Final Report

Ecological Assessment: Moreton Hill Windfarm, Pittong, Victoria

Prepared for

MHWF Nominees Pty Ltd

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Ecology and Heritage Partners Pty Ltd

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Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

EXECUTIVE SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by MHWF Nominees Pty Ltd to undertake a suite of ecological assessments to determine the ecological values present within, and inform the ecological planning and legislative implications of the proposed Moreton Hill Windfarm, Victoria (the Project).

The purpose of the Ecological Assessment was to:

- Identify and characterise the vegetation on-site and along associated haulage swept paths, access roads and ancillary alignments;
- Determine the presence (or likelihood thereof) of any significant flora and fauna species and/or ecological communities within the project footprint;
- Inform the design of the Project and to minimise the impacts of the Project on biodiversity;
- Address any implications under Commonwealth and State environmental legislation and policy; and,
- Support the submission of Project referrals under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) and Environment Effects Act 1978 (Victoria).

This report presents the results of the ecological assessment and discusses the potential ecological and legislative implications associated with the proposed development. The ecological impacts presented in this report are based on the worst-case scenario, determined from the current infrastructure footprint.

Methods

The ecological field assessment program detailed in this report commenced in September 2020, with the most recent surveys completed in October 2023. The surveyed area included the Project Area, the Assessment Area (including the ancillary alignment along Willowvale Road) and the swept path alignment of infrastructure transport to the Project Area. The field assessments sought primarily to assess the extent and condition of native vegetation communities and potential flora and fauna habitat, with consideration given to significant ecological communities and species of conservation concern, such as threatened and migratory species. The survey program was designed to optimise the survey timing, methods and frequency to enable sampling of those flora and fauna species which occur seasonally.

Flora

Detailed vegetation assessments were completed within the Assessment Area and the Swept Paths at 13 main intersections. Where native vegetation was observed, an assessment in accordance with the *Guidelines for the removal, destruction or lopping* (DELWP 2017) was undertaken to map the condition and extent of the native vegetation.

Targeted surveys for a suite of significant flora species were undertaken within areas supporting suitable habitat within the Project Area.

Fauna

Targeted fauna surveys were undertaken within the Project Area and included the following:

- Bird Utilisation Surveys;
- Microbat surveys using Anabat detector and Songmeter units;
- Golden Sun Moth *Synemon plana* targeted surveys and habitat suitability assessments;
- Grey-headed Flying-fox habitat assessment;
- Striped Legless Lizard *Delma impar* habitat suitability assessments; and,
- Level 1 and Level 2 Brolga *Antigone rubicunda* Assessments to address the potential risk posed to the species by the proposed Wind Farm (*in progress*).

Results

Flora

A total of 29.80 hectares of native vegetation was recorded within the Assessment Area, representative of six EVCs: Plains Grassy Woodland (EVC 55), Plains Grassy Wetland (EVC 125), Plains Sedgy Wetland (EVC 647), *Heavier soils* Plains Grassland (EVC 132_61), Grassy Woodland (EVC 175) and Heathy Dry Forest (EVC 20). Within the treed patches of these EVCs, a total of 35 Large Trees were recorded. A total of 41 scattered trees were recorded within the Assessment Area, which consisted of 26 Large and 15 Small scattered trees.

A total of 91 flora species were recorded, comprising 56 native and 35 non-native species. One nationally significant flora species was recorded within the Assessment Area, Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*, and one State significant flora species was recorded, Pale Swamp Everlasting *Coronidium gunnianum.* The proposed ancillary alignment along Willowvale Road within the Assessment Area contained 4.58 hectares of Plains Grassland, of which 3.656 hectares met the threshold for listing as the nationally significant *Natural Temperate Grassland of the Victorian Volcanic Plain* ecological community.

Patches of native vegetation were mapped at six of the swept path intersection assessments, which comprised of either Plains Grassland or treeless Grassy Woodland patches. Of these, native vegetation is proposed to be impacted at one intersection.

The State significant Western (Basalt) Plains Grassland was recorded in small patches throughout the Assessment Area.

Fauna

Two Nationally significant fauna species were identified during bird utilisation surveys completed within the Project Area: Blue-winged Parrot *Neophema chrysostoma* and Brown Treecreeper *Climacteris picumnus victoriae*.

Two State significant fauna species were identified within the Project Area during bird utilisation surveys: Brolga *Antigone rubicunda* and Little Eagle *Hieraaetus morphnoides*.

A Grey-headed Flying-fox camp occurs 20 kilometres south of the Project Area.

During the third round of microbat surveys, the call complex for the State significant Eastern Bent-wing Bat *Miniopterus schreibersii oceanensis* was recorded. The call detected showed similar parameters to Eastern Bent-wing Bat however, the frequency is not consistent with a typical call from Eastern Bent-wing Bat, and is more likely to be Large Forest Bat *Vespadelus darlingtoni* which was positively identified when calling at less

than 43kHz. In the absence of being able to definitely attribute the call to a specific species, the call has been assigned to the call complex.

During the fourth round of microbat surveys, the call complex for the significant Eastern Bent-wing Bat and Southern Bent-wing Bat *Miniopterus schreibersii bassanii* was recorded. The call complex was assigned in this instance due to the overlapping distribution of Eastern Bent-wing Bat, Southern Bent-wing Bat and Chocolate Wattled Bat *Chalinobolus morio*. If the characteristic frequency was longer, it would confirm the present of Southern Bent-wing Bat, however the call frequency was more consistent with Chocolate Wattled Bat. In the absence of a definitive call that can be attributed to a single species, these calls have subsequently been labelled as the call complex.

Targeted surveys for Golden Sun Moth did not record any individuals.

Summary of Ecological Values

The desktop and field assessments identified several ecological features within the Project Area and surrounding landscape; and these are summarised below (Table S1).

Table S1. Summary of the ecological values within the Project Area.

Species diversity	A diverse assemblage of plants and animals, with 91 flora species (56 native and 35 exotic) and 96 fauna species (85 bird species and 11 bat species) recorded during the field surveys.

Native Vegetation	• Native vegetation mapped within the Assessment Area was represented by six EVCs:
	  ○ Plains Grassy Woodland (EVC 55) – 3.409 ha
	  ○ Plains Grassy Wetland (EVC 125) – 0.009 ha
	  ○ Plains Sedgy Wetland (EVC 647) – 12.533 ha
	  ○ *Heavier soils* Plains Grassland (EVC 132_61) – 5.122 ha
	  ○ Grassy Woodland (EVC 175) – 6.137 ha
	  ○ Heathy Dry Forest (EVC 20) – 2.591 ha
	• 41 Scattered Trees (26 Large and 15 Small); and,
	• 35 Large Trees in patches of native vegetation.

Ramsar Wetlands	There are no Ramsar wetlands within or adjacent to the Project Area. The nearest Ramsar wetland is the Western District Lakes, located approximately 10-20 kilometres upstream of the Project Area.
Significant ecological communities	• One Nationally significant ecological community - Natural Temperate Grassland of the Victoria Volcanic Plain, was mapped within the ancillary alignment along Willowvale Road within the Assessment Area; • One State significant ecological community - Western (Basalt) Plains Grassland Community, was present in the Assessment Area, six of the swept path intersections and the ancillary alignment.

Significant flora species	• One Nationally significant flora species, Spiny Rice-flower, was mapped within the Ancillary Alignment along Willowvale Road and along Rankin Road within the Assessment Area. • One State significant flora species was mapped along Rankin Road within the Assessment Area, Pale Swamp Everlasting *Coronidium gunnianum.* • Several flora species 'protected' under the FFG Act in Family/genera Acacia, Asteraceae and Orchidaceae were recorded within the Project Area. No additional National or State Significant flora species were recorded within the Assessment Area, although several were recorded in the Project Area during the field assessments or have recent past records, including one Nationally significant species White Sunray *Leucochrysum albicans* subsp. *tricolor* and several State significant species such as Golden Cowslips *Diuris behrii* and Small Milkwort *Comesperma polygaloides.*
Significant fauna species	• Two Nationally significant fauna species were identified during bird utilisation surveys: Blue-winged Parrot *Neophema chrysostoma* and Brown Treecreeper *Climacteris picumnus victoriae*. • Two State significant fauna species were identified within the Project Area: Brolga *Antigone rubicunda* and Little Eagle *Hieraaetus morphnoides* • A recording in the call complex of Eastern Bent-wing Bat (State significant) and Southern Bent-wing Bat (nationally significant) was recorded (although no calls were definitively attributed to either species). • Low quality habitat for the Nationally significant Striped Legless Lizard and Golden Sun Moth was recorded within areas of native grassland within the Assessment Area. • Grey-headed Flying-fox camp recorded 20 kilometres north west of the Project Area.

Legislative and Policy Implications

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act – Commonwealth)

One Nationally significant flora species, Spiny Rice-flower, and one nationally significant ecological community, *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP), were recorded within the Assessment Area. A total impact of 0.20 hectares to NTGVVP is proposed along Willowvale Road. No impacts to Spiny Rice-flower are proposed.

Two nationally significant fauna species were observed within the Project Area; Blue-winged Parrot and Brown Treecreeper, and a Grey-headed Flying-fox camp is located 20 kilometres south of the Project Area. All three species are listed as Vulnerable under the EPBC Act.

The Project will be referred under the EPBC Act to the Commonwealth for a decision on whether it is considered a Controlled Action under the EPBC Act.

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

The following ecological values Listed or protected under the FFG Act were recorded within the Assessment Area:

- Two Listed flora species, Spiny Rice-flower and Pale Swamp Everlasting;
- Two vulnerable fauna species, Brolga and Little Eagle;
- One ecological community, Western (Basalt) Plains Grassland Community; and,
- Five protected flora species; Golden Wattle *Acacia pycnantha,* Milky Beauty-heads *Calocephalus lacteus*, Common Everlasting *Chrysocephalum apiculatum*, Onion Orchid *Microtis* spp. and Slender Sun-orchid *Thelymitra pauciflora*.

Where impacts to protected flora species or communities occur on private land, a permit under the FFG Act is not required. However, where impacts are proposed on public land (i.e. road reserves), an FFG Act permit will be required. This applies to the vegetation along Willowvale Road, Rankin Road and a cross over along Lismore-Pittong Road, where a small number of Milky Beauty-heads and the Western (Basalt) Plains Grassland community will be impacted.

Environment Effects Act 1978 (Victoria)

Individual types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, which are relevant to the results of this report are:

- Potential clearing of 10 hectares or more of native vegetation from an area that includes an endangered EVC or vegetation that is of Very high Conservation Significance;
- Potential 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;
- Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Dictionary of Important Wetlands in Australia'; and,
- Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long time.

In addition, there are several combinations of factors that can warrant a referral, such as a combination of:

- Potential clearing of 10 hectares or more of native vegetation, unless authorised under an approved Forest Management Act or Fire Protection Plan
- Potential extensive or major effects on landscape values of regional importance, especially where recognised by a planning scheme overlay or within or adjoining land reserved under the *National Parks Act 1975;* and,
- Matters listed under the FFG Act:
    - Potential loss of a significant area of a listed ecological community;
    - Potential loss of a genetically important population of an endangered or threatened species;
    - Potential loss of critical habitat; or,
    - Potential significant effects on habitat values of a wetland supporting migratory birds

The project proposed to impact upon a total of 0.330 hectares of Plains Grassland vegetation, which is an endangered Ecological Vegetation Class (EVC). No impacts to critical habitat for or a significant proportion of any FFG Act listed species or ecological community is likely to result from the project.

It is unlikely that an EES will be triggered based on ecological impacts alone as:

- None of the thresholds relating to any of the individual ecological criteria are likely to be exceeded; and,
- None of the thresholds relating to the combination of ecological criteria are likely to be exceeded.

CONTENTS

1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by MHWF Nominees Pty Ltd (herein referred to as MHWF Nominees) to undertake Ecological Assessment for the proposed Moreton Hill Windfarm, located in Pittong, Victoria. MHWF Nominees are in the pre-planning stages of a proposal to develop a 62 turbine Wind Farm located primarily within privately-owned agricultural land located south of Pittong. This ecological assessment will be used to inform the planning and environmental approvals for the Project.

The turbine model will be selected after the approvals process. For the purposes of the Ecological Assessment the following dimensions of likely future turbines has been provided by MHWF Nominees:

- Rotor Diameter up to 172 meters;
- Overall Wind Turbine Generator (WTG) tip height up to 252 meters; and,
- Minimum blade to ground clearance of 44 meters.

The purpose of the Ecological Assessment was to:

- Identify and characterise the vegetation on-site and along associated haulage swept paths, access roads and ancillary alignments;
- Determine the presence (or likelihood thereof) of any significant flora and fauna species and/or ecological communities within the project footprint;
- Inform the design of the Project and to minimise the impacts of the Project on biodiversity;
- Address any implications under Commonwealth and State environmental legislation and policy; and,
- Support the submission of Project referrals under the Environment Protection and Biodiversity Conservation Act 1999 (Cth) and Environment Effects Act 1978 (Victoria).

This report presents the results of the ecological assessment and discusses the potential ecological and legislative implications associated with the proposed development. The ecological impacts presented in this report are based on the worst-case scenario, determined from the current infrastructure footprint.

1.2 Project Area

The Project Area covers an area of approximately 6,154 hectares and is broadly bounded by the Glenelg Highway to the north, Linton – Mannibadar Road to the east, Lismore – Pittong Road to the south and Mount Bute Road to the west (Figure 1).

The Project Area comprised predominantly agricultural land (cropping and grazing), with scattered dams, sheds and dwellings present, consistent with the Farming Zone that the general area falls within. The surrounding land use is consistent with that of the Project Area, being predominantly agricultural with associated infrastructure. The nearest major town in Ballarat, located approximately 47 kilometres east of the Project Area.

The terrain is generally undulating, with steeper areas along waterways such as in the south east. No major rivers or creeks occur within the Project Area, however smaller creeks and tributaries were present, including Hoyles Creek and Naringhil Creek.

No National Parks, State Parks or large conservation areas are located within proximity of the Project Area. The nearest reserves are:

- Lake Goldsmith – 18 kilometres north
- Enfield State Park – 15 kilometres north east
- Lake Corangamite – 28 kilometres south
- Linton State Forest– 8 kilometres north east

According to the Department of Energy, Environment and Climate Action (DEECA) NatureKit Map (DEECA 2023a), the Project Area intersects both the Central Victorian Uplands and Victorian Volcanic Plains bioregions and is located within the Corangamite Catchment Management Authority (CMA) and Corangamite Shire and Golden Plains Shire municipalities.

1.2.1 *Assessment Area*

A focused area for the vegetation assessments completed in March 2023 through to September 2023 was created within the Project Area, deemed the Assessment Area (Figure 1b). This was based on the proposed infrastructure footprint provided by the client. The Assessment Area included a 25 meter buffer either side of all proposed access tracks, power pole locations and ancillary works within the Project Area, and a 50 meter buffer around proposed turbine hardstand locations, which was applied to the client's infrastructure footprint by Ecology and Heritage Partners. The intent of the Assessment Area was to capture the vegetation values in the general vicinity of the proposed infrastructure footprint, and to allow for micro-siting should significant ecological values be identified.

The Assessment Area also included an underground power cable alignment (ancillary alignment) along a portion of Willowvale Road, Road between Lismore – Pittong Road and Crambs Road, leading south from the Project Area.

All patches of native vegetation and scattered trees, as defined by the *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines) (DELWP 2017) were mapped within the Assessment Area.

All fauna surveys completed for the project were based on the Project Area, and not restricted to the Assessment Area.

1.2.2 *Swept Path Analysis*

The transport of infrastructure into the Project Area will follow an alignment from Portland, Victoria, to the project locality. Most of the route will follow the transport route used for previous wind farm developments (e.g. Stockyard Hill and Berrybank) and will not result in any additional impacts to native vegetation. Within proximity to the Project Area, there are 13 key intersections that will be used for access and transporting material to the turbine locations which were assessed for impacts to native vegetation. The assessments were completed between 2019 and 2023 with the results discussed throughout the report.

2 METHODS

2.1 Relevant 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);
- *Environment 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 (the Guidelines) (DELWP 2017);
- Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria (DTP 2023);
- Interim Guidelines for the Assessment of Potential Windfarm Impacts on the Brolga (DSE 2012);
- Golden Plains Shire and Corangamite Shire Planning Scheme; including,
    - Clause 12.01 Biodiversity
    - Clause 52.17 Native Vegetation
    - Clause 52.32 Wind Energy Facility
- *Wildlife Act 1975* (Wildlife Act); and,
- *Catchment and Land Protection Act 1994* (CaLP Act).

2.2 Desktop Assessment

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

- The DEECA NatureKit Map (DEECA 2023a) and Native Vegetation Information Management (NVIM) Tool (DEECA 2023b) 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 (DEECA 2023c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DEECA 2023d);
- BirdLife New Atlas Bird Data Extraction for significant birds within 20 kilometres of the Project Area (BirdLife Australia 2023);

- The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2023a);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened (DEECA 2023e) and Protected (DELWP 2019a) Lists;
- The online VicPlan Map (Department of Transport and Planning [DTP] 2023) to ascertain current zoning and environmental overlays in the study area; and,
- Aerial photography of the study area.

2.3 Vegetation Assessment (including Habitat Hectare Assessment)

Given the size of the Project Area and the type and extent of the proposed infrastructure footprint (i.e. only a very small proportion of the Project Area is likely to be disturbed as a result of the project), vegetation surveys and targeted surveys primarily focused on areas within or adjacent to the potential infrastructure layout (i.e. the Assessment Area) (Figure 1b).

The Biodiversity Assessment was conducted by ecologists accredited by DEECA in the habitat hectare methodology (DSE 2004a) to quantify the quality and extent of native vegetation values within the Assessment Area to identify flora and fauna habitat values, and to determine conditions with reference to findings of the desk-based assessment.

Native vegetation in the local area was investigated to aid in determining the pre-European vegetation within the Project Area. Ecological Vegetation Classes (EVCs) were determined with reference to DEECA pre-1750 and extant EVC mapping and their published descriptions (DEECA 2023c).

The Biodiversity Assessment 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.

Native vegetation was classified in accordance with the definitions provided in Table 3, as defined in the Guidelines (DELWP 2017). The previously mapped native vegetation (assessed during the preliminary 2020 site assessments) was re-visited to confirm the current extent and condition where it intersected with the Assessment Area.

A summary of the vegetation assessments completed for the project are provided in Table 1. This includes all the dates for the habitat hectare assessments, where the more recent 2023 assessments were undertaken to validate the past results and assess any new areas that resulted from a change in the project footprint.

