <i>Current Wetlands</i> .
Scattered tree	A native canopy tree that does not form part of a native patch.	Measured in hectares. Each Large scattered tree is assigned an extent of 0.071 hectares (30m diameter). Each Small scattered tree is assigned a default extent of 0.31 hectares (10 metre diameter)	Scattered trees are assigned a default condition score of 0.2 (outside a patch).

Notes: Native vegetation is defined in the Victoria Planning Provisions as ‘plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses’.

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2.5.3 Mapped Wetlands (DELWP)

Wetlands can be difficult to map and assess accurately as they respond quite quickly to changes in environmental condition, especially rainfall. After a period of no or low rainfall they can disappear or appear very degraded. They do, however, recover rapidly after periods of increased rainfall. As a result, under the Guidelines (DELWP 2017a) all mapped wetlands (based on ‘Current Wetlands’ layer in the DELWP NatureKit

Map) that are to be impacted must be included as native vegetation, with the modelled condition score assigned to them (DELWP 2018a).

Note that mapped wetlands do not apply if they are covered by an artificial surface, for example, a roadway, or if the wetland is artificially constructed (i.e. farm dam).

2.5.4 Impact Avoidance and Minimisation

All applications to remove native vegetation must demonstrate the three-step approach of avoid, minimise and offset. This is a precautionary approach that aims to ensure that the removal of native vegetation is restricted to what is reasonably necessary, and that biodiversity is appropriately compensated for any native vegetation removal that is approved.

2.5.5 Offsets

Biodiversity offsets are required to compensate for the permitted removal of native vegetation. Offset obligations and offset site criteria are determined in accordance with the Guidelines (DELWP 2017a) and are divided into two categories, being General Habitat Units and Species Habitat Units.

The offset requirements for native vegetation removal are calculated by DELWP and presented in a Native Vegetation Removal (NVR) Report, which are based on the vegetation condition scores determined during the biodiversity assessment.

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2.6 Consultation

DELWP was consulted throughout the pre-application process to inform the development of the project and discuss the survey design to ensure that a full understanding of potential impacts can be ascertained.

Table 6 summarises the stakeholder liaison activities that occurred during the pre-application process in relation to ecology, and a summary of the outcomes of each meeting.

Table 6. Stakeholder engagement activities undertaken in relation to ecological investigations.

Activity	Date	Matters Discussed	Outcomes
Virtual Meeting with DELWP (Michael Juttner, Mitch Connolly, Mark Dold, Nathan McDonald, Nihal Altuntas, Monique Claasz).	08/12/2020	<ul style="list-style-type: none"> Proposed development footprint; Broad planning framework; Ecological survey program Ecological survey findings to date; 	<ul style="list-style-type: none"> DELWP generally happy with proposed survey timing and schedule; Proposed retention of all native vegetation within the wind farm development boundary;

2.7 Likelihood of Occurrence Assessment

Relevant biological databases, literature (listed in Section 2.1) and expert advice were used to identify all species records of national, State and regional conservation significance within 10 kilometres of the project area. The proximity, number, dispersion and date of known locality records (assuming over-dispersed and

random patterns of locality records being more likely to occur in the project area) were considered to determine a species' likelihood of occurrence within the project area.

Additional factors also taken into consideration include: the known biogeographical distribution of the species; underlying geology of existing locality records; and, vegetation and habitat associations. The decision guidelines for determining the likelihood of occurrence of flora and fauna species are presented in Table 7 and Table 8 respectively.

The results of the likelihood of occurrence assessment for listed flora and fauna species are provided in Appendices 1.3 and 2.1, respectively.

Table 7. Decision guidelines for determining a flora species likelihood of occurrence within the wind farm development boundary.

Likelihood of occurrence	Decision guidelines
1 – Known occurrence	Recorded within the project area recently (i.e. within 10 years).
2 - High	Previous records of the species in the local vicinity; and/or, the project area contains areas of high-quality habitat.
3 – Moderate	Limited previous records of the species in the local vicinity; and/or, the project area contains some characteristics of the species' preferred habitat.
4 – Low	Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a low likelihood of presence.
5 – Unlikely	No potential habitat and/or outside the species range.

Table 8. Decision guidelines for determining a fauna species likelihood of occurrence within the wind farm development boundary.

Likely presence or use of the project area	Decision guidelines
1 – Known occurrence	Recorded within the project area recently (i.e. within 10 years).
2 - High	Likely resident in the project area based on database records, or expert advice; and/or, recent records (i.e. within 10 years) of the species in the local area; and/or, the project area contains the species' preferred habitat.
3 - Moderate	The species is likely to visit the project area regularly (i.e. at least seasonally); and/or, previous records of the species in the local area; and/or, the project area contains some characteristics of the species' preferred habitat.
4 - Low	The species may visit the project area occasionally or opportunistically whilst en route to more suitable sites; and/or, there are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, the project area contains few or no characteristics of the species' preferred habitat.
5 - Unlikely	No previous records of the species in the local area; and/or, the species may fly over the project area when moving between areas of more suitable habitat; and/or, out of the species' range; and/or, no suitable habitat present.

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2.8 Assessment Qualifications and Limitations

2.8.1 Site Assessment

This report has been written based on the quality and extent of the ecological values and habitat considered to be present or absent at the time of the desktop and/or field assessments being undertaken.

Data and information held within the ecological databases and mapping programs reviewed in the desktop assessment (e.g. VBA, PMST, Nature Kit Maps etc.) are unlikely to represent all flora and fauna observations within, and surrounding, the wind farm development boundary. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent.

The 'snapshot' nature of a standard biodiversity assessment meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent. Only the land identified as 'Wind farm development boundary' as shown in Figure 2a, and the swept path envelopes as shown in Figure 2b was assessed as part of the flora assessment.

A comprehensive list of all terrestrial flora and fauna present within the wind farm development boundary was not undertaken as this was not the objective of the assessment. Rather a list of commonly observed species was recorded to inform the habitat hectare assessment and assist in determining the broader biodiversity values present within the wind farm development boundary.

Ecological values identified within the wind farm development boundary were recorded using a hand-held GPS or tablet with an accuracy of +/-3 metres. This level of accuracy is considered to provide an accurate assessment of the ecological values present within the wind farm development boundary; however, this data should not be used for detailed surveying purposes.

2.8.2 Brolga Assessment

A total of 225 waterbodies surveyed across the survey period. An additional 59 waterbodies could not be accessed during the roaming surveys as they were not visible via publicly accessible areas. As such, the quality of these waterbodies was determined through a combination of historical aerial photography analysis as well as the condition of nearby habitats observed during the site assessments.

However, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered to adequately inform an accurate assessment of the ecological values present within the wind farm development boundary, as well as potential Brolga breeding habitat within the area of investigation.

2.8.3 Microbat Assessment

Where possible, Anabat detectors were placed in trees at least 1.8 metres above ground. Weller and Zabel (2002) found detectors placed at a height of 1.4 metres recorded 30% more calls than those placed on the ground.

Depending on the bat species and how far it projects its call, Anabat detectors can typically detect bat echolocation calls at between five and 20 metres. It is important to note that although detectors may give an

index of overall bat activity levels, they cannot be used to determine bat abundance, as the number of individuals emitting the calls is not known.

It is noted that the canopy height throughout most of the study area is less than 25 metres in height meaning that the detection of some species of bats may not be possible using Anabat technology. However, given that no known populations of significant bat species are known to occur within the broader locality, it is likely that only common bat species that fly at a height outside the detectability range were not captured, rather than any significant species.

Despite the above limitations it is considered that the methodologies applied during the current surveys, and the duration and intensity of the surveys were sufficient to provide an accurate assessment of the microbat species utilising the wind farm area.

2.8.4 *Bird Utilisation Surveys*

The fixed-point bird counts may have suffered from some biases because of the use of estimation in determining the distance of birds from the observer. Horizontal distances became increasingly difficult to judge as the distance between the observer and the bird increased.

Vertical distances were also difficult to judge, depending on structures and other landmarks that could be used as a reference. However, the higher the bird the greater the likelihood of error. In addition, this difficulty was not consistent across species, with small and large species biasing the results in unknown directions.

To attempt to overcome these potential errors, and to calibrate the estimations of the observers, at each point count 200 metres was measured to use as a reference for the estimations that followed. To calibrate height, a landmark of known height (such as wind anemometer tower, power-line poles etc.) was used as a reference point. Whilst these precautions alleviated some of the bias in this process, the height and distance data need to be interpreted in a cautious manner, given the probability of a high degree of error in the data-set.

A further bias in the data-set is the over-representation of large birds. As the distance between the observer and the bird increases, smaller species are increasingly likely to be overlooked. This effect is also likely to be exacerbated by weather conditions with overcast, windy or wet conditions having a negative impact on the detectability of some birds.

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3 RESULTS

3.1 Overview

A total of 37 flora species were recorded within the wind farm development boundary during the field assessment. Of these, 16 were native, and 21 were either introduced or planted (noting that planted species that were not naturally recruiting were not recorded). A consolidated list of flora species recorded is provided in Appendix 1.1.

No significant flora species were recorded within the wind farm development boundary and no species of national, state or regional significance are considered likely to frequently utilise habitats within the wind farm development boundary.

A total of 64 fauna species were recorded within the wind farm development boundary during the field assessment, including: 10 mammals, one amphibian and 53 birds (four introduced).

Two State significant fauna – Brolga *Antigone rubicunda* and Eastern Bent-wing Bat *Miniopterus orianae oceanensis* were recorded within, or in close proximity to the wind farm development during the field assessments.

A list of fauna species recorded is provided in Appendix 2.2, Table 13 and Table 15.

Native vegetation in the wind farm development boundary is representative of one EVC; Plains Grassy Wetland (EVC 125). The remainder of the site was actively grazed and/or cropped and comprised typically of improved pastures, with some areas showing outbreaks of noxious weed species. Roadside vegetation adjacent to the windfarm development footprint was comprised of introduced and planted native vegetation, present as pasture grass and ornamental gardens/screens.

In addition, four Current Wetlands are modelled to occur within the wind farm development boundary (Figure 2a).

3.2 Vegetation Condition – Windfarm Development Boundary

3.2.1 Patches of Native Vegetation

Native vegetation in the wind farm development boundary is representative of one EVC: Plains Grassy Wetland (EVC 125), which is widespread across the local geographic area, but is listed as Endangered within the Victorian Volcanic Plain bioregion. Specific details relating to the observed EVC are provided below.

The results of the habitat hectare assessment are provided in Appendix 1.2.

Plains Grassy Wetland

Plains Grassy Wetland (PGWe) is present near the centre of the wind farm development boundary within a slight depression that was at the time of assessment excluded from grazing. The broader central sections of the patch were extensively covered by sedges; Common Spike-sedge *Eleocharis acuta* and Small Spike-sedge *Eleocharis pusilla*, and grasses such as Reed Bent-grass *Deyeuxia quadriseta* and Common Swamp Wallaby-grass *Amphibromus nervosus*. A diversity of herbs was also present such as River Buttercup *Ranunculus inundatus*, and Floating Pondweed *Potamogeton tricarinatus* (Plate 1 and Plate 2). Towards the drier, outer

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edge of the patch, the PGWe patch was dominated by Common Swamp Wallaby-grass and Reed Bent-grass only, with no sedges present.



Plate 1. Plains Grassy Wetland recorded within the wind farm development boundary (Ecology and Heritage Partners Pty Ltd 01/10/2020).



Plate 2. Plains Grassy Wetland recorded within the wind farm development boundary (Ecology and Heritage Partners Pty Ltd 01/10/2020).

3.2.2 Large Trees in Patches and Scattered Trees

No large trees or scattered trees were present within the windfarm development boundary.

3.2.3 Introduced and Planted Vegetation

Areas not supporting native vegetation had a high cover (>95%) of exotic grass species, many of which were direct-seeded for use as pasture. Scattered native grasses were occasionally present in these areas, however they did not have the required 25% relative cover to be considered a patch.

Planted native screens persist along the northern boundary of the wind farm development boundary adjacent to the Western Highway (Plate 3) typically represented by common native species such as Black Wattle *Acacia mearnsii*, Yellow Gum *Eucalyptus leucoxylon*, Common Correa *Correa reflexa*, and Spiny-headed Mat-rush *Lomandra longifolia*. Further plantings were observed as windbreaks (Pine *Pinus radiata*) and garden beds adjacent to an old homestead (Plate 4).

The southern boundary of the windfarm development boundary contains a plantation (as identified in an historical Trawalla parish map that comprises planted Sugar Gum *Eucalyptus cladocalyx* and River Red-gum *Eucalyptus camaldulensis* (Appendix 6).

Non-native areas were dominated by environmental weeds such as Toowoomba Canary-grass *Phalaris aquatica*, Rye-grass *Lolium* spp., Ribwort *Plantago lanceolata*, Couch *Cynodon dactylon* var. *dactylon* and Wild Oat *Avena fatua* (Plate 5).

Noxious weeds were present, with Spear Thistle *Cirsium vulgare* present in localised concentrations to the north west of the site (Plate 6).

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Plate 3. A row of planted trees along the northern boundary (Ecology and Heritage Partners Pty Ltd 01/10/2020).



Plate 4. Planted Pine trees (Ecology and Heritage Partners Pty Ltd 01/10/2020).



Plate 5. Exotic improved pastures forming the majority of the wind farm development boundary (Ecology and Heritage Partners Pty Ltd 01/10/2020).



Plate 6. Established Spear Thistle within paddocks (Ecology and Heritage Partners Pty Ltd 01/10/2020).

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3.3 Swept Path Assessments

An on ground habitat hectare assessment was undertaken at the following swept paths intersections along the transport route to confirm the presence or absence of native vegetation with the potential to be impacted.

3.3.1 *Glenelg Highway and Henty Highway, Hamilton*

No native vegetation was recorded within the swept path envelope at the intersection (Figure 2b – i). The site was highly modified and was dominated by introduced vegetation.

3.3.2 *Dunkeld-Cavendish Road and Glenelg Highway, Dunkeld*

A patch of moderate quality Plains Grassy Woodland (PGW1) was recorded at the Dunkeld-Cavendish Road and Glenelg Highway intersection (Figure 2b-ii).

The overstorey was dominated by Yellow Gum *Eucalyptus leucoxylon*, with an understory comprising scattered occurrences of Wallaby-grass *Rytidosperma* spp., and Spear-grass *Austrostipa* spp.

Introduced grasses are prevalent with Toowoomba Canary-grass and Great Brome commonly observed. Large areas of revegetation were also present, comprising planted specimens of Yellow Gum.

Based on a review of the swept path analysis (RE Future 2021), no impacts are proposed to any native vegetation (EVCs) present at the intersection.

3.3.3 Eurambeen-Streatham Road and Glenelg Highway, Streatham

Native vegetation at the intersection is representative of two EVCs: *Low rainfall* Plains Grassland (EVC 132_63) and Plains Grassy Wetland (EVC 125) (Figure 2b-iii).

All patches of Plains Grassland were present in moderate to good quality, however, were dominated by different species. Habitat zone PG1a was dominated by Spear-grass, with Wild Oat *Avena fatua* common and limited other species present. Habitat zone PG1b was dominated by Kangaroo Grass *Themeda triandra* and native herbs and was mown at the time of assessment. Habitat zone PG2, PG1c and PG1d was dominated by a high cover Wallaby-grass. All patches of PG1 had a low weed cover, however PG2 contained a moderate weed cover with Paspalum *Paspalum dilatatum* and Cat’s-ear *Hypochoeris radicata* being the main exotic species present.

Native herbs were present in a moderate cover in PG1b, and low cover in other patches, with Common Everlasting *Chrysocephalum apiculatum* and Lemon Beauty-heads *Calocephalus citreus* being most prevalent (Plate 7). One shrub, Hedge Wattle *Acacia paradoxa*, was recorded in the PG1b and a Golden Wattle *Acacia pycnantha* was recorded in PG1a. All patches of PG1 classified as the nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain*. The weed cover in PG2 was too high to meet the requirements for NTGVVP.

Plains Grassy Wetland was observed on the north western side of the Glenelg Highway, in a low lying area dominated by Rush *Juncus* sp., (Plate 8). Water was present at the time of the assessment, however it is likely the area dries over dry periods. Exotic grasses, primarily Couch *Cynodon dactylon*, dominated the area.



Plate 7. Kangaroo Grass and native herbs within PG1b (Ecology and Heritage Partners Pty Ltd 16/03/2020).

Plate 8. Juncus dominated PGWe within the intersection (Ecology and Heritage Partners Pty Ltd 21/05/2020).

Previous targeted surveys conducted by Ecology and Heritage Partners identified a large population of the nationally significant Hoary Sunray *Leucochrysum albicans* var. *tricolour* within the south western corner of the intersection (Plate 9; Plate 10; Figure 2b-iii). These surveys recorded a patch of approximately 900 Hoary

Sunray individuals, surrounded by several scattered individuals, all located within a high quality patch of Kangaroo Grass.



Plate 9. Sunray *Leucochrysum* sp. recorded outside the impact area (Ecology and Heritage Partners Pty Ltd 21/05/2020).



Plate 10. Flowering Hoary Sunray recorded outside the impact area during the targeted surveys (Ecology and Heritage Partners Pty Ltd 04/11/2020).

Based on a review of the swept path analysis (RE Future 2021), no impacts are proposed to any native vegetation (EVCs), or the nationally significant Hoary Sunray or NTGVVP ecological community (Figure 2b-iii).

3.3.4 Western Highway and Pin Oak Court, Trawalla

No native vegetation was recorded within the swept path envelope at the intersection (Figure 2b – iv). The site was highly modified and was dominated by introduced vegetation.

3.3.5 Western Highway Off-ramp, Trawalla

No native vegetation was recorded within the swept path envelope at the intersection (Figure 2b – v). The site was highly modified and was dominated by introduced vegetation.

3.3.6 Trawalla Road and Rodgers Drive, Trawalla

A patch of low quality Plains Grassland (PG1) was recorded at the Trawalla Road and Rodgers Drive intersection, adjacent to the Trawalla Primary School frontage (Figure 2b-vi).

The patch comprised a cover of approximately 35% Wallaby-grass and scattered Spear-grass. Introduced grasses and herbs were dominant with Ribwort *Plantago lanceolata* and Kikuyu both present throughout the nature strip.

Based on a review of the swept path analysis (RE Future 2021), no impacts are proposed to any native vegetation (EVCs) present at the intersection (Figure 2b-vi).

3.3.7 Site Entrance at 295 Trawalla Road, Trawalla

No native vegetation was recorded within the swept path envelope at the intersection (Figure 2b – vii). The site was highly modified and was dominated by introduced vegetation.

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3.4 Fauna Habitat

Plains Grassy Wetland within the wind farm development boundary provides low to moderate quality habitat to native fauna. The vegetation in these patches has been disturbed and is present predominantly as recent regrowth. Nevertheless, the sedgy vegetation provides suitable foraging and nesting habitat for a variety of waterbirds (i.e. ducks) and frogs.

The scattered trees, patches of PGW1, and windrows are of low to moderate habitat value for fauna. While the majority of the remnants within the study area are structurally deficient, lacking key mid-storey and understorey components, they are likely to act as 'stepping stones' of habitat for more mobile species (principally birds). Trees (native and non-native) are also likely to facilitate fauna movement throughout the otherwise cleared landscape, and provides habitat for diurnal raptors (e.g., Nankeen Kestrel *Falco cenchroides*, Black-shouldered Kite *Elanus axillaris*), which use trees for perching, roosting and foraging activities.

The remainder of the site is comprised of exotic grassland, dominated by a range of introduced pasture grasses and herbaceous weeds, likely to be used as a foraging resource by common generalist bird species that are tolerant of modified open areas.

Fauna observed using this habitat included Australian Magpie *Cracticus tibicen*, Little Raven *Corvus mellori*, Galah *Eolophus roseicapilla* and European Rabbit *Oryctolagus cuniculus*. The European Rabbit is listed as pest animals under the CaLP Act.

3.5 Removal, Destruction or Lopping of Native Vegetation (the Guidelines)

The below scenario is based on the development footprint provided to Ecology and Heritage Partners by RE Future on 7 April 2021 and shown in Figure 2a and Figure 2b.

3.5.1 Vegetation proposed to be removed

The windfarm footprint, including swept paths has been designed to avoid all identified patches of native vegetation. However, it should be noted that Brewster Wind Farm Pty Ltd are proposing to formalise access to one of the turbines along an existing farm track that passes through a Modelled Wetland at 7 Pin Oak Court (Figure 2a),. Although no native vegetation was present along the access track at the time of the assessments, as per the requirements under the Guidelines (DELWP 2017), the impact to the Modelled Wetland has been included as native vegetation, with the modelled condition score assigned to this area.

The study area is within Location 1, with 0.082 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Basic assessment pathway (Table 9).

Condition scores for vegetation proposed to be removed are based on modelled scores available in the NVIM system (DELWP 2021b).

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Table 9. Removal of Native Vegetation (The Guidelines) (DELWP 2017)

Assessment pathway	Basic
Location Category	1
Total Extent (past and proposed) (ha)	0.082
Extent of past removal (ha)	0.00
Extent of proposed removal (ha)	0.082
Large Trees (scattered and in patches) to be removed (no.)	0
Small scattered trees to be removed (no.)	0
EVC Conservation Status of vegetation to be removed	Not Applicable (Modelled Wetland)

3.5.2 Offset Targets

The offset requirement for native vegetation removal is 0.015 General Habitat Units.

A summary of proposed vegetation losses and associated offset requirements is presented in Table 10 and the Native Vegetation Removal (NVR) is presented in Appendix 3.

Table 10. Offset Targets.

General Offsets Required	0.015 General Habitat Units
Large Trees	0
Vicinity (catchment/council)	Glenelg Hopkins CMA /Pyrenees Shire Council
Minimum Strategic Biodiversity Value*	0.168

*The minimum Strategic Biodiversity Value is 80% of the weighted average score across habitat zones where a General offset is required.

3.5.3 Offset Statement

According to DELWPs Native Vegetation Offset Register (DELWP 2021g), there are 24 offset sites within the Glenelg Hopkins CMA that can be used to satisfy the General Habitat Unit offset requirements generated by the proposal.

An offset register search statement identifying the relevant offsite sites is provided in Appendix 4.

3.6 Significance Assessment

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3.6.1 Flora

The VBA contains records of four nationally significant and six State significant flora species previously recorded within 10 kilometres of the site (DELWP 2021d) (Figure 5). The PMST nominated an additional 13 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DAWE 2021) (Figure 5; Appendix 1.3).

No national or State significant species listed under the EPBC Act or FFG Act were recorded within the windfarm development boundary.

The wind farm development boundary is highly modified, with the majority of the land subject to historical and ongoing agricultural use, including ground disturbance (ploughing) to facilitate cropping. As such, almost all potential habitat for national and State significant flora has been removed.

The Plains Grassy Wetland habitat supports moderate quality habitat for wetland flora (i.e. Pale Swamp Everlasting *Xerochrysum palustre*, Pale Swamp Everlasting *Coronidium gunnianum*). However, this area will not be impacted by the proposed development, and therefore, targeted surveys are not required.

One flora 'protected' under the FFG Act (Golden Wattle *Acacia pycnantha*) was recorded within the parcel at 295 Trawalla Road, Trawalla (Figure 2a; Figure 2b-vii). However, the specimen is located outside of the impact footprint.

Based on absence of suitable habitats within the development footprint (including roadsides), landscape context and the proximity of previous records, nationally significant flora species are considered highly unlikely to occur within, or immediately adjacent to the development footprint (Appendix 2.2).

A large population of the nationally significant Hoary Sunray is present within the road reserve of Eurambeen-Streatham Road and Glenelg Highway, Streatham (Figure 2b-iii). However, this population is outside of the swept path tyre envelope for the intersection, and although the blade clearance envelope will overhang the population, there will be no impact to the species.

3.6.2 Fauna

The VBA contains records of seven nationally significant and 18 State significant fauna species previously recorded within 10 kilometres of the wind farm development boundary (DELWP 2021d) (Figure 6). The PMST nominated an additional 12 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DAWE 2021) (Figure 6; Appendix 2.1).

The State significant Brolga was opportunistically recorded during the November 2021 bird utilisation survey, while the State significant Eastern Bent-wing Bat *Miniopterus orianae oceanensis* was recorded during the microbat surveys. No additional significant fauna species were recorded during the field assessments.

There are 139 previously documented records of Brolga. Implications relating to Brolga are detailed below in Section 3.7.

The Plains Grassy Wetland habitat contains low to moderate quality habitat for the nationally significant Growling Grass Frog *Litoria raniformis*. However, this habitat is located over 900 metres from Spring Hill Creek, and other waterbodies within the site (farm dams) are devoid of the species preferred habitat features (i.e. fringing and emergent vegetation) (DEWHA 2009a). As such, it is considered highly unlikely that the species would inhabit or make significant use of habitats within the wind farm development boundary. In addition, the Plains Grassy Wetland habitat will not be impacted by the proposed windfarm development, and therefore, there will not be a significant impact to the species.