Targeted flora surveys were complete for nationally significant flora with a moderate or higher likelihood of occurrence, and individuals of State significant flora were marked within areas of public land were observed. Further details on the targeted flora surveys are provided in Section 2.5.

Table 1. Summary of vegetation assessments completed for the Moreton Hill Wind Farm

Survey Type	Survey Date	Survey Details	Infrastructure Footprint
Habitat Hectare Assessment, Large Tree Assessment	22nd – 24th September 2020	Habitat hectare assessments undertaken in original Project Area (north western half of current Project Area, Figure 1a).	September 2020 layout (2020 Project Area shown on Figure 1a)
	20th – 23rd March 2023	Habitat hectare assessment undertaken in expanded footprint and confirmation of condition and extent of previous habitat hectare assessment data (September 2020).	March 2023 layout Assessment Area
	6th - 7th April 2023	Habitat hectare assessment along select roadsides within the Project Area where potential upgrades may occur.	March 2023 layout
	14th September 2023	Habitat hectare assessment/vegetation assessment to review revised turbine layout	September 2023 layout
Significant Flora Assessment	11th -13th November 2020	Significant flora assessment undertaken within areas identified to support suitable habitat (i.e. road reserves) to aid in informing the infrastructure layout	Within areas identified during the September 2020 assessment
	7th – 8th November 2022	Significant flora assessment undertaken within areas identified to support suitable habitat (i.e. road reserves) to aid in informing the infrastructure layout	Select potential access points within road reserves. KML provided by client in November 2022 (Figure 3)
	4th – 5th May 2023	Targeted surveys for Spiny Rice-flower along Rankin Road and Willowvale Road	Within areas identified as suitable habitat along Rankin Road and Willowvale Road
	5th – 7th June 2023	Follow up targeted surveys for Spiny Rice-flower along Rankin Road and Willowvale Road	Within areas identified as suitable habitat along Rankin Road and Willowvale Road

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

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

2.4.1 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 DEECA's NVIM Tool (DEECA 2023b). Determination of assessment pathway is summarised in Table 2.

Table 2. Assessment pathways for applications to remove, destroy or lop native vegetation (DELWP 2017).

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.

2.4.2 Vegetation Assessment

Native vegetation (as defined in Table 3) 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 3. Determination of a patch of native vegetation (DELWP 2017).

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 *Current Wetlands map*, available in DEECA systems and tools.	Measured in hectares. Based on hectare area of the native patch.	Vegetation Quality Assessment Manual (DSE 2004a). Modelled condition for *Current Wetlands*.
Large Trees	A native canopy tree with a Diameter at Breast Height (DBH) greater than or equal to the large tree benchmark for the relevant bioregional EVC.	Circumference measurement around a tree at 1.3 meters above ground level.	Defined by EVC benchmark and status (i.e. Large Tree in a Patch of Native Vegetation or Scattered Large Tree). Refer to Vegetation Quality Assessment Manual (DSE 2004a).

Category	Definition	Extent	Condition
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 (15m radius). Each Small scattered tree is assigned a default extent of 0.031 hectares (10 metre radius)	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'.

2.4.2.1 Large Tree and Habitat Assessment

Large tree and habitat assessments were undertaken concurrently with the habitat hectare assessments to quantify the number of scattered trees and Large Trees within native vegetation patches.

Large Tree benchmarks relating to the EVCs present within the Assessment Area are summarised below (Table 4).

Table 4. Benchmark sizes for large trees within the Assessment Area for treed EVCs.

EVC	Large Tree Benchmark	Large Tree DBH
Grassy Woodland (EVC 175)	*Eucalyptus* sp.	≥ 70 cm
Heathy Dry Forest (EVC 20)	*Eucalyptus* sp.	≥ 60 cm
Plains Grassy Woodland (EVC 55)	*Eucalyptus* sp.	≥ 80 cm
Riparian Woodland (641)	*Eucalyptus camaldulensis*	≥ 80 cm

Note. DBH = Diameter at Breast Height (i.e. 1.3 metres above ground level).

2.4.2.2 Current Wetlands (DEECA)

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 2017) all mapped wetlands (based on 'Current Wetlands' layer in DEECA's NatureKit Map) that are to be impacted must be included as native vegetation, with the modelled condition score assigned to them (DEECA 2023b).

Note that mapped wetlands do not apply if they are covered by a hardened, man-made surface, for example, a roadway. If covered by any vegetation including crops, bare soil, a mapped wetland must be treated as a native patch.

2.4.3 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.

2.4.4 *Offsets*

Biodiversity offsets are required to compensate for the permitted removal of native vegetation. The offset requirements for native vegetation removal are calculated by DEECA and presented in a Native Vegetation Removal (NVR) Report, which are based on the vegetation condition scores determined during the biodiversity assessment.

2.5 Targeted Flora Surveys

Targeted surveys for National and State significant flora were conducted by a qualified botanist between the 11 and 13 November 2020, 7 and 8 November 2022, 4 and 5 May 2023, and 5 – 7 June 2023, focusing on all areas of suitable habitat public land within the 2020 Assessment Area and selected potential access road locations within the Project Area (areas surveyed provided by client as a shapefile).

No areas of potential habitat were identified within private land within the Assessment Area due to the agriculturally modified condition of habitat (e.g. ploughed, cropped or plantation).

Areas of potential habitat for significant flora were identified along roadsides, which were systematically traversed at approximately five-metre linear intervals as per the flora survey guidelines detailed in the *Biodiversity Precinct Planning Structure Kit* (DSE 2010). Surveys for Spiny Rice-flower were undertaken in accordance with the recommended survey guidelines detailed in the Significant Impact Guidelines for the critically endangered Spiny Rice-flower (DEWHA 2009a).

Although the Project Area is not located within a prescribed Precinct Structure Plan, this survey method is best-practice for conducting surveys significant flora that do not have their own specific set of survey guidelines (i.e. White Sunray and Clover Glycine).

The targeted flora surveys focused on Nationally significant flora species identified in the desktop assessment as potentially occurring within the Project Area, such as White Sunray *Leucochrysum albicans* subsp. *tricolor*, Clover Glycine *Glycine latrobeana* and Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*. A summary of the targeted flora species is provided in Table 5, based on the results of the desktop assessment and initial vegetation assessments completed on site.

Table 5. Significant flora species targeted during the surveys.

Scientific Name	Common Name	Description	Recommended Survey Period	Survey Date/s
Nationally Significant Flora				
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	Small shrub to approx. 30 centimetre, stems spinescent. Small yellow flowers appear in winter, generally between May - August. Occurs predominately grasslands, often on basalt-derived soils.	May - August	4th – 5th May 2023 5th – 7th June 2023
Leucochrysum albicans subsp. *tricolor*	White Sunray	Perennial herb to 50 cm high, with white inner bracts surrounded by purple bracts.	November - December	11th – 13th November 2020

Scientific Name	Common Name	Description	Recommended Survey Period	Survey Date/s
		Leaves cottony/woolly. Flowers November - December		7th – 8th November 2022
Glycine latrobeana	Clover Glycine	Trailing herb with trifoliate, dark green leaves. Petals deep purple. Flowers September – December. Occurs in grasslands and grassy woodlands.	September – December	11th – 13th November 2020 7th – 8th November 2022
State Significant Flora				
Coronidium gunnianum	Pale Swamp Everlasting	Perennial herb to 50 cm high with cottony stems and yellow bracts. Flowers November – April. Occurs on soils that are low lying, often subject to inundation.	November - April	7th – 8th November 2022 14th September 2023
Comesperma polygaloides	Small Milkwort	Slender subshrub to 40 cm high, glaucous leaves with pink to mauve flowers at the tip of the branches. Flowers November – January. Occurs in grassland and grassy woodland habitats.	November – January	7th – 8th November 2022
Eucalyptus yarraensis	Yarra Gum	Rough-barked eucalypt tree to 15 m tall, flowers September – December. Broad distribution through Victoria from Glengarry in Gippsland to Ararat.	Flowers September – December but can be identified year round.	22nd – 24th September 2020 20 – 23rd March 2023 6th – 7th April 2023 14th September 2023

Whilst the above-mentioned species were the focus of the surveys, any Nationally or State significant flora opportunistically observed were recorded. Handheld GPS units were used to record the location of any significant species encountered.

2.6 Targeted Fauna Surveys

Fauna assessments were undertaken to obtain information on terrestrial fauna values within the wind farm development boundary (Table 6). Binoculars were 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 an emphasis on habitats that may provide shelter, food or other resources for significant species.

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

2.6.1 *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.

Table 6. Summary of fauna surveys completed for the Moreton Hill Wind Farm

Survey Type	Survey Dates
Bird Utilisation	• 22 – 24 September 2020 (8 sites) • 12 – 14 July 2021 (8 sites) • 31 October – 3 November 2022 (11 sites) • 20 February – 23 February 2023 (11 sites)
Brolga	• October – November 2020; October 2022 – Roaming Surveys • March 2021 & May 2021 (Flocking Surveys) • February - May 2023 (Flocking Surveys)
Microbats	• 13 November – 16 December 2020 • 4 March – 7 April 2021 • 19 October – 17 November 2022 • 23 February – 27 March 2023
Striped Legless Lizard Habitat Assessment	• 8 September 2020 • 20 – 23 March 2023 • 7 June 2023
Golden Sun Moth targeted surveys	<u>Survey 1</u> • 19 December 2022 • 7 January 2023 • 13 January 2023 • 17 January 2023 <u>Survey 2</u> • 17th December 2023 • 23rd December 2023 • 29th December 2023 • 5th January 2024

2.6.2 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* (Interim Guidelines) (DSE 2012). The Interim 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 Interim 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).

It is noted that DELWP released the Draft *Brolga Assessment and Mitigation Standards for wind energy facility permit applications* in 2020 (DELWP 2020a). However, this document is still in Draft and is yet to be incorporated into the Victorian Planning Scheme. As such, the assessment of the potential impacts of the Moreton Hill Wind Farm on Brolga was undertaken with reference to the Interim Guidelines (DSE 2012). This approach has been confirmed by DEECA to be appropriate.

The Level 1 Assessment provides a preliminary determination of whether a proposed wind farm development represents any level of risk to the Victorian Brolga population. As the Project Area is located within the Victorian range of Brolga, as identified in Figure 1 of the Interim Guidelines (DSE 2012), and shown in Figure 6c through the presence of historical records of the species, a Level 1 Assessment is triggered. The findings of the Level One Assessment are used to decide whether a Level Two Assessment is required as per the Interim Guidelines (DSE 2012).

The Level 1 assessment was undertaken using a combination of desktop review, field assessments, and engagement with relevant stakeholders.

2.6.2.1 Level 1 Assessment Methodology

Desktop Analysis

As part of the desktop review, the following databases were interrogated for information regarding the presence of historical Brolga breeding, flocking and sighting records within the 10 kilometre Radius of Investigation (ROI):

- The Department of Energy, Environment and Climate Action (DEECA) NatureKit Map (DEECA 2023a) and Native Vegetation Information Management (NVIM) Tool (DEECA 2023b) for:
    - Modelled vegetation associated with Brolga habitat;
- Brolga Movements and Spatial Requirements During Breeding, south-west Victoria. Ecology and Heritage Partners Pty Ltd, November 2013 (EHP 2013);
- Breeding home range movements of pre-fledged brolga chicks, *Antigone rubicundra* (Gruidae) in Victoria, Australia – Implications for wind farm planning and conservation (Veltheim *et al.* 2019);
- Birdlife New Atlas Bird Data for Brolga records within 10 kilometres of the wind farm development boundary (BirdLife Australia 2023);
- South West Brolga Flocking Database (Sheldon 2004);

- The Victorian Biodiversity Atlas (VBA) for previously documented Brolga records within the project locality (DEECA 2023d); and,
- Aerial photography of the study area.

Stakeholder Liaison

Windfarm host landowners were invited to participate in Landowner Consultation Questionnaire in March 2023. All other residents located within a 10 kilometre radius of the wind farm boundary were invited to participate to respond to the Landowner Consultation Questionnaire in October 2023 (with the exception of residential dwellings within the townships of Skipton and Linton). This consultation is currently ongoing.

The purpose of the landowner consultation was to enable the detection of additional Brolga breeding and/or flocking habitat, as well as other relevant ecological features that has not been documented within the available databases.

A copy of the Landowner Consultation Questionnaire and accompanying Letter is provided in Appendix 1.

Further, Birdlife Australia, Corangamite Catchment Management Authority, and local Landcare and friends groups were contacted to ascertain the historical and current utilisation of Brolga, and the presence of potential habitats within the broader locality. Where no response was received by telephone, these groups were contacted via email.

Preliminary Field Assessment

Preliminary field assessments and a roaming and habitat survey was undertaken by driving along publicly accessible roads between 28-30 October and 12 November 2020 and 24-26 October 2022 to visually assess (using binoculars) all visible locations within 10 kilometres of the Project Area where the species has previously been recorded, as well as sites within 10 kilometres that have the potential to support flocking or breeding habitat (Figure 6b). Brolga sightings and/or brolga nests were recorded where observed. The 2020 and 2022 roaming surveys were undertaken during the known breeding season for the Brolga, which is a period of high detectability for the species.

Roaming surveys of all publicly accessible wetlands within 10 kilometres of the Project Area were also undertaken in September 2023 to identify breeding pairs of Brolga and nest sites. Flight behaviour studies were also undertaken at any sites where the species was observed. These surveys are currently ongoing.

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.

During the site surveys the following data were recorded for each nest located (Table 7).

Table 7. Data recorded at each wetland

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)

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

Breeding Site definition

As per the Interim Guidelines (DSE 2012), a breeding site is defined as "*the nest of a Brolga breeding pair and the perimeter of the surrounding wetland. A breeding site also includes wetlands with previous records of Brolga breeding nests from any relevant information source. A wetland remains a breeding site provided that it has not been permanently drained and/or planted with trees*".

In the instance where historical Brolga breeding records are not associated with wetlands due to the accuracy of the record. DEECA (formerly DELWP) have provided a protocol for addressing the Brolga breeding records that have an inaccurate record of greater 100 metres where the co-ordinates are not at a wetland. The following steps were applied in these circumstances:

- Attempt to confirm the record location using the location and observer details;
- Buffer the record according to the accuracy field;
- Attribute the record to the closest wetland within the accuracy buffer;
- If there are no wetlands within the accuracy buffer, disregard the record; and,
- If the accuracy attribute is greater than one kilometre, disregard the record.

Flocking site definitions

The Interim Guidelines (DSE 2012) define a Flocking site as a permanent or ephemeral wetland known to be utilised by a Brolga flock for nocturnal roosting. A flock roost site must meet three required criteria (Table 8).

Table 8. Criteria used to identify a flock roost site. The site should meet all three criteria (DSE 2012).

Criteria	Justification
More than one year of recording	To ensure the selection of traditional regularly used sites
One or more records of counts equal to or greater than 10 birds	To include sites which have been used often or traditionally by flocking Brolgas. The assumptions is made that if more than 10 birds are recorded on a wetland, flocking behaviour is likely.
Recorded in more than one month	To include sites where Brolgas flock for periods greater than one day or one week, i.e. to include sites traditionally for the majority of the flocking or non-breeding season.

For the initial investigation, sites that had supported 10 or more Brolga (including any identified through Landowner consultation) were identified as possible flocking sites. Short-listed sites could be divided into two categories:

Traditional Flocking Sites

- Not specifically defined within the Interim Guidelines (DSE 2012), traditional flocking sites are described as a wetland to which 10 or more Brolga return each night to roost during the dry, flocking season 'year after year' (DSE 2012).

One-off *Flocking* Sites

- One-off flocking sites are defined in the Interim Guidelines as a site where 10 or more Brolga have been observed on a single occasion, but the site is not a regularly used (traditional) site (DSE 2012). One-off flocking sites include:
- Single records of a flock;
- Repeat records once in a month or less; and,
- Flocks observed foraging away from wetlands during the day.

One-off flocking records may correspond to day foraging made by Brolga away from the traditional flocking site and can often be observation of Brolga occupying non-wetland habitats (i.e. pasture and cropped land). Therefore, traditional flocking sites are considered to have greater value for the species as they represent a key habitat resource that provides overnight roosting after foraging behaviour throughout the broader landscape.

Importantly, Brolga movement and dispersal to and from one-off sites are likely to be key indicators of typical movements by Brolga during the migration season. Such movements can be considered in determine the residual risk of the proposed development to the Brolga population (DSE 2012).

2.6.2.2 Level 2 Assessment – Targeted Brolga surveys and habitat assessments

A Level 2 Assessment has commenced in accordance with survey methods detailed the Interim Guidelines (DSE 2012). Specifically, the objective is 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). This will be achieved via a combination of roaming surveys and flight behaviour studies at confirmed breeding and flocking sites.

Brolga flocking surveys were undertaken between March 2021 and May 2021 and February and April 2023. Flocking surveys were typically focused on Widderin Swamp and Lake Goldsmith.

Roaming surveys and flight behaviour studies are currently being undertaken at all wetlands within 10 kilometres of the Project Area.

2.6.3 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 Moreton Hill 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.

2.6.3.1 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.

2.6.3.2 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 total number of point counts was determined based on both the habitat conditions of the Project Area and the number of turbines proposed, in addition to any existing data that has already been collected (e.g. detailed significant species data).

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

- Between 8-11 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 proximity to the windfarm development boundary were sampled and that a range of habitat types represented in that sample (Figure 2);

- 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 at least six times over the course of each survey period.

Fixed point bird surveys also focused on areas of potential habitat for wetland birds (where visible within the search radius of each fixed point count location) to ensure adequate survey effort was undertaken. At the time of surveys 1 and 2, the majority of wetlands and dams generally supported low volumes of water. However, during surveys #3 and 4, all waterbodies exhibited high levels of inundation.

Four bird utilisation survey events were undertaken (Table 9). Eight fixed point locations were used for the first two surveys, with an additional three sites added for the final two surveys due to the increased footprint of the Project Area (nine within, and two outside the Project Area) (Figure 2).

Table 9. Bird utilisation survey dates

Survey #	Survey dates	No. Survey Sites
Survey #1 (Spring)	22 – 24 September 2020	8
Survey #2 (Winter)	12 – 14 July 2021	8
Survey #3 (Spring)	31 October – 3 November 2022	11
Survey #4 (Summer)	20 – 23 February 2023	11

2.6.3.3 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.

2.6.3.4 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).

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

- Ground;
- Below RSA (1–44 metres);
- Within RSA (between 44 - 252 metres); and,
- Above RSA (> 252 metres).

Analysis of the bird utilisation survey data is provided in Section 3.3.4.

2.6.4 Migratory and Wetland Birds

Wetlands in the Project Area provide potential habitat for several wetland birds, including Australasian Bittern *Botaurus poiciloptilus*, Australasian Shoveler *Anas rhynchotis* and Eastern Great Egret *Ardea modesta*. In addition, several migratory species, including Common Greenshank *Tringa nebularia*, Glossy Ibis *Plegadis falcinellus*, Latham's Snipe *Gallinago hardwickii*, Red-necked Stint *Calidris ruficollis*, Sharp-tailed Sandpiper *Calidris acuminata* have the potential to utilise wetland habitats within the broader locality.

Nocturnal surveys for wetland birds were undertaken in accordance with the following methodology:

- Nocturnal surveys were undertaken at Widderin Swamp over six nights on 11-12 November 2020, and 3-5 March, and 9 March 2021;
- The perimeter of wetlands was visually assessed using binoculars and a spotlight, observers recorded all birds species seen or heard;
- Call playback was undertaken at each wetland during surveys in the two hours after sunset. Bird calls were broadcast for two minutes, followed by five minutes of quiet listening. The procedure was repeated for targeted bird species (ie - Australasian Bittern, Australasian Shoveler, Latham's Snipe, Eastern Great Egret, Glossy Ibis, Common Greenshank etc).

As there are no specific Commonwealth survey guidelines for Australasian Bittern this survey method is also in accordance with the *BirdLife Australasian Bittern Survey Guide* (BirdLife Australia 2020).

Daytime searches for wetland and migratory birds were also undertaken at areas containing potential habitat for wetland birds concurrently with the fixed-point count and roaming survey methods (Section 2.6.3.2 – 2.6.3.3 – Figure 2).

Nocturnal surveys were undertaken at Widderin Swamp on 11-12 November 2020, and 3-5 March, and 9 March 2021 (i.e. – the beginning and end of the non-breeding season for migratory species). It is therefore considered that the survey methodology was also consistent with the survey guidelines in non-tidal areas outlined in '*Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species'* (DoEE 2017).

2.6.5 *Microbat Surveys*

Bat surveys were undertaken in accordance with the *Survey guidelines for Australia's threatened bats* (DEWHA 2010) and the Guidelines for bat surveys in relation to wind farm developments (Lumsden 2007).

No significant bat species have previously been documented within the VBA (DEECA 2023d) within or in proximity to the Project Area (Figure 8). As such, the purpose of the microbat survey was not to undertake targeted surveys for any specific species, but rather, to gain an understanding of the diversity of species that are likely to utilise habitat within and adjacent to the Project Area.

Song Meter SM4 (Wildlife Acoustics™) sound recorders were the main equipment used to survey microbat species. The SM4's recorded audible sounds from 10kHz hz-55kHz which is the calling acoustic frequency for microbats. These instruments record the high frequency calls or echolocation, produced by the bats when they are in flight, and save these calls directly to a memory card. Different bat species produce distinguishable calls; therefore, detectors were used to identify the species present in a given area. 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 making the calls is not known.

During Survey 1 and 2, in addition to Song Meter units, two Anabat bat detectors linked to CF Storage Zcaims (Titley Electronics, Ballina NSW) were also used, recording audible sounds within the same range as the Song Meter's.

Due to an increase in the Project Area, additional microbat detectors were deployed for Survey 3 and 4 to ensure the full range of potential habitats were surveyed.

Microbat detectors were deployed throughout the study area (Figure 2) during the following four survey periods:

- Survey 1: Eight Songmeters and two Anabats were deployed at locations 1-8 (Figure 2) on 13 November 2020 and retrieved on 16 December 2020;
- Survey 2: Eight Songmeters and two Anabats were deployed at locations 1-8 (Figure 2) on 4 March 2021 and retrieved on 7 April 2021;
- Survey 3: 16 Songmeters were deployed on 19 October 2022 and retrieved on 17 November 2022; and,
- Survey 4: 16 Songmeters were deployed on 23 February 2023 and retrieved on 27 March 2023.

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.

Detection distances for Anabat and Song Meter units vary enormously depending on the frequency and amplitude of each bat call. Based on the sensitivity settings of the microbat detectors, it is assumed that most bats within 30 metres will be detected under typical conditions, while some species which call at low frequencies will be detectable up to 100 metres.

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.

Call Analysis

Bat calls collected throughout the Moreton Hill Wind Farm site were downloaded to a laptop and Kaleidoscope Pro 5.4 software (Wildlife Acoustics) was used to convert the WAV (and W4V) files into zero crossing (ZC) files, with the outputs saved in nightly subdirectories. The default Kaleidoscope Pro feature was used to filter 'Noise' into a separate subfolder.

Identification of bat calls collected was undertaken by recognised expert Rob Gration from EcoAerial Consulting Services. Rob has analysed over 2 million microbat calls and has collated an extensive microbat call reference library for Victorian bat species.

Call analysis accounted for all significant species that had the potential to be present within the Project Area such as Yellow-bellied Sheathtail Bat *Saccolaimus flaviventris*, Eastern Bent-wing Bat and Southern Bent-Wing Bat *Miniopterus orianae bassanii*, with common (i.e. not significant) species also recorded.

Call identification was completed using Anabat Insight sound analysis software (Titley Scientific) with reference to the EcoAerial microbat call reference library for Victoria.

The microbat call analysis was conducted in accordance with the *Standards for reporting bat detector surveys (Australian Bat Society Incorporated undated)*. Results of the microbat call analysis is provided in Section 3.5.

2.6.6 Striped Legless Lizard Habitat Assessment

Striped Legless Lizard typically occupy areas of native and introduced grassland, particularly where a high percentage of the native Kangaroo Grass *Themeda triandra* is found. They are typically restricted to lowland tussock grassland habitat (Coulson 1990) in temperate south-eastern Australia, where the species has a limited and patchy distribution. A small percentage of the original habitat for Striped Legless Lizard remains. As a result, this species is likely to occur in small, isolated populations due to the limited and severely fragmented nature of remaining habitat.

Since European settlement, the distribution of Striped Legless Lizard has declined, and the species is known to have disappeared from many areas. Within Victoria, an estimated 95% of native lowland grasslands have been substantially altered since European settlement, including Western (Basalt) Plains Grassland community, the primary grassland habitat known to support Striped Legless Lizard. Western Plains Grasslands typically occur on cracking clay soils with at least some surface rock, which provides ideal shelter for Striped Legless Lizard (Coulson 1990).

The Areas of potential habitat for Striped Legless Lizard identified within Rankin Road and Willowvale Road were mapped concurrently with the Spiny Rice-flower surveys between 4 - 5 May 2023 and 5 -7 June 2023. The quality of the habitat was assessed and categorised into low, medium or high, depending on the number of niche habitat requirements met for the species. These requirements are summarised below, determined from the Conservation Advice for the species (TSSC 2016).

Key habitat traits:

- Presence of cracking clay soils;
- Presence of rocks and tussock grasses;

- General height of vegetation (with taller vegetation found to negatively impact the occurrence of SLL);
- Management practices of the vegetation (e.g. grazed, slashed, burnt, fertilised);
- Presence of Toowoomba Canary-grass Phalaris aquatica (e.g. is it the dominant vegetation type);
- Assessment of habitat connectivity, including presence of barriers to surrounding areas of suitable habitat (e.g. ploughed paddocks, waterways, etc); and,
- Proximity to known populations of SLL.

The number of above attributes met at each assessed location were used to inform the quality of habitat for the species. The habitat assessments excluded areas that are clearly inconsistent with the above (i.e. ploughed/cultivated paddocks and forestry plantations). The results of the habitat assessment are provided below in Section 3.6 and Table 21.

2.6.7 Golden Sun Moth Surveys

Golden Sun Moth typically occur in native grassland, grassy woodland, dominated by greater than 40% cover of Wallaby-grass, in particular *Rytidosperma* spp. (DSE 2004b), but may also inhabit areas dominated by Kangaroo Grass *Themeda triandra* (Endersby and Koehler 2006) and introduced grassland dominated by Chilean Needle-grass *Nassella neesiana* and other introduced species (A. Organ pers. obs.). Male flight is typically low, to about a metre above the ground, fast and can be prolonged, but they are generally not recorded flying more than 100 metres from suitable habitat (Clarke and O'Dwyer 1999). The male of this species generally flies between 11am and 3pm on calm, warm (over 20°C), sunny days.

Targeted surveys for Golden Sun Moth were undertaken over two survey seasons on the 19 December 2022, 7, 13 and 17 January 2023, and 17, 23 and 29 December 2023 and 5 January 2024 within areas of potential habitat located within the Project Area in publicly accessible land (i.e. road reserves) (Figure 2). Due to the modified condition of land within the assessment area in private paddocks, no suitable Golden Sun Moth habitat was recorded. Areas of potential Golden Sun Moth habitat proposed to be impacted were identified during the significant flora assessment conducted in November 2022 and were the focus of targeted surveys conducted in the 2022/2023 season for the species. The 2023/2024 surveys focused on the Willowvale Road corridor, Rankin Road corridor and key intersections along the updated infrastructure footprint where habitat was identified.

Four surveys during suitable flying conditions for Golden Sun Moth were undertaken over the two survey events at each area of potential habitat during 2022/ 2023 and 2023/2024 (Table 10). Areas of potential habitat on public land that coincided with potential access areas were surveyed (+/- 50 metres either side) (Figure 2).

Table 10. Golden Sun Moth Survey dates.

Survey #	Date	Reference site*
Survey #1	19 December 2022	Broadmeadows Valley Park
Survey #2	7 January 2023	Broadmeadows Valley Park
Survey #3	13 January 2023	Beaufort
Survey #4	17 January 2023	Mount Mercer

Survey #	Date	Reference site*
Survey #5	17 December 2023	Mount Mercer
Survey #6	23 December 2023	Merrimu
Survey #7	29 December 2023	Merrimu
Survey #8	5 January 2024	Broadmeadows

*The species was confirmed flying at known reference sites in western Victoria through a review of the Golden Sun Moth diary circulated by the Ecological Consultants Association (ECA) of Victoria around the period that the targeted surveys being undertaken, as well as other sites being concurrently surveyed by Ecology and Heritage Partners staff.

In addition to the ECA Golden Sun Moth diary records for the dates of the assessment, the species was also recorded flying in Beaufort around the time of the surveys, showing that the species was active in the local area throughout the surveys undertaken for the project.

Survey procedures followed those outlined in the *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth* (DEWHA 2009). The below methods were followed:

- Surveys were conducted by ecologists experienced in the detection and identification of Golden Sun Moth;
- Each area of potential habitat was surveyed on four separate occasions, during the species' confirmed flight season;
- Surveys were undertaken during weather conditions suitable for detecting the species. Male moths generally fly between 10am and 3pm on warm (over 20˚C by 10am) days with minimal cloud cover and still conditions. However, if males are observed flying on site after 3pm or during moderately windy conditions surveys can continue until males are no longer observed flying; and,
- Surveys were conducted using parallel transects at distances prescribed by the Commonwealth (DEWHA 2009) with observers walking or, where terrain permitted, driving in a car at < 10 km / hour (flying male moths can be readily seen from a vehicle) until moths are observed.

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 and State 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 11 and Table 12 respectively.

The results of the likelihood of occurrence assessment for listed flora and fauna species are provided in Appendices 1.4 and 2.1, respectively.

Table 11. 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 12. 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.

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 observed 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 'Assessment Area' as shown in Figure 1b were assessed as part of the flora assessment.

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.

Only the Assessment Area was assessed as part of the habitat hectare assessments and targeted flora surveys.

2.8.2 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. 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.

2.8.3 Golden Sun Moth

Targeted Golden Sun Moth surveys were undertaken by experienced personnel during the known flight period of the species and during appropriate conditions by following suitable survey guidelines.

The 2022/23 Golden Sun Moth season presented some unforeseen challenges, and Ecology and Heritage Partners closely monitored the emergence, distribution and abundance of the species at reference sites across Victoria. Likely due to unseasonably wet and cool conditions through November and December, the species were not observed to be actively flying until mid-late December 2022, and numbers did not become consistent or reach typical abundances until the first to second week of January 2023. Typically, Golden Sun Moth emergence declines in the lead up to and in early January, whereby surveying for this species in February is unprecedented as historically the species' flight season is completed by this stage. In temperate regions, insect larvae often face a decision between development into their adult stage, or ongoing growth for emergence in the subsequent season (DAWE 2021). We therefore expected a truncated emergence period for the species once conditions became suitable. However, in order to complete all four survey efforts while the species was known to be flying, surveys were undertaken outside of the generally accepted seasonal timeframes. However, based on the seasonal conditions during the 22/23 flight season, the timing of the surveys is considered to be appropriate. Importantly, the species was recorded at known reference sites on, or around the days of each

survey, indicating the suitability of the survey effort. The results of this assessment are considered suitable for the purposes of assessing the works against the objectives of the project.

2.8.4 Brolga

It is noted that the quality of Landowner survey data is likely to vary due to Landowner interest and length of residency. However, the data provided to date through the consultation process has added additional information to the assessment not previously available via desktop sources. Detailed desktop interrogation via aerial imagery, field observations, and investigations as part of the Level 2 and Level 3 Assessment will appropriately consider the potential for any additional areas to support these habitats.

2.8.5 General Limitations

General ecological limitations associated with the ecological investigations include:

- The assessment of likelihood of occurrence is based on survey effort and results, background information and previous records compiled;
- Non-vascular flora (i.e. mosses, liverworts) were not recorded, although their presence is noted as part of the cover of native species in the definition of a patch of native vegetation;
- Ecological features identified during field assessments were recorded using with an accuracy of between +/- 3 metres. This level of accuracy is considered adequate to provide an accurate assessment of the ecological features present within the Project Site; however, this data should not be used for detailed surveying purposes; and,
- For cryptic and less abundant species that are known to, or that have the potential to use habitat resources within the Assessment Area as a resident or a visitor on a regular or infrequent basis, the precautionary principle (i.e. the absence of a species during targeted surveys is not used as a reason for assuming the species is not present, or may utilise habitats within the Assessment Area, particularly where the species was/is known to occur within the locality, and the Assessment Area supports suitable habitats) has been applied when determining the likelihood of occurrence.

2.8.6 Updated Development Footprint

The initial field assessments completed for the project were undertaken in 2020 within the original Project Area (Figure 1), which encompassed the infrastructure footprint for the project as proposed in 2020. This area was smaller than the current Project Area and covered an area in the north-west of the current Project Area. All flora assessments completed for the 2020 Project Area were re-assessed where they intersected with the current Assessment Area, to confirm the extent and condition of the native vegetation present. The Assessment Area is defined in Section 1.2.1. The Project Area was expanded in 2022 and refined to the current Project Area in 2023 to capture the increased infrastructure footprint.

Prior to the update of the infrastructure footprint, two rounds of fixed-point bird counts were undertaken at eight sites across the 2020 Project Area. Songmeters and Anabats were also deployed for two rounds at eight locations during the initial surveys. After the infrastructure footprint was updated an additional two rounds of bird utilisation surveys were undertaken across 11 sites. Similarly, two more rounds of bat surveys were undertaken with 16 Songmeters deployed during each survey.

The Golden Sun Moth targeted surveys were completed based on the two most recent infrastructure footprints. The 2023/2024 surveys captured additional areas not included in the 2022/2023 surveys (e.g. Willowvale Road and Rankin Road).

3 EXISTING ECOLOGICAL CONDITION

3.1 Vegetation Condition

Most of the landscape within the Project Area has been significantly modified for agricultural use, including cropping of cereals, grains and canola and paddocks over sown with exotic species for grazing. Past and current land use also includes plantation stands, with a large area located east of Browns S Road and Notmans Road once supporting a significant plantation that has since been removed around 2012 (based on a review of aerial imagery).

The current and past land use has resulted in much of the native vegetation within areas of private land being removed, with most of the native vegetation restricted to linear road reserves or isolated clusters. Native scattered trees were common, retained by famers in paddocks or along sections of degraded road reserves. Linear areas of planted vegetation were present, generally near dwellings, dams or along paddock boundaries. Many of these linear plantings contained a mixture of Eucalypt and Acacia species.

3.1.1 Patches of Native Vegetation

Native vegetation in the study area is modelled to support six EVCs: Plains Grassy Woodland (EVC 55), Plains Grassy Wetland (EVC 125), Plains Sedgy Wetland (EVC 647), *Heavier soils* Plains Grassland (EVC 132_61), Grassy Woodland (EVC 175) and Heathy Dry Forest (EVC 20) (DEECA 2023b). All were recorded within the Assessment Area during the vegetation assessment to varying extents (Table 13; Figure 4).

Table 13. Summary of EVCs identified within the study area

EVC	Bioregional Conservation Status	Extent recorded in Assessment Area (ha)
Plains Grassy Woodland (EVC 55)	Endangered	3.409
Plains Grassy Wetland (EVC 125)	Endangered	0.01
Plains Sedgy Wetland (EVC 647)	Endangered	12.533
***Heavier soils* Plains Grassland (EVC 132_61)**	Endangered	5.122
Grassy Woodland (EVC 175)	Endangered	6.137
Heathy Dry Forest (EVC 20)	Least Concern	2.591
TOTAL		**29.80**

A list of all flora species recorded during the field assessment are provided in Appendix 2.1. Specific details relating to observed EVCs are provided below.

The results of the habitat hectare assessment are provided in Appendix 2.2, and a summary of native vegetation observed within or adjacent to each proposed turbine is provided in Appendix 4.

3.1.1.1 Plains Grassy Woodland

Plains Grassy Woodland is described as an open eucalypt woodland to 15 meters tall, containing an open shrub layer and diverse grassy and herbaceous ground layer (DEECA 2023c).

Plains Grassy Woodland was present in a treeless state within the construction footprint. One patch was located between Turbines 53 and 54. This patch contained an understorey of Spear-grass *Austrostipa* spp., Common Wheat-grass *Anthosachne scabra*, Weeping Grass *Microlaena stipoides* and several specimens of Tree Violet *Melicytus dentatus* (Plate 1; Plate 2). The patch was surrounded by the exotic Toowoomba Canary-grass *Phalaris aquatica*.

3.1.1.2 Plains Grassy Wetland

Plains Grassy Wetland occurs in waterlogged to seasonally inundated areas, often containing a ground layer of grasses, small sedges and herbs (DEECA 2023c).