There are three records of Striped Legless Lizard within the project locality (Figure 6). However, due to modification of the wind farm development boundary through agricultural activity (ploughing) to facilitate agricultural use (i.e. planting of crops), preferred habitat characteristics for the species, such as cracking soils and surface rock are no longer present. Owing to a lack of suitable habitat, Striped Legless Lizard is considered highly unlikely to inhabit or make significant use of the wind farm development boundary or its immediate surrounds.

Based on the absence or low quality of potential habitats within the wind farm development boundary (including roadsides), landscape context and the proximity of previous records, nationally significant fauna species are considered highly unlikely to occur within the wind farm development boundary, or be impacted by the wind farm development (Appendix 3.1).

It is possible that State and regionally significant birds may fly over the wind farm development boundary occasionally or opportunistically whilst en route to more suitable sites within the broader landscape. These species include Hardhead *Aythya australis*, Blue-billed Duck *Oxyura australis*, Caspian Tern *Hydroprogne caspia* and Latham's Snipe *Gallinago hardwickii*. Low quality habitat for these species is present in the wind farm development boundary as the dams are small and open, although they provide limited aquatic vegetation. Based on the low numbers of records for each species in the locality and lack of high quality habitat, these species are considered unlikely to visit the wind farm development boundary regularly, and considering the small scale of the proposed wind farm the potential operational impact on these species is considered to be low.

Potential impacts relating to avifauna are further detailed in Section 5.2.

3.6.3 Ecological Communities

Five nationally listed ecological communities are predicted to occur within 10 kilometres of the study area (DAWE 2021):

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain;
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia;
- Natural Temperate Grassland of the Victorian Volcanic Plain;
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains; and
- White Box - Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland.

However, vegetation within the wind farm development boundary did not meet the condition thresholds that define any national or State-significant communities due to the absence of key indicator species, presence of contra-indicative species (i.e. sedges) and the low diversity of native flora and high cover of exotic vegetation.

The nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* is present at the Eurambeen-Streatham Road and Glenelg Highway intersection, but is located outside of the impact footprint.

3.7 Brolga Assessment

3.7.1 Landowner Liaison

A total of five landowners located within the wind farm development boundary and nearby locality were contacted as part of the Level 1 Assessment.

Four landowners had not observed Brolga within the immediate vicinity of the wind farm development boundary for several years. However, recent (2019/20) sightings of Brolga had been observed east of Lake Burrumbeet and within the vicinity of Waubra Wind Farm.

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The 5th landowner [REDACTED] stated that Brolga regularly foraged in a dam located immediately to the north-east of his dwelling (Site 153 – Figure 4a). However, no breeding or flocking behaviour was observed by the landowner.

3.7.2 Desktop Assessment

Birdlife New Atlas

Data extraction from the Birdlife New Atlas revealed 13 non-breeding Brolga records within a 10 kilometre radius of the wind farm development boundary (Figure 4b). These records are all located around waterbodies between the north-east and south-east such as Dunn’s Marsh, Black Swamp, Cockpit Lagoon and Lake Burrumbeet, as well as a single record to the south-west near Beaufort-Carngham Road (Figure 4b). There are no documented Brolga records to the north, south or west within the Birdlife Atlas (Birdlife Australia 2021).

Sheldons Brolga Database

Sheldon’s Brolga Database revealed 23 Brolga records previously recorded within 10 kilometres of the wind farm development boundary (Figure 4b). No breeding records or flocking events were identified within 10 kilometres of the site from the Sheldon’s Brolga Database.

Victorian Biodiversity Atlas

A search of the VBA revealed 148 additional Brolga records within 10 kilometres of the wind farm development boundary (Figure 4b), of which 20 of these are identified as breeding records, and of those, seven are located within four kilometres of the wind farm development boundary (Figure 4a).

The two closest breeding records are located approximately 3.8 kilometres (west – Site 114) and 2.6 kilometres (north-east – adjacent to Site 194) respectively (Figure 4a).

The majority of the VBA records occur to the east, north and north-west of the wind farm development boundary (Figure 4b). Of these, only 48 records occur within four kilometres of the wind farm development boundary, including one record of Brolga from 2011 within the south-east of the wind farm development boundary.

Within the broader area (i.e. 20 kilometres), there are large numbers of Brolga records located to the south-west of the wind farm development boundary, particularly between Beaufort near Lake Goldsmith (DELWP 2021d). Although there are a small number of additional Brolga records north of the wind farm development boundary, the lack of documented records and available breeding habitat within and directly surrounding the wind farm development boundary indicates that Brolga movement throughout the local area is predominantly confined to the south and southwest of the wind farm development boundary, and the species is unlikely to frequently fly across the wind farm development boundary to access habitats located within, or between more optimal habitats to the east.

3.7.3 Brolga Roaming Surveys

No evidence of Brolga (i.e. adults, chicks or nests) were observed during the site assessments undertaken in October and November 2020. A summary of the survey results and habitat assessment are presented below (Table 11).

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Site Assessments

A total of 225 waterbodies surveyed outside of the wind farm development boundary across the survey period. The majority of observed waterbodies were shallow dams with no riparian, emergent or floating vegetation, or paddocks dominated by pasture grasses that contained no evidence of recent inundation. One waterbody (Site 47), which is located approximately seven kilometres north-west of the wind farm development boundary met the criteria for ‘High Quality’ habitat. Most sites are located in areas that consistently and frequently undergo cultivation for either cropping or pasture establishment. All other assessed waterbodies were modified (i.e. most have been drained) and either lacked riparian and/or aquatic vegetation (i.e. emergent, submerged and fringing vegetation) or supported a low cover of aquatic vegetation.

Eighteen waterbodies met the criteria for ‘Moderate’ habitat quality. These were dams or waterbodies that were located in an area of high agricultural activity and supported low levels of riparian and/or aquatic vegetation. The majority of waterbodies (i.e. 206) met the criteria for ‘Low’ quality habitat quality. Many of these waterbodies were dry at the time of the assessment and were located in modified areas subject to ongoing agricultural land uses and contain no riparian and/or emergent vegetation due to being channelised and/or drained. Sites 114 and 194 – containing the two closest historical Brolga breeding records have both been assessed as low quality as they are both highly modified due to agricultural disturbance, and at the time of the assessment, were dry and did not contain any riparian and/or emergent vegetation.

Site 153, where a local landowner stated that Brolga regularly forage within a dam on his property was assessed as supporting moderate quality habitat.

Fifty-nine waterbodies could not be accessed during the roaming surveys as they were not visible via publicly accessible areas. As such, the quality of these waterbodies was determined through a combination of historical aerial photography analysis as well as the condition of nearby habitats observed during the site assessments.

Of the 59 waterbodies, four were considered to meet the criteria for ‘Moderate’ habitat quality, while 55 met the criteria for ‘Low’ habitat quality due to being sited in areas that are frequently and consistently subject to cultivation and harvesting activities.

A summary of the survey results and Habitat Assessment are presented in Table 11.

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Table 11. Results of Brolga Surveys and Habitat Assessment.

Habitat Quality	Habitat Quality based on Site Assessment	Habitat Quality based on Desktop Assessment	Brolgas Present
High	1	0	No
Moderate	17	4	No
Low	206	55	No

Incidental Sightings

Four Brolga were observed at Wetland 124 during bird utilisation surveys conducted between 29 November – 1 December 2021. The Brolga were sighted on 29 and 30 November 2021, with a separate incidental sighting on 2 December 2021 while driving past the wetland. No Brolga were observed at Wetland 124 (or any other wetland) during the previous bird utilisation surveys undertaken for the project, or during the Level 1 and 2

Brolga assessment conducted in 2020. However, the VBA (DELWP 2021) contains a historical record of Brolga from 2011.

The four Brolga observed appeared to comprise a family of two adults and two juveniles, with no chicks present. Given the absence of Brolga from Wetland 124 during previous surveys, this indicates that the wetland was not being used for breeding purposes as fledging generally occurs at around 100 days, with juveniles staying with their parents for another breeding season if the parents do not re-nest (Marchant and Higgins 1993).

Based on the absence of Brolga at Wetland 124 during all previous surveys undertaken for the project, as well as the absence of chicks during the opportunistic sightings, it is highly likely that Wetland 124 was being opportunistically utilised for foraging purposes, and does not support breeding habitat for Brolga.

3.8 Bird Utilisation Surveys

3.8.1 Overview

Forty-six (46) bird species were recorded, consisting of 1,570 individuals, during the fixed-point bird counts. Five other species was identified to generic level (i.e. Raven species, either Little Raven *Corvus mellori* or Australian Raven *Corvus coronoides*). Four introduced species were recorded: Common Starling *Sturnus vulgaris*, Common Blackbird *Turdus merula*, Eurasian Skylark *Alauda arvensis*, and European Goldfinch *Carduelis carduelis*. One additional species was recorded as an 'opportunistic observation' between sites: Nankeen Kestrel *Falco cenchroides*. No nationally significant species were recorded within the study area; however, one following species listed as threatened under the FFG Act were recorded: Brolga *Antigone rubicunda* (Endangered) (DELWP 2021f).

The most frequently recorded species were Australian Magpie *Gymnorhina tibicen* (recorded during 77% of surveys), Common Starling (28%), Little Raven (20%), Eurasian Skylark (43%), and Straw-necked Ibis *Threskiornis spinicollis* (43%).

A total of 99% of bird observations made during the point counts were of individuals that were either on the ground or flying below the Rotor Swept Area. The remaining 1% did not have their height recorded as they were obscured from vision, while no birds were recorded flying in or above the Rotor Swept Area.

One species – Brolga – recorded during the bird utilisation surveys is defined as 'species of interest' as outlined in Lumsden *et al.* (2019).

A variety of other bird species were also recorded (see Appendix 2.2 and Table 13 for full species list), including:

- Generalist bird species common in modified landscapes, such as open paddocks, including Magpie Lark *Grallina cyanoleuca*, Willie Wagtail *Rhipidura leucophrys* and Little Raven;
- Woodland bird species using linear patches of native and non-native vegetation along roadsides and other bushland in the study area, such as Rufous Whistler *Pachycephala rufiventris*, Red Wattlebird *Anthochaera carunculata*, New Holland Honeyeater *Phylidonyris novaehollandiae*, Striated Pardalote *Pardalotus striatus* and Golden Whistler *Pachycephala pectoralis*;

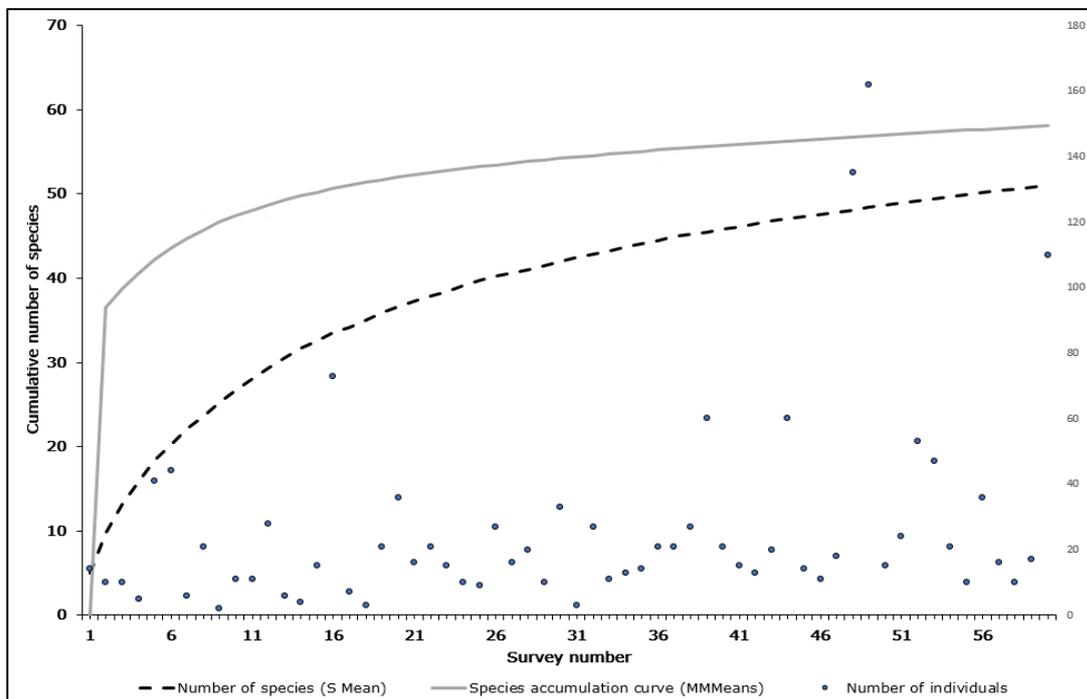
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- Water bird species using dams and streams in the study area including Australian Woodduck *Chenonetta jubata*, Australian Shelduck *Tadorna tadornoides*, Straw-necked Ibis *Threskiornis spinicollis* and White-faced Heron *Egretta novaehollandiae*;
- Raptors foraging over paddocks, roadsides and waterbodies, including Whistling Kite *Haliastur sphenurus*, Brown Falcon *Haliastur sphenurus*, and Nankeen Kestrel; and,
- Parrot species feeding on sowed crops and using large hollow-bearing gums, including Crimson Rosella *Platycercus elegans*, Eastern Rosella *Platycercus eximius*, Blue-winged Parrot *Neophema chrysostoma*, and Galah *Eolophus roseicapilla*.

3.8.2 Species Richness

The predicted species richness estimate for the point count surveys was 58 species, which converts to a completeness of over 88% and means that an additional 6-7 species are predicted to occupy the study area but were not recorded. A greater number of predicted species relative to actual species is an indication that while survey effort was high and covered a range of conditions and seasons, several possibly more cryptic species are likely to be present but were not recorded. The study appears to reach asymptote (or plateau) after four months of survey. The results show a clear relationship between effort and the number of species detected (Graph 1).



Graph 1. Species accumulation curve across the entire survey period. **Source:** Species accumulation curve produced using EstimateS (Colwell 2013)

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3.8.3 Flight Heights

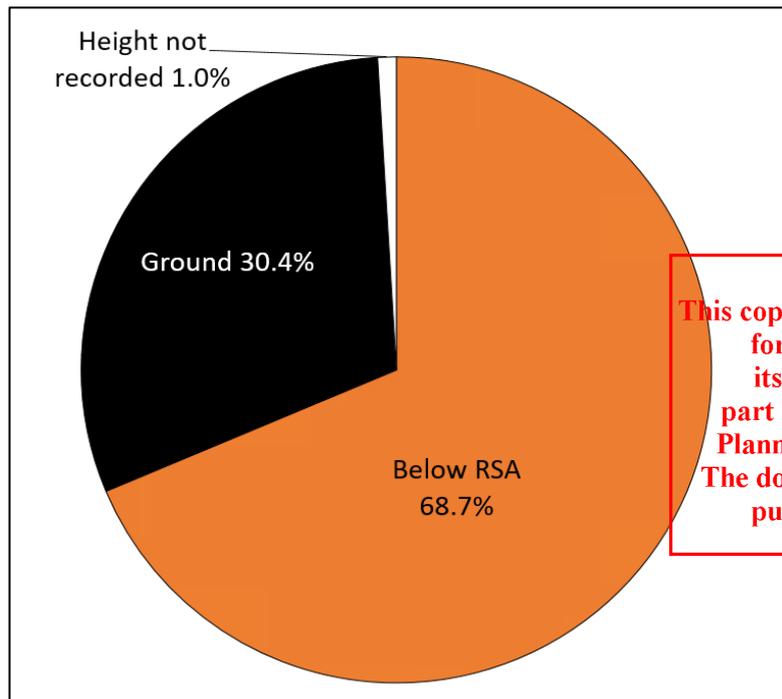
Nearly all birds observed (99%) during the point counts were either recorded on the ground or flying below the Rotor Swept Area (Table 12; Graph 2). No species were recorded flying in or above the Rotor Swept Area. The species observed flying closest to the Rotor Swept Area – at 50 metres or greater – was Straw-necked Ibis,

while Brown Falcon *Falco berigora* and Eastern Rosella *Platycercus eximius* were recorded flying at 40 metres in height.

Bird point count survey locations were assigned to capture a representative sample of vegetation and habitat type. Given much of the study area comprises open paddocks, most bird point count survey locations are situated in these areas. However, where possible, fixed count locations were sited near plantations/windrows/waterbodies to capture any woodland and waterbird habitats in the study area.

Table 12. Summary of birds recorded at the varying flight heights

Flight Height	# of birds	% of birds
Height not recorded	15	1.0%
Ground (0 metres)	477	30.4%
Below RSA (1-84m)	1078	68.7%
RSA (85-247m)	0	0.0%
Above RSA (>247m)	0	0.0%



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Graph 1. Percentage of birds recorded below (RSA), at rotor swept area (RSA) height (85 – 247 metres), during the survey period. Note no species were recorded within or above RSA, although several parrot and raptor species are likely to utilise heights within and above RSA

While no species were recorded flying in or above the Rotor Swept Area, several parrot and raptor species are likely to utilise heights within and above RSA on occasion. Large parrots, including several recorded below the Rotor Swept Area during surveys such as Galah, Sulphur-crested Cockatoo and Long-billed Corella, tend to fly in the Rotor Swept Area as they move daily between roosts and feeding areas. No significant wetlands are

present in or near the study area, however several waterbird species recorded during point count surveys – Brolga, Straw-necked Ibis, White-necked Heron *Ardea pacifica*, and White-faced Heron – may fly in the Rotor Swept Area when moving between habitat areas. The study area was driven extensively and, except for Straw-necked Ibis, very few water birds likely to fly in the Rotor Swept Area were identified flying overhead.

Generally, non-passerine birds such as raptors, wetland/waterbirds and parrots have flight characteristics that make them prone to collisions with wind turbines. These species are usually larger, less mobile, occur in flocks (particularly parrots) and forage in more open areas. Some minor changes in local distribution and abundance of these species may be expected as a consequence of ongoing operation of the turbines, and although these impacts are not expected to be significant and minimal in line with the stated AusWEA (2005), collision potential and post construction monitoring should be established to further assess the impact of the project on bird species and populations.

A summary of species recorded during point count surveys and associated flying heights against Rotor Swept Area is provided in Table 13.

Table 13. Number of instances of bird species recorded in Point Count Surveys classified according the RSA at which they were detected (excluding incidental records).

Species (Common Name)	Height not observed	Ground	Below RSA	RSA	Total
Australasian Pipit	1	10	1	0	12
Australian Magpie	0	100	60	0	160
Australian Raven	1	12	52	0	65
Australian Shelduck	0	2	0	0	2
Australian White Ibis	0	2	0	0	2
Australian Woodduck	0	5	5	0	10
Blue-winged Parrot	0	4	0	0	4
Brolga	0	0	12	0	12
Brown Falcon	0	5	0	0	5
Brown Songlark	0	14	4	0	18
Common Blackbird	0	1	1	0	2
Common Bronzewing	0	1	0	0	1
Common Starling	0	143	0	0	143
Corella sp.	0	12	3	0	15
Crested Pigeon	0	6	0	0	6
Crimson Rosella	0	11	0	0	11
Eastern Rosella	0	22	0	0	22
Eurasian Skylark	1	19	29	0	49
European Goldfinch	0	6	0	0	6
Galah	0	17	12	0	29
Golden Whistler	0	1	1	0	2

Species (Common Name)	Height not observed	Ground	Below RSA	RSA	Total
Golden-headed Cisticola	0	0	1	0	1
Little Corella	0	6	7	0	13
Little Raven	11	245	178	0	434
Little Wattlebird	0	2	0	0	2
Long Billed Corella	0	53	11	0	64
Magpie lark	0	7	10	0	17
Masked Lapwing	0	0	3	0	3
New Holland Honeyeater	0	3	0	0	3
Pacific Black Duck	0	9	0	0	9
Parrot sp.	0	1	0	0	1
Raven sp.	0	132	51	0	183
Red Wattlebird	0	23	0	0	23
Red-rumped Parrot	0	15	0	0	15
Rufous Whistler	0	2	0	0	2
Songlark sp.	0	1	0	0	1
Straw-necked Ibis	0	76	4	0	80
Striated Pardalote	0	11	0	0	11
Stubble Quail	0	0	1	0	1
Sulphur-crested Cockatoo	0	5	30	0	35
Superb Fairywren	0	19	1	0	20
Tree Martin	0	4	0	0	4
Wattlebird sp.	0	1	0	0	1
Welcome Swallow	0	26	0	0	26
Whistling Kite	0	1	0	0	1
White-faced Heron	0	3	0	0	3
White-necked Heron	0	1	0	0	1
Willie Wagtail	0	1	0	0	1
Yellow-faced Honeyeater	0	9	0	0	9
Yellow-Rumped Thornbill	0	19	0	0	19
Yellow-tailed black cockatoo	1	10	0	0	11

Note. Ground – 0 metres; Below RSA – 1-84 metres; RSA 85-247 metres; Above RSA > 247 metres.

3.8.4 Raptors

Three raptor species were observed flying in the study area, however no individuals were recorded near the Rotor Swept Area (Table 13).

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Raptors in general accounted for a low percentage (<1%) of birds recorded within and adjacent to the wind farm during the bird surveys.

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3.9 Anabat Assessment

3.9.1 Desktop Assessment

The database search of the VBA (DELWP 2021d) contained records for two microbat species; Gould's Wattled Bat *Chalinolobus gouldii* and Long-eared Bat *Nyctophilus* spp. within a 10 kilometre radius of the study area. No significant bat species have previously been recorded within 10 kilometres of the site (DELWP 2021d).

A total of nine bat species were recorded as part of the background ecological assessments for the Stockyard Hill Wind Farm (BL&A 2009), which is located approximately 18 kilometres to the south-west of the wind farm development boundary. One unidentified Long-eared Bat *Nyctophilus* spp. was identified during pre-construction bat surveys; however, this is likely to be Lesser Long-eared Bat *Nyctophilus geoffroyi* or Goulds Long-eared Bat *Nyctophilus gouldii* given these species are likely to occur within the study area (Table 14).

The nearest roosting cave for the nationally significant Southern Bent-Wing Bat *Miniopterus schreibersii bassanii* is Pomborneit cave approximately 95 kilometres to the south-west. As the species is highly unlikely to fly this distance from its roosting cave each night, with research showing the species flies up to 25 kilometres from the Naracoorte maternity cave (Lumsden and Jemison 2015), although recent research indicates that the species can forage up to 72 kilometres from its roosting cave (SWIFFT 2021). Given that the wind farm development boundary is 95 kilometres from the nearest roosting cave, targeted surveys for the species are not required.

Table 14. Microbat species previously recorded during pre-construction surveys at Stockyard Hill Wind Farm (BL&A 2009)

Common Name	Species Name	Conservation Status
White-striped Freetail Bat	<i>Tadarida australis</i>	Not listed
Chocolate Wattled Bat	<i>Chalinolobus morio</i>	Not listed
Gould's Wattled Bat	<i>Chalinolobus gouldi</i>	Not listed
Inland Broad-nosed Bat	<i>Scotorepens balstoni</i>	Not listed
Large Forest Bat	<i>Vespadelus darlingtoni</i>	Not listed
Little Forest Bat	<i>Vespadelus vulturnus</i>	Not listed
Southern Freetail Bat	<i>Mormopterus sp4</i>	Not listed
Southern Forest Bat	<i>Vespadelus regulus</i>	Not listed
<u>Unidentified Long-eared Bats</u>		
Lesser Long-eared Bat	<i>Nyctophilus</i> spp.	Not listed
Gould's Long-eared Bat		

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3.9.2 Bat Survey Results

A total of nine native bat species were detected during the bat surveys, including Southern Free-tailed Bat, White-striped Freetail Bat, Gould's Wattled Bat, Chocolate Wattled Bat and Little Forest Bat. In addition, the State significant Eastern Bent-wing Bat (listed as Critically Endangered on the FFG Act Threatened List [DELWP 2021f) was also recorded at least once from each of the Anabat detectors (Table 15). Eastern Bent-wing Bat is defined as 'species of interest' as outlined in Lumsden *et al.* (2019)

A total of 10 native bat species were recorded when calls that could not be identified to species level were assigned to one of four call complexes (Table 15).