One small patch of Plains Grassy Wetland was recorded in a dry dam located adjacent to the access track between Turbine 7 and Turbine 9. The patch contained a cover of two native species; Pondweed *Potamogeton cheesemanii* and Water-milfoil *Myriophyllum crispatum* (Plate 3; Plate 4).

Plate 1. Plains Grassy Woodland patch located between Turbine 53 and 54 (Ecology and Heritage Partners Pty Ltd 22/03/2023).

Plate 2. Tree Violet within Plains Grassy Woodland patch (Ecology and Heritage Partners Pty Ltd 22/03/2023).

Plate 3. A patch of Plains Grassy Wetland in a dry farm dam located between Turbine 7 and 9 (Ecology and Heritage Partners Pty Ltd 22/03/2023).

Plate 4. Pondweed and Water-milfoil in the patch of Plains Grassy Wetland (Ecology and Heritage Partners Pty Ltd 22/03/2023).

3.1.1.3 Plains Sedgy Wetland

Plains Sedgy Wetland is associated with wet depressions, containing sedgy-herbaceous vegetation, often decreasing in diversity in deeper water (DEECA 2023c).

Low-lying areas and drainage lines within the Project Area contained a low to moderate cover of native sedges and herbs. Native species included Rush *Juncus* sp., Common Reed *Phragmites australis* and Common Spike-sedge *Eleochaeris acuta*. The exotic species Spiny Rush *Juncus acutus* was common in all Plains Sedgy Wetland patches. Plate 5 and Plate 6 below both represent one patch of Plains Sedgy Wetland, taken three years apart.

Plate 5. A patch of Plains Sedgy Wetland within the Project Area (Ecology and Heritage Partners Pty Ltd 22/09/2020).

Plate 6. Dry patch of Plains Sedgy Wetland within the Project Area (Ecology and Heritage Partners Pty Ltd 22/03/2023).

3.1.1.4 Heathy Dry Forest

Heathy Dry Forest is characterised by an open eucalypt forest to 20 meters tall, often growing in shallow, rocky soils with an understorey dominated by ericoid-leaved shrubs (DEECA 2023c).

Two patches of Heathy Dry Forest were mapped within the Project Area along Browns Road in the far north. The patches were defined by a eucalypt canopy including Red Stringybark *Eucalyptus macrorhynca* and Long-leaf Box *Eucalyptus goniocalyx* over a predominantly exotic understory consisting of pasture grasses such as Rye Grass *Lolium* spp. and Toowoomba Canary-grass (Plate 7; Plate 8). Native species in the understory included scattered occurrences of Blackwood *Acacia melanoxylon*.

Plate 7. A patch of Heathy Dry Forest recorded within the study area (Ecology and Heritage Partners Pty Ltd 22/09/2020).

Plate 8. A patch of Heathy Dry Forest recorded within the study area (Ecology and Heritage Partners Pty Ltd 22/09/2020).

3.1.1.5 Grassy Woodland

Grassy Woodland is descripted an open eucalypt woodland to 15 meters tall supporting a diverse ground layer of grasses and herbs (DEECA 2023c).

Within the Assessment Area, Grassy Woodland was present in both treeless and treed conditions. Where present, the canopy contained a mixture of Manna Gum *Eucalyptus viminalis* and Messmate Stringybark, with an understory of Kangaroo Grass *Themeda triandra*, Wattle Mat-rush *Lomandra filiformis*, Common Rice-flower *Pimelea humilis*, Black-anther Flax-lily *Dianella revoluta* and Hedge Wattle *Acacia paradoxa*. Treeless patches contained a low to moderate cover of native grass mixed with exotic species (Plate 9). Higher quality patches of Grassy Woodland were also present in the broader Project Area supporting a more diverse understory, including Common Everlasting *Chrysocephalum apiculatum* s.l. and the FFG Act-Listed Golden Cowslips *Diuris behrii* (Plate 10).

Plate 9. Treeless Grassy Woodland within the Project Area (Ecology and Heritage Partners Pty Ltd 22/09/2020).

Plate 10. Golden Cowslips and Common Everlasting observed within a patch of Grassy Woodland within the Project Area (Ecology and Heritage Partners Pty Ltd 22/09/2020).

3.1.1.6 Plains Grassland

Plains Grassland is characterised as a treeless vegetation community dominated by grasses and herbs (DEECA 2023c).

Small, discrete patches of Plains Grassland were mapped within sections of road reserves. Patches were often dominated by Kangaroo Grass (Plate 11), with a lower occurrence of Wallaby-grass *Rytidosperma* spp. and Spear-grass *Austrostipa* spp. Higher quality patches were located along Lismore – Pittong Road, outside of the Assessment Area (Plate 12).

Plate 11. A patch of Plains Grassland dominated by Kangaroo Grass (Ecology and Heritage Partners Pty Ltd 22/03/2023).

Plate 12. High Quality Plains Grassland located in the Project Area but outside of the Assessment Area (Ecology and Heritage Partners Pty Ltd 22/09/2020).

3.1.2 Large Trees in Patches

A total of 35 Large Trees (LTs) in Heathy Woodland, Plains Grassy Woodland and Grassy Woodland patches were present within the Assessment Area (Figure 4) and a number of Large Trees were incidentally observed in the broader Project Area (Plate 13; Plate 14). All specimens recorded within the Assessment Area were River Red-gum *Eucalyptus camaldulensis*, with the exception of two stags, and were primarily observed along Spring Hill Road (Figure 4; Appendix 2.3).

3.1.3 Scattered Trees

A total of 41scattered trees were recorded within the study area, which consisted of 26 large and 15 small scattered trees (Figure 4; Appendix 2.3). Most specimens were either Rough-barked Manna Gum or River Red-gum (Plate 15; Plate 16), with the occasional Messmate Stringybark present.

These trees would have once formed part of the Plains Grassy Woodland, Heathy Woodland and Grassy Woodland patches; however, the understorey vegetation contained introduced species (exotic pasture grasses) and the trees no longer formed a patch of native vegetation.

Plate 13. Large Tree (Dead) in retained Heathy Dry Forest (Ecology and Heritage Partners Pty Ltd 22/09/2020).

Plate 14. Large Tree in Heathy Dry Forest (Ecology and Heritage Partners Pty Ltd 22/09/2020).

Plate 15. Large Scattered Tree (Manna Gum) within Assessment Area (Tree 124 on Figure 4) (Ecology and Heritage Partners Pty Ltd 21/03/2023).

Plate 16. Large Scattered Tree (River Red-gum) in western section of the Project Area (Tree 133 on Figure 4) (Ecology and Heritage Partners Pty Ltd 22/03/2023).

3.1.4 Introduced and Planted Vegetation

The project footprint occurs predominately within areas of modified land, where agricultural crops and exotic pasture have been over sown into paddocks, removing native vegetation. During the March 2023 vegetation assessment, many of the paddocks were observed to have been recently ploughed (Plate 17), in preparation for new crops to be sown, or contained recently harvested crops (Plate 18). Many of these paddocks were observed with new crops in the September 2023 assessment.

Common pasture grasses included Rye *Lolium* spp., Cocksfoot *Dactylis glomerata*, Toowoomba Canary-grass *Phalaris aquatica*, Tall Fescue *Festuca* sp. and Barley-grass *Hordeum* spp. Native vegetation was absent from these areas with the exception of a few native scattered trees retained in paddocks.

Noxious weeds were also generally absent due to the managed nature of the paddocks (i.e. crops), however in less managed paddocks, Spear Thistle *Cirsium vulgare* was present in small patches (Plate 19). Additional noxious weeds observed included Sweet Briar *Rosa rubiginosa* and Spiny Rush, with Spiny Rush common in low-lying areas.

Planted vegetation in the form of windrows in paddocks and along roadside or as scattered trees in paddocks were common throughout the Project area (Plate 20), evident through the linear strips of trees visible in many of the paddocks.

Plate 17. Recently ploughed paddocks within the Assessment Area (Ecology and Heritage Partners Pty Ltd 21/03/2023).

Plate 18. Cropped paddocks within the Assessment Area (Ecology and Heritage Partners Pty Ltd 21/03/2023).

Plate 19. A noxious weed, Spear Thistle, recorded within the Assessment Area (Ecology and Heritage Partners Pty Ltd 21/03/2023).

Plate 20. Stand of planted Eucalypt within the Assessment Area (Ecology and Heritage Partners Pty Ltd 21/03/2023).

3.2 Fauna Habitat

The fauna habitats across the Project Area exhibited evidence of sustained agricultural land-use, with large areas dominated by introduced cropping and pasture species. Most of the moderate to high quality terrestrial fauna habitat is present in the form of canopy vegetation distributed throughout the broader area.

3.2.1 Woodlands

Woodland vegetation varies in quality throughout the Assessment Area, primarily represented as mixed planted eucalypts or higher quality remnants along road reserves. These roadside remnants were generally

structurally and floristically diverse and the vegetation cover provided habitat niches for a diversity of native fauna and important habitat connectivity in an otherwise highly modified landscape.

A variety of arboreal mammals, microbats, ground-dwelling mammals, woodland birds, reptiles and amphibians are likely to reside in, forage in, rely upon, regularly use and move through woodland vegetation within the Project Area. A diversity of woodland bird species were observed within this vegetation type during the avian surveys, including Brown Thornbill *Acanthiza pusilla*, Spotted Pardalote *Pardalotus punctatus* and White-plumed Honeyeater *Lichenostomus penicillatus* and several parrot species, Blue-winged Parrot, Crimson Rosella *Platycercus elegans,* Eastern Rosella *Platycercus eximius,* Purple-crowned Lorikeet *Glossopsitta porphyrocephala* and Red-rumped Parrot *Psephotus haematonotus*.

These areas support occasional hollow-bearing trees, providing habitat for hollow-dependent fauna including possums, microbats and hollow-nesting birds such as parrots and owls.

3.2.2 Scattered Trees

The habitat value of scattered trees is dependent on the tree species, maturity and landscape context however, overall, are of moderate value for native fauna.

Scattered trees in varying densities occur throughout the Assessment Area and provide an important resource for more mobile tree-dependent fauna. Many of the scattered eucalypts are relatively mature, providing an array of small, medium, large and very large hollows, bark fissures and crevices. These are likely to be relied upon for shelter and nesting by a range of hollow-dependent fauna including parrots, microbats, possums, gliders and owls.

Scattered trees provide foraging habitat for insectivorous and nectivorous birds as well as vantage points and nesting areas for diurnal and nocturnal raptors and other non-hollow dependant species including Australian Magpie *Gymnorhina tibicen* and Australian Raven *Corvus coronoides*. These trees also provide stepping stones for more mobile fauna moving through the Assessment Area, enhancing landscape permeability for a wide range woodland birds, possums, reptiles, as well as predators such as raptors.

3.2.3 Open Pasture / Crops

The majority of the Project Area consists of paddocks which are either cropped or contain improved exotic pasture. Bird species which are tolerant of modified open areas are likely to use these areas, including foraging nocturnal and diurnal raptors. During the current suite of assessments, Wedge-tailed Eagle *Adua audax*, Brown Falcon *Falco berigora,* Australian Hobby *Falco longipennis* and Nankeen Kestrel *Falco cenchroides* were observed foraging in these areas. A Wedge-tail Eagle nest was observed in a scattered pine tree located between turbine 23 and 25 (Figure 4i). It was unclear if the nest was active, however given the presence of Wedge-tail Eagle in the Project Area, it is assumed to be active.

Common opportunist species including Australian Magpie, Australasian Pipit *Anthus novaeseelandiae,* Magpie Lark *Grallina cyanoleuca* and Willie Wagtail *Rhipidura leucophrys* were also observed utilising this habitat during the field assessments.

3.2.4 Creeklines and Artificial Waterbodies

Several drainage lines and creeklines, as well as artificially constructed farm dams occur throughout the Project Area, providing habitat of varying quality for a range of waterbirds and frog species, such as Australian Shelduck *Tadorna tadornoides,* Little Pied Cormorant *Microcarbo melanoleucos* and Straw-necked Ibis *Threskiornis spinicollis.*

Most of the farm dams were in very poor condition, with livestock having unrestricted access. The network of drainage lines and creeklines area spatially well connected. However, during the assessments undertaken in 2020 and 2023, most contained limited water and few refuge pools remained, while aquatic vegetation had generally senesced.

Nonetheless, when inundated and connected, the network of waterbodies is likely to provide dispersal opportunities for fauna, particularly frogs and fish that may be residing, refuging and/or breeding in the dams and creeklines throughout the Assessment Area.

3.3 Brolga Surveys – Level 1 Assessment

3.3.1 Desktop Analysis

3.3.1.1 Historical Breeding Records

Figure 6a and 6b show the location of historical breeding records within the ROI. This includes 48 records from the VBA (DEECA 2023d), and one non-specific breeding record from Birdlife (Birdlife 2023). Non-specific breeding activity refers to Brolga that were observed to be engaging in activity relating to a breeding event (i.e. mating ritual), not an actual breeding site (i.e. nest site).

A single breeding record from 1984 is located within the northern third of the Project Area, in a wetland south of Nottmans Road (Figure 6a). As part of the ecological assessments, this wetland has since been observed to have been ploughed and drained, and is therefore no longer considered to support potential brolga breeding habitat.

Overall, the historical distribution of brolga records, including breeding records indicates that the Project Area is located on the eastern perimeter of Brolga records in south-west Victoria (Figure 6b; Figure 6c). However, there are several Brolga records within, or located within close proximity to the Project Area.

3.3.1.2 Historical Flocking Records

Sheldon's Brolga Database contains records of ten sites where Brolga flocking behaviour has been identified within ten kilometres of the Project Area. Of these sites, three meet the criteria used to identify a flocking site in accordance with the Interim Guidelines (DSE 2012).

The closest of these records to the Project Area are two flocking records located within Widderin Swamp, approximately one kilometre west of the Project Area, and are both from 1996 (Site 55 - Figure 6b). Widderin Swamp has also previously been identified as an 'intermittent flocking site' as part of the Stockyard Hill Wind Farm investigations (Biosis 2016).

3.3.2 *Stakeholder Engagement*

Twelve landowners located within the wind farm development boundary have been contacted to date as part of the Level 1 Assessment in March 2023. As of 6 October 2023, a total of seven responses had been received. Landowner observations of Brolga are summarised below:

- Six Landowners/residents reported not having seen Brolga on their property;
- One Landowner reported seeing Brolga on their property or on adjacent property; and,
- Zero Landowners reporting Brolga breeding or flocking behaviour on their property or on adjacent property.

All other residents located within a 10 kilometre radius of the wind farm boundary were invited to participate to respond to the Landowner Consultation Questionnaire in October 2023 (with the exception of residential dwellings within the townships of Skipton and Linton). This consultation is currently ongoing.

3.3.3 *Initial Brolga Roaming and Habitat Surveys*

Roaming field surveys were undertaken during the breeding and non-breeding seasons of 2020 through to late 2022 to document the extent of Brolga activity and current and historical spatial patterns of activity within the study area. Field investigations occurred during various weather conditions, including low and high rainfall (i.e. La Niña). No evidence of Brolga (i.e. adults, chicks, or nests) were observed during the roaming assessments where 326 waterbodies were visually assessed (Table 15). However, it is noted that a total of 10 Brolga were observed near bird utilisation locations #6 and #7 (Figure 2a) within the Project Area during the September 2020 and July 2021 bird utilisation surveys (Table 14) (Section 3.4.1).

Table 14. Incidental Brolga observations during bird utilisation surveys

Survey Date	Time of day	Number of individuals	Direction of movement	Vertical height	Comment
24/09/2020	9:10	2	-	0	Foraging
12/07/2021	14:44	2	-	0	Standing next to dam in wetland
12/07/2021	16:02	2	SE	20	Flew away to the SE, possibly to site 7
13/07/2021	9:10	2	N	30	Flew in from SE, possibly from the wetland at site 7. Mating dance in full display
15/07/2021	15:59	2	E	0	Standing next to wetland dam

There are an additional 741 historic records of Brolga activity within 10km of the study area, including breeding and flocking records (DEECA 2023d; BirdLife Australia 2022; Sheldon 2004). As part of the roaming surveys, an assessment of habitat quality was undertaken at all observable wetlands within the ROI. Habitat assessments have recorded low, moderate and high Brolga habitat quality across the majority ROI (Table 15) (Appendix 3.2).

Table 15. Results of 2020 - 2022 Brolga Surveys and Habitat Assessment.

Habitat Quality	# Wetlands	Brolgas Present
High	21	No Brolga observed
Moderate	68	No Brolga observed
Low	237	No Brolga observed
Not able to be visually assessed	84	N/A

3.3.3.1 Flocking surveys

Flocking field surveys were undertaken during the 2021 and 2023 flocking seasons, between February and April, to assess the extent of Brolga flocking activity in proximity to the Project Area. Dawn and dusk surveys were undertaken Widderin Swamp and Lake Goldsmith to ascertain the presence of flocking behaviour.

A summary of flocking survey results is provided below (Table 16; Table 17).

Table 16. Brolga 2021 Flocking Survey dates.

Survey #	Time of day	Date	Results
Survey #1-3	Dusk and Dawn	3-5 March 2021	No Brolga observed
Survey #4	Dusk	9 March 2021	No Brolga observed
Survey #5-7	Dusk and Dawn	4-7 May 2021	No Brolga observed

Table 17. Brolga 2023 Flocking Survey dates.

Survey #	Time of day	Date	Results
Survey #1-3	Dusk and Dawn	20-23 February 2023	No Brolga observed
Survey #4-6	Dusk and Dawn	20-23 March 2023	No Brolga observed
Survey #7	Dusk and Dawn	6 April 2023	No Brolga observed
Survey #8	Dusk and Dawn	14 April 2023	No Brolga observed

3.3.4 *Conclusion*

Based on the results to date of the Level 1 Brolga assessment, the requirement for a Level 2 Brolga Assessment is triggered due to:

- The presence of historical Brolga breeding and flocking records within the ROI, namely:
- Flocking records within Widderin Swamp and Lake Goldsmith;
- Historical breeding records with the Project Area and ROI.
- The Project Area may be located within an area which may be used by Brolga for diurnal movements between the foraging and roosting sites.

3.3.5 *Brolga Assessment – Next Steps*

Ongoing stakeholder consultation is currently underway. A Level 2 Brolga Assessment has commenced, with further investigations currently being undertaken in the form of:

- Aerial surveys;
- Roaming surveys;
- Ground-truthing of potential Brolga breeding sites;
- Flight behaviour studies; and,
- Time activity budgets.

The intent of the Level 2 Brolga investigations will be to better understand the utilisation of habitat within the ROI, and understand the flight behaviour and movement patterns of Brolga within the ROI. Detailed landowner consultation, combined with historical data, will enable a comprehensive analysis of longer-term Brolga activity in the ROI.

The following data will be recorded as part of the flight behaviour investigation (Table 18).

Table 18. 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	

Data	Format
Flight Distance	
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.

The data collected as part of the Level 2 Assessment will be used to inform the requirement for a Level 3 Assessment. If required, the Level 3 Assessment will include:

- Investigation of appropriate turbine free buffer zones from any confirmed breeding and flocking sites;
- The preparation of a site-specific Collision Risk Model (CRM), using data collected as part of the Level 2 Assessment;
- Preparation of a Population Viability Analysis (PVA) to determine residual impacts to the Victorian Brolga population;
- Investigation of potential mitigation methods; and,
- Preparation of an appropriate compensation strategy (if required) to ensure a zero net impact to the Victorian Brolga population.

The overall objectives of the Level 2 and Level 3 (if required) Brolga Assessments will be to manage and mitigate cumulative impacts to the species so that were is no 'net effect' to the population of Brolga in Victoria (DSE 2012).

3.4 Bird Utilisation Surveys

3.4.1 Overview

A total of 85 bird species were recorded, consisting of 2,701 individuals, during the fixed-point bird counts undertaken. Four introduced species were recorded: Common Starling *Sturnus vulgaris*, Eurasian Skylark *Alauda arvensis*, European Goldfinch *Carduelis carduelis*, and House Sparrow *Passer domesticus*.

Two nationally significant species - Blue-winged Parrot *Neophema chrysostoma* and Brown Treecreeper *Climacteris picumnus victoriae* and two FFG Act listed species - Brolga *Antigone rubicunda* and Little Eagle *Hieraaetus morphnoides* were recorded during the assessments.

The most frequently recorded species were Australian Magpie and Little Raven *Corvus mellori.*

A total of 79% of bird observations made during the point counts were of individuals that were either on the ground or flying below the Rotor Swept Area. A further 16% did not have their height recorded as they were obscured from vision, while 5% of birds were recorded flying in or above the Rotor Swept Area.

A variety of other bird species were also recorded, including:

- Generalist bird species common in modified landscapes, such as open paddocks, including Magpie Lark, Willie Wagtail and Australasian Pipit*;*
- Woodland bird species using linear patches of native and non-native vegetation along roadsides and other bushland in the study area, such as Brown Treecreeper, Brown Thornbill, Spotted Pardalote and White-plumed Honeyeater*;*
- Water bird species using wetlands, dams and streams in the study area including Australian Shelduck, Black Swan *Cygnus atratus*, Dusky Moorhen *Gallinula tenebrosa,* Little Pied Cormorant and Straw-necked Ibis*;*
- Raptors foraging over paddocks, roadsides and waterbodies, including Australian Hobby, Black Kite *Milvus migrans*, Brown Falcon, Brown Goshawk *Accipiter fasciatus*, Little Eagle *Hieraaetus morphnoides*, Nankeen Kestrel, Swamp Harrier, Wedgetail Eagle, and Whistling Kite *Haliastur sphenurus; and,*
- Parrot species feeding on sowed crops and using large hollow-bearing gums, including Blue-winged Parrot, Crimson Rosella*,* Eastern Rosella*,* Purple-crowned Lorikeet and Red-rumped Parrot.

3.4.2 Raptors

Eight raptor species were observed flying in the study area. Seven species (Australian Hobby, Brown Goshawk, Brown Falcon, Little Eagle, Nankeen Kestrel, Wedge-tailed Eagle and Whistling Kite) were recorded in the Rotor Swept Area.

Raptors in general accounted for a low percentage (<2%) of birds recorded within and adjacent to the wind farm during the bird surveys.

3.4.3 Species Richness

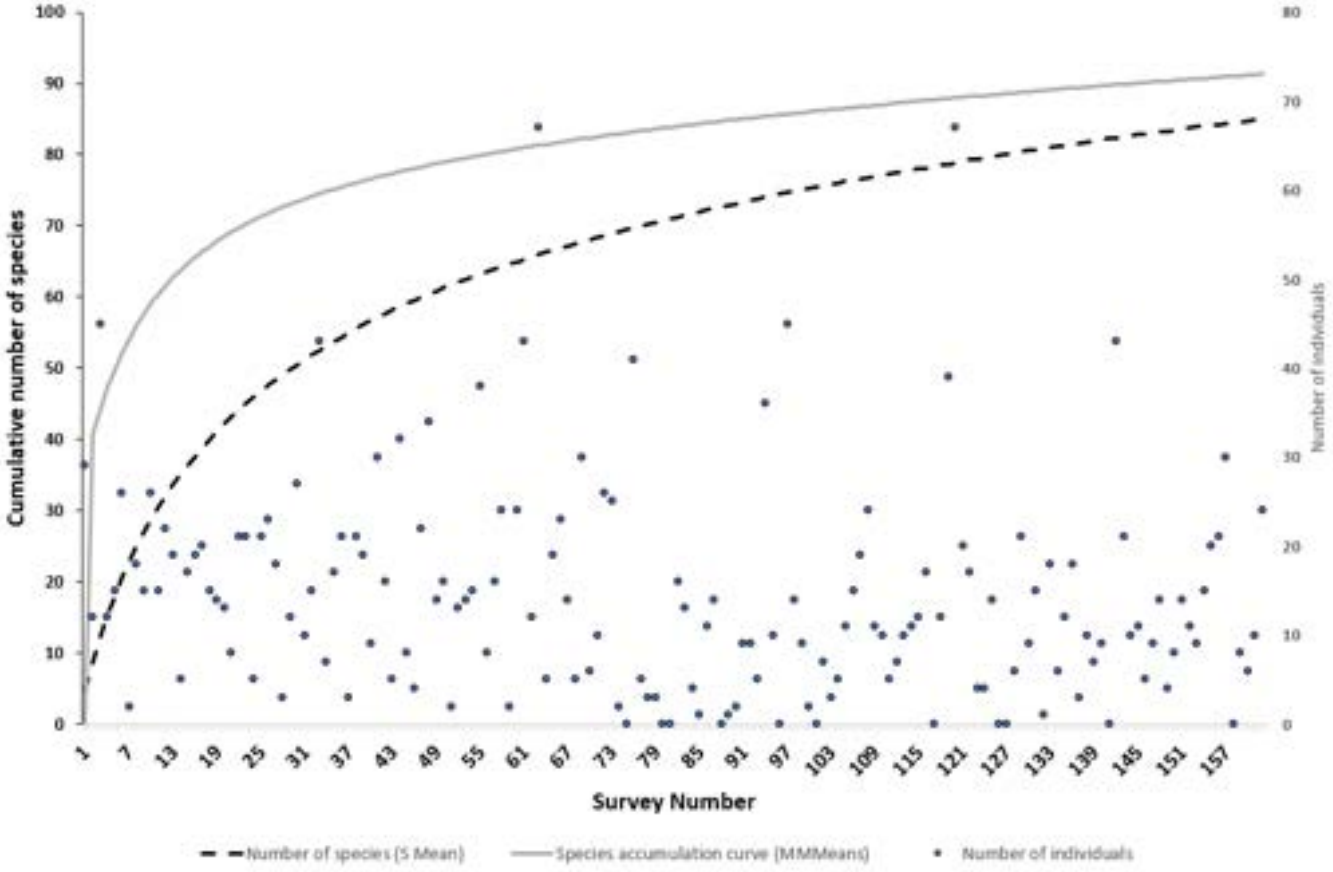
The predicted species richness estimate for the point count surveys was 91 species, which converts to a completeness of over 90% and means that an additional 4-5 species are predicted to occupy the study area but were not recorded. A greater number of predicted species relative to actual species is an 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 six months of survey. The results show a clear relationship between effort and the number of species detected (Graph 1).

3.4.4 Flight Heights

Nearly all birds observed (97%) during the point counts were either recorded on the ground or flying below the Rotor Swept Area (Table 19). 18 species were observed flying in the Rotor Swept Area (Australian Hobby,

Australian Magpie, Brown Goshawk, Eurasian Skylark *Alauda arvensis,* Little Corella *Cacatua sanguinea*, Little Eagle, Long-billed Corella *Cacatua tenuirostris*, Magpie-lark, Nankeen Kestrel, Purple-crowned Lorikeet, Raptor sp., Raven sp., Straw-necked Ibis, Wedge-tailed Eagle, Whistling Kite, White-necked Heron *Ardea pacifica* and Yellow-tailed Black Cockatoo *Calyptorhynchus funereus* (Table 20).

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, several sites were situated to capture any woodland and waterbird habitats in the study area.

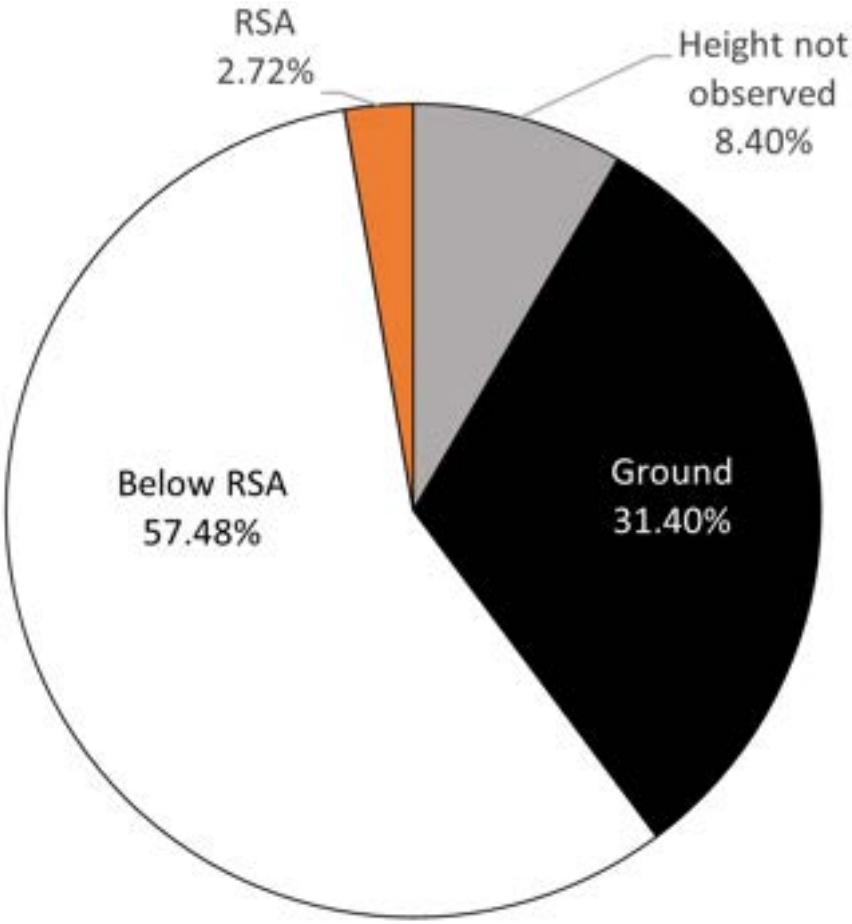


Graph 1. Species accumulation curve across the entire survey period. Source: Species accumulation curve produced using EstimateS (Colwell 2013).

Table 19. Summary of birds recorded at the varying flight heights

Flight Height	# of birds	% of birds
Height not observed	235	8.40%
Ground (0 metres)	879	31.40%
Below RSA (1-<44m)	1609	57.48%

Flight Height	# of birds	% of birds
RSA (44-<252m)	76	2.72%
Above RSA (>252m)	0	0.00%



Graph 2. Percentage of birds recorded below (RSA), at rotor swept area (RSA) height (44 – 252 metres), during the survey period.

While six raptor species and two waterbird species were recorded flying within the Rotor Swept Area, several parrot, waterbird and raptor species are also likely to utilise heights within and above RSA on occasion. Large parrots are more frequently recorded flying below the RSA during foraging activity, which is demonstrated in the bird utilisation survey data with several species predominantly recorded below the Rotor Swept such as Little Corella, Yellow-tailed Black-Cockatoo and Long-billed Corella. However, many parrot species may fly in the Rotor Swept Area during longer flights as they move daily between roosts and feeding areas.

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.

Table 20. 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	Below RSA *	Ground *	RSA *	Total
Australasian Pipit	0	8	14	0	22
Australian Hobby	1	4	0	2	7
Australian Magpie	58	151	226	7	442
Australian Raven	7	50	14	0	71
Australian Reed-Warbler	2	0	0	0	2
Australian Shelduck	2	14	88	0	104
Australian Wood Duck	0	22	100	0	122
Black Kite	1	0	0	0	1
Black Swan	0	0	130	0	130
Black-Faced Cuckoo-Shrike	1	5	0	0	6
Blue-Faced Honeyeater	1	3	0	0	4
Blue-Winged Parrot	0	4	0	0	4
Brolga	0	4	6	0	10
Brown Falcon	2	6	0	0	8
Brown Goshawk	0	0	0	1	1
Brown Headed Honeyeater	0	2	0	0	2
Brown Quail	0	6	0	0	6
Brown Songlark	0	1	0	0	1
Brown Thornbill	4	48	0	0	52
Brown Treecreeper	0	4	0	0	4
Buff-Rumped Thornbill	0	43	0	0	43
Common Bronzewing	0	1	0	0	1
Common Starling	0	60	0	0	60
Crested Pigeon	0	2	0	0	2
Crimson Rosella	1	4	0	0	5
Dusky Moorhen	0	0	15	0	15
Eastern Rosella	0	25	0	0	25
Eurasian Coot	0	0	17	0	17
Eurasian Skylark	31	27	12	5	75
European Goldfinch	0	37	0	0	37

Species (Common Name)	Height not observed	Below RSA *	Ground *	RSA *	Total
Flame Robin	0	8	0	0	8
Galah	0	56	1	0	57
Golden Headed Cisticola	6	21	9	0	36
Grey Currawong	0	4	0	0	4
Grey Fantail	3	19	4	0	26
Grey-Shrike Thrush	9	6	2	0	17
Horsfeld Bronzed Cuckoo	0	1	0	0	1
House Sparrow	0	90	0	0	90
Little Corella	0	14	20	10	44
Little Eagle	0	0	0	2	2
Little Pied Cormorant	0	2	0	0	2
Little Raven	10	188	78	3	279
Little Wattlebird	0	3	0	0	3
Long-Billed Corella	5	6	20	2	33
Magpie-Lark	25	9	7	1	42
Masked Lapwing	3	11	10	0	24
Musk Lorikeet	5	0	0	0	5
Nankeen Kestrel	0	17	0	3	20
New Holland Honeyeater	0	7	0	0	7
Noisy Miner	6	4	0	0	10
Pacific Black Duck	0	5	11	0	16
Parrot Spp.	0	2	0	0	2
Purple Swamp Hen	0	0	2	0	2
Purple-Crowned Lorikeet	0	1	0	9	10
Raptor Sp.	0	0	0	1	1
Raven Sp.	0	5	0	4	9
Red Rumped Parrot	2	43	0	0	45
Red Wattlebird	1	30	0	0	31
Restless Flycatcher	3	2	1	0	6
Rufous Songlark	0	1	0	0	1
Rufous Whistler	0	1	0	0	1
Scarlet Robin	1	1	0	0	2
Silver Gull	0	0	2	0	2
Silvereye	0	4	0	0	4
Spotted Pardalote	1	0	0	0	1

Species (Common Name)	Height not observed	Below RSA *	Ground *	RSA *	Total
Straw Necked Ibis	0	0	63	3	66
Striated Pardalote	10	24	2	0	36
Stubble Quail	1	0	6	0	7
Superb Fairywren	10	130	14	0	154
Swamp Harrier	0	1	0	0	1
Tree Martin	0	8	0	0	8
Wedge Tailed Eagle	6	4	0	1	11
Weebill	0	3	0	0	3
Welcome Swallow	0	146	0	0	146
Whistling Kite	0	6	0	10	16
White Eared Honeyeater	1	0	0	0	1
White Ibis	0	36	0	0	36
White-Faced Heron	0	7	4	0	11
White-Fronted Chat	0	3	0	0	3
White-Necked Heron	0	30	0	8	38
White-Plumed Honeyeater	5	26	0	0	31
Willie Wagtail	0	17	1	0	18
Yellow Thornbill	0	6	0	0	6
Yellow-Faced Honeyeater	1	12	0	0	13
Yellow-Rumped Thornbill	10	25	0	0	35
Yellow-Tailed Black Cockatoo	0	33	0	4	37

Note: * Ground – 0 metres; Below RSA – 1-<44 metres; RSA 44-<252 metres; Above RSA > 252 metres**;** Bolded species are those which were recorded flying with the RSA.

3.5 Microbat Surveys

3.5.1 Species Records

There are no historical records of any National or State significant microbats within a 10-kilometre radius of the Project Area (DEECA 2023d).

3.5.2 Survey Results

A total of 11 native bat species were detected during the bat surveys, including Chocolate Wattled Bat *Chalinolobus morio*, Eastern Falsistrelle *Falsistrellus tasmaniensis*, Gould's Wattled Bat *Chalinolobus gouldii*, Inland Broad-nosed Bat *Scotorepens balstoni*, Large Forest Bat *Vespadelus darlingtoni*, Little Forest Bat *Vespadelus vulturnus*, South-eastern Freetail Bat *Mormopterus ridei* and White-striped Freetail Bat *Austronomus australis*. In addition, a further three calls were identified down to the genus level (*Nyctophilus* sp. *Vespadelus* sp., and *Ozimops* sp.).

No calls were recorded that could be attributed to a specific significant microbat species. However, during the third round of microbat surveys (19 October – 17 November 2022), the call complex for the State significant Eastern Bent-wing Bat (listed as Critically Endangered on the FFG Act Threatened List (DEECA 2023e) was recorded at one of the Anabat detectors. The call detected show similar parameters to the species as it was at the lower end of the call frequency (i.e. 44kHz), however, the frequency was not consistent with a typical call from Eastern Bent-wing Bat, and was considered more likely to be Large Forest Bat which was positively identified when calling at less than 43kHz (Rob Gration, EcoAerial. *pers. comms*. 2023).

The allocation of calls to a call complex is a conservative outcome in the event when a particular species cannot be ruled out based on frequency and geographic location. Due to this, the call has been assigned to the call complex (Rob Gration, EcoAerial. *pers. comms*. 2023).