Table 15. Microbat species recorded during microbat surveys at Brewster Wind Farm

	Detector #	1	2	3	4	Species Total
Common Name	Species Name	Positively identified calls				
Gould's Wattled bat	<i>Chalinolobus gouldii</i>	6	3	43	6	58
Chocolate Wattled Bat	<i>Chalinolobus morio</i>	43	6	26		75
Eastern False Pipistrelle	<i>Falsistrellus tasmaniensis</i>	35	5	4		44
Large Forest Bat	<i>Vespadelus darlingtoni</i>	48	3	93		144
Southern Forest Bat	<i>Vespadelus regulus</i>			7	1	8
Little Forest Bat	<i>Vespadelus vulturnus</i>	3	2	22	3	30
Eastern Bent-winged Bat	<i>Miniopterus oriana oceanensis</i>	57	1	4	1	63
White-striped Free-tailed Bat	<i>Austronomus australis</i>	6		1		7
South-Eastern Free-Tailed Bat	<i>Ozimops planiceps</i>	3			1	4
Common Name	Species Name	Unresolved calls				
Southern Myotis/Long Eared Bat	<i>Myotis macropus / Nyctophilus sp.</i>		1	30		31
Eastern False Pipistrelle/Large Forest Bat	<i>F. tasmaniensis / V. darlingtoni</i>	69	4	54		127
Large Forest Bat/Southern Forest Bat	<i>V. darlingtoni / V. regulus</i>	3		6		9
Southern Forest Bat/Little Forest Bat	<i>V. regulus / V. vulturnus</i>			8		8
Little Forest Bat/Chocolate Wattled Bat	<i>V. vulturnus / C. morio</i>	1		3		4
	Detector Total	274	25	301	12	612
	Total nights with calls	17	6	15	2	40

Eleven of the thirteen possible microbat species recorded within the study area are considered to have a moderate to high risk of collision due to their flight behaviour. White-striped Freetail Bat and Gould's Wattled Bat are particularly at risk, having recorded the highest and second highest number of collision incidents respectively from a sub-sample of turbines across 15 Victorian Wind Energy Facilities between 2003 and 2018 (Moloney *et al.*, 2019).

The State significant Eastern Bent-wing Bat is a cave dwelling bat that forages at and around canopy height in treed areas, and close to the ground in grassy areas. The species has previously been shown to fly consistently below turbine height, with no collision mortalities published in Victoria (Moloney *et al.*, 2019).

All bat species recorded in the study area (including call complex level) that have a moderate to high risk of collision are not state or federally listed species, with stable populations and widespread distribution. In this context, turbines are likely to result in a low impact to bat populations recorded in the study area.

3.10 Migratory or Marine Species

Migratory species are protected under the EPBC Act if they are listed under the following agreements:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention);
- China Australia Migratory Bird Agreement (CAMBA);
- Japan Australia Migratory Bird Agreement (JAMBA); or the
- Republic of Korea Australia Migratory Bird Agreement (ROKAMBA).

The VBA (DELWP 2021d) indicates that 10 migratory and/or marine bird species have been recorded within 10 kilometres of the wind farm development boundary (Caspian Tern *Hydroprogne caspia*, Common Greenshank *Tringa nebularia*, Eastern Cattle Egret *Bubulcus coromandus*, Glossy Ibis *Plegadis falcinellus*, Great Egret *Ardea alba*, Latham's Snipe *Gallinago hardwickii*, Pectoral Sandpiper *Calidris melanotos*, Rainbow Bee-eater *Merops ornatus*, Red-necked Stint *Calidris ruficollis*, and Sharp-tailed Sandpiper *Calidris acuminata*).

However, the wind farm development boundary would not be classed as 'important habitat' for Migratory species as defined under the EPBC Act Policy Statement 1.1 *Principal Significant Impact Guidelines* (DoE 2013). The proposed wind farm is not located between, or in close proximity to, either migratory bird feeding areas, or important, regularly used, feeding and roosting sites, hence the likelihood of migratory birds moving through the wind farm development boundary when moving between wetlands in the local area is low.

While it is possible that small numbers of migratory birds could fly over the site during migration, it has been well documented that shorebirds typically fly between 0.5 and six kilometres in elevation during migration, well above the tip of the proposed turbines (Williams *et al.* 1981; Piersma *et al.* 1990; Tulp *et al.* 1994). Owing to these factors, it is considered that the likelihood of migratory bird mortality through turbine collisions is low and that the proposed wind farm is unlikely to have a significant impact on any migratory species.

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4 LEGISLATIVE AND POLICY IMPLICATIONS

4.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a Commonwealth process for the assessment of proposed actions likely to have a significant impact on any matters of National Environmental Significance (NES), described in Table 16.

Table 16. Potential impacts to matters of National Environmental Significance (NES)

Matter of NES	Potential Impacts
World Heritage properties	The proposed action will not impact any properties listed for World Heritage.
National heritage places	The proposed action will not impact any places listed for national heritage.
Ramsar wetlands of international significance	The nearest Ramsar wetland is the Western District Lakes – approximately 65 kilometres south (downstream). The proposed action is highly unlikely to impact the ecological character of any Ramsar wetland, or other downstream waterbodies.
Threatened species and ecological communities	The nationally significant Hoary Sunray and Natural Temperate Grassland of the Victorian Volcanic Plain are present at the Eurambeen-Streatham and Glenelg Highway intersection (Figure 2b-iii). No other nationally significant flora, fauna or ecological communities are present. The windfarm development footprint (including swept paths) has been designed to avoid impacts to all areas of native vegetation and matters of NES, and therefore will not be impacted by the proposed development.
Migratory and marine species	Ten Migratory and/or Marine species have been recorded within 10 kilometres of the windfarm development boundary (DELWP 2021d;). However, the windfarm development boundary would not be classed as an ‘important habitat’ as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DoE 2013).
Commonwealth marine area	The proposed action will not impact any Commonwealth marine areas.
Nuclear actions (including uranium mining)	The proposed action is not a nuclear action.
Great Barrier Reef Marine Park	The proposed action will not impact the Great Barrier Reef Marine Park.
Water resources impacted by coal seam gas or mining development	The proposed action is not a coal seam gas or mining development.

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4.1.1 Implications

The proposed action is highly unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not required regarding matters listed under the EPBC Act.

4.2 Environment Effects Act 1978

The *Environment Effects Act 1978* (EE Act) provides for assessment of proposed actions that can have a significant effect on the environment via the preparation of an Environment Effects Statement (EES). A project

with potential adverse environmental effects that, individually or in combination, could be significant in a regional or State context should be referred.

4.2.1 Implications

The relevant ecological criteria are only considered when the impact footprint is 10 hectares or more, or when the proposed impact has the potential to result in the long-term loss of a significant proportion (1-5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria.

Based on the referral criteria that consider ecological matters, it is highly unlikely that a referral to the Minister for Planning will be triggered based on the current development proposal.

4.3 Flora and Fauna Guarantee Act 1988 (Victoria)

The FFG Act is the primary Victorian legislation providing for the conservation of threatened species and ecological communities, and for the management of processes that are threatening to Victoria's native flora and fauna. The FFG Act contains protection procedures such as the listing of threatened species and/or communities, and the preparation of action statements to protect the long-term viability of these values.

Proponents are required to apply for an FFG Act Permit to 'take' listed and/or protected¹ flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

4.3.1 Flora and Fauna Guarantee Amendment Act 2019

The *Flora and Fauna Guarantee Amendment Act 2019* (the Amendment Act) came into effect on 1 June 2020 and now applies the FFG Act to Crown land and private/freehold land that is managed by a public authority. The Amendment Act requires consideration of biodiversity across government to ensure decisions and policies are made with proper consideration of the potential impacts on biodiversity.

4.3.2 Implications

One flora 'protected' under the FFG Act (Golden Wattle *Acacia pycnantha*), and two fauna listed as threatened (Brolga and Eastern Bent-wing Bat) were recorded during the ecological assessments.

Based on the requirements under the FFG Act, a permit is not required. However, the Responsible Authority must consider potential impacts to FFG Act matters to ensure decisions and policies are made with proper consideration of the potential impacts on biodiversity.

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¹ In addition to 'listed' flora species, the FFG Act identifies 'protected' flora species. This includes any of the Asteraceae (Daisies), all orchids, ferns (excluding *Pteridium esculentum*) and Acacia species (excluding *Acacia dealbata*, *Acacia decurrens*, *Acacia implexa*, *Acacia melanoxylon* and *Acacia paradoxa*), as well as any taxa that may be a component of a listed ecological community. A species may be both listed and protected.

4.4 *Planning and Environment Act 1987 (Victoria)*

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17, which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation, unless an exemption at Clause 52.17-7 on the Victoria Planning Provisions applies.

4.4.1 *Local Planning Scheme*

The study area is located within the Pyrenees Shire Council. The following zoning and overlays apply (DELWP 2021d):

- Farming Zone (FZ) – entire study area; and,
- Public Acquisition Overlay – Schedule 1 (PAO1) – over a small portion in the far north-east of the study area.

4.4.2 *The Guidelines*

The State Planning Policy Framework and the decision guidelines at Clause 12.01 Biodiversity and Clause 52.17 Native Vegetation require Planning and Responsible Authorities to have regard for the Guidelines (DELWP 2017a).

4.4.3 *Implications*

In accordance with Clause 61.01 of the Pyrenees Shire Planning Scheme, the Minister for Planning is the Responsible Authority for the use and development of land for a Wind Energy facility or Solar facility.

The windfarm footprint, including swept paths has been designed to avoid all identified patches of native vegetation.

However, it should be noted that Brewster Wind Farm Pty Ltd are proposing to formalise access to one of the turbines along an existing farm track that passes through a Modelled Wetland at 7 Pin Oak Court. Although no native vegetation was present along the access track at the time of the assessments, as per the requirements under the Guidelines, the impact to the Modelled Wetland has been included as native vegetation, with the modelled condition score assigned to this area.

The study area is within Location 1, with 0.082 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Basic assessment pathway.

The offset requirement for native vegetation removal is 0.015 General Habitat Units.

No scattered native vegetation was observed within the windfarm development footprint. However, scattered native vegetation (Wallaby-grass) is located within the tyre envelope of the swept paths at the intersections of Eurambeen-Streatham Road and Glenelg Highway, Streatham (north-east corner - Figure 2b-iii), Trawalla Road and Rodgers Drive, Trawalla (Figure 2b-vi) and the Site Entrance at 295 Trawalla Road, Trawalla (Figure 2b-vii).

A permit to remove native vegetation under Clause 52.17 of the Pyrenees Planning Scheme is required. This report satisfies the application requirements of the Basic Assessment pathway listed in Clause 52.17 of the Pyrenees Planning Scheme.

A permit is required under Clause 52.32 of the Pyrenees Shire Planning Scheme to use and develop a wind energy facility. This report satisfies the relevant ecological application requirements listed in Clause 52.32-4.

4.5 **Catchment and Land Protection Act 1994 (Victoria)**

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. The Act also provides a legislative framework for the management of private and public land and sets out the responsibilities of land managers, stating that they must take all reasonable steps to:

- Avoid causing or contributing to land degradation which causes or may cause damage to land of another landowner;
- Protect water resources;
- Conserve soil;
- Eradicate regionally prohibited weeds;
- Prevent the growth and spread of regionally controlled weeds; and,
- Prevent the spread of, and as far as possible eradicate, established pest animals.

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4.5.1 *Implications*

Two weeds listed as noxious under the *Catchment and Land Protection Act 1994* were recorded during the assessment (*Gorse Ulex europaeus*, and *Spear Thistle Cirsium vulgare*). Similarly, there is evidence that the study area is currently occupied by pest fauna species (e.g. European Rabbit *Oryctolagus cuniculus*) listed under the CaLP Act. Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species. Listed noxious weeds/pests should be appropriately controlled throughout the study area.

4.6 **Wildlife Act 1975 and Wildlife Regulations 2013 (Victoria)**

The *Wildlife Act 1975* (and associated *Wildlife Regulations 2013*) is the primary legislation in Victoria providing for protection and management of wildlife. Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*, issued by DELWP.

4.6.1 *Implications*

Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*.

4.7 Policy and Planning Guidelines – Development of Wind Energy Facilities in Victoria

Wind energy facilities should not lead to unacceptable impacts on critical environmental, cultural or landscape values. These values include those protected under Commonwealth and State legislation, those recognised through planning schemes such as the State Planning Policy Framework.

The Responsible Authority and applicants must consider a range of environmental values (for example: flora, vegetation and fauna) and risks when identifying suitable sites for wind energy facility development.

4.7.1 Implications

Impacts on flora and fauna species and habitats from wind energy facilities and associated infrastructure can be minimised through facility placement and design measures at the project planning stage. Avoidance of all native vegetation patches, scattered trees, and significant impacts to environmental values at the site has been achieved by focusing construction and other project activity in areas currently cropped.

An Environmental Management Plan (EMP) will be required to detail how the site will be managed throughout the life of the Project, and across all environmental components. The EMP should include a bat and avifauna management plan (DELWP 2017b). The project must consider impacts on birds and bats, which are known to collide with wind turbines. Research by the Arthur Rylah Institute has improved knowledge of wind turbine impact on bats and birds (DELWP 2020a), and DELWP is developing risk assessment and mitigation guidelines specifically for Brolga, Southern Bent-wing Bat, Red-tailed Black Cockatoo, Black Falcon and White-bellied Sea Eagle (DELWP 2020b)

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5 POTENTIAL IMPACTS

The project footprint has been finalised with reference to the findings of this assessment to avoid and minimise impacts on ecological values where possible. Impacts associated with the project footprint and operation of the proposed wind farm are discussed in the following sections.

5.1 Construction Related Impacts

In the absence of suitable mitigation measures, construction-related impacts are likely to include:

- The introduction and spread of weeds and soil pathogens due to on-site activities;
- Disturbance to wildlife from increased human activity and noise during construction; and,
- Indirect impacts on adjacent areas if construction activities, erosion and drainage are not appropriately managed.

The study area is located within a relatively flat farmland landscape with interspersing ephemeral drainage lines which are unlikely to hold water for any length of time. Due to the absence of a permanent natural water source and sparse vegetation, the study area is unlikely to support the significant species identified as occurring within the locality that would be affected by construction activities. Therefore the potential construction related impacts are considered to be low to negligible.

5.2 Operational Impacts

There are likely to be bird and bat mortalities as a result of turbine collision and barotrauma associated with the operation of the wind farm.

5.2.1 Birds

The impact of bird mortality as a result of turbine collisions on a population level will affect certain species in different ways. Species that are short-lived and with high annual reproduction rates are likely to be able to absorb additional mortality with insignificant impacts to their overall population size at a regional or national level (Chamberlain *et al.* 2006). By contrast, long-lived, slowly reproducing species are more vulnerable to this type of additive mortality and may be less able to maintain their population size when faced by such stresses (Sæther and Bakke 2000).

Given that raptors are long-lived and are a slowly reproducing species, they are distributed in low densities compared to other birds and are therefore exposed to increased risk of local population declines. The loss of a single breeding individual could potentially adversely impact the local population. However, it is well known based on published literature that certain raptors adapt their behaviour in the presence of wind turbines (Farfán *et al.* 2009), although detailed avoidance rates for most species worldwide is not known (Chamberlain *et al.* 2006). Particular raptor species have been identified as being 'of concern' due to their proneness to collision with operational wind turbines, although these species do appear to become conditioned to the presence of wind turbines after an extended period of time, and adjust their foraging behaviour to avoid wind turbines (i.e. up to 99% avoidance rates for most species).

Overall, the quality of habitat in the study area, the small size of the wind farm and the ability of birds to actively avoid collisions, means that the impact of the proposed wind farm on local avifauna is expected to be low.

5.2.2 Brolga

Based on the results of the desktop and targeted field surveys (Level 1 and 2 Assessments), and incidental observations made (Section 3.7), the study area is within the Brolga's distribution range. The key risk to Brolga associated with the proposed wind energy facility is the operation of seven wind turbines. No new transmission lines are proposed as part of the wind farm development.

An assessment to determine the risk to Brolga associated with development of the wind farm has been undertaken in accordance with Interim Brolga Guidelines (DSE 2012), where level of consequence means mortality or disturbance to Brolga. The results of the desktop assessment, targeted Brolga surveys and habitat assessments demonstrate that the proposed Brewster Wind Farm presents a low risk to Brolga, with the likelihood of impacts to the species considered low to negligible. This determination is based on the following:

- Aquatic habitats within the wind farm parcel boundary are limited to artificial dams that are unlikely to be used for breeding and are not defined as flocking habitat;
- Aquatic habitats within the 10 kilometre investigation radius are generally limited to artificial dams and low quality ephemeral habitats located in paddocks subject to agricultural disturbance. These habitats are unlikely to be reliably used for breeding and are not defined as flocking habitat;
- The closest documented breeding record is from 1984 (Site 194 – low quality habitat) and is located approximately 2.6 kilometres from the nearest proposed wind turbine. This site is comprised of modified agricultural land that appears to have been disturbed, with a channel now present which drains water out of the former wetland where the breeding record was recorded, and into a farm dam located to the south-west. Suitable breeding habitat is not considered to persist within 3.2 kilometres of the Brewster Windfarm.
- The closest documented flocking site is located approximately 14.5 kilometres from the nearest proposed wind turbine (DELWP 2021). The Interim Brolga Guidelines (DSE 2012) recommend that a 3.2 and five-kilometre radius turbine-free buffer is applied around known breeding sites and flocking sites, respectively;
- Although four Brolga were observed at Wetland 124 during the late Spring bird utilisation survey, no Brolga were observed at Wetland 124 during the previous bird utilisation surveys undertaken for the project, or during the Level 2 Brolga assessment conducted in 2020. This indicates that the wetland was not being used for breeding, given that fledging generally occurs at around 100 days, with juveniles staying with their parents for another breeding season if the parents do not re-nest (Marchant and Higgins 1993);
- Local records of the species are concentrated around large high-quality wetland systems to the south and west of the study area (DELWP 2021f) (Figure 4b). The relatively lower number of document Brolga records / sightings to the north and east of the study area, and the paucity of high quality waterbodies in the local area suggests that the proposed wind farm is not situated within an important flight path where birds are expected to regularly or periodically fly within and between suitable wetland and foraging habitats; and,

- The absence of Brolga within the wind farm development boundary, although the absence of the species during a short survey period doesn't necessarily imply that the species won't use a particular area in the future (i.e. the species is known to use a variety of different wetlands overtime depending on landscape and local conditions). However, more importantly the results of detailed habitat assessments of wetlands present within a 10-kilometre radius of the wind farm development boundary revealed that the majority of wetlands either lacked suitable habitat for the species, or supported low quality habitat for the species.

5.2.3 Bats

Bats are susceptible to collision with wind turbines (Arnett 2005; Kunz *et al.* 2007). In some habitats high numbers are struck by wind turbines, especially those bat species that undertake large scale annual migrations (Kunz *et al.* 2007; Kuvlesky *et al.* 2007; Cryan and Barclay 2009). Furthermore, bats may be attracted to wind turbines following vortices created by the blade tips and have been observed investigating all parts of the turbine (Horn *et al.* 2008; Cryan and Barclay 2009). Bat mortality as a result of barotrauma, which is caused by changes in pressure produced by the rotating turbines, has also been documented (Cryan and Barclay 2009).

To date little scientific data has been published regarding the impact of existing wind farms on Australian bat species. Carcass surveys undertaken as part of the Studland Bay and Bluff Point Wind Farms in Tasmania revealed that the majority of the carcasses were Gould's Wattled Bat (a high-flying, open-air foraging species) with the remaining being *Vespadelus* spp. (Hull and Cawthen 2012). A carcass survey within the small scale (two turbines) Hepburn Wind Farm detected a single White-Striped Freetail Bat mortality (Bennett 2012). The Arthur Rylah Institute (ARI) recently published an report collating post-construction mortality data from 15 Victorian wind farm and found that bats represented 44% of avifauna mortality, and of all bat mortality, 67% of records were of the White Striped Freetail Bat (Moloney *et. al.*, 2019).

Collisions with turbine blades are understood to be the most frequent interaction causing mortality or injury, although the cause(s) of these collisions is poorly known. General observations to date indicate that bats do not typically collide with turbine towers, transmission structures, guy wires, or meteorological towers (i.e. stationary structures); however current understanding of how and why bats come into contact with turbines is lacking. This is due to the limited ability to observe how bats behave at night around these structures as they move across the landscape between patches of vegetation and during foraging activities (MNR 2007, Horn *et al.* 2008).

There are four main factors that contribute to bat mortality at wind farm sites:

- Bat species and abundance in the area;
- Season (i.e. time of year) and weather conditions (e.g. clear, warm nights with low wind). Such factors are likely to influence the level of bat activity and thus mortality at wind power sites (MNR 2007);
- Habitat/landscape features in the area (e.g. migration routes, forested ridges, and hibernacula/swarming sites may be important features). High levels of bat activity have been documented in forested ridge habitats, and areas where the woodland patches have been cleared for wind turbine placement also offer attractive foraging habitat for some species of bats. Edges of remnant woodlands and scattered remnant trees in paddocks provide favourable foraging areas

where bats can easily capture airborne insect prey, creating areas of concentrated bat activity (Lumsden and Bennett 2000, 2005; Kunz *et al.* 2007, Horn *et al.* 2008); and,

- The number of turbines contained within the wind farm.

Bat Species in the Locality

Eleven of the thirteen possible microbat species recorded within the study area are considered to have a moderate to high risk of collision due to their flight behaviour. White-striped Freetail Bat and Gould's Wattled Bat are particularly at risk, having recorded the highest and second highest number of collision incidents respectively from a sub-sample of turbines across 15 Victorian Wind Energy Facilities between 2003 and 2018 (Moloney *et al.*, 2019).

The State significant Eastern Bent-wing Bat is a cave dwelling bat that forages at and around canopy height in treed areas, and close to the ground in grassy areas. The species has previously been shown to fly consistently below turbine height, with no collision mortalities published in Victoria (Moloney *et al.*, 2019).

However, the potential impacts to bats during operation of the wind farm are expected to be low due to the small number of turbines (seven) and their location in highly cleared landscapes away from woodland habitats that would generally be favoured for foraging by most bat species.

5.2.4 Indirect Impacts: Displacement, Habitat Loss and Disturbance

The main focus of the impacts of wind farms on birds and bats is related to the risk of collision with wind turbines (Kuvlesky *et al.* 2007). However, wind farms have the potential to affect birds, among other taxa, in indirect, yet potentially significant ways. In Europe, displacement through habitat loss is considered the primary detrimental effect of wind farms on avian abundance (Kuvlesky *et al.* 2007).

This effect has been shown to manifest itself on both grassland birds that use habitat under the wind turbines (Leddy *et al.* 1999), as well as raptors that are frequently encountered at RSA height (Farfán *et al.* 2009), and is likely to occur because of the noise, movement and frequent human disturbance associated with wind turbines (Leddy *et al.* 1999).

Given that no native vegetation patches or scattered trees will be removed to construct the wind farm, and only seven turbines are proposed, operational impacts to bird populations due to displacement and habitat removal or disturbance are likely to be temporary and minimal.

5.3 Cumulative Biodiversity Impacts

The largest impact to biodiversity in the locality and encompassing bioregion is likely to have stemmed from increased European settlement around the 1940s and the subsequent land clearance for agriculture. Future disturbance associated with human activities in the broader locality is likely to be associated with ongoing agricultural activities and development.

The impacts from the project must be considered together with the biodiversity impacts that have resulted from historic and predicted future human disturbances.

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In addition to cumulative impacts associated with construction of the wind farm, operational activities have the potential to lead to incremental and cumulative impacts (e.g. barrier effects, changes to bird/bat behaviour etc.). Nearby operating and proposed wind farms within the vicinity of the project area include:

- Waubra Wind Farm (operating) - 128 turbines located approximately eight kilometres north of the wind farm development boundary;
- Chepstowe Wind Farm (operating) - Three turbines located approximately 16 kilometres south of the wind farm development boundary; and,
- Stockyard Hill Wind Farm (operating) – 149 turbines located approximately 19 kilometres south-west of the wind farm development boundary.

Operation of the proposed Brewster Wind Farm is considered unlikely to significantly increase cumulative impacts on ecological values within the broader landscape due to:

- The sites distance from other operating and proposed wind energy facilities; and,
- The development footprint being located within a cleared and uniform landscape, outside the likely common distribution range and/or flight paths of key species potentially impacted by wind farm developments (e.g. Brolga, Southern Bent-wing Bat, migratory shorebirds).

Despite this, ongoing monitoring of bird populations, following commissioning of the wind farm, will enable the proponent to identify and mitigate cumulative impacts as other wind farms are brought on-line.

5.4 The Impact of Climate Change

Climate change is likely to have an impact on both the flora and fauna of the broader locality. There has been recent speculation about the movement of wetlands south as the interior of Australia becomes increasingly arid. This conjecture is not supported by empirical data and it is likely that changes in Australia's climate will have unpredictable impacts on Australia's biodiversity, including birds (Pittock 2003). Changes that have already occurred as a result of the effect of climate change on birds include changes to distribution, phenology, morphology and physiology, behaviour, and abundance and population dynamics (Chambers *et al.* 2005).

As climate change is better understood it may be that developments such as wind farms need to be mindful of the impacts of this phenomenon, however at present, this is not possible. It should also be noted that wind farms are a 'clean' energy source with relatively very low carbon emissions.

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6 MITIGATION MEASURES

For the removal of vegetation that falls under all assessment pathways, the Guidelines (DELWP 2017a) require the Responsible Authority to consider whether the applicant has demonstrated avoidance and minimisation of impacts to native vegetation.

6.1 Avoid and Minimise Statement

The windfarm development boundary has not been subject to a strategic level planning process.