During the fourth round of microbat surveys (23 February – 27 March 2023) the call complex for Eastern Bent-wing Bat and Southern Bent-wing Bat was recorded at nine of the 16 microbat detectors. The below call image (Plate 21) is indicative of Eastern Bent-wing Bat and Southern Bent-wing bat call complex based on several curved pulses with relatively long characteristic frequency and downward tail. The call complex was assigned in this instance due to the overlapping distribution of Eastern Bent-wing Bat, Southern Bent-wing Bat and Chocolate Wattled Bat. If the characteristic frequency was longer, it would confirm the present of Southern Bent-wing Bat however the call is more consistent with Chocolate Wattled Bat. However, in the absence of a definitive call that can be attributed to a single species, these calls have subsequently been labelled as the call complex (Rob Gration, EcoAerial. *pers. comms*. 2023).

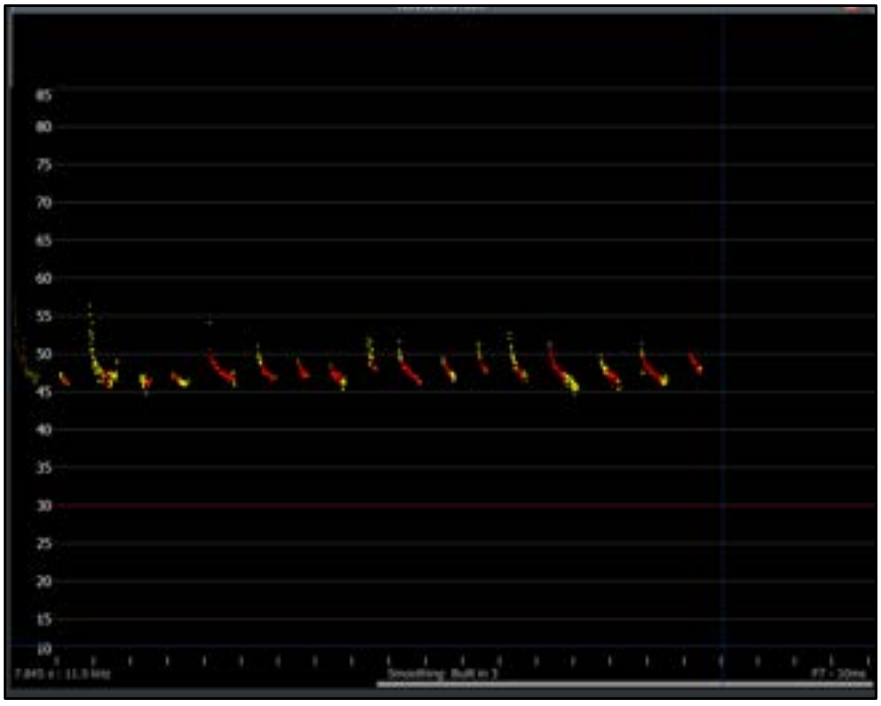


Plate 21. Indicative call complex of Eastern Bent-wing Bat and Southern Bent-wing Bat (EcoAerial, 2023)

3.6 Striped Legless Lizard Habitat Assessment

The habitat quality assessments undertaken on 7 June 2023 identified Low-Moderate quality habitat for Striped Legless Lizard along Rankin Road and Willowvale Road. Low quality patches generally comprised of grasses >50cm with tussock grasses (Wallaby-grass *Rytidosperma* spp., Spear-grass *Austrostipa* spp., Kangaroo Grass *Themeda* spp., and Tussock-grass *Poa spp.*) and weed cover (*Phalaris aquatica*) between 40-70%. One medium quality patch of habitat was also identified containing a higher proportion of native grasses as well as embedded rock. All patches of Striped Legless Lizard habitat were isolated and small in size (between 82m^2 and 712m^2).

A summary of the habitat patches and the quality score is provided below in Table 21.

Table 21. Striped Legless Lizard habitat quality assessment

Patch ID	Vegetation Community	Habitat Quality Score	Area (hectares)
PG1e	-	Low	0.031
PG1g	-	Low	0.009
PG1h	-	Low	0.026
PG1e	-	Low	0.012
PG1	-	Low	0.019
PG1	-	Low	0.071
PG1e	-	Moderate	0.009
PG1c	-	Low	0.008
PG2	NTGVVP*	Low	0.056

Note: * = Natural Temperate Grassland of the Victorian Volcanic Plain

Based on the results of the habitat quality assessment and small, isolated, fragmented areas of potential Striped Legless Lizard habitat, it is considered unlikely that a population of Striped Legless Lizard is present. Further, a maximum of 0.330 hectares of low quality potential habitat is proposed to be impacted. Therefore, a significant impact to an important population of the species (if present) is considered unlikely to occur (DSE 2011). As such, targeted surveys have not been undertaken. Additional information is provided below in Section 3.8.2.

3.7 Golden Sun Moth

There are four documented Golden Sun Moth records in the VBA dated between 2011-2020 within a 10-kilometre radius of the Project Area (DEECA 2023d). No Golden Sun Moth were detected within the Project Area during the targeted surveys. A summary of weather conditions and survey results is provided in Table 22.

Targeted surveys focused on areas of potential habitat that were located within, or adjacent to the proposed development footprint, including patches of Plains Grassland and Grassy Woodland, as well as areas that were not defined as a patch, but were made up of vegetation where at least 10% of the ground layer was comprised of preferred food species (i.e. Wallaby-grass, Spear-grass and/or Kangaroo Grass).

Table 22. Golden Sun Moth survey site weather conditions and results

Date	Survey times	Temperature (°C) (start and end of survey)		Wind (km/hr)	Cloud cover (%)	No. of days since rain	No. Golden Sun Moth recorded
19/12/2022	11:00 – 14:55	20.8	25.0	9.6	0	5	0
7/01/2023	10:30 – 14:15	20.6	25.8	22	0	6	0
13/01/2023	11:00 – 14:10	20.4	26.8	19.4	30	10+	0
17/01/2023	11:00 – 14:25	24.6	32.7	26	80	10+	0
17/12/2023	10:45 – 13:50	21.1	25.0	19.2	1%	3	0
23/12/2023	11:30 – 14:00	20.6	22.7	14.8	0%	4	0
29/12/2023	13:00 – 16:00	20.7	24.0	16.0	0%	2	0
05/01/2024	10:30 – 14:00	22.5	26.4	9.3	1%	2	0

3.7.1 Habitat Assessment

The general Project Area supported large open areas of non-native grasses and was dominated by Toowoomba Canary-grass and Yorkshire Fog. Flora species that are known to be the preferred food choice for Golden Sun Moth, such as Wallaby-grass, Spear-grass *Austrostipa* spp., were generally present in narrow, discrete areas located in road reserves, isolated from other areas of potential habitat, and surrounded by Toowoomba Canary-grass or by modified agricultural paddocks.

Low lying areas within the Project Area contained Plains Sedgy Wetland and Plains Grassy Wetland along waterways, which supported unsuitable habitat for Golden Sun Moth due to the high proportions of rushes and waterlogged soil.

Larger bands of Wallaby-grass and Kangaroo Grass occurred along road reserves along Willowvale Road and Rankin Road providing potential habitat for Golden Sun Moth (Plate 21; Plate 22). These areas were the focus for the targeted surveys, however no Golden Sun Moth were recorded during the surveys.

Plate 22. Potential habitat for Golden Sun Moth (Ecology and Heritage Partners 17/01/2023)

Plate 23. Potential habitat for Golden Sun Moth (Ecology and Heritage Partners 17/01/2023)

3.8 Grey-headed Flying-fox

3.8.1 Distribution in the Project Area

The nearest known roosting camps for Grey-headed Flying-fox are at Hexham, approximately 60 kilometres south west and Colac, approximately 60 kilometres south of the study area (DCCEEW 2023b). Recent correspondence with DEECA has also identified a camp with numbers in the low thousands at Lismore, approximately 20 kilometres south of the study area (Geoff Brooks, DEECA, *pers. comms*. 2023). The presence of this camp was confirmed by Ecology and Heritage Partners in June 2023. The camp contained a number of large Cypress *Cupressus* sp. and Sugar Gum *Eucalyptus cladocalyx* trees that the Grey-headed Flying-fox were roosting within.

The study area is within the foraging range for Grey-headed Flying-fox using the Lismore camp. The species may visit or pass through the study area during nightly foraging activity or when moving to areas of more suitable habitat. A significant impact assessment for the species has been prepared in Section 6.1.

3.9 Nationally and State Significant Values

3.9.1 Flora

The VBA contains records of 11 nationally significant and 29 State significant flora species previously recorded within 10 kilometres of the study area (DEECA 2023d) (Figure 7; Appendix 2.4). The PMST nominated an additional 10 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2023a) (Appendix 2.4).

Targeted surveys were undertaken on several separate occasions to determine the presence of significant flora; once in November 2020, November 2022, May 2023 and June 2023. These surveys focused on native vegetation at select locations along road reserves prior to the finalisation of the current infrastructure footprint. One Nationally significant flora species, Spiny Rice-flower, was observed during the June 2023

surveys along Rankin Road and Willowvale Road, and one State significant flora species, Pale Swamp Everlasting *Coronidium gunnianum* was also observed along Rankin Road in the September 2023 assessment.

A number of flora Protected under the FFG Act were observed throughout the road reserves in the Project Area. As a result, the infrastructure footprint was revised to largely avoid these areas, given that the vegetation had the potential to support other significant flora and fauna species.

The vegetation within the Assessment Area surrounding the current infrastructure footprint was generally of low quality and did not contain the habitat values commonly associated with significant flora. Much of the vegetation was either modified (i.e. cropped or direct seeded exotic pasture), or roadsides dominated largely by exotic grasses such as Cocksfoot, Yorkshire Fog or Toowoomba Canary-grass. Potential habitat for several significant flora was present within the broader Project Area (i.e. Lismore – Pittong Road, Browns S Road and Rokewood – Skipton Road), however these areas are not proposed to be impacted.

In additional to the observed significant flora species, the VBA highlights that several further significant flora species have past records within the Project Area, including Yarra Gum *Eucalyptus yarraensis*, Clover Glycine *Glycine latrobeana,* White Sunray and Small Milkwort *Comesperma polygaloides.* Of these, several records for Spiny Rice-flower, Pale Swamp Everlasting and Small Milkwort occur along Rankin Road, which is within the Assessment Area (Figure 7). A discussion of these species and associated recommendations are provided in Table 23 and a description of each species is provided in Section 2.5.

Table 23. Assessment of significant flora species with a moderate or higher likelihood of occurrence within the Assessment Area

Scientific Name	Common Name	Likelihood	Recommendation
Nationally Significant Flora			
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	Recorded in Assessment Area. Spiny Rice-flower was observed along Rankin Road and Willowvale Road during targeted surveys. Most of the habitat within the Assessment Area was not suitable due to evidence of ground disturbance (i.e. ploughing/cropping).	Targeted surveys were completed and all individuals recorded are being retained. Implement mitigation to ensure that all individuals are avoided during construction and operation (See Section 8).
Leucochrysum albicans subsp. *tricolor*	White Sunray	Not recorded in Assessment Area. Targeted flora surveys undertaken in November 2020 and November 2022 were within the flowering period for the species. Observed in flower along Rokewood – Skipton Road in November 2022, distinct amongst the surrounding vegetation due to white bracts. Not observed within the Assessment Area and unlikely to occur due to modified/low quality condition of native vegetation observed.	No further surveys recommended as no impacts are proposed to areas where species was observed, and no other areas of suitable habitat were observed within infrastructure footprint.
Glycine latrobeana	Clover Glycine	Not recorded in Assessment Area. Not observed during vegetation assessments or targeted surveys, and no recent records within 10 km's of the Project Area. Potential habitat within study area often dominated by one or two native grass species in small, discrete patches, not likely to support the species.	No further surveys recommended as no areas of suitable habitat were observed within infrastructure footprint.

Scientific Name	Common Name	Likelihood	Recommendation
State Significant Flora			
Coronidium gunnianum	Pale Swamp Everlasting	Recorded in Assessment Area. Species observed in September 2023 along Rankin Road, and past records present along Rankin Road. Observed individuals were located in or adjacent to the drain on the eastern side of the road, where the cover of exotic vegetation was low and biomass was low.	Targeted surveys were completed and all individuals recorded are being retained. Implement mitigation to ensure that all individuals are avoided during construction and operation (See Section 8).
Comesperma polygaloides	Small Milkwort	Past records in Assessment Area. Species not observed during vegetation assessments or targeted surveys but has past records along Rankin Road. Rankin Road contained a mixture of native and exotic vegetation, with a high biomass, potentially concealing several flora species. Embedded rock was present in the road reserve, indicating that the ground has not been subject to extensive disturbance.	Targeted surveys were completed with no individuals recorded. Due to past records, species has the potential to occur along Rankin Road, hidden amongst the high biomass observed.
Eucalyptus yarraensis	Yarra Gum	Past records along Francis Lane, adjacent to Assessment Area. Species not observed during vegetation assessments or targeted surveys and considered unlikely to occur in the Assessment Area due to the limited number of trees recorded, of which were dominated by the species River Red-gum.	No further surveys recommended as species was not recorded in Assessment Area, and no impacts to areas containing trees occur on public land.

3.9.2 Fauna

The VBA contains records of 15 nationally significant and 24 State significant fauna species previously recorded within 10 kilometres of the study area (DEECA 2023d) (Figure 8). The PMST nominated an additional 14 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2023a) (Appendix 3.1).

Two Nationally significant species were identified during bird utilisation surveys: Blue-winged Parrot and Brown Treecreeper *Climacteris picumnus victoriae*. Two State significant fauna species were identified within the study area: Brolga and Little Eagle. Several calls in the Eastern Bent-wing Bat /Southern Bent-wing Bat call complex were recorded during bat surveys. The call complex was assigned in this instance due to the overlapping distribution of Eastern Bent-wing Bat, Southern Bent-wing Bat and Chocolate Wattled Bat. If the characteristic frequency was longer, it would confirm the present of Southern Bent-wing Bat however the call is more consistent with Chocolate Wattled Bat. However, in the absence of a definitive call that can be attributed to a single species, these calls have subsequently been labelled as the call complex (Rob Gration, EcoAerial. *pers. comms*. 2023).

A camp of Grey-headed Flying-fox in the low thousands has been identified at Lismore, approximately 20 kilometres south of the Project Area. The species may utilise foraging habitat within the Project Area.

Targeted surveys for the nationally significant Golden Sun Moth did not record any individuals, and due to the isolated, fragmented nature of the areas of potential habitat, a significant population of the species is unlikely to occur within the Assessment Area.

Although potential habitat for Striped Legless Lizard is present, it is of low quality, and present in small, discrete patches within a larger agricultural and disturbed landscape.

A significant impact assessment for nationally significant fauna species has been undertaken in Section 6.1.

Nationally significant species with the highest likelihood of occurrence are addressed below. The State significant Brolga is addressed in Section 5.2.1.1

3.9.2.1 Nationally Significant Fauna

Blue-winged Parrot

A partial migrant, Blue-winged Parrot was recently listed as Vulnerable under the EPBC Act (effective date 31 March 2023), due in part to significant decline in reporting rates across their core range in Tasmania and Victoria (DCCEEW 2023c). During the non-breeding season (i.e. autumn to early spring), the species is distributed northern Victoria (Figure 9), eastern South Australia, south-western Queensland and western New South Wales, with some birds reaching south-eastern New South Wales and eastern Victoria, particularly on the southern migration, whereby variable numbers migrate across Bass Strait to breed in Tasmania (Higgins 1999).

Blue-winged Parrot occupy a range of coastal, sub-coastal and inland environments, through to semi-arid zones. They favour grasslands and grassy woodlands and are often found near wetlands, but may occupy modified landscapes such as paddocks and golf-courses (Higgins 1999; Holdsworth *et al.* 2021). Blue-winged Parrot use tree hollows or stumps to nest and lay eggs. This species primarily forage on/near the ground for seeds from a range of native and introduced grasses, herbs, and shrubs (Higgins 1999, DCCEEW 2023c).

Such foraging behaviour is evident by way of 100% of Blue-winged Parrot observations (i.e. four out of four) recorded the species below the rotor swept area (1-44 metres) (Table 20). Similarly, four out of five Crimson Rosella observations were recorded below the rotor swept area, with the fifth observation unable to be determined. Eastern Rosella and Red-rumped Parrot was also recorded below the rotor swept area during 100% of observations (i.e. 25 and 45 records, respectively). In contrast, Purple-crowned Lorikeet was recorded once below the rotor swept area, but nine times between 45-252 metres (i.e. within the rotor swept area).

A review of bird and bat mortality across 15 Victorian wind farms between 2003 and 2018 (Moloney *et al.* 2019) did not identify any Blue-winged Parrot collisions, with parrot species in general only making up 0.88% of all bird collisions. Based on this, Blue-winged Parrot is considered unlikely to be significantly impacted by the proposed wind farm.

A significant impact assessment for Blue-winged Parrot is included in Section 6.1.2.1.

Brown Treecreeper

Brown Treecreeper was recently listed as Vulnerable under the EPBC Act (effective date 31 March 2023). Although Brown Treecreeper is recognised as being a species of interest in Lumsden *et al.* (2019), it is identified as having a *Low* risk of collision.

Brown Treecreeper is endemic to south-eastern Australia, with its range occurring from the Grampians in western Victoria through New South Wales, and extending to the Bunya Mountains in Queensland (DCCEEW 2023d). Within its range, the south-eastern subspecies mainly inhabits woodlands dominated by stringybarks

or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species. The subspecies is not usually found in woodlands with a dense shrub layer, and it is absent from heavily degraded woodlands and steep rocky hills (DCCEEW 2023d).

Brown Treecreeper tend to nest and roost in eucalypt tree cavities, making hollows essential for the species (Noske 1982). Breeding takes place from July to February across its range (DCCEEW 2023d).

The species is known to forage on the ground and within the tree canopy on insects and larvae, and is also known to drink nectar and eat sap from eucalypts (DCCEEW 2023d). This behaviour is consistent with the observation s made by Ecology and Heritage Partners during the bird utilisation surveys where all observation of the species were below RSA (Table 20).

The main threats to Brown Treecreeper include habitat loss and fragmentation due to land clearance for agriculture, habitat degradation caused by over-grazing, inappropriate fire regimes, and territorial competition – particularly from Noisy Miner *Manorina melanocephala*.

Given that the species is known to forage at ground or canopy level (DCCEEW 2023d), and with no known specimens having been recorded during mortality monitoring (Moloney *et al.* 2019), Brown Treecreeper is considered highly unlikely to be significantly impacted by the proposed wind farm.