Following receipt of the ecological assessment, design measures were put in place to avoid impacts on native flora and fauna. RE Future Pty Ltd have designed the traffic route and construction footprint to avoid all impacts to areas of on-site native vegetation by strategically locating swept path envelopes, cabling, hardstands, laydown areas and the switch yard in areas of degraded, agricultural land. In particular, the route of the access track was realigned in order to avoid areas of Plains Grassy Wetland. The Plains Grassy Wetland is completely avoided by over 300 metres.

It should be noted that Brewster Wind Farm Pty Ltd are proposing to formalise access to one of the turbines along an existing farm track that passes through a Modelled Wetland at 7 Pin Oak Court. Although no native vegetation was present along the access track at the time of the assessments, as per the requirements under the Guidelines (DELWP 2017), the impact to the Modelled Wetland has been included as native vegetation, with the modelled condition score assigned to this area.

The wind farm development footprint is not expected to impact the hydrological aspects of the modelled wetland or adjacent waterbodies (i.e. Plains Grassy Wetland or Spring Hill Creek). As a result of these measures the proposed wind farm will have no on-site impact to areas of mapped native flora, vegetation, or fauna habitat located on the site.

The location of native vegetation, and the infrastructure footprint within the wind farm parcel boundary is shown in Figure 2a, with analysis of swept paths shown in Figure 2b.

In the context of the development, the retention of all patches of on-site mapped native vegetation in the wind farm development boundary and along the transport route, and a small impact to an area of Modelled Wetland is considered an appropriate outcome in this instance. There are no feasible opportunities to further avoid or minimise impacts without undermining the key objectives of the proposal and result in a potential increase in impacts to the Modelled Wetland.

6.2 Best Practice Mitigation Measures

Recommended measures to mitigate impacts upon terrestrial values present within the wind farm development boundary may include:

- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation. If indeed necessary, trees should be lopped or trimmed rather than removed. Similarly, soil disturbance and sedimentation within wetlands should be avoided or kept to a minimum, to avoid, or minimise impacts to fauna habitats;

- All contractors should be aware of ecologically sensitive areas to minimise the likelihood of inadvertent disturbance to areas marked for retention. Native vegetation (areas of sensitivity) should be included as a mapping overlay on any construction plans;
- Where possible, construction stockpiles, machinery, roads, and other infrastructure should be placed away from areas supporting native vegetation and wetlands; and,
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Authority guidelines (EPA 1991; EPA 1996; Victorian Stormwater Committee 1999) to prevent offsite impacts to waterways and wetlands; and,
- As indigenous flora provides valuable habitat for indigenous fauna, it is recommended that any landscape plantings that are undertaken as part of the proposed works are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

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7 RECOMMENDATIONS

Based on the quality and extent of ecological values known to, or considered likely to occur, it is recommended that RE Future:

1. Prior to construction, develop a Construction Environmental Management Plan (CEMP) with specific management actions to mitigate against potential impacts to areas of ecological value;
2. Develop a Weed Management Plan, which should be incorporated into the CEMP;
3. Before commencement of construction, the preparation of a Bat and Avifauna Management Plan to the satisfaction of the Responsible Authority, in consultation with the DELWP. When approved, the BAM Plan must be endorsed by the Responsible Authority. The BAM Plan must include:
 - a) A strategy for managing and mitigating bird and bat strike arising from the wind energy facility operation. The strategy must include procedures for the regular removal of carcasses likely to attract raptors to areas near wind turbines;
 - b) A procedure for addressing significant impacts of birds and bat populations caused by the wind farm. This procedure must provide that the operator of the wind energy facility immediately investigates the possible causes of any significant impacts on bird and bat populations, and thereafter designs and implement measures to mitigate those impacts in consultation with the Responsible Authority and DELWP;
 - c) A monitoring period of not less than one year to record, by species, any bird and bat strikes; and,
 - d) A strategy to manage and/or monitor the wind farm beyond the designated period depending upon the results of the monitoring period referred to above. The strategy must include provisions to take account of any changes to weather patterns during the initial one-year monitoring period.
4. If there are changes to the layout through the process of preparing the final development plans, confirmation of any potential impacts (or lack thereof) to native vegetation must be undertaken.

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8 FURTHER REQUIREMENTS

Further requirements associated with development of the project, as well as additional studies or reporting that may be required, are provided in Table 17.

Table 17. Further requirements associated with development of the Project.

Relevant Legislation	Implications	Further Action
Environment Protection and Biodiversity Conservation Act 1999	The proposed action is highly unlikely to have a significant impact on any matter of NES. As such, a referral to the Commonwealth Environment Minister is not required regarding matters listed under the EPBC Act.	No further action required.
Flora and Fauna Guarantee Act 1988	One flora 'protected' under the FFG Act (Golden Wattle <i>Acacia pycnantha</i>), and two fauna listed as threatened (Brolga and Eastern Bent-wing Bat) were recorded during the ecological assessments. Based on the requirements under the FFG Act, a permit is not required. However, the Responsible Authority must consider potential impacts to FFG Act matters to ensure decisions and policies are made with proper consideration of the potential impacts on biodiversity.	No further action required.
Planning and Environment Act 1987	The impact to the Modelled Wetland has been included as native vegetation, with the modelled condition score assigned to this area. The study area is within Location 1, with 0.082 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Basic assessment pathway. The offset requirement for native vegetation removal is 0.015 General Habitat Units. A permit to remove native vegetation under Clause 52.17 of the Pyrenees Planning Scheme is required. A permit is required under Clause 52.32 of the Pyrenees Shire Planning Scheme to use and develop a wind energy facility	Prepare and submit a Planning Permit application under Clause 52.17 and Clause 52.32.
Catchment and Land Protection Act 1994	Two (2) weed species listed under the CaLP Act were recorded within the wind farm development boundary (Gorse <i>Ulex europaeus</i> , and Spear Thistle <i>Cirsium vulgare</i>). To meet requirements under the CaLP Act, listed noxious weeds should be appropriately controlled throughout the wind farm development boundary.	Listed noxious weeds should be appropriately controlled throughout the wind farm development boundary
Wildlife Act 1975	Any persons engaged to conduct salvage and relocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Ensure wildlife specialists hold a current Management Authorisation.

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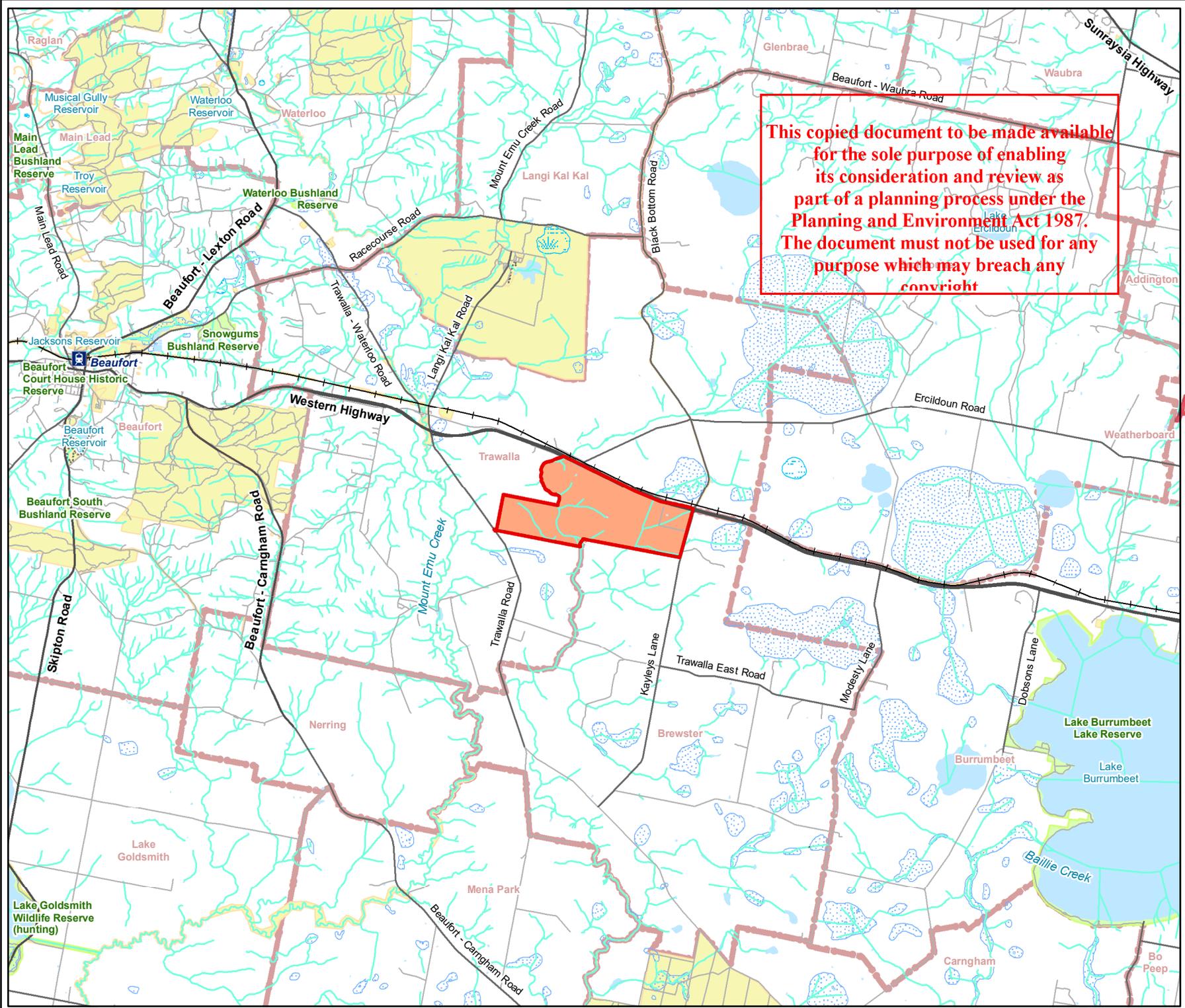
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FIGURES

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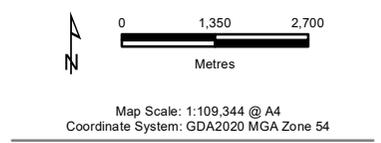
Legend

- Wind Farm Parcel Boundary
- Railway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Walking Track
- Minor Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities

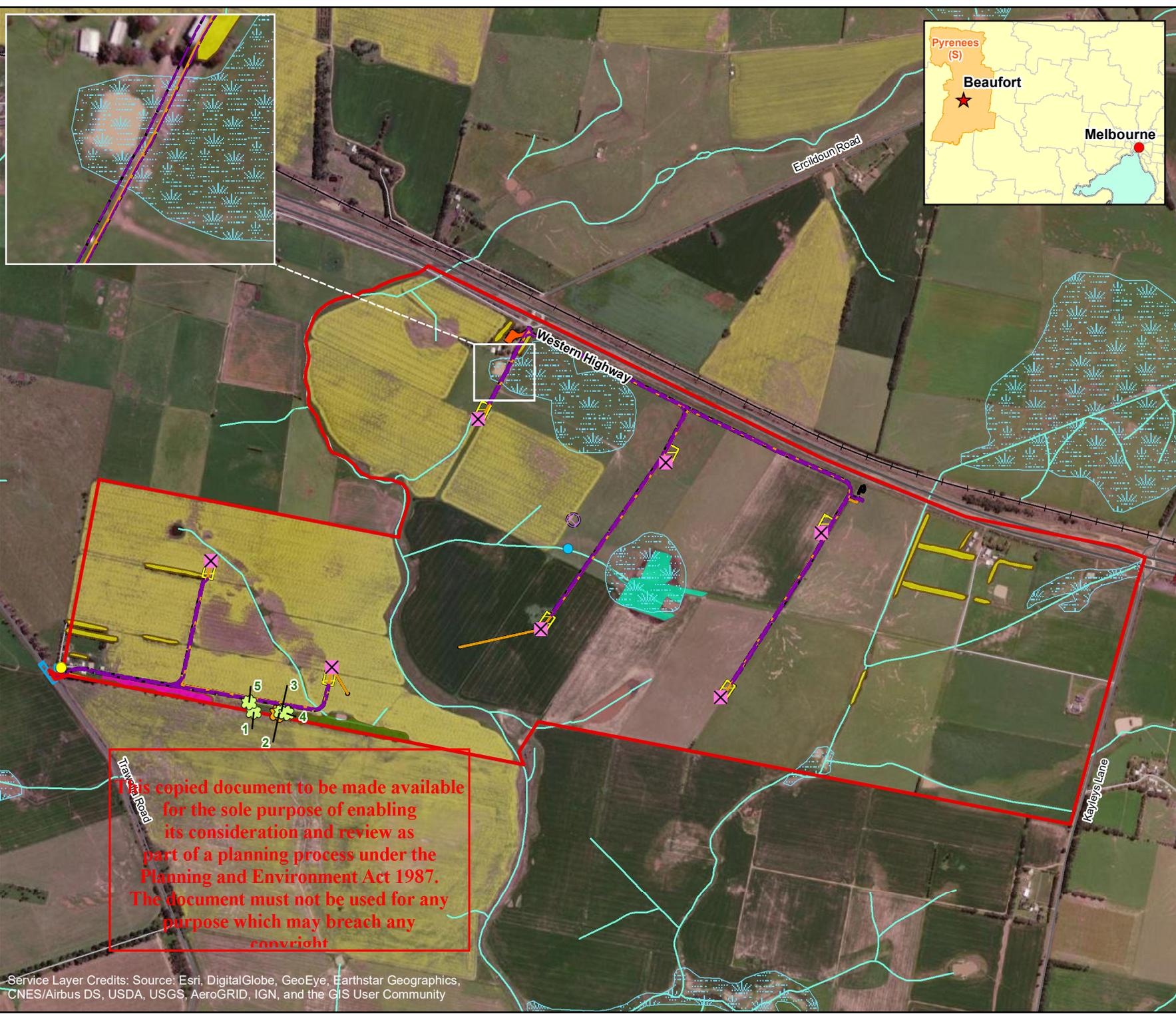
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Figure 1
 Location of the study area
*Ecological Assessment for
 Brewster Wind Farm, Beaufort*



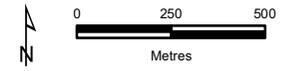
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- Legend**
- Wind Farm Parcel Boundary
 - ✕ Turbine location including foundation area
 - 60m met mast location
 - 140m met mast (20m buffer)
 - Access track 7.5m footprint
 - Hardstand
 - Cabling footprint
 - Site office compound
 - Development footprint
 - Western Site entry - road side verge & farm compound trees
 - Planted vegetation**
 - ✿ Planted Large Tree
 - ✿ Planted Small Tree
 - Planted Sugar Gum
 - Planted Windrows
 - Planted River Red-Gum
 - Native vegetation**
 - Plains Grassy Wetland (EVC 125)
 - Current Wetlands
 - FFG Act protected flora**
 - Golden Wattle

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Figure 2a
Ecological features
Ecological Assessment for Brewster Wind Farm, Beaufort



Map Scale: 1:20,000 @ A4
 Coordinate System: GDA 1994 MGA Zone 54



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Legend

-  Blade clearance / swept path
-  Tires envelope

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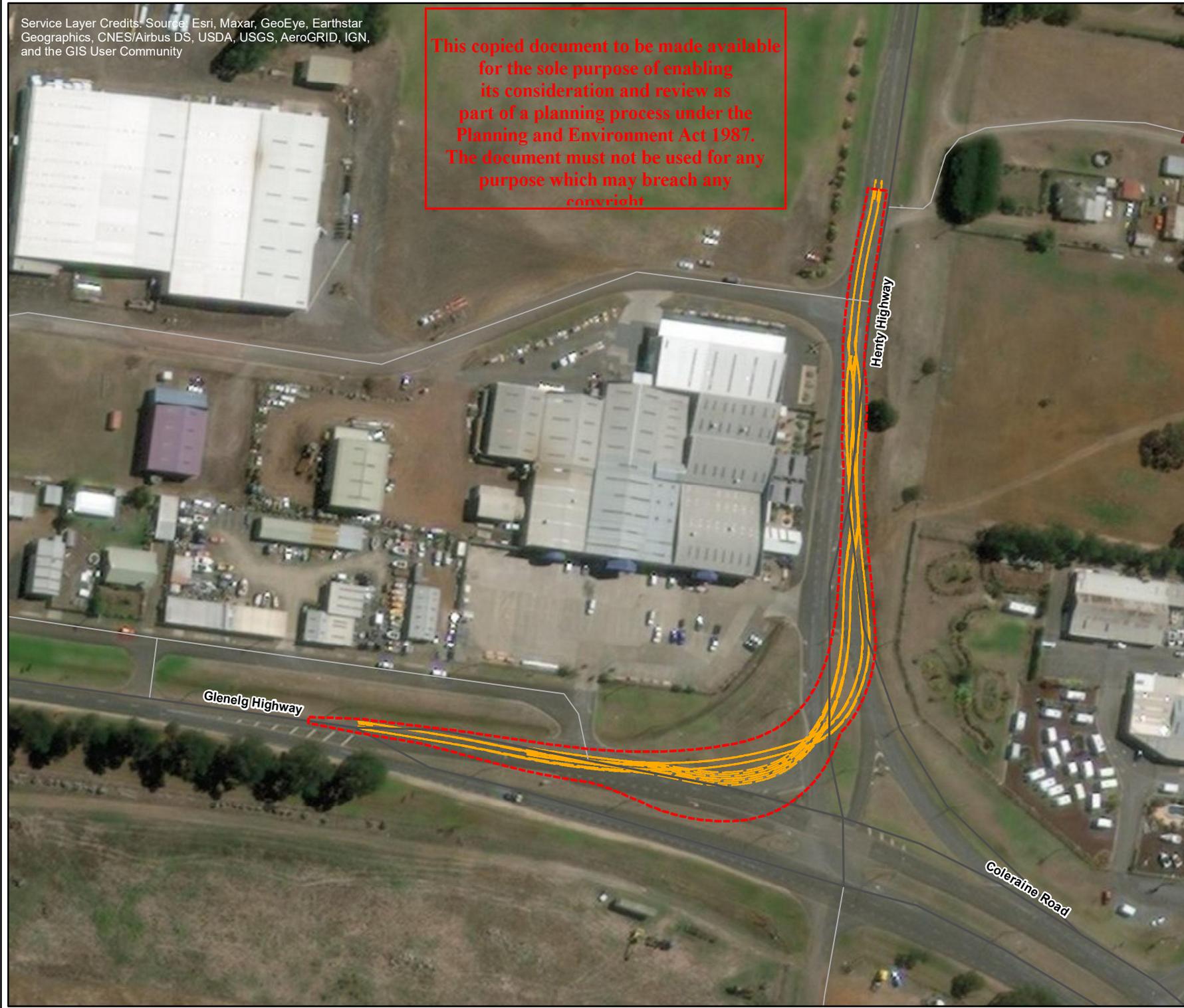
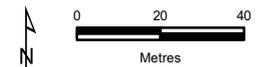


Figure 2b-i
Ecological features
Ecological Assessment - Swept Path for Brewster Wind Farm

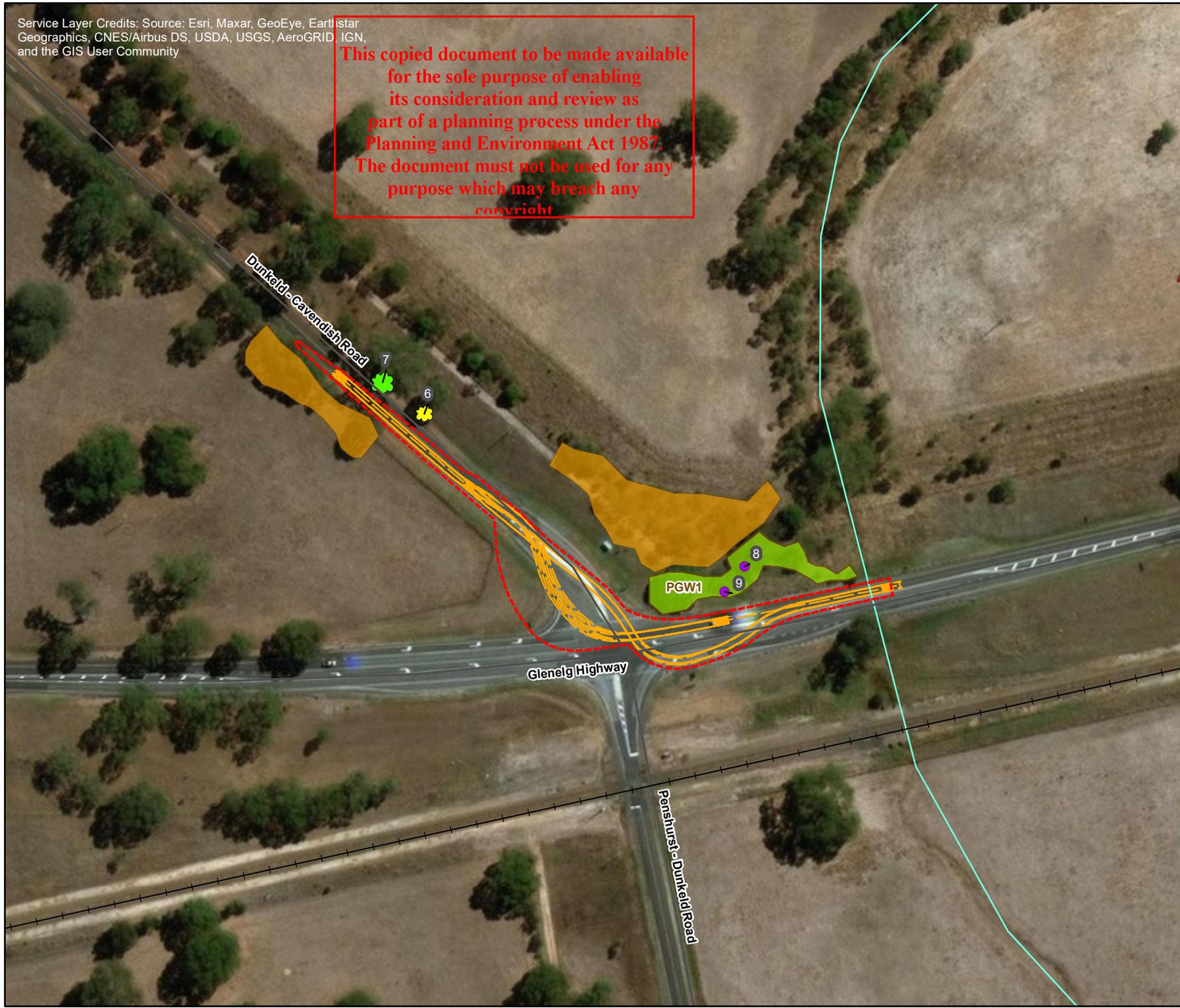


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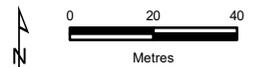


- Legend**
- Blade clearance / swept path
 - Tires envelope
 - Scattered Large Tree
 - Scattered Small Tree
 - Large Tree in patch
 - Native vegetation**
 - Plains Grassy Woodland (EVC 55)
 - Planted native vegetation

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Figure 2b-ii
Ecological features
Ecological Assessment - Swept Path for Brewster Wind Farm

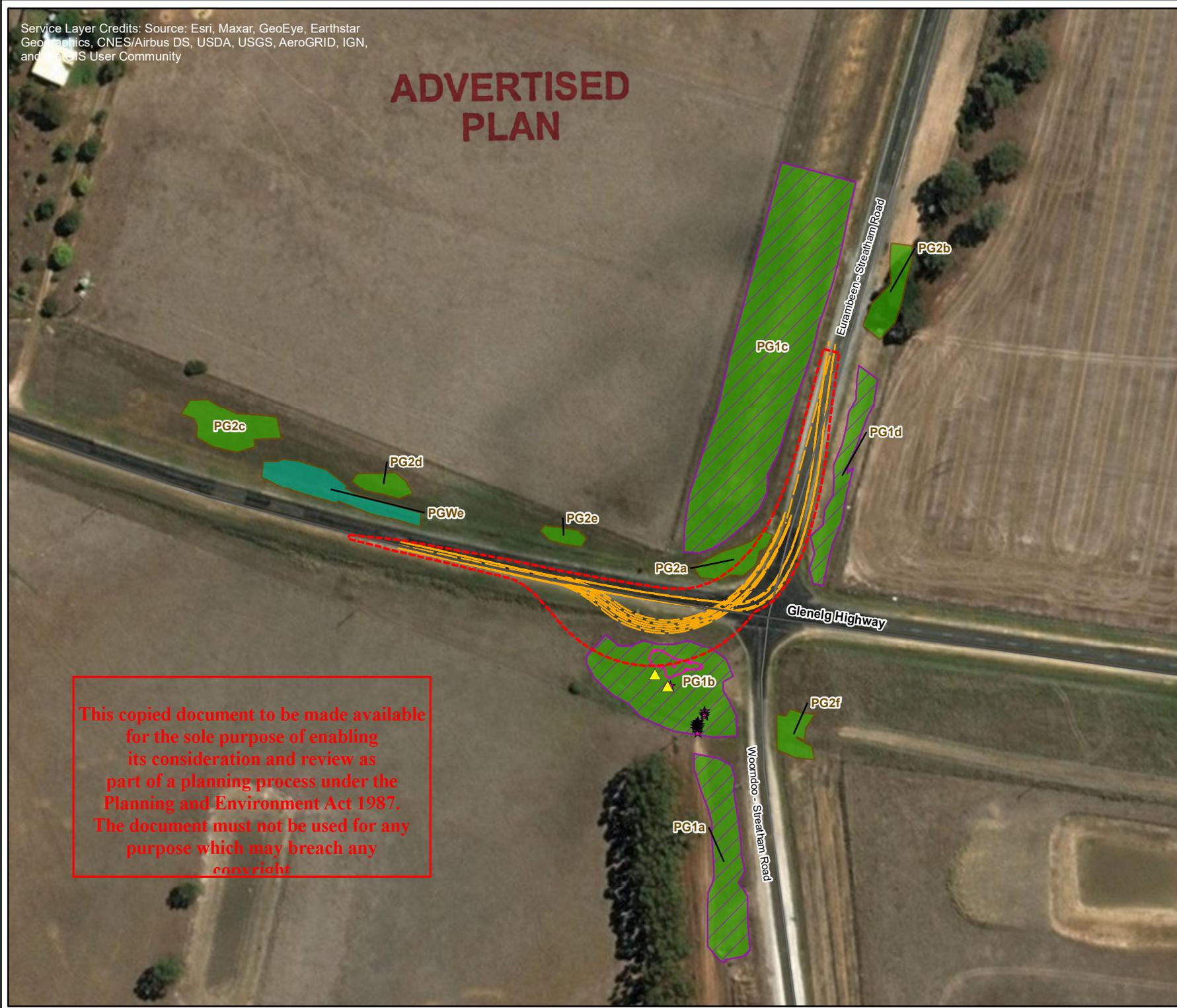


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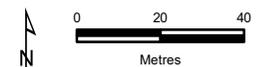
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Legend

- Blade clearance / swept path
- Tires envelope
- Ecological Vegetation Classes**
- Plains Grassland (EVC 132)
- Plains Grassy Wetland (EVC 125)
- EPBC Act vegetation community**
- Natural Temperate Grassland of the Victorian Volcanic Plain
- CaLP**
- African weed orchid (approximately 10 individuals at each point)
- EPBC Act listed species**
- Hoary Sunray
- Hoary Sunray patch (approximately 900 individuals)



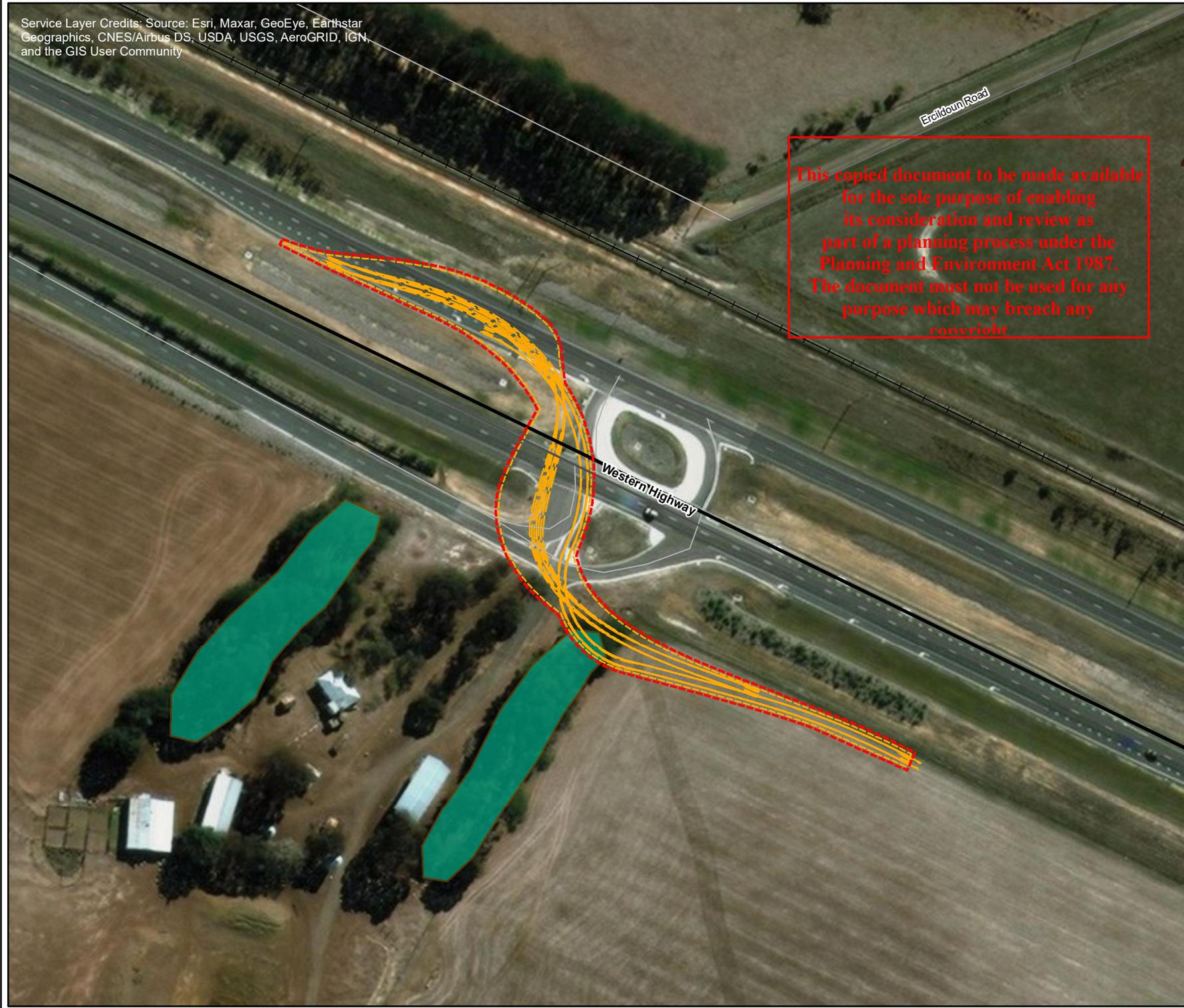
Figure 2b-iii
Ecological features
Ecological Assessment - Swept Path for Brewster Wind Farm



Map Scale: 1:1,800 @ A4
 Coordinate System: GDA 1994 MGA Zone 54



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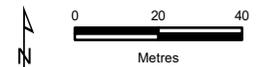
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- Legend**
- Wind Farm Parcel Boundary
 - Blade clearance / swept path
 - Tires envelope
 - Planted Windrows

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Figure 2b-iv
Ecological features
Ecological Assessment - Swept Path for Brewster Wind Farm



Map Scale: 1:1,800 @ A4
Coordinate System: GDA 1994 MGA Zone 54



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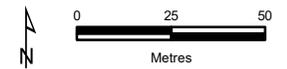
Legend

- Blade clearance / swept path
- Tires envelope

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Figure 2b-v
Ecological features
Ecological Assessment - Swept Path for Brewster Wind Farm



Map Scale: 1:2,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54



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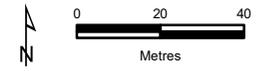
- Legend**
-  Blade clearance / swept path
 -  Tires envelope
 - Ecological Vegetation Class**
 -  Plains Grassland (EVC 132)

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Figure 2b-vi
Ecological features
Ecological Assessment - Swept Path for Brewster Wind Farm

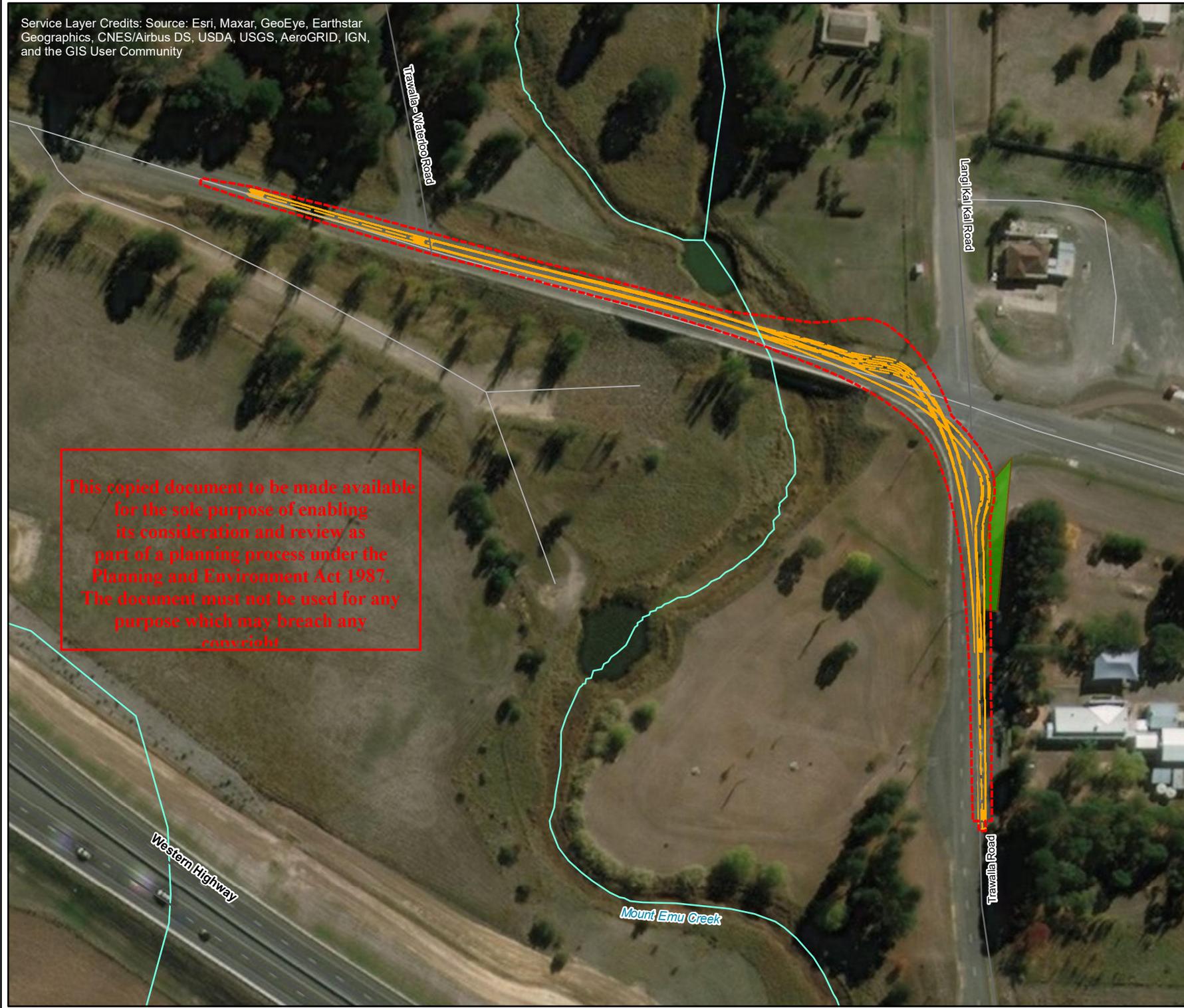


Map Scale: 1:1,800 @ A4
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13850_Fig02b_EcoFeatSP_MB_G94_3/12/2021_psorensen



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Legend

-  Wind Farm Parcel Boundary
-  Blade clearance / swept path
-  Tires envelope
-  Planted Sugar Gum
-  Planted Windrows

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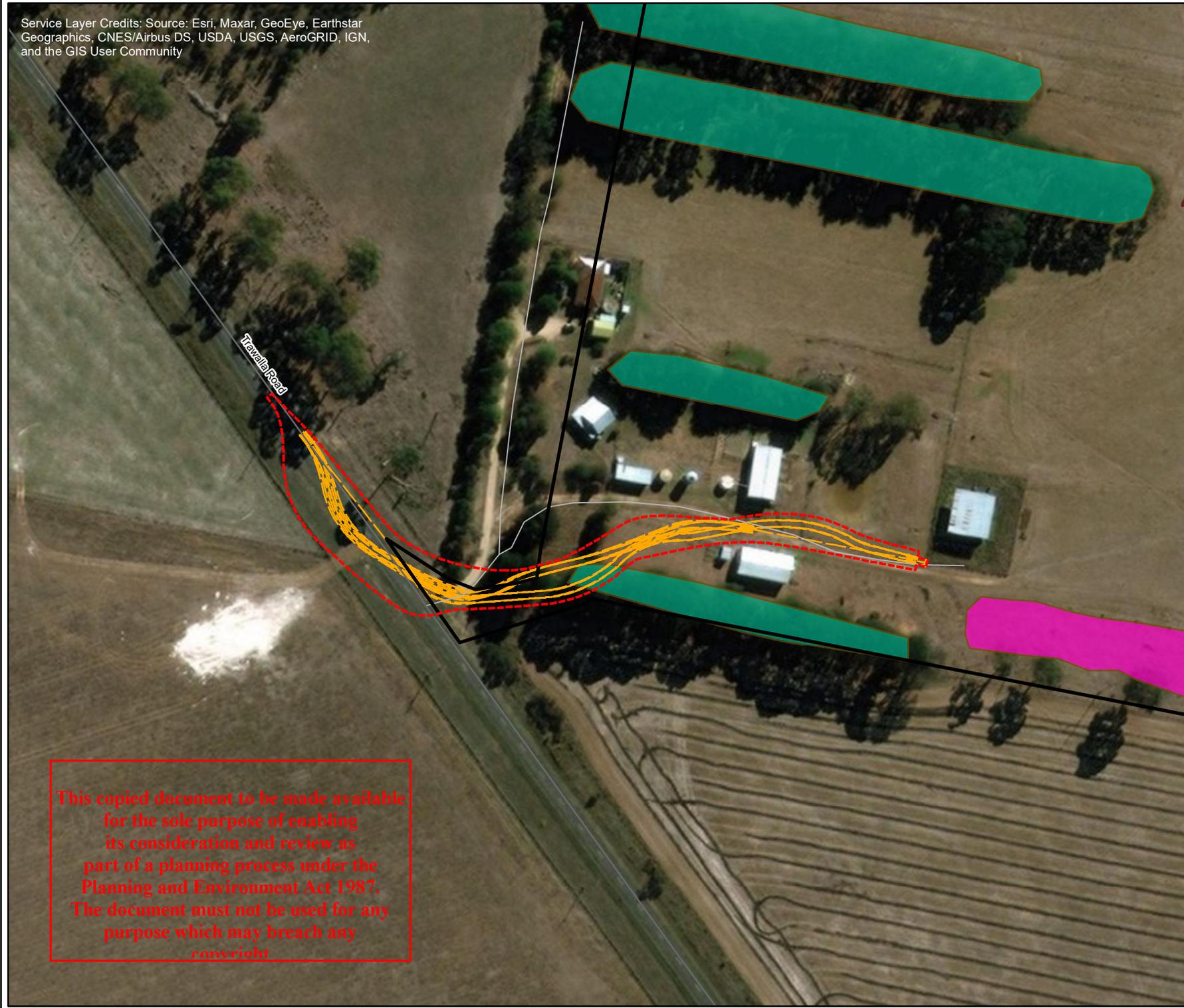
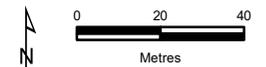


Figure 2b-vii
Ecological features
Ecological Assessment - Swept Path for Brewster Wind Farm

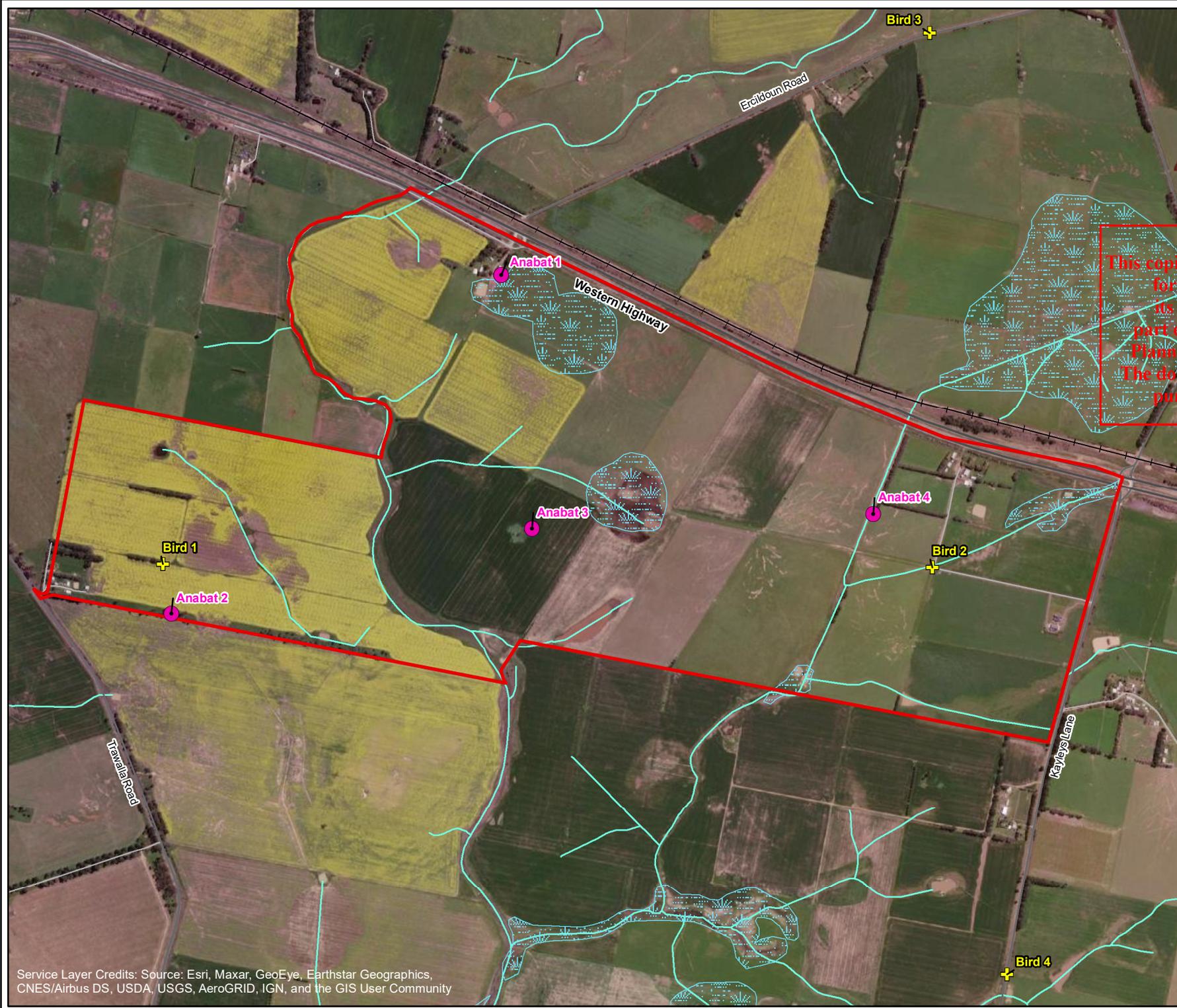


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 Coordinate System: GDA 1994 MGA Zone 54



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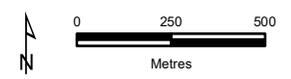
- Legend**
- Wind Farm Parcel Boundary
 - Current Wetlands
 - Anabat location
 - + Bird survey point count location

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Figure 3
Fauna survey effort
Ecological Assessment for Brewster Wind Farm, Beaufort

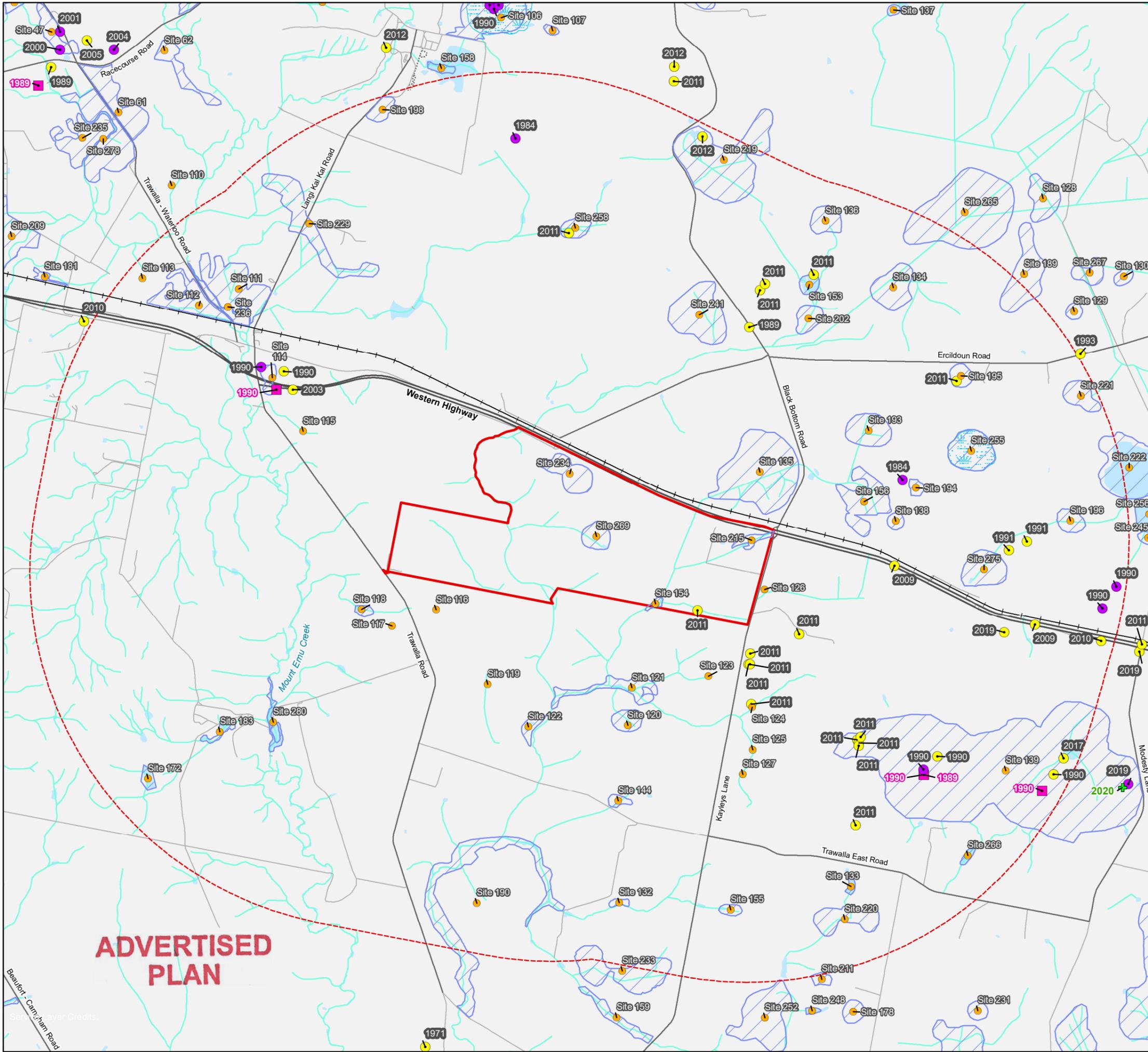


Map Scale: 1:20,000 @ A4
 Coordinate System: GDA 1994 MGA Zone 54



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13850_Fig03_FaunaSurvey_G94 1/12/2021 Melsley



- Legend**
- Wind Farm Parcel Boundary
 - Brolga records (VBA 2021)
 - Brolga breeding records (VBA 2021)
 - Brolga Records (Sheldons Flocking Database)
 - + Brolga records (Birdlife Australia)
 - Brolga survey point
 - Current Wetlands
 - Permanent Waterbody
 - Wetland/Swamp