A significant impact assessment for Brown Treecreeper is included in Section 6.1.2.1.

Striped Legless Lizard

There are four past records of the nationally significant Striped Legless Lizard *Delma impar* within 10 kilometres of the Project Area. Striped Legless Lizard is known to occur in lowland tussock grassland habitats in temperate south-eastern Australia (Coulson 1990), where the species has a limited and patchy distribution. The major type of grassland known to support Striped Legless Lizard is the Western (Basalt) Plains Grassland community, and the majority of sites in Victoria occur on cracking clay soils with at least some surface rock which provides shelter (Cogger 1996; Coulson 1995).

Limited areas of suitable habitat were present in the Assessment Area, generally restricted to narrow linear patches of grassland in road reserves. These areas often had a sparse cover of native vegetation and higher presence of bare ground, dominated by smaller tussock grasses such as Wallaby-grass and Spear-grass (Section 3.6). Impacts within areas that contained potential habitat are limited to two locations within the Assessment Area where the infrastructure footprint impacts on road reserves, providing access from private land onto the existing roads. This occurs near the southern end of the Project Area along Lismore – Pittong Road, along Rankin Road and along Willowvale Road.

Based on the results of the habitat quality assessment and small, fragmented area of Striped Legless Lizard habitat proposed to be impacted (0.330 hectares), targeted surveys are not recommended as a significant impact to an important population of the species is considered unlikely (if present) (DSE 2011). An Important population of Striped Legless Lizard is defined as (DSE 2011):

- key source populations either for breeding or dispersal;
- populations that are necessary for maintaining genetic diversity; and/or,
- populations that are near the limit of the species range.

The following criteria are also considered when determining whether a site has the potential to support an important population. Habitat is considered unlikely to support an important population if it is:

- Less than 0.5 hectares;
- Small, isolated areas of habitat which are currently under pressure, or are likely to experience long-term pressures (for example sites located within urban settings, such as adjacent to factories or in residential subdivisions); and,
- Small sites which support marginal or low quality habitat (for example dominated by high threat weeds).

The largest patch size identified during habitat assessments was 0.071 hectares and was considered low quality habitat (Section 3.6).

Grey-headed Flying-fox

Grey-headed Flying-fox *Pteropus poliocephalus* is currently listed as vulnerable under the EPBC Act (DCCEEW 2023b) and vulnerable under the FFG Act (DEECA 2023e). Grey-headed Flying-fox has been identified as a species of interest for wind farms in Victoria (Lumsden *et al.* 2019).

The species occurs in the coastal belt from Rockhampton in central Queensland to Mt Gambier in South Australia (Menkhorst and Knight 2011). Only a small proportion of the range is in use at any one time as the species selectively forages dependant on the availability of food. As a result, patterns of occurrence and relative abundance vary greatly between seasons and years.

Although there are no documented records of Grey-headed Flying Fox within 10 kilometres of the Project Area (DEECA 2023d), a camp is known to occur near Lismore, approximately 20 kilometres to the south of the proposed project. The Lismore camp was visited during the project site assessments, where the species was observed roosting.

The Grey-Headed Flying-fox is known to be highly mobile within the distribution of the national population and is known to be fluid dependant on the abundance and distribution of food sources. The species typically commutes daily from the colony site to foraging areas, usually within 15 kilometres of the day roost site (Tidemann 1999). Grey-Headed Flying-fox have been recorded foraging up to 50 kilometres from their roost to different feeding areas in search of food when scarce (Tidemann and Nelson 2004), and there is typically a mass exodus of the roosting site at dusk (Parry-Jones and Augee 1992).

This is further supported by advice provided by Rodney van der Ree (EII 2019) who states that the species usually forages within 15-20 kilometres of the day roost site, although they have been recorded foraging as far as 50 kilometres from their roost in search of food.

A census of Grey-Headed Flying-fox occurred in May 2005 with a total of 674,000 individuals recorded (Birt 2005; Eby 2004). More recent assessments as part of the National Flying-fox Monitoring Program placed the estimated population of the species at around 700,000 individuals (CSIRO 2019).

Therefore, it is considered that there is the potential for Grey-headed Flying-fox from the Lismore camp to opportunistically visit the Project Area during nightly foraging activities.

The species has also become an emerging issue at wind farms with a number of mortalities recently recorded due to turbine strikes at other wind farms in the broader locality (Melanie Savage, DEECA, *pers. comms*. 2023).

With the presence of the Lismore Grey-headed Flying-fox camp located 20 kilometres southwest of the study area, with numbers in the low thousands, there is the potential for impacts to the species as they move through the landscape to forage however this impact is not considered to be significant (Section 6.1).

Southern Bent-wing Bat

A call complex that included Southern Bent-wing Bat (SBwB) was recorded during the fourth round of microbat surveys (as discussed in section 3.5.1). Based on this call complex recording, the potential presence of Southern Bent-wing Bat within the Project Area was considered as below.

The Draft National Recovery Plan (Lumsden and Jemison 2015) notes that habitat critical to the survival of Southern Bent-wing Bat includes the two regularly used maternity sites (Warrnambool and Naracoorte) and non-breeding roosting caves scattered throughout the distribution range for the species. Key foraging areas and potential migration paths are also considered critical habitat.

The location of individual roosting caves in Victoria is not published, in order to reduce the risk of increased visitation leading to disturbance. During over-wintering surveys of roost sites, undertaken in June 2011, not all individuals documented in the maternity sites over summer could be accounted for during any of the winter surveys. This may indicate that there are unknown roost sites, or that bats are roosting in other structures at this time of the year. As such, the eastern extent of the species' distribution is not yet fully understood. Monitoring has been undertaken in key roosting caves in Victoria since 2013, using bat detectors recording most nights, to investigate relative levels of activity and seasonal use of caves, while searches for new roosting caves and monitoring of population size in the main non-maternity caves, especially in Victoria, is ongoing (DAWE 2021; DELWP 2020b). Further, it is acknowledged that additional undiscovered/reported sites may present within the subspecies' distribution range.

The nearest known significant roosting caves for Southern Bent-wing Bat are Pomborneit cave approximately 65 kilometres to the south, and O'Keefe's cave, approximately 80 kilometres southwest of the Project Area, near Timboon. Maternity and roosting caves are also present further to the south and west, such as the maternity cave at Warrnambool.

A desktop geomorphological assessment of potential roosting caves within 80 kilometres of the wind farm boundary was undertaken by Wakelin Associates (2023). The assessment identified a number of potential roosting sites in the surrounding landscape however none are known to contain significant bat populations (i.e. only occasional bats observed) with the exception of Pomborneit Cave (Wakelin Associates 2023).

Skipton Lave Cave – located near Mt Widderin was previously known to support a large bat population until around 1866 when human interference resulted in bats abandoning the cave. No bats are currently known to use this as a roosting site (Wakelin Associates 2023). Another nearby cave at Mount Hamilton has not had any previous records of roosting bats, or guano, indicating that this site is, and has not previously been used by bats.

Recent research indicates that Southern Bent-wing Bat can travel up to 80 kilometres each night away from its roosting cave (van Harten *et al.* 2022). These distances have been tracked where an individual has flown from the maternity cave to a roosting cave (van Harten *et al.* 2022). Individuals have also been tracked travelling up to 140 kilometres in a single night (i.e. flying 70 kilometres to a roosting cave, and back again to the maternity cave) (DAWE 2021).

The Project Area is located approximately 65 kilometres from the nearest known roosting site (Pomborneit Cave), which is within the known foraging range of the species. The desktop geomorphological assessment acknowledged that the cave at Mt Widderin (approximately six kilometres west) has occasional bat observations however it is not a known roosting site for SBwB (Wakelin Associates 2023). There are no other known caves near the Project Area within the 80 kilometres flight radius from Pomborneit Cave that could be, or are known to be used as a roosting site (Wakelin Associates 2023). Therefore, it is highly unlikely that SBwB would forage at a distance of 65 kilometres from a known roosting/maternity cave – in a direction where no roosting caves are known to occur, and fly back again.

Southern Bent-wing Bat are unlikely to regularly visit the Project Area. This conclusion is based on the distance between the Project Area and known roosting sites (i.e. 65 kilometres) and foraging range for the species.

If the species was present, it is highly likely that it would have been detected during the microbat surveys undertaken for the project.

3.9.2.2 State Significant Fauna

Little Eagle

Little Eagle *Hieraaetus morphnoides* is currently listed as vulnerable under the FFG Act (DEECA 2023e). The species is widespread in Victoria, and is particularly common in open woodland habitats, as well as treeless farmlands, where they are known to forage (FFGSAC 2020).

Adult breeding Little Eagles reside in permanent home ranges and are known to exhibit site fidelity over several consecutive years (Debus 2017).

Threats to the species include loss of, and or disturbance to breeding habitat, urbanisation and poisoning from use of pindone to control rabbits (Debus 2017).

Little Eagle was one of seven raptor species observed during ecological assessments, with raptors in general accounting for a low percentage (<2%) of birds recorded within and adjacent to the wind farm during the bird surveys. In total, two Little Eagle were recorded, both flying within the RSA (Table 20).

There has been one known Little Eagle fatality recorded in Victoria as a result of turbine collision (Moloney *et. al.,* 2019). Potential impacts to raptors are discussed further in Section 5.2.1.

Eastern Bent-wing Bat

Eastern Bent-wing Bat is defined as 'species of interest' as outlined in Lumsden *et al.* (2019) and is generally found along the eastern coastline of Australia. The species is a cave dwelling bat that forages at and around canopy height in treed areas, and close to the ground in grassy areas (Churchill 2008). The species has previously been shown to fly consistently below turbine height, with no collision mortalities published in Victoria (Moloney *et. al.,* 2019).

Brolga

Brolga is listed as endangered under the FFG Act (DEECA 2023e). Brolga belong to the Crane family and are one of two species that occur in Australia (Marchant and Higgins 1993). In general, Cranes are large-bodied, long-legged and long-lived. Brolga exhibit these typical morphological characteristics.

Breeding pairs of Brolga can form long-term bonds with their mate (Marchant and Higgins 1993). Typically, pairs produce one or two offspring per breeding season and therefore, recruitment into the population is low.

In Victoria, the population is currently estimated to range between 400-600 birds (Swift 2023), although the population across northern Australia is estimated in the tens of thousands (Marchant and Higgins 1993).

A total of 10 Brolga were opportunistically observed during bird utilisation surveys undertaken as part of the project.

A detailed Brolga assessment is currently being undertaken (Section 3.3). The results of the Brolga assessment will be provided separately to this report once completed.

3.9.3 Ecological Communities

3.9.3.1 Nationally Significant Ecological Communities

Five nationally listed ecological communities are predicted to occur within 10 kilometres of the Project Area (DCCEEW 2023a):

- 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.

Two nationally significant ecological communities were observed within the Project Area, *Natural Temperate Grassland of the Victorian Volcanic Plain* (NTGVVP) and *Grassy Eucalypt Woodland of the Victorian Volcanic Plain* (GEWVVP). The preliminary vegetation assessment and significant flora surveys completed in September and November 2020, and November 2022 highlighted the key areas within the Project Area that supported significant vegetation, and as a result many of the significant areas were avoided during the revisions to the infrastructure footprint. This included patches along Lismore-Pittong Road, Funston Road/Spring Hill Road and Browns Road, all of which were avoided in the current infrastructure footprint and associated Assessment Area.

Several small patches of NTGVVP were recorded along the Ancillary Alignment along Willowvale Road, with a total of 3.6 hectares recorded across 15 patches of Plains Grassland (Figure 4). All patches were represented by a cover of Kangaroo Grass and Tussock-grass where the combined cover exceeded 50% of the total native perennial foliage cover.

The remaining patches of native vegetation within the Assessment Area that contained potential characteristics of the NTGVVP and GEWVVP ecological communities were either small, fragmented patches that did not meet the size requirements, or contained a high >50% cover of perennial exotic species, reducing the quality of the patches to the point where they no longer met the criteria that defines the communities.

3.9.3.2 State Significant Ecological Communities

All patches of Plains Grassland mapped within the Assessment Area meet the criteria for classification as the State significant Western (Basalt) Plains Grasslands Community, due to the presence of native grasses and several native herbs. The total extent mapped within the Assessment Area was 5.122 hectares, which correlates with the patches of Plains Grassland mapped on Figure 4.

3.9.4 Migratory Birds

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 (DEECA 2023d) indicates that 11 migratory bird species (Common Greenshank *Tringa nebularia*, Double-banded Plover *Charadrius bicinctus*, Fork-tailed Swift *Apus pacificus*, Glossy Ibis *Plegadis falcinellus*, Latham's Snipe *Gallinago hardwickii*, Red-necked Stint *Calidris ruficollis*, Rufous Fantail *Rhipidura rufifrons*, Satin Flycatcher *Myiagra cyanoleuca* Sharp-tailed, Sandpiper *Calidris acuminate*, White-throated Needletail *Hirundapus caudacutus*, Wood Sandpiper *Tringa glareola*) have been recorded within the project locality (Appendix 3.1). The PMST nominated an additional five migratory species that have the potential to occur within the project locality (Eastern Curlew *Numenius madagascariensis*, Pectoral Sandpiper *Calidris melanotos*, Curlew Sandpiper *Calidris ferruginea*, Common Sandpiper *Actitis hypoleucos* and Yellow Wagtail *Motacilla flava*).

Nocturnal call playback surveys were undertaken at Widderin Swamp in November 2020 and March 2021. Although several waterbirds were observed, including Australian Shelduck, Black Swan, Dusky Moorhen, Little Pied Cormorant and Straw-necked Ibis, no species of bird recognised under the migratory provisions of the EPBC Act were recorded during field surveys.

Migratory species are not considered likely to rely on habitat within Widderin Swamp, or other wetlands within close proximity to the project area on a regular or permanent basis given higher quality habitat is located elsewhere in the region, including Lake Corangamite and Lake Gnarpurt to the south, Lake Gellie, Lake Bolac, Pink Lake and several others to the west, and Lake Goldsmith to the north.

However, some migratory species may forage opportunistically within Widderin Swamp and other waterbodies within the Project Area during periods of high rainfall and inundation. However, it is noted that the majority of waterbodies within the Project Area have been modified to an extent through agricultural activity, with many having been channelised and drained.

While migratory species of bird may occasionally visit habitats within the Project Area and broader locality, the Project Area (including Widderin Swamp) is not considered to be classed as an 'important habitat' as defined under the *EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines* (DoE 2013), in that it does not contain:

- Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;
- Habitat utilised by a migratory species which is at the limit of the species range; or,
- Habitat within an area where the species is declining.

In addition, the Project Area is not considered to be classed as internationally important habitat for migratory shorebirds as defined in DoEE (2017) as wetland habitat within the Project Area does not regularly support:

- 1% of the individuals of a populations of one species or subspecies of waterbird; or
- A total abundance of at least 20,000 waterbirds.

Further, the Project Area is not considered to be classed as nationally important habitat for migratory shorebirds as defined in DoEE (2017) as wetland habitat within the Project Area does not regularly support:

- 0.1% of the flyway population of a single species of migratory shorebird; or
- 2,000 migratory shorebirds; or
- 15 migratory shorebird species.

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 Project Site 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.

3.9.4.1 White-tailed Needletail

White-throated Needletail is non-breeding migrant in Australia, and flocks of birds are known to visit the local area during is migration period (i.e. spring and summer). The species is a northern hemisphere breeding migrant, and has a large distribution across Australia, with a species range extending well beyond the Project Site. There is little knowledge of the species genetic diversity.

White-throated Needletail was not recorded during bird utilisation surveys when the species is known to occur in southern Australia. While it is likely that moderate numbers of birds could conceivably fly over the Project Area several days a year when the species is in southern Australia (i.e. between November and March), it is unlikely an ecologically significant population would fly over the site due to the species wide distribution. The species flight patterns may intersect with Rotor Swept Area height and flocks may fly across the Project Area during summer. While the species is known to collide with turbines in Australia (DAWE 2019), the risk for the species in the Project Area is low due in part due to their wide distribution, the species' highly manoeuvrable flight behaviour which enables birds to avoid turbines (Aaron Organ pers. obs.), and the fact that the species is highly mobile and has the ability to cover large distances in a day.

It is also unlikely that birds would fly over the Project Area for extended periods of time (i.e. only an occasional visitor). This is consistent with the DAWE Conservation advice regarding the assessment of threats to the

White-throated Needletail, namely that 'collision with wind turbines is of low severity and affects a small number of birds' (Page 5, DAWE 2019).

Given any proposed impact is not assessed as significant for the species (Section 6.1), specific mitigation measures are not proposed for White-throated Needletail. Ongoing monitoring of the species presence, utilisation of the Project Area and mortality will be undertaken as part of the BAM Plan.

3.9.5 Other Matters of NES

The Assessment Area does not support any other features corresponding to matters of NES protected under the EPBC Act (e.g. World or National Heritage Areas, Ramsar Wetlands). The nearest Ramsar wetland is the Western District Lakes, located approximately 10-20 kilometres upstream of the Project Area.

4 REMOVAL, DESTRUCTION OR LOPPING OF NATIVE VEGETATION (THE GUIDELINES)

4.1 Avoid and Minimise Statement

The project objective, with respect to native vegetation, has focused on opportunities to avoid impacts to native vegetation. This is reflected in the development of the infrastructure footprint, where many adjustments have been accommodated within the layout to firstly avoid impacts to native vegetation. A suite of site assessments have been completed to date to capture the native vegetation extent, quality and associated values present within proximity to the infrastructure layout, with frequent discussions and sharing of data between the project team that included measures to avoid impacts to these identified values.

The land within the Project Area has not been subject to any specific strategic level planning process, and the majority of the land falls within the Farming zone. However, some discrete areas are affected by an ESO or a VPO that intersect with the infrastructure footprint. This includes a VPO that covers sections of Willowvale Road, and two ESO's for the protection of water courses within the Assessment Area. The overarching objectives of clause 12.01 (Biodiversity), clause 52.17 (Native vegetation) and clause 52.32 (Wind Energy Facility) of the local planning schemes have also been considered in the development of the project.

The infrastructure footprint has sought to avoid impacts to native vegetation throughout much of the Project Area. This was achieved by understanding the general native vegetation extent within the initial 2020 Project Area, consideration of the historic land use within the Project Area, and subsequent detailed vegetation assessments. Much of the land has undergone modification for agricultural activity, such as cropping and exotic pasture, with these areas containing no native vegetation, with the expectation of a few native scattered trees. These areas were targeted for placement of the wind farm infrastructure, due to the ability to avoid impacts to native vegetation.