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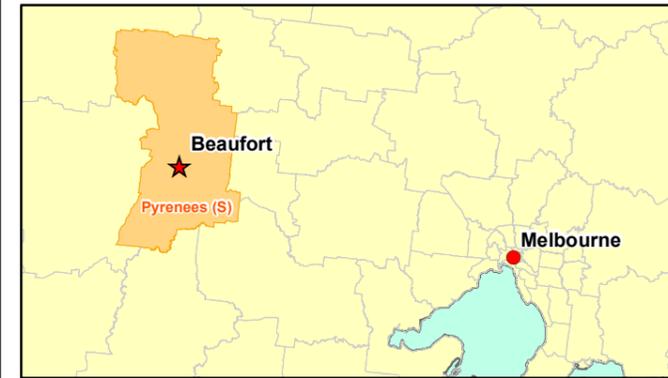
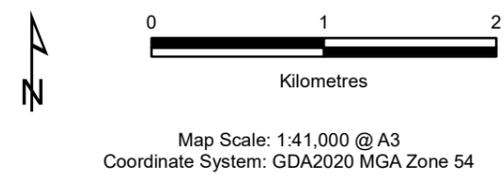
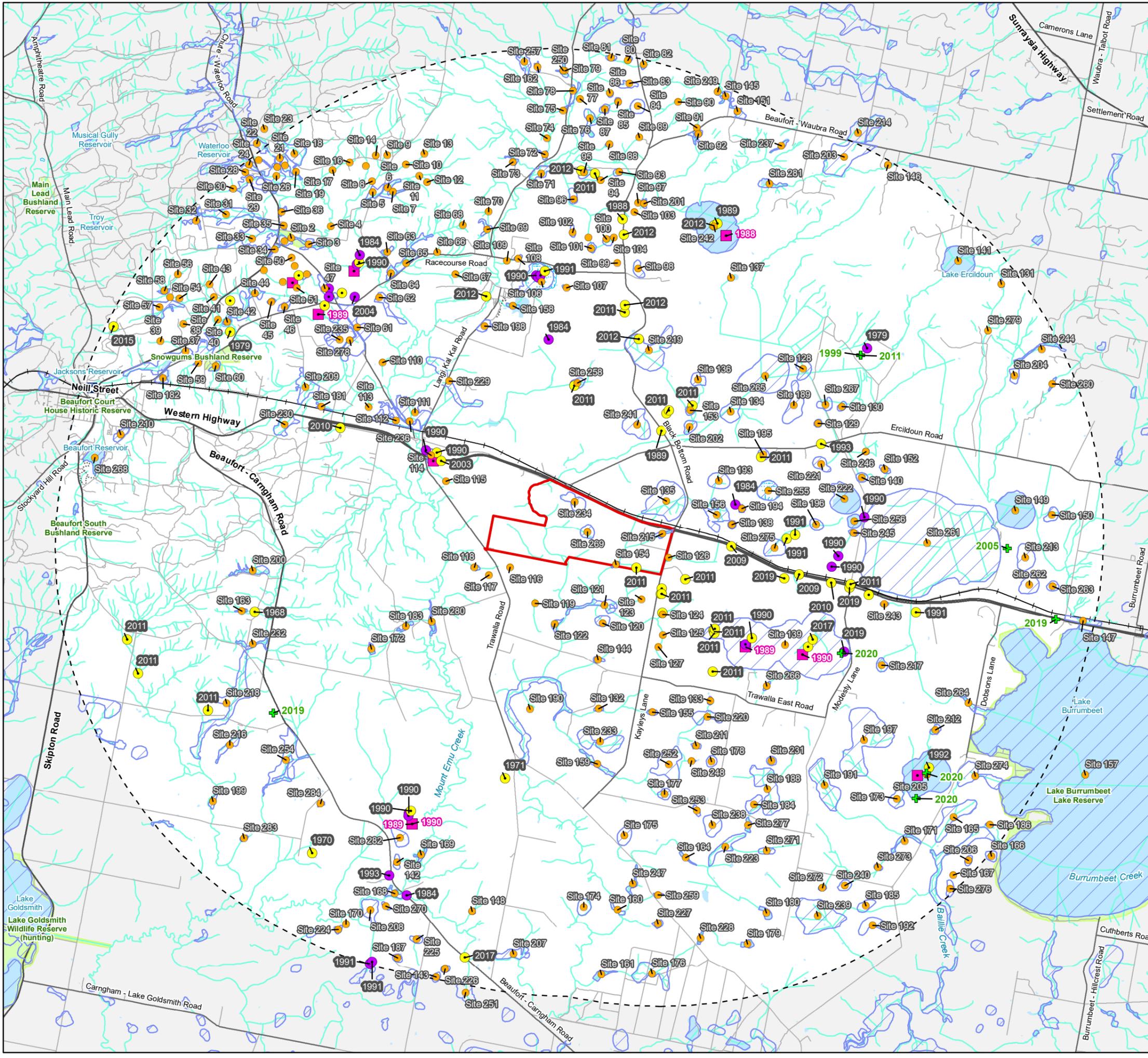


Figure 4a
 Previously documented Brolga records within 4km of the study area
Ecological Assessment for Brewster Wind Farm, Beaufort



Victorian Biodiversity Atlas (VBA) // Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100'. Updated August 2021 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.
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Legend

- Wind Farm Parcel Boundary
- Brolga records (VBA 2021)
- Brolga breeding records (VBA 2021)
- Brolga records (Sheldons Flocking Database)
- + Brolga records (Birdlife Australia)
- Brolga survey point
- Current Wetlands
- Permanent Waterbody
- Wetland/Swamp

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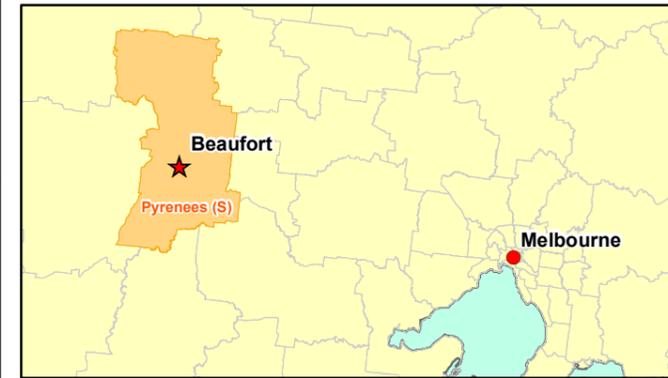
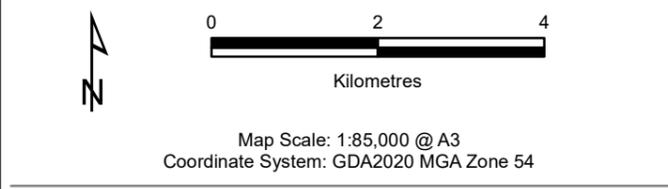


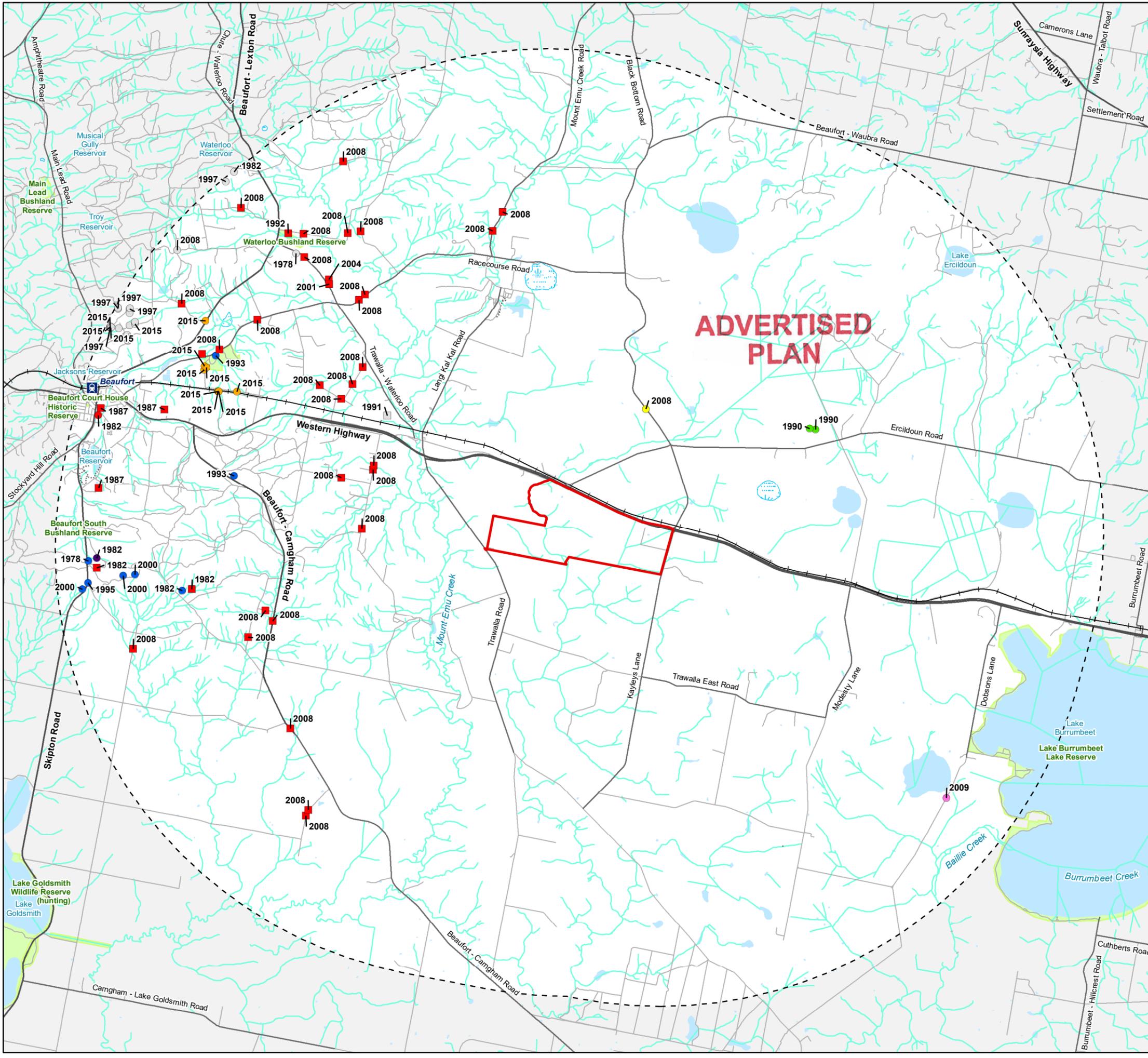
Figure 4b
 Previously documented Brolga records within 10km of the study area
Ecological Assessment for Brewster Wind Farm, Beaufort



Victorian Biodiversity Atlas (VBA) // Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100'. Updated August 2021 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.

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13850_Fla04b_Brolga_10km_G20_1/12/2021_Melbiew



Legend

- Wind Farm Parcel Boundary
- 10km buffer

Significant flora

- Ben Major Grevillea
- Buxton Gum
- Matted Flax-lily
- Pale Swamp Everlasting
- Plump Swamp Wallaby-grass
- Rough Wattle
- Salt Paperbark
- Shiny Tea-tree
- Swamp Everlasting
- Yarra Gum

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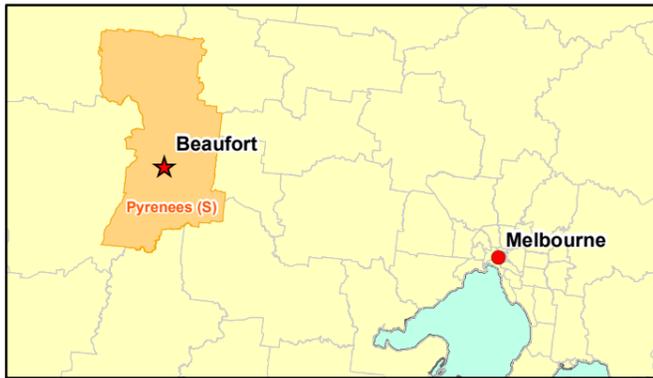
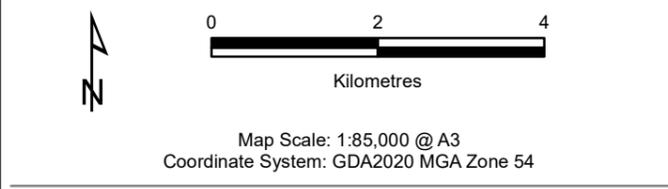


Figure 5
Previously documented significant flora within 10km of the study area
Ecological Assessment for Brewster Wind Farm, Beaufort



Victorian Biodiversity Atlas (VBA) // Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100'. Updated August 2021 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.

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13850 Fla05 SigFlora G20 1/12/2021 Melsjev

APPENDIX 1 - FLORA

Appendix 1.1 - Flora Results

Legend:

- * Listed as a noxious weed under the CaLP Act;
- w Weed of National Significance;
- ** Planted indigenous species in the study area.

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Table A1.1. Flora within the wind farm development boundary.

Scientific Name	Common Name	Notes
NATIVE		
<i>Acacia mearnsii</i>	Black Wattle	**
<i>Acacia melanoxylon</i>	Blackwood	**
<i>Acacia pycnantha</i>	Golden Wattle	
<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass	
<i>Correa reflexa</i>	Common Correa	**
<i>Deyeuxia quadriseta</i>	Reed Bent-grass	
<i>Dianella revoluta s.l.</i>	Black-anther Flax-lily	**
<i>Eleocharis acuta</i>	Common Spike-sedge	
<i>Eucalyptus camaldulensis</i>	River Red-gum	**
<i>Eucalyptus leucoxylon</i>	Yellow Gum	**
<i>Eucalyptus melliodora</i>	Yellow Box	**
<i>Eleocharis pusilla</i>	Small Spike-sedge	
<i>Eucalyptus tricarpa</i>	Red Ironbark	**
<i>Potamogeton tricarlinatus s.l.</i>	Floating Pondweed	
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	**
<i>Ranunculus inundatus</i>	River Buttercup	
INTRODUCED		
<i>Acetosella vulgaris</i>	Sheep Sorrel	
<i>Agrostis capillaris</i>	Brown-top Bent	
<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass	
<i>Arctotheca calendula</i>	Cape Weed	
<i>Avena fatua</i>	Wild Oat	
<i>Brassica napus</i>	Canola	
<i>Bromus diandrus</i>	Great Brome	
<i>Cirsium vulgare</i>	Spear Thistle	*
<i>Cynodon dactylon</i>	Couch	

Scientific Name	Common Name	Notes
<i>Eucalyptus cladocalyx</i>	Sugar Gum	
<i>Holcus lanatus</i>	Yorkshire Fog	
<i>Hordeum vulgare</i>	Barley	
<i>Hypochaeris radicata</i>	Flatweed	
<i>Pennisetum clandestinum</i>	Kikuyu	
<i>Lolium spp.</i>	Rye-grass	
<i>Pennisetum clandestinum</i>	Kikuyu	
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	
<i>Pinus radiata</i>	Radiata Pine	
<i>Plantago lanceolata</i>	Ribwort	
<i>Ulex europaeus</i>	Gorse	*w
<i>Urtica dioica</i>	Giant Nettle	

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Appendix 1.2 - Habitat Hectare Assessment

Table A1.2. Habitat Hectare Assessment Table

Study Area Option	Wind Farm Boundary	Swept Path (Fig 2b-iii)	Swept Path (Fig 2b-iii)	Swept Path (Fig 2b-iii)	Swept Path (Fig 2b-ii)	Swept Path (Fig 2b-vi)
Vegetation Zone	PGWe1	PG1	PG2	PGWe	PGW1	PG
Bioregion	VVP	VVP	VVP	VVP	VVP	VVP
EVC / Tree	PGWe	PG(LR)	PG(LR)	PGWe	PGW	PG(LR)
EVC Number	125	132_63	132_63	125	55_61	132_63
EVC Conservation Status	En	En	En	En	En	En
Patch Condition	Large Old Trees /10	0	0	0	8	0
	Canopy Cover /5	0	0	0	5	0
	Under storey /25	10	15	15	5	5
	Lack of Weeds /15	15	9	6	2	4
	Recruitment /10	3	6	6	3	3
	Organic Matter /5	5	5	3	2	2
	Logs /5	0	0	0	0	0
	Treeless EVC Multiplier	1.36	1.36	1.36	1.36	1.00
Subtotal =	44.88	47.60	40.80	16.32	27.00	12.24
Landscape Value /25	4	5	5	5	4	2
Habitat Points /100	49	53	46	21	31	14
Habitat Score	0.49	0.53	0.46	0.21	0.31	0.14

Note: PGWe = Plains Grassy Wetland; PG = Plains Grassland; PGW = Plains Grassy Woodland; VVP = Victorian Volcanic Plain bioregion.

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Appendix 1.3 - Significant Flora Species

Table A1.4 Significant flora recorded within 10 kilometres of the wind farm development boundary

Likelihood: Habitat characteristics of significant flora species previously recorded within 10 kilometres of the wind farm development boundary, or that may potentially occur within the wind farm development boundary were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings is defined below:

1	Known Occurrence	<ul style="list-style-type: none"> Recorded within the study area recently (i.e. within ten years)
2	High Likelihood	<ul style="list-style-type: none"> Previous records of the species in the local vicinity; and/or, The study area contains areas of high-quality habitat.
3	Moderate Likelihood	<ul style="list-style-type: none"> Limited previous records of the species in the local vicinity; and/or The study area contains poor or limited habitat.
4	Low Likelihood	<ul style="list-style-type: none"> Poor or limited habitat for the species, however other evidence (such as lack of records or environmental factors) indicates there is a very low likelihood of presence.
5	Unlikely	<ul style="list-style-type: none"> No suitable habitat and/or outside the species range.

Notes: EPBC = *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), FFG = *Flora and Fauna Guarantee Act 1988* (FFG Act); # = Records identified from EPBC Act Protected Matters Search Tool, Data source: Victorian Biodiversity Atlas (DELWP 2021d); Protected Matters Search Tool (DAWE 2021). Order: Alphabetical.

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Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Rationale for occurrence likelihood
NATIONALLY SIGNIFICANT						
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	-	-	VU	-	Limited habitat and lack of records.
<i>Caladenia versicolor</i>	Candy Spider-orchid	-	-	VU	en	Limited habitat and lack of records.
<i>Daviesia laevis</i>	Grampians Bitter-pea	-	-	VU	cr	No suitable habitat and outside species range
<i>Dianella amoena</i>	Matted Flax-lily	8	2015	EN	cr	Limited previous records. No suitable habitat within study
<i>Dodonaea procumbens</i>	Trailing Hop-bush	-	-	VU	-	No suitable habitat within study area and lack of records.
<i>Eucalyptus crenulata</i>	Buxton Gum	1	1982	EN	en	Not present within study area.
<i>Glycine latrobeana</i>	Clover Glycine	-	-	VU	vu	No suitable habitat within study area and lack of records.
<i>Grevillea floripendula</i>	Ben Major Grevillea	36	2015	VU	cr	Not present within study area and lack of records.
<i>Lachnagrostis adamsonii</i>	Adamson's Blown-grass	-	-	EN	en	Limited habitat and lack of records.
<i>Lepidium hyssopifolium</i>	Basalt Peppercross	-	-	EN	en	No suitable habitat within study area and lack of records
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	Hoary Sunray	-	-	EN	en	Limited habitat and lack of records.
<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	-	-	CR	cr	Limited habitat and lack of records.
<i>Poa sallacustris</i>	Salt-lake Tussock-grass	-	-	VU	cr	No suitable habitat within study area and lack of records.
<i>Rutidosis leptorhynchoides</i>	Button Wrinklewort	-	-	EN	en	No suitable habitat within study area and lack of records
<i>Senecio psilocarpus</i>	Swamp Fireweed	-	-	VU	-	No suitable habitat within study area and lack of records
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	-	-	VU	en	No suitable habitat within study area and lack of records
<i>Xerochrysum palustre</i>	Swamp Everlasting	1	1991	VU	cr	Limited habitat and limited previous records.
STATE SIGNIFICANT						
<i>Amphibromus pithogastrus</i>	Plump Swamp Wallaby-grass	2	1990	-	cr	Limited habitat and limited previous records.
<i>Eucalyptus yarraensis</i>	Yarra Gum	40	2008	-	cr	Some previous records nearby but not present in study area.
<i>Acacia aspera</i> subsp. <i>parviceps</i>	Rough Wattle	8	2000	-	en	Some previous records nearby but not present in study area

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Rationale for occurrence likelihood
<i>Coronidium gunnianum</i>	Pale Swamp Everlasting	1	2008	-	cr	Limited habitat and limited previous records.
<i>Melaleuca halmaturorum</i>	Salt Paperbark	1	2009	-	vu	Not present within study area.
<i>Leptospermum tubinatum</i>	Shiny Tea-tree	1	1982	-	en	Not present within study area.

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APPENDIX 2 - FAUNA

Appendix 2.1 - Significant Fauna Species

Table A2.1. Significant fauna within 10 kilometres of the study area.

Likelihood: Habitat characteristics of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings is defined below.

1	High Likelihood	<ul style="list-style-type: none"> Known resident in the study area based on site observations, database records, or expert advice; and/or, Recent records (i.e. within five years) of the species in the local area (DELWP 2018); and/or, The study area contains the species' preferred habitat.
2	Moderate Likelihood	<ul style="list-style-type: none"> The species is likely to visit the study area regularly (i.e. at least seasonally); and/or, Previous records of the species in the local area (DELWP 2018); and/or, The study area contains some characteristics of the species' preferred habitat.
3	Low Likelihood	<ul style="list-style-type: none"> The species is likely to visit the study area occasionally or opportunistically whilst en route to more suitable sites; and/or, There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, The study area contains few or no characteristics of the species' preferred habitat.
4	Unlikely	<ul style="list-style-type: none"> No previous records of the species in the local area; and/or, The species may fly over the study area when moving between areas of more suitable habitat; and/or, Out of the species' range; and/or, No suitable habitat present.

EPBC *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

FFG *Flora and Fauna Guarantee Act 1988* (FFG Act)

NAP National Action Plan (Cogger *et al.* 1993; Duncan *et al.* 1999; Garnet *et al.* 2011; Woinarski *et al.* 2014; Sands and New 2002; Tyler 1997)

EX Extinct

DD Data deficient (insufficiently or poorly known)

RX Regionally extinct

L Listed as threatened under FFG Act

CR Critically endangered

EN Endangered

Listed on the Protected Matters Search Tool

NT Near threatened

VU Vulnerable

CD Conservation dependent

LC least concern

RA Rare

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Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	Likelihood of occurrence in the study area	Rationale for occurrence likelihood
NATIONAL SIGNIFICANCE							
Australasian Bittern	<i>Botaurus poiciloptilus</i>	-	-	EN	cr	4	No previous records, no suitable habitat.
Australian Painted Snipe	<i>Rostratula australis</i>	-	-	VU	cr	4	No previous records, no suitable habitat.
Curlew Sandpiper	<i>Calidris ferruginea</i>	-	-	CR	cr	4	No previous records, no suitable habitat.
Little Galaxias	<i>Galaxiella toourtkoourt</i>	2011	17	VU	en	4	No suitable habitat.
Eastern Barred Bandicoot	<i>Perameles gunnii</i>	1967	23	VU	en	4	No suitable habitat.
Eastern Curlew	<i>Numenius madagascariensis</i>	-	-	CR	cr	4	No previous records, no suitable habitat.
Golden Sun Moth	<i>Synemon plana</i>	2015	2	CR	vu	4	No suitable habitat.
Greater Glider	<i>Petauroides volans</i>	-	-	VU	vu	4	No previous records, no suitable habitat.
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	-	-	VU	vu	4	No previous records, no suitable habitat. Occasional fly over.
Growling Grass Frog	<i>Litoria raniformis</i>	2013	28	VU	vu	3	Previous records in the local area, some characteristics of preferred habitat present.
Painted Honeyeater	<i>Grantiella picta</i>	1972	1	VU	vu	4	No previous records, no suitable habitat.
Pink-tailed Worm-Lizard	<i>Aprasia parapulchella</i>	-	-	VU	en	4	No previous records, no suitable habitat.
Plains-wanderer	<i>Pedionomus torquatus</i>	-	-	CR	cr	4	No previous records, no suitable habitat.
Regent Honeyeater	<i>Anthochaera phrygia</i>	1971	2	CR	cr	4	Two records, more than 40 years old, no suitable habitat.
Southern Brown Bandicoot	<i>Isodon obesulus obesulus</i>	-	-	EN	en	4	No previous records, no suitable habitat.
Spot-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	-	-	EN	en	4	No previous records, no suitable habitat.
Striped Legless Lizard	<i>Delma impar</i>	2012	3	VU	vu	4	No suitable habitat.

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	Likelihood of occurrence in the study area	Rationale for occurrence likelihood
Swift Parrot	<i>Lathamus discolor</i>	-	-	CR	cr	4	No previous records, no suitable habitat.
Western Alaskan Bar-tailed Godwit	<i>Limosa lapponica baueri</i>	-	-	VU	-	4	No previous records, no suitable habitat.
STATE SIGNIFICANCE							
Australian Gull-billed Tern	<i>Gelocheidon niloteca macrotarsa</i>	1992	2		en	4	Limited historical records, limited suitable habitat.
Australian Shoveler	<i>Spathula rhynchotis</i>	2019	15		vu	4	Limited historical records, limited suitable habitat.
Blue-billed Duck	<i>Oxyura australis</i>	1980	3	-	vu	3	Limited historical records, limited suitable habitat.
Brolga	<i>Anigone rubicunda</i>	2019	143		en	2	Recorded outside study area, but limited habitat present within the study area.
Brown Toadlet	<i>Pseudophryne bibronii</i>	2015	4	-	en	3	Previous records in the local area, some characteristics of preferred habitat present.
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	1997	5	-	vu	4	Limited historical records, no suitable habitat.
Caspian Tern	<i>Hydroprogne caspia</i>	2017	6	-	vu	3	Limited historical records, limited suitable habitat.
Common Greenshank	<i>Tringa nebularia</i>	2017	6	-	en	3	Limited historical records, limited suitable habitat.
Diamond Firetail	<i>Stagonopleura guttata</i>	1977	1	-	vu	4	Limited historical records, limited suitable habitat.
Eastern Great Egret	<i>Ardea alba modesta</i>	2019	7		vu	3	Limited historical records, limited suitable habitat.
Hardhead	<i>Aythya australis</i>	2017	13	-	vu	3	Limited preferred habitat, species may visit study area opportunistically.
Little Eagle	<i>Hieraaetus morphnoides</i>	1991	3		vu	3	Limited preferred habitat, species may visit study area opportunistically.
Musk Duck	<i>Biziura lobata</i>	2018	12	-	vu	3	Limited preferred habitat, species may visit study area opportunistically.
Platypus	<i>Ornithorhynchus anatinus</i>	1954	1		vu	4	Limited historical records, no suitable habitat.

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	Likelihood of occurrence in the study area	Rationale for occurrence likelihood
Plumed Egret	<i>Ardea intermedia plumifera</i>	2000	2		cr	4	Limited historical records, no suitable habitat.
Powerful Owl	<i>Ninox strenua</i>	1998	4	-	vu	4	Limited historical records, no suitable habitat.
Speckled Warbler	<i>Pyrrholaemus sagittatus</i>	1970	3		en	4	Limited historical records, no suitable habitat.
Southern Toadlet	<i>Pseudophryne semimarmorata</i>	1885	4	-	en	3	Previous records in the local area, some characteristics of preferred habitat present.

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Appendix 2.2 – Fauna Species List

Common Name	Scientific Name	Hollow Use	Observation Type	Flying at RSA
Mammals				
European Rabbit *	<i>Oryctolagus cuniculus</i>	-	S	N/A
Birds				
Australian Magpie	<i>Gymnorhina tibicen</i>	-	S	NO
Australian Shelduck	<i>Tadorna tadornoides</i>	Total	S	NO
Australian Wood Duck	<i>Chenonetta jubata</i>	Total	S	NO
Black-shouldered Kite	<i>Elanus axillaris</i>	-	S	NO
Brolga	<i>Antigone rubicunda</i>	-	S	NO
Chestnut Teal	<i>Anas castanea</i>	Total	S	NO
Crescent Honeyeater	<i>Phylidonyris pyrrhoptera</i>	-	H	NO
Eastern Yellow Robin	<i>Eopsaltria australis</i>	-	S	NO
European Goldfinch	<i>Carduelis carduelis</i>	-	S	NO
European Skylark*	<i>Alauda arvensis</i>	-	S	NO
Galah	<i>Eolophus roseicapilla</i>	Total	S	NO
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	Partial	H	NO
Little Corella	<i>Cacatua sanguinea</i>	Total	S	NO
Little Raven	<i>Corvus mellori</i>	-	S	NO
Superb Fairy-wren	<i>Malurus cyaneus</i>	-	S	NO
Welcome Swallow	<i>Petrochelidon neoxena</i>	Partial	S	NO
White-eared Honeyeater	<i>Lichenostomus leucotis</i>	-	S	NO
White-throated Treecreeper	<i>Cormobates Leucophaeus</i>	Total	H	NO
Amphibian				

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Common Name	Scientific Name	Hollow Use	Observation Type	Flying at RSA
Common Froglet	<i>Crinia signifera</i>	-	H	N/A

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Appendix 2.3 – Brolga Habitat Assessment

Table A2.3. Results of the Brolga Habitat Assessment

Note: D – Habitat quality determined via Desktop Assessment; SEW – Shallow Ephemeral Wetland

Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
1	SEW	No	0%	0%	Grazed pasture	No	Low	
2	Dam	Yes	90%	70%	Grazed pasture	No	Mod	
3	SEW	No	0%	0%	Grazed pasture	No	Low	
4	Dam/SEW	Yes	5%	0%	Grazed pasture	No	Low	
5	SEW	No	0%	0%	Grazed pasture	No	Low	
6	SEW	Yes	0%	0%	Grazed pasture	No	Low	
7	Dam	Yes	5%	5%	Grazed pasture	No	Low	
8	Dam	Yes	25%	0%	Cropped paddock	No	Low	
9	Dam	Yes	25%	0%	Cropped paddock	No	Low	
10	Dam/SEW	Yes	25%	0%	Cropped paddock	No	Low	
11	Dam	Yes	10%	0%	Cropped paddock	No	Low	
12	Dam	Yes	25%	5%	Cropped paddock	No	Low	
13	Dam	Yes	50%	10%	Cropped paddock	No	Low	
14	Dam	Yes	25%	0%	Cropped paddock	No	Low	
15	Dam	Yes	10%	0%	Cropped paddock	No	Low	
16	Dam	Yes	25%	10%	Cropped paddock	No	Low	
17	Dam	Yes	25%	10%	Cropped paddock	No	Low	
18	SEW	Yes	100%	50%	Grazed pasture	No	Mod	
19	SEW	Yes	100%	50%	Grazed pasture	No	Mod	
20	SEW	No	0%	0%	Grazed pasture	No	Low	
21	SEW	No	0%	0%	Grazed pasture	No	Low	
22	SEW	No	0%	0%	Grazed pasture	No	Low	
23	SEW	Yes	100%	80%	Grazed pasture	No	Mod	
24	Dam	Yes	25%	0%	Grazed pasture	No	Low	
25	Dam	Yes	10%	0%	Grazed pasture	No	Low	
26	SEW	No	0%	0%	Grazed pasture	No	Low	
27	SEW	Yes	75%	80%	Grazed pasture	No	Mod	
28	Dam	Yes	25%	0%	Grazed pasture	No	Low	
29	Dam	Yes	25%	0%	Grazed pasture	No	Low	
30	Dam	Yes	25%	0%	Grazed pasture	No	Low	
31	Dam	Yes	50%	0%	Grazed pasture	No	Low	

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Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
32	Dam	Yes	10%	0%	Grazed pasture	No	Low	
33	Dam/SEW	Yes	50%	50%	Grazed pasture	No	Mod	
34	Dam	Yes	100%	65%	Grazed pasture	No	Low	
35	SEW	No	0%	0%	Grazed pasture	No	Low	
36	SEW	No	0%	0%	Grazed pasture	No	Low	
37	Dam	Yes	75%	0%	Grazed pasture	No	Low	Beaufort Waste Water Treatment Plant
38	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
39	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
40	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
41	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
42	Dam/SEW	Yes	85%	60%	Grazed pasture	No	Mod	Dammed wetland
43	Dam	Yes	80%	0%	Grazed pasture	No	Low	
44	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
45	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
46	SEW	No	0%	0%	Grazed pasture	No	Low	
47	SEW	Yes	10%	80%	Grazed pasture	No	High	
48	SEW	No	0%	0%	Grazed pasture	No	Low	
49	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
50	Dam	Yes	75%	0%	Grazed pasture	No	Low	
51	Dam	Yes	75%	0%	Grazed pasture	No	Low	
52	Dam	Yes	50%	0%	Grazed pasture	No	Low	
53	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
54	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
55	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
56	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
57	Dam/SEW	Yes	20%	0%	Grazed pasture	No	Low	
58	Dam	Yes	60%	35%	Grazed pasture	No	Mod	
59	Dam	Yes	60%	35%	Grazed pasture	No	Mod	
60	Dam/SEW	Yes	20%	0%	Grazed pasture	No	Low	
61	SEW	Yes	25%	70%	Grazed pasture	No	Mod	
62	SEW	Yes	25%	70%	Grazed pasture	No	Mod	
63	Dam/SEW	Yes	20%	0%	Grazed pasture	No	Low	
64	Dam/SEW	Yes	45%	50%	Grazed pasture	No	Mod	

Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
65	Dam/SEW	Yes	45%	70%	Grazed pasture	No	Mod	
66	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
67	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
68	Dam/SEW	Yes	60%	0%	Grazed pasture	No	Low	
69	Dam/SEW	Yes	20%	0%	Grazed pasture	No	Low	
70	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
71	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
72	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
73	Dam/SEW	Yes	75%	0%	Grazed pasture	No	Low	
74	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
75	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
76	Dam/SEW	Yes	80%	0%	Grazed pasture	No	Low	
77	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
78	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
79	Dam/SEW	Yes	50%	20%	Grazed pasture	No	Low	
80	Dam	Yes	100%	65%	Grazed pasture	No	Mod	
81	Dam/SEW	Yes	20%	0%	Grazed pasture	No	Low	
82	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
83	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
84	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
85	Dam/SEW	Yes	75%	10%	Grazed pasture	No	Low	
86	Dam/SEW	Yes	45%	10%	Grazed pasture	No	Low	
87	Dam/SEW	Yes	75%	0%	Grazed pasture	No	Low	
88	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
89	Dam/SEW	Yes	60%	0%	Grazed pasture	No	Low	
90	Dam	Yes	75%	0%	Grazed pasture	No	Low	
91	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
92	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
93	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
94	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
95	Dam/SEW	Yes	45%	70%	Grazed pasture	No	Low	
96	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
97	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
98	Dam/SEW	Yes	60%	0%	Grazed pasture	No	Low	
99	Dam/SEW	Yes	20%	0%	Grazed pasture	No	Low	

Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
100	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
101	Dam	Yes	25%	0%	Grazed pasture	No	Low	
102	Dam	Yes	25%	0%	Grazed pasture	No	Low	
103	Dam/SEW	Yes	25%	0%	Grazed pasture	No	Low	
104	Dam	Yes	10%	0%	Grazed pasture	No	Low	
105	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
106	SEW	Yes	10%	85%	Grazed pasture	No	Mod	Bittern Lagoon
107	SEW	No	0%	0%	Grazed pasture	No	Low	
108	Dam	Yes	75%	0%	Grazed pasture	No	Low	
109	Dam	Yes	80%	80%	Grazed pasture	No	Low	
110	SEW	No	0%	0%	Grazed pasture	No	Low	
111	SEW	No	0%	0%	Grazed pasture	No	Low	
112	SEW	No	0%	0%	Grazed pasture	No	Low	
113	SEW	No	0%	0%	Grazed pasture	No	Low	
114	SEW	No	0%	0%	Grazed pasture	No	Low	
115	Dam	Yes	25%	0%	Plantation	No	Low	
116	SEW	No	0%	0%	Grazed pasture	No	Low	
117	SEW	No	0%	0%	Grazed pasture	No	Low	
118	Dam	Yes	25%	0%	Grazed pasture	No	Low	
119	SEW	No	0%	0%	Grazed pasture	No	Low	
120	SEW	No	0%	0%	Cropped paddock	No	Low	
121	SEW	No	0%	0%	Cropped paddock	No	Low	
122	SEW	No	0%	0%	Cropped paddock	No	Low	
123	Dam	Yes	25%	0%	Grazed pasture	No	Low	
124	Dam	Yes	25%	0%	Cropped paddock	No	Low	4 foraging Brolga observed
125	Dam	Yes	25%	0%	Cropped paddock	No	Low	
126	Dam	Yes	50%	0%	Cropped paddock	No	Low	
127	Dam	Yes	50%	0%	Cropped paddock	No	Low	
128	SEW	No	0%	0%	Cropped paddock	No	Low	
129	SEW	No	0%	0%	Cropped paddock	No	Low	
130	SEW	No	0%	0%	Cropped paddock	No	Low	
131	Dam				Grazed pasture		Low	D
132	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
133	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	

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Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
134	SEW				Grazed pasture		Low	D
135	Dam/SEW	Yes	50%	0%	Grazed pasture	No	Low	
136	SEW				Grazed pasture		Low	D
137	SEW				Cropped paddock		Low	D
138	SEW	No	0%	0%	Cropped paddock	No	Low	
139	SEW	No	0%	0%	Cropped paddock	No	Mod	
140	SEW	No	0%	0%	Cropped paddock	No	Low	
141	SEW				Grazed pasture		Mod	D
142	SEW				Grazed pasture		Low	D
143	SEW				Grazed pasture		Low	D
144	SEW	No	0%	0%	Cropped paddock	No	Low	
145	Dam	Yes	50%	0%	Cropped paddock	No	Low	
146	Dam				Grazed pasture		Low	D
147	SEW	No	0%	0%	Cropped paddock	No	Low	
148	Dam				Cropped paddock		Low	D
149	SEW				Cropped paddock		Mod	D, Cockpit Lagoon
150	SEW	No	0%	0%	Cropped paddock	No	Low	
151	SEW	No	0%	0%	Cropped paddock	No	Low	
152	SEW	No	0%	0%	Cropped paddock	No	Low	
153	Dam	Yes	80%	15%	Grazed pasture	No	Mod	
154	SEW	No	0%	0%	Cropped paddock	No	Low	
155	SEW	No	0%	0%	Cropped paddock	No	Low	
156	SEW	No	0%	0%	Cropped paddock	No	Low	
157	Lake	Yes	75%	1%	Cropped paddock	No	Low	
158	Dam				Grazed pasture		Mod	D
159	SEW	No	0%	0%	Cropped paddock	No	Low	
160	SEW				Cropped paddock		Low	D
161	SEW				Grazed pasture		Low	D
162	SEW				Grazed pasture		Low	D
163	Dam				Grazed pasture		Low	D
164	Dam				Cropped paddock		Low	D, Reedy Creek
165	SEW	No	0%	0%	Cropped paddock	No	Low	
166	SEW				Cropped paddock		Low	D
167	SEW				Cropped paddock		Low	D

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Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
168	SEW	No	0%	0%	Cropped paddock	No	Low	
169	SEW				Grazed pasture		Low	D
170	SEW				Grazed pasture		Low	D
171	SEW	No	10%	0%	Cropped paddock	No	Low	
172	SEW				Cropped paddock		Low	D
173	SEW	No	0%	0%	Cropped paddock	No	Low	
174	SEW				Cropped paddock		Low	D
175	SEW	No	0%	0%	Cropped paddock	No	Low	
176	SEW				Grazed pasture		Low	D
177	SEW				Cropped paddock		Low	D
178	SEW	No	0%	0%	Cropped paddock	No	Low	
179	SEW	No	0%	0%	Cropped paddock	No	Low	
180	SEW	No	0%	0%	Cropped paddock	No	Low	
181	SEW	No	0%	0%	Cropped paddock	No	Low	
182	SEW	No	0%	0%	Cropped paddock	No	Low	
183	Lake				Grazed pasture		Low	D, Mt Emu Creek
184	SEW	No	0%	0%	Cropped paddock	No	Low	
185	SEW	No	0%	0%	Cropped paddock	No	Low	
186	SEW				Grazed pasture		Low	D
187	SEW				Grazed pasture		Low	D
188	SEW	No	0%	0%	Cropped paddock	No	Low	
189	SEW	No	0%	0%	Cropped paddock	No	Low	
190	SEW	No	0%	0%	Cropped paddock	No	Low	
191	SEW	No	0%	0%	Cropped paddock	No	Low	
192	SEW	No	0%	0%	Cropped paddock	No	Low	
193	SEW	No	0%	0%	Cropped paddock	No	Low	
194	SEW	No	0%	0%	Cropped paddock	No	Low	
195	SEW	No	0%	0%	Cropped paddock	No	Low	
196	SEW	No	0%	0%	Cropped paddock	No	Low	
197	SEW	No	0%	0%	Cropped paddock	No	Low	
198	SEW	No	0%	0%	Cropped paddock	No	Low	
199	SEW	No	0%	0%	Cropped paddock	No	Low	
200	SEW				Grazed pasture		Low	D
201	SEW	No	0%	0%	Cropped paddock	No	Low	
202	SEW	No	0%	0%	Cropped paddock	No	Low	

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Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
203	SEW	No	0%	0%	Cropped paddock	No	Low	
204	SEW				Grazed pasture		Low	D
205	SEW	Yes	5%	60%	Cropped paddock	No	Mod	
206	SEW				Cropped paddock		Low	D
207	SEW	No	0%	0%	Cropped paddock	No	Low	
208	SEW				Grazed pasture		Low	D
209	SEW	No	0%	0%	Cropped paddock	No	Low	
210	SEW	No	0%	0%	Cropped paddock	No	Low	
211	SEW	No	0%	0%	Cropped paddock	No	Low	
212	SEW	No	0%	0%	Cropped paddock	No	Low	
213	SEW	No	0%	0%	Cropped paddock	No	Low	
214	SEW	No	0%	0%	Cropped paddock	No	Low	
215	SEW	No	0%	0%	Cropped paddock	No	Low	
216	SEW				Grazed pasture		Low	D
217	SEW				Cropped paddock		Low	D
218	SEW	No	0%	0%	Cropped paddock	No	Low	
219	SEW	No	0%	0%	Cropped paddock	No	Low	
220	SEW	No	0%	0%	Cropped paddock	No	Low	
221	SEW	No	0%	0%	Cropped paddock	No	Low	
222	SEW				Grazed pasture		Low	D
223	SEW				Cropped paddock		Low	D
224	SEW				Grazed pasture		Low	D
225	SEW				Grazed pasture		Low	D
226	SEW	No	0%	0%	Cropped paddock	No	Low	
227	SEW	No	0%	0%	Cropped paddock	No	Low	
228	SEW	No	0%	0%	Cropped paddock	No	Low	
229	SEW	No	0%	0%	Cropped paddock	No	Low	
230	SEW	No	0%	0%	Cropped paddock	No	Low	
231	SEW				Cropped paddock		Low	D
232	SEW	No	0%	0%	Cropped paddock	No	Low	
233	SEW	No	0%	0%	Cropped paddock	No	Low	
234	SEW	No	0%	0%	Cropped paddock	No	Low	
235	SEW	No	0%	0%	Cropped paddock	No	Low	
236	SEW	No	0%	0%	Cropped paddock	No	Low	
237	SEW				Grazed pasture		Low	D

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Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
238	SEW	No	0%	0%	Cropped paddock	No	Low	
239	SEW	No	0%	0%	Cropped paddock	No	Low	
240	SEW	No	0%	0%	Cropped paddock	No	Low	
241	SEW	No	0%	0%	Cropped paddock	No	Low	
242	SEW				Grazed pasture		Mod	D, Horseshoe Lagoon
243	Dam	Yes	50%	0%	Grazed pasture	No	Low	
244	Dam				Grazed pasture		Low	D
245	SEW	No	0%	0%	Cropped paddock	No	Low	
246	SEW	No	0%	0%	Cropped paddock	No	Low	
247	SEW	Yes	10%	90%	Cropped paddock	No	Mod	Reedy Creek
248	SEW				Grazed pasture		Low	D
249	Dam				Grazed pasture		Low	D
250	SEW	No	0%	0%	Cropped paddock	No	Low	
251	SEW	No	0%	0%	Cropped paddock	No	Low	
252	SEW	No	0%	0%	Cropped paddock	No	Low	
253	SEW	No	0%	0%	Cropped paddock	No	Low	
254	SEW	No	0%	0%	Cropped paddock	No	Low	
255	SEW				Grazed pasture		Low	D
256	SEW	No	0%	0%	Cropped paddock	No	Low	
257	SEW				Grazed pasture		Low	D
258	SEW				Grazed pasture		Low	D
259	SEW	No	0%	0%	Cropped paddock	No	Low	
260	SEW				Grazed pasture		Low	D
261	SEW	No	0%	0%	Cropped paddock	No	Low	
262	SEW	No	0%	0%	Cropped paddock	No	Low	
263	SEW	No	0%	0%	Cropped paddock	No	Low	
264	SEW	No	0%	0%	Cropped paddock	No	Low	
265	SEW	No	0%	0%	Cropped paddock		Low	D
266	SEW				Grazed pasture		Low	D
267	SEW	No	0%	0%	Cropped paddock	No	Low	
268	Lake	Yes			Beaufort Reservoir		Low	D
269	SEW	No	0%	0%	Cropped paddock	No	Low	
270	SEW	No	0%	0%	Cropped paddock		Low	D
271	SEW				Grazed pasture		Low	D

Brolga Site ID	Wetland Type	Water Present	Inundation %	Aquatic Veg Cover %	Surrounding Habitat	Brolga / Nests Present	Habitat Quality	Comment
272	SEW	No	0%	0%	Cropped paddock	No	Low	
273	SEW	No	0%	0%	Cropped paddock	No	Low	
274	SEW	No	0%	0%	Cropped paddock	No	Low	
275	SEW	No	0%	0%	Cropped paddock	No	Low	
276	SEW				Cropped paddock		Low	D
277	SEW	No	0%	0%	Cropped paddock	No	Low	
278	SEW	No	0%	0%	Cropped paddock	No	Low	
279	SEW				Grazed pasture		Low	D
280	Creek	Yes			Cropped paddock		Low	D, Mt Emu Creek
281	SEW				Grazed pasture		Low	D
282	SEW				Grazed pasture		Low	D
283	SEW	No	0%	0%	Cropped paddock	No	Low	
284	Dam	Yes	60%	0%	Cropped paddock	No	Low	

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APPENDIX 3 – NATIVE VEGETATION REMOVAL REPORT

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This report provides information to support an application to remove, destroy or lop native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*. The report **is not an assessment by DELWP** of the proposed native vegetation removal. Native vegetation information and offset requirements have been determined using spatial data provided by the applicant or their consultant.

Date of issue: 24/11/2021

Report ID: EHP_2021_190

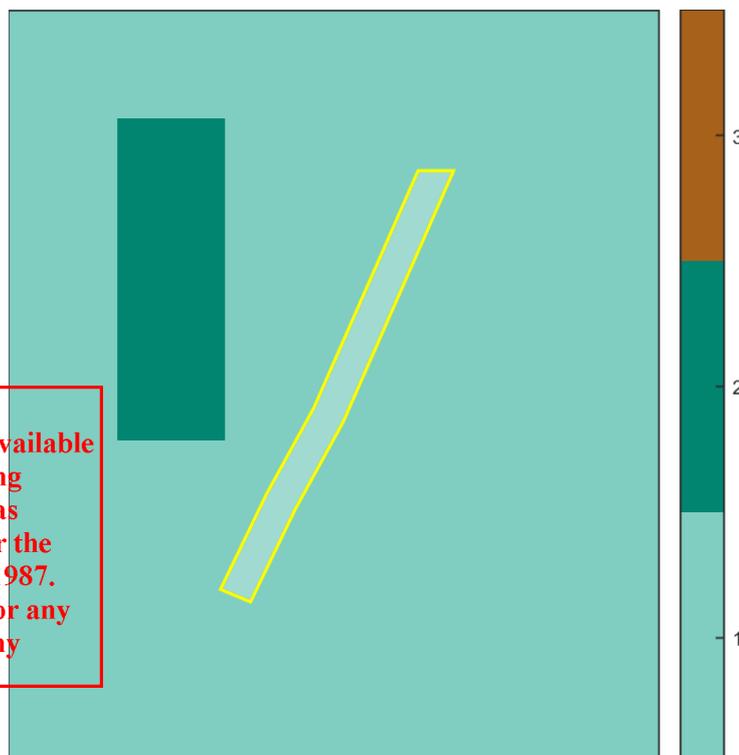
Time of issue: 2:03 pm

Project ID	EHP13850_BrewsterWF_VG94
------------	--------------------------

Assessment pathway

Assessment pathway	Basic Assessment Pathway
Extent including past and proposed	0.082 ha
Extent of past removal	0.000 ha
Extent of proposed removal	0.082 ha
No. Large trees proposed to be removed	0
Location category of proposed removal	Location 1 The native vegetation is not in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map), sensitive wetland or coastal area. Removal of less than 0.5 hectares in this location will not have a significant impact on any habitat for a rare or threatened species

1. Location map



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Offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

General offset amount¹	0.015 general habitat units
Vicinity	Glenelg Hopkins Catchment Management Authority (CMA) or Pyrenees Shire Council
Minimum strategic biodiversity value score ²	0.168
Large trees	0 large trees

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

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¹ The general offset amount required is the sum of all general habitat units in Appendix 1.

² Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

Next steps

Any proposal to remove native vegetation must meet the application requirements of the Basic Assessment Pathway and it will be assessed under the Basic Assessment Pathway.

If you wish to remove the mapped native vegetation you are required to apply for a permit from your local council. Council will refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

This *Native vegetation removal report* must be submitted with your application for a permit to remove, destroy or lop native vegetation.

Refer to the *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines) for a full list of application requirements. This report provides information that meets the following application requirements:

- The assessment pathway and reason for the assessment pathway
- A description of the native vegetation to be removed (met unless you wish to include a site assessment)
- Maps showing the native vegetation and property
- The offset requirements determined in accordance with section 5 of the Guidelines that apply if approval is granted to remove native vegetation.