As a result, all 62 turbine locations avoid impacts to any mapped patches of native vegetation or scattered trees, as detailed in Appendix 4. Several scattered trees are located close to select turbines, but will be retained and protected (following the measures detailed in Section 8). All of the turbine access tracks located within areas of private property avoid native vegetation impacts. Numerous discussions, revisions and site visits where completed to achieve this outcome and confirm that the mapped values can sufficiently be avoided at these locations.

Access tracks are designed to avoid tree protection zones or patches of native vegetation, by either navigating around these values or committing to the use of existing tracks and roads. Minor upgrades will be required to roads that are anticipated to receive higher level of contractor traffic and will likely result in some minor impacts to native vegetation mapped within the road reserve (i.e. at the intersection of Rankin Road and Henderson Road). As a result, all access tracks associated with the project are considered new, despite the presence of any existing tracks, due to the likelihood that all access tracks will undergo some degree of upgrading/modification.

The primary access track that contained native vegetation was Rankin Road. Several patches of Plains Grassland were mapped along Rankin Road. Of these, five patches are proposed to be impacted, including:

- The removal of PG18 (Figure 5a);
- One eight meter cut through to of PG64 to provide access to Turbine 44 (Figure 5b); and,
- Three patches at the intersection of Henderson Road and Rankin Road (PG16, PG66, PG67 on Figure 5e).

The removal of PG18 is proposed to allow for the upgrade to Rankin Road. Both sides of the road at this location support native vegetation patches. The eastern side was identified to support a higher diversity of native flora, and contained the state significant Pale Swamp Everlasting, therefore the decision was made to restrict the road upgrades to the western side and avoid the east entirely.

To provide vehicle access to Turbine 44, an eight meter access crossover is proposed from Rankin Road into the adjoining private paddock. This access passes through a linear patch of Plains Grassland, fragmenting the patch into two smaller patches.

The impacts to the three patches at the intersection of Henderson Road and Rankin Road are unavoidable, as this will function as the main intersection to the site office and maintenance compound, and access to Turbine 47. Given that high levels of traffic are anticipate to use this area, the three linear patches are likely to be impacted as a result of the intersection upgrade. The concentrated use of this area has resulted from a revision to the site layout, where previously, additional upgrades and use of Rankin Road to the south was proposed. However, the identification of more patches of Plains grassland, significant flora and a Vegetation Protection Overlay resulted in the layout being refined to avoid any specific works associated with the project occurring south of the intersection.

The impacts to native vegetation along Rankin Road have been minimised to retain as much of the mapped native vegetation patches and scattered native shrubs as considered feasible, whilst still providing for safe access along the road.

Spring Hill Road, entering from Rokewood – Skipton Road, is the other main access that will be used for the project. No upgrades are proposed to this road that extend beyond the current road footprint, therefore all mapped native vegetation along this route is retained. The entrance from Rokewood – Skipton Road is also currently sufficient to support large transport vehicles, as it has two access points to allow easy turning from either the north west or south east.

The proposed reticulation route with the Project Area was reviewed to identify opportunities to avoid impacts to native vegetation. For the most part, the alignment occurs within modified agricultural paddocks devoid of native vegetation patches or scattered trees. A small impact will occur along Lismore – Pittong Road for the installation of electrical reticulation between Turbine 56 and Turbine 57, where the patch of Plains Grassland within the road reserve will be impacted (PG4 on Figure 5f).

An above ground power line spans between Turbine 57 and 58, which also contains two patches of native vegetation. The precise location of the power poles have been re-positioned to avoid impacting upon the native vegetation, and will be entirely avoided. No trees were recorded in either patch, therefore no lopping will be required for the power line. A further impact initially occurred to a patch of treeless Grassy Woodland that occurs within an unused road reserve (GW34 on Figure 4). To avoid this patch, it is proposed to bore the power underneath this linear section, which predominately contained Kangaroo Grass.

The primary impact to native vegetation will result from the Willowvale Road underground cabling installation. The entire Willowvale Road corridor was assessed, which determined that the western side of the road easement was more suitable to build the underground cabling. This will include a six (6) meter wide construction corridor, commencing from the western edge of the existing asphalt. The cabling will be installed within a 1.15 meter wide trench, approximately 1.4 meters deep, with benched edges created on either side to accommodate the depth during construction. All construction associated actives will occur from the eastern side of the trench, within the designated construction corridor or adjacent existing road shoulder and asphalt. A Vegetation Protection Fence will be installed along the western interface to prevent access into the area of retained grassland. The trench will be backfilled once construction is completed. The decision to install an underground route was to reduce the visual impact on the local amenity. The impacts along Willowvale Road result in the reduction in extent of 10 patches of Plains Grassland, where the eastern edge of these patches are impacted marginally to accommodate the construction corridor. None of the patches are entirely removed, and the corridor between the edge of construction and fence bordering the private paddocks to the west is retained, which is approximately 13 meters wide and generally supports Plains Grassland patches.

The project has sought to avoid and minimise all impacts to native vegetation based on the current layout and application of general construction constraints. There may be opportunities to further avoid impacts to native vegetation during construction by micro-siting access, however given the specific details of construction are generally unknown, it is submitted that there are no further feasible opportunities to avoid or minimise impacts to native vegetation

4.2 Residual Impacts to Native Vegetation

The below clearing scenario is based on the current infrastructure footprint and associated buffers as provided by RE Future on 5th (infrastructure layout) and 22nd (local road upgrades) September 2023 and was used to determine the overall native vegetation impacts associated with the project. The footprint includes all anticipated construction related impacts, including laydown areas, site offices, storage, road batters and drainage considerations. Specifically, the impact buffers applied around the infrastructure footprint by the client comprise:

- Access Tracks* – 5 metres wide, plus an additional 1.5 meters either side (eight meters width in total) to allow for the shoulder and drainage (except on existing roads such as Spring Hill Road where no additional impacts are anticipated outside of the existing road);
- Hardstands and other infrastructure – 5 metre buffer around outside of footprint;
- Reticulation (excluding Willowvale Road) – 1.5 metres either side (i.e. 3 metres overall);
- Willowvale Road underground cabling – 6 meter impact corridor; and,
- Pole disturbance – 3 metre construction buffer.

*One small section along Rankin Road crosses an existing drainage line, and water pools across the road during wet times creating a muddy area. This section of road has been increased to 10 meters to allow the installation of proper drainage and prevent access issues in the future.

All efforts to avoid and minimise have been considered through the design process and implemented where feasible. The vegetation impacts and offset requirements presented in this section are assumed to be the

worst-case scenario and may be reduced through further detailed design works undertaken for the project. The current intention is to inform the potential implications under the EE Act and EPBC Act.

Of the above, the total native vegetation impacts associated with the project are summarised below and shown on Figure 5.

- Electrical reticulation (excluding Willowvale Road) – 0.0027 hectares of Plains Grassland;
- Willowvale Road underground cabling – 0.214 hectares of Plains Grassland; and,
- Local Road Upgrades – 0.11 hectares of Plains Grassland.

4.2.1 *Vegetation Proposed to be Removed*

The study area is within Location 2, with 0.330 hectares of native vegetation proposed to be removed, which comprises 18 patches of native vegetation. As such, the permit application falls under the Intermediate assessment pathway. The overall impact to native vegetation, and total within each local government area, are provided in Table 24.

Condition scores for vegetation proposed to be removed are provided in Appendix 2.2.

Table 24. Removal of Native Vegetation (the Guidelines) (DELWP 2017).

	Corangamite Shire native vegetation impact	Golden Plains Shire native vegetation impact	Total native vegetation impact
Assessment pathway	Intermediate	Intermediate	Intermediate
Location Category	2	2	2
Total Extent (past and proposed) (ha)	0.040	0.290	0.330
Extent of past removal (ha)	0.000	0.000	0.000
Extent of proposed removal (ha)	0.040	0.290	0.330
Large Trees (scattered and in patches) to be removed (no.)	0	0	0
Small scattered trees to be removed (no.)	0	0	0
EVC Conservation Status of vegetation to be removed	Endangered (Plains Grassland)	Endangered (Plains Grassland)	Endangered (Plains Grassland)

4.2.2 *Offset Targets*

The offset requirement for native vegetation removal is 0.149 General Habitat Units.

A summary of proposed vegetation losses and associated offset requirements, including for each local government area, is presented in Table 25 and the Native Vegetation Removal (NVR) report is presented in Appendix 5.

Table 25. Offset Targets.

	Corangamite Shire offset requirement	Golden Plains Shire offset requirement	Total offset requirement
General Offsets Required	0.017 General Habitat Units	0.132 General Habitat Units	0.149 General Habitat Units
Large Trees	0	0	0
Vicinity (catchment/council)	Corangamite CMA / Corangamite Shire	Corangamite CMA / Golden Plains Shire	Corangamite CMA / Corangamite Shire and Golden Plains Shire
Minimum Strategic Biodiversity Value*	0.259	0.280	0.278

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

4.2.3 Offset Strategy

According to DEECAs Native Vegetation Offset Register (DEECA 2023f), there are 21 offset sites within the Corangamite Shire Council and 16 offset sites within the Golden Plains Shire municipality that can be used to satisfy the General Habitat Unit offset requirement for each local government area.

An offset register search statement identifying the relevant offsite sites is provided in Appendix 6, which provides evidence that the offset obligation can be secured without any difficulty should a permit be provided for the project.

5 POTENTIAL IMPACTS

Likely impacts associated with the project footprint and operation of the proposed renewable energy project 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 an undulating agricultural landscape with several low-lying drainage areas and waterways. Many of the minor roads are gravel, and some have narrow bands of native vegetation present. Most of the proposed access tracks are located in cleared paddocks or along existing roads to avoid impacts to higher quality areas of native vegetation along road reserves and prevent off-target damage to ecological values in the general vicinity of the infrastructure footprint. The primary impacts to native vegetation are at crossover locations, where access tracks are exiting private agricultural paddocks and crossing road reserves to connect to existing roads.

The potential construction related impacts are generally considered to be low provided a Construction Environment Management Plan is prepared to ensure the protection of retained vegetation prior to, and during construction, as well as control the spread of weeds and pathogens.

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

Ongoing monitoring of bird populations and mortalities at the wind farm, once built, would be required to ensure that bird mortality is at a low level. This will take the form of a Bird and Avifauna Management (BAM) Plan (Section 8).

5.2.1.1 Brolga

At the time of this report, there are no known reported incidents of Brolga colliding with wind turbines, Brolga although collisions with power lines have been reported in Victoria (Goldstraw & Du Guesclin 1991; Herring 2005). However, Brolga are considered vulnerable to collision with turbines due to their large size and relatively low mobility (Veltheim *et al.* 2019).

Although individual and flock reactions to wind turbines will vary, general avoidance has been documented, particularly at Macarthur Wind Farm where monitoring of Brolga behaviour post-construction suggests that Brolga have bred within 400 metres of operating turbines for at least six out of 10 years, and regularly forage within 100 metres of the operating turbines (Wood 2014; Wood 2017).

Level 1 and 2 Brolga investigations are currently ongoing across the Project Area and all wetlands within 10 kilometres. The intent of the Level 2 Brolga investigations is to better understand the utilisation of habitat within the ROI, and understand the flight behaviour and movement patterns of Brolga within the ROI. If required, a Level 3 assessment will also be undertaken to inform suitable mitigation measures to be implemented to ensure the project results in a *zero net impact* to the Victorian Brolga population.

5.2.2 Bats

Bats are susceptible to mortality caused by wind turbines (Arnett 2005; Bearwald *et al*. 2008, Kunz *et al*. 2007). In some habitats both a high number of individuals and species are struck by wind turbines, especially those bat species that undertake large scale annual migrations or feed primarily on insects (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). There is also potential for bats to die as a result of barotrauma caused by changes in pressure produced by the rotating turbines (Bearwald *et al*. 2008, Cryan and Barclay 2009).

Collisions with turbine blades are understood to be the most frequent interaction causing mortality or injury, although the cause 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.* 2008a).

A recent assessment of bird and bat mortality (Moloney *et. al.,* 2019) found that bats account for 44% of wind farm mortalities (445 total bat carcasses found from data available to February 2018). The majority of these mortalities were from White-striped Freetail Bat (67%), which is consistent with other bat mortality surveys (Bennett *et. al.,* 2022). 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).

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. bats found to be more active on clear, warm nights with low wind). Such factors are likely to influence the level of bat activity and thus mortality at wind farms (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 (Barclay 1985; Lumsden and Bennett 2000, 2005; Kunz *et al.* 2007, Horn et al. 2008a); and,
- The number of turbines contained within the wind farm.

5.2.3 Bats Species in the Study Area

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 call complex for Eastern bent-wing Bat and Southern Bent-wing Bat was recorded during microbat surveys. given the results from the surveys, the call complex is more consistent with Chocolate Wattled Bat (Rob Gration, EcoAerial. *pers. comms*. 2023) (Section 3.5.1).

Given the distance of the wind farm from the nearest known roosting cave it is considered unlikely that the nationally significant Southern Bent-wing Bat would regularly visit the Project Area to forage, as the distance the species would need to travel to subsequently return to Pomborneit Cave would be large (i.e. 130 kilometres). If it was present, it is highly likely that it would have been detected during the previous surveys.

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).

5.2.3.1 Grey-headed Flying-fox

Grey-headed Flying-fox has been identified as a species of interest for wind farms in Victoria (Lumsden *et al.* 2019). The species has also become an emerging issue at wind farms with a number of mortalities due to turbine strikes at other wind farms in the broader locality (Melanie Savage, DEECA, *pers. comms*. 2023).

The Lismore camp is located approximately 20 kilometres to the south of the project, with Grey-headed Flying-fox usually travelling between 5 – 15 kilometres to forage at night (Tidemann 1999). However, the species has been known to travel up to 50 kilometres if food resources are scarce (Tidemann and Nelson 2004).

With the presence of the Lismore Grey-headed Flying-fox camp located 20 kilometres southwest of the study area, with numbers in the low thousands, there is the potential for collision risk to the species where food resources are scarce in closer proximity to the camp. However, given the broad spread of foraging habitat within the region (i.e. remnant eucalypts, fruit trees and eucalypt windrows) indicating that the species is unlikely to regularly fly through the windfarm site, this potential collision risk is highly unlikely to result in a significant impact to the species (Section 6.1).

Ongoing monitoring and mitigation of potential impacts to the species will be required as part of a Bat and Avifauna Management Plan (Section 0).

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 and the subsequent land clearance for agriculture. The Victorian Volcanic Plain and Central Victorian Uplands bioregions, with the Victorian Volcanic Plain being one of Victoria's most cleared bioregions, with native vegetation extent being greatly reduced in areas of private land (VEAC 2011). Future disturbance associated with human activities in these bioregions 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.

In addition to cumulative impacts associated with construction of the Moreton 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 wind farms within the vicinity of the study area include:

- Stockyard Hill Wind Farm – consists of 149 approved wind turbines and generates up to 532 MW of energy. The Wind Farm is currently operating and is located approximately 35 kilometres west of Ballarat and starts approximately three kilometres north of the Project Area and extends for 30 kilometres in a north west direction;
- Chepstowe Wind Farm – generates up to 6.15 MW of energy. The Wind Farm is currently operating and is located approximately eight kilometres north of the Project Area;
- Berrybank Wind Farm - Stage 1 Wind Farm and Berrybank Stage 2 Wind Farm generates up to 180.6 MW (Stage 1), 109.2 MW (Stage 2). The Wind Farm is currently operating and is located approximately 16 kilometres east of Lismore and is approximately 9.5 kilometres south of the Project Area.

- Golden Plains Wind Farm (under construction) – Golden Plains Wind Farm will generate up to 1,330 MW of energy. The Wind Farm is currently under construction. It is located approximately 25 kilometres east of Lismore and is approximately 10 kilometres southeast of the Project.

The operation of the proposed Moreton Wind Farm will likely contribute to increased cumulative pressures within the broader landscape, although it is noted that the development footprint is generally sited within a predominantly cleared and uniform landscape.

Ongoing monitoring of bird and bat populations following commissioning of the Project will enable the proponent to identify and mitigate cumulative impacts as other renewable energy projects 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 Project Area. 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.

6 LEGISLATIVE AND POLICY IMPLICATIONS

6.1 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

The EPBC Act establishes a Commonwealth process for the assessment of proposed actions (i.e. project, development, undertaking, activity, or series of activities) that are likely to have a significant impact on matters of national environmental significance (NES), or on Commonwealth land. An action, unless otherwise exempt, requires approval from the Commonwealth Environment Minister if it is considered likely to have an impact on any matters of NES. The proponent is currently preparing a referral for the project under the EPBC Act.

A summary of potential impacts to matters of NES is provided in Table 26.

Table 26. Potential impacts to matters of NES.

Matter of NES	Potential Impacts
World Heritage properties	No. The proposed action will not impact any properties listed for World Heritage.
National Heritage places	No. 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, located approximately 10-20 kilometres upstream of the Project Area. The proposed development will not impact any wetlands of international significance.
Threatened species and ecological communities	The following threatened species and ecological communities were recorded: • Spiny Rice-flower • Blue-winged Parrot • Brown Treecreeper • Natural Temperate Grassland of the Victorian Volcanic Plain Habitat for a further two threatened species was observed for: • Striped Legless Lizard • Golden Sun Moth A camp for Grey-headed Flying-fox is located approximately 20 kilometres south of the Project Area.
Migratory and marine species	There is no marine habitat within the Project Area and the Project Area would not be classed as an 'important habitat' as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DoE 2013), in that it does not contain: • Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; • Habitat utilised by a migratory species which is at the limit of the species range; or, • Habitat within an area where the species is declining. 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.
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.

Matter of NES	Potential Impacts
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 project.

6.1.1 Significant Flora

Seven Spiny Rice-flower individuals were recorded within the Assessment Area. All seven individuals are located outside of the construction footprint and will be retained. No additional nationally significant flora species were recorded within the Assessment Area.

6.1.2 Significant Fauna

6.1.2.1 Blue-winged Parrot, Brown Treecreeper and White-throated Needletail

Two nationally significant fauna species were observed within the Project Area, Blue-winged Parrot and Brown Treecreeper. Both species are listed as Vulnerable under the EPBC Act.

While White-throated Needletail was not recorded within the study area during bird utilisation surveys, it could conceivably fly over the study area and ROI several days a year when the species is in southern Australia (i.e. between November and March) and utilise wooded areas within the Project