Additional application requirements must be met including:

- Topographical and land information
- Recent dated photographs
- Details of past native vegetation removal
- An avoid and minimise statement
- A copy of any Property Vegetation Plan that applies
- A defensible space statement as applicable
- A statement about the Native Vegetation Precinct Plan as applicable
- An offset statement that explains that an offset has been identified and how it will be secured.

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Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

For more information contact the DELWP Customer Service Centre 136 186

www.delwp.vic.gov.au

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Obtaining this publication does not guarantee that an application will meet the requirements of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes or that a permit to remove native vegetation will be granted.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes.

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Appendix 1: Description of native vegetation to be removed

All zones require a general offset, the general habitat units each zone is calculated by the following equation in accordance with the Guidelines:

General habitat units = extent x condition x general landscape factor x 1.5, where the general landscape factor = 0.5 + (strategic biodiversity value score/2)

The general offset amount required is the sum of all general habitat units per zone.

Native vegetation to be removed

Zone	Information provided by or on behalf of the applicant in a GIS file						Information calculated by EnSym					
	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
1- CW	Patch	vvp_0132	Endangered	0	no	0.200	0.082	0.082	0.210		0.015	General

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Appendix 2: Information about impacts to rare or threatened species' habitats on site

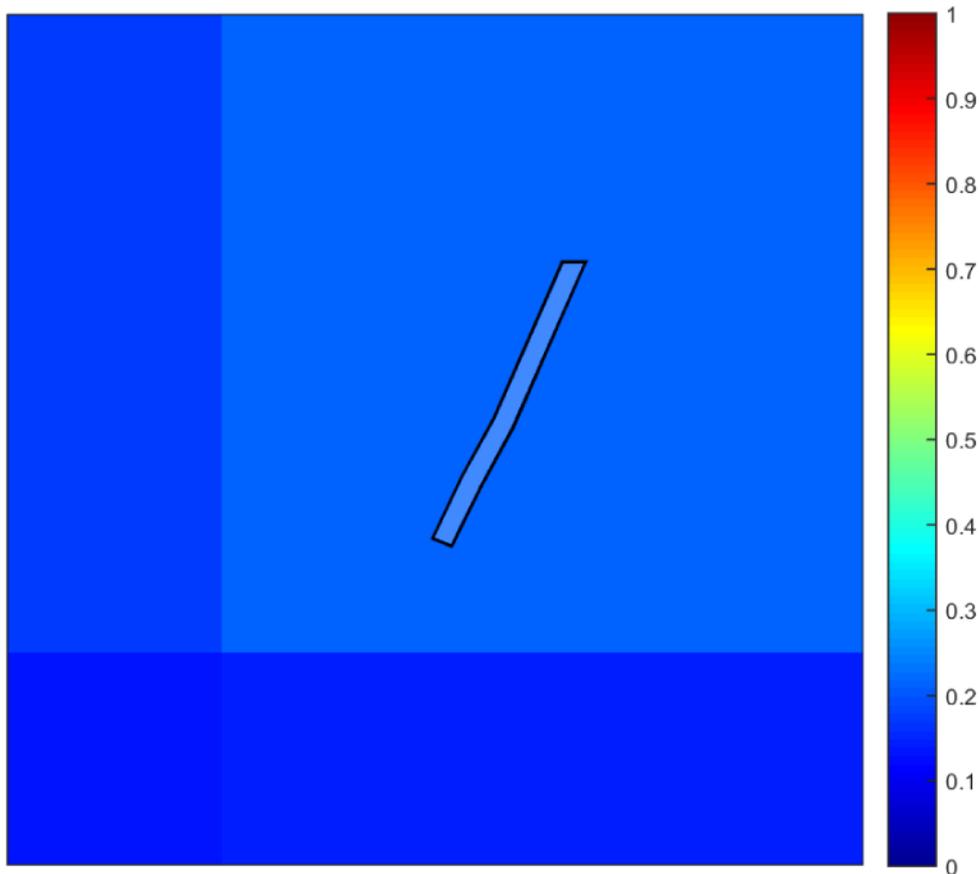
This is not applicable in the Basic Assessment Pathway.

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Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map

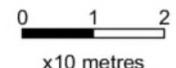


3. Aerial photograph showing mapped native vegetation



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4. Map of the property in context



Yellow boundaries denote areas of proposed native vegetation removal.

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APPENDIX 4 – OFFSET CREDIT STATEMENT

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Report of available native vegetation credits

This report lists native vegetation credits available to purchase through the Native Vegetation Credit Register.

This report is **not evidence** that an offset has been secured. An offset is only secured when the units have been purchased and allocated to a permit or other approval and an allocated credit extract is provided by the Native Vegetation Credit Register.

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Date and time: 06/12/2021 07:22

Report ID: 12128

What was searched for?

General offset

General habitat units	Strategic biodiversity value	Large trees	Vicinity (Catchment Management Authority or Municipal district)	
0.015	0.168	0	CMA	Glenelg Hopkins
			or LGA	Pyrenees Shire

Details of available native vegetation credits on 06 December 2021 07:22

These sites meet your requirements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
BBA-0101	0.455	0	Glenelg Hopkins	Southern Grampians Shire	No	Yes	No	VegLink
BBA-0110	0.070	5	Glenelg Hopkins	Ararat Rural City	Yes	Yes	No	Contact NVOR
BBA-0639	7.437	0	Glenelg Hopkins	Moyne Shire	Yes	Yes	No	Bio Offsets
BBA-0667	1.582	0	Glenelg Hopkins	Southern Grampians Shire	Yes	Yes	No	Contact NVOR
BBA-0668	0.102	0	Glenelg Hopkins	Southern Grampians Shire	Yes	Yes	No	VegLink
BBA-0741	1.691	0	North Central	Pyrenees Shire	Yes	Yes	No	VegLink
BBA-1139_05	1.547	0	Glenelg Hopkins	Moyne Shire	Yes	Yes	No	VegLink
BBA-2088	0.212	5	Glenelg Hopkins	Southern Grampians Shire	Yes	Yes	No	VegLink
BBA-2467	3.017	40	Glenelg Hopkins	Glenelg Shire	Yes	Yes	No	VegLink
BBA-2467	0.369	11	Glenelg Hopkins	Glenelg Shire	No	Yes	No	
BBA-3027	2.518	267	Glenelg Hopkins	Pyrenees Shire	Yes	Yes	No	VegLink
BBA-3031	9.299	174	North Central	Pyrenees Shire	Yes	Yes	No	VegLink
BBA-3031	0.974	0	North Central	Pyrenees Shire	Yes	Yes	Yes	VegLink
BBA-3041	4.144	283	Glenelg Hopkins	Moyne Shire	Yes	Yes	No	VegLink
TFN-C0543	0.407	7	Glenelg Hopkins	Southern Grampians Shire	No	Yes	No	Bio Offsets
TFN-C1668	0.121	12	Glenelg Hopkins	Glenelg Shire	Yes	Yes	No	VegLink
TFN-C1967	0.019	0	Glenelg Hopkins	Moyne Shire	No	Yes	No	VegLink
VC_CFL-1139_06	0.331	0	Glenelg Hopkins	Moyne Shire	Yes	Yes	No	VegLink

VC_CFL-3076_01	9.378	49	North Central	Pyrenees Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3693_01	4.058	686	Glenelg Hopkins	Ararat Rural City	Yes	Yes	No	VegLink
VC_CFL-3714_01	14.430	0	Glenelg Hopkins	Ararat Rural City	Yes	Yes	No	VegLink
VC_TFN-C2046_01	10.596	1459	Glenelg Hopkins	Southern Grampians Shire	Yes	Yes	No	Ecocentric, Ethos, VegLink
VC_TFN-C2109_01	1.029	0	Glenelg Hopkins	Pyrenees Shire	Yes	Yes	No	VegLink
VC_TFN-C2109_02	0.853	0	Glenelg Hopkins	Pyrenees Shire	Yes	Yes	No	VegLink

These sites meet your requirements using alternative arrangements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
----------------	-----	----	-----	-----	------------	--------	-------------	-----------

There are no sites listed in the Native Vegetation Credit Register that meet your offset requirements when applying the alternative arrangements as listed in section 11.2 of the Guidelines for the removal, destruction or lopping of native vegetation.

These potential sites are not yet available, land owners may finalise them once a buyer is confirmed.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
VC_CFL-3755_01	4.926	0	Glenelg Hopkins	Glenelg Shire	Yes	Yes	No	Contact NVOR

LT - Large Trees

CMA - Catchment Management Authority

LGA - Municipal District or Local Government Authority

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Next steps

If applying for approval to remove native vegetation

Attach this report to an application to remove native vegetation as evidence that your offset requirement is currently available.

If you have approval to remove native vegetation

Below are the contact details for all brokers. Contact the broker(s) listed for the credit site(s) that meet your offset requirements. These are shown in the above tables. If more than one broker or site is listed, you should get more than one quote before deciding which offset to secure.

Broker contact details

Broker Abbreviation	Broker Name	Phone	Email	Website
Abezco	Abzeco Pty. Ltd.	(03) 9431 5444	offsets@abzeco.com.au	www.abzeco.com.au
Baw Baw SC	Baw Baw Shire Council	(03) 5624 2411	bawbaw@bawbawshire.vic.gov.au	www.bawbawshire.vic.gov.au
Bio Offsets	Biodiversity Offsets Victoria	0452 161 013	info@offsetsvictoria.com.au	www.offsetsvictoria.com.au
Contact NVOR	Native Vegetation Offset Register	136 186	nativevegetation.offsetregister@delwp.vic.gov.au	www.environment.vic.gov.au/native-vegetation
Ecocentric	Ecocentric Environmental Consulting	0410 564 139	ecocentric@me.com	Not available
Ethos	Ethos NRM Pty Ltd	(03) 5153 0037	offsets@ethosnrm.com.au	www.ethosnrm.com.au
Nillumbik SC	Nillumbik Shire Council	(03) 9433 3316	offsets@nillumbik.vic.gov.au	www.nillumbik.vic.gov.au
TFN	Trust for Nature	8631 5888	offsets@tfn.org.au	www.trustfornature.org.au
VegLink	Vegetation Link Pty Ltd	(03) 8578 4250 or 1300 834 546	offsets@vegetationlink.com.au	www.vegetationlink.com.au
Yarra Ranges SC	Yarra Ranges Shire Council	1300 368 333	biodiversityoffsets@yarraranges.vic.gov.au	www.yarraranges.vic.gov.au

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For more information contact the DELWP Customer Service Centre 136 186 or the Native Vegetation Credit Register at nativevegetation.offsetregister@delwp.vic.gov.au

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APPENDIX 5 – MICROBAT CALL IDENTIFICATION REPORT

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Microbat Call Identification Report

Prepared for (“Client”):	Ecology & Heritage Partners
Survey location/project name:	Beaufort, Victoria
Survey dates:	1-21 October 2021
Client project reference:	
Job no.:	EHP-2101
Report date:	20 November 2021

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Methods

Data received

Balance Environmental received four raw data files (data.dat) from four Anabat SD1 bat detectors. The detectors were deployed over a three-week period (1-21 October 2021) at sites in the Beaufort area, central Victoria.

Zero-crossing analysis bat-call sequence files (ZC files) were extracted from the data.dat files using *CFCread* Version 4.6c (Corben 2018).

Call identification

Call analyses were undertaken with *Anabat Insight* (Version 2.0.1; Titley Scientific, Brisbane). All ZC files were passed through a noise filter to separate files containing only non-bat background noise. The remaining files (*i.e.* those with bat calls) were then processed manually, with species identification achieved by comparing call spectrograms and derived metrics with those of regionally relevant reference calls (G. Ford and A. Lo Cascio, unpublished data) and published call descriptions (*e.g.* Pennay *et al.* 2004).

The likelihood of species' occurrence in the study area was further confirmed by referring to distribution maps in the online *BatMap* application (Australasian Bat Society 2021) and other published distributional information (*e.g.* Churchill 2008; van Dyck *et al.* 2013).

Reporting standard

The format and content of this report follows Australasian Bat Society standards for the interpretation and reporting of bat call data (Reardon 2003), available on-line at <http://www.ausbats.org.au/>.

Species nomenclature follows Armstrong *et al.* (2020).

Results & Discussion

The data conversion process yielded 2552 ZC files; however, noise filtration excluded 1946 of those files from further analysis. The remaining 607 ZC files contained 612 identifiable bat calls, 70% of which (428 calls) were positively identified. The other 184 calls had characteristics potentially attributable to two or more species. These "unresolved" calls were assigned to multi-species groups and all members of those groups should be considered "possibly present" if they were not also reliably identified from other calls.

Nine species were reliably identified (see upper section of **Table 1**).

Most of the unresolved calls represented species that were otherwise positively identified (**Table 1** bottom portion); however, 31 calls represented at least one and potentially up to three additional species (*Myotis macropus* and/or *Nyctophilus geoffroyi* and/or *N. gouldi*).

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Table 1 Microbat species recorded during the Beaufort survey, 1-21 October 2021.
Count of calls recorded per detector.

Detector #	1	2	3	4	Species Total
Total nights with calls	17	6	15	2	
Positively identified calls					
<i>Chalinolobus gouldii</i>	6	3	43	6	58
<i>Chalinolobus morio</i>	43	6	26		75
<i>Falsistrellus tasmaniensis</i>	35	5	4		44
<i>Vespadelus darlingtoni</i>	48	3	93		144
<i>Vespadelus regulus</i>			7	1	8
<i>Vespadelus vulturnus</i>	3	2	22	3	30
<i>Miniopterus orianae oceanensis</i>	57	1	4	1	63
<i>Austronomus australis</i>	6		1		7
<i>Ozimops planiceps</i>	3			1	4
Unresolved calls					
<i>Myotis macropus</i> / <i>Nyctophilus</i> sp.		1	30		31
<i>F. tasmaniensis</i> / <i>V. darlingtoni</i>	69	4	54		127
<i>V. darlingtoni</i> / <i>V. regulus</i>	3		6		9
<i>V. regulus</i> / <i>V. vulturnus</i>			8		8
<i>V. vulturnus</i> / <i>C. morio</i>	1		3		4
Detector Total	274	25	301	12	612

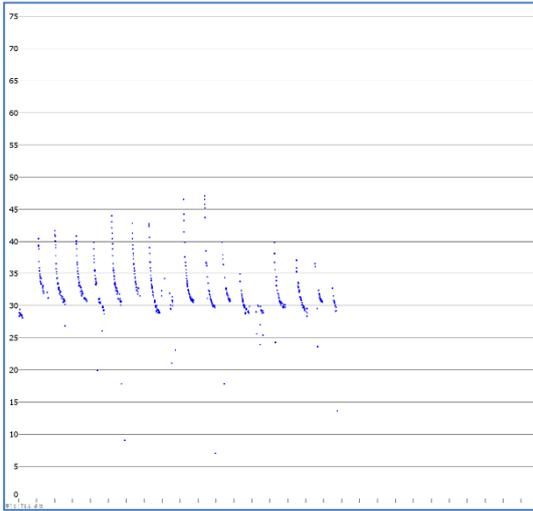
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References

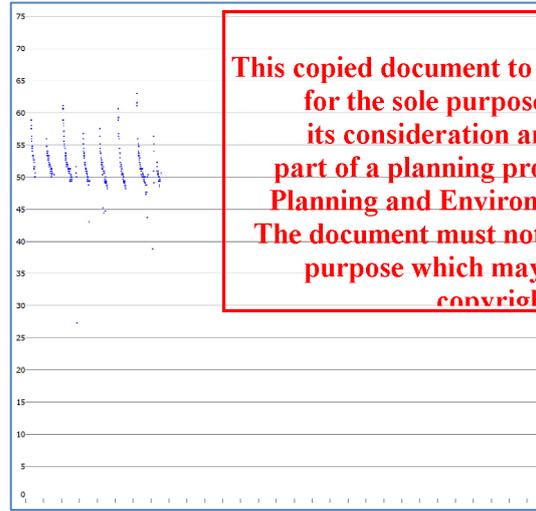
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URL: <http://ausbats.org.au/species-list/4593775065>
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- van Dyck, S., Gynther, I. and Baker, A. (ed.) (2013). *Field Companion to the Mammals of Australia*. New Holland; Sydney.

Appendix 1

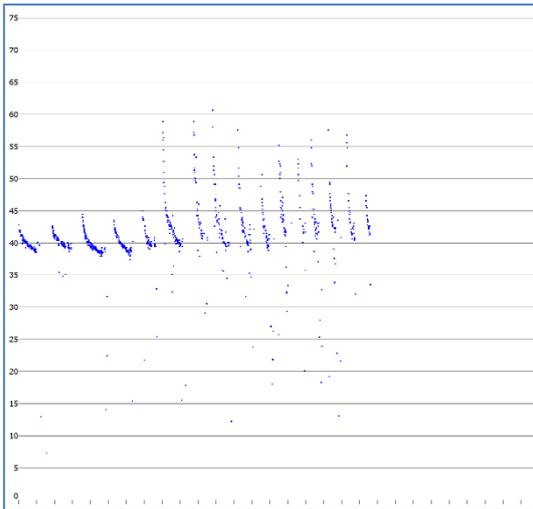
Representative call sequences from the Beaufort dataset, recorded 1-21 October 2021.
Scale: 10msec per tick; time between pulses removed (*Anabat Insight F7* compressed view)



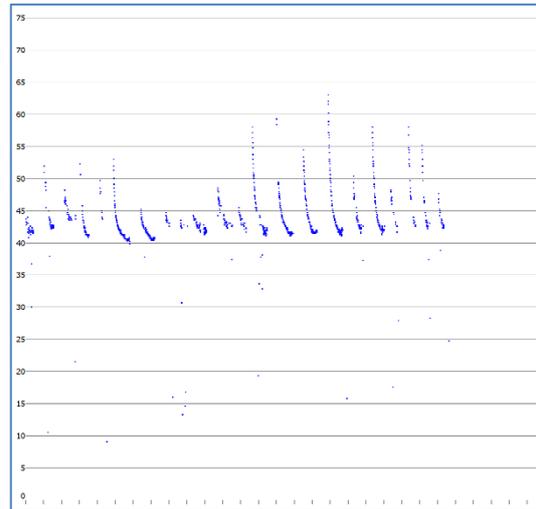
Chalinolobus gouldii



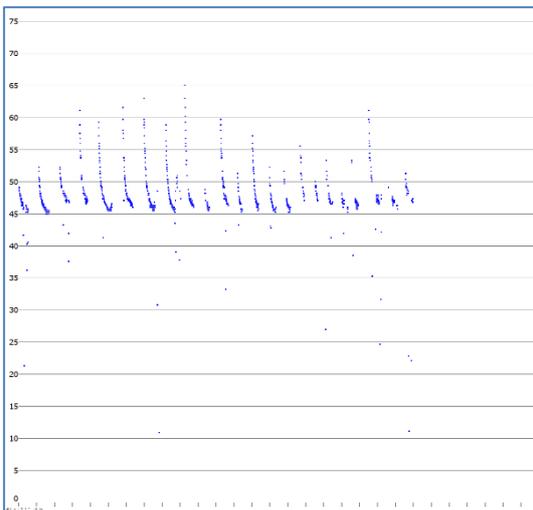
Chalinolobus morio



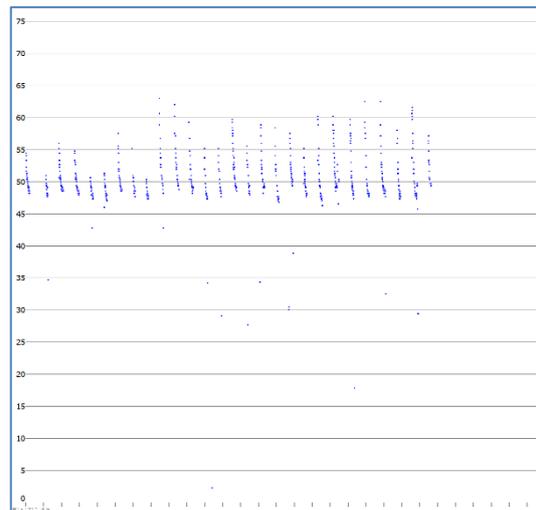
Falsistrellus tasmaniensis



Vespadelus darlingtoni

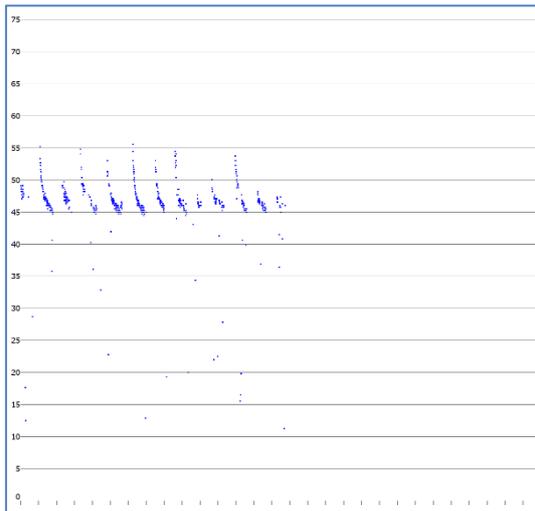


Vespadelus regulus

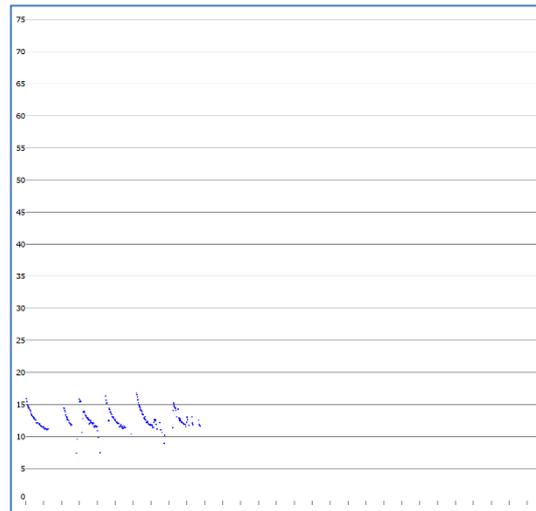


Vespadelus vulturinus

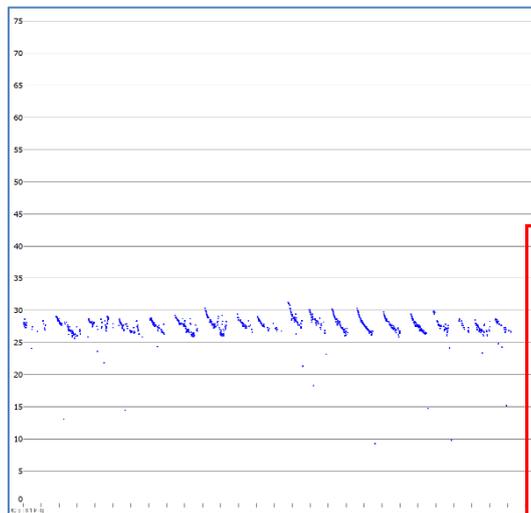
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Minopterus orianae oceanensis

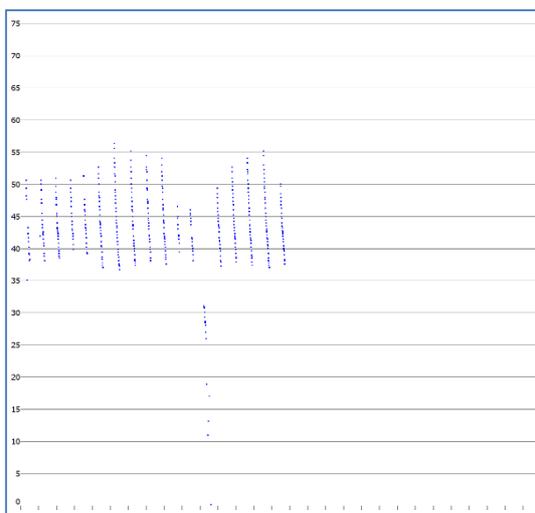


Austronomus australis

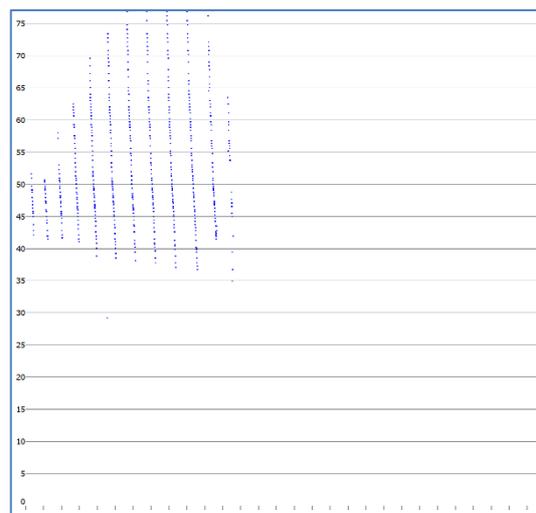


Ozimops planiceps

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Possibly *Myotis macropus*



Possibly *Nyctophilus sp.*

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APPENDIX 6 – TRAWALLA PARISH MAP



Plate A6.1. Trawalla Parish Map - 1922

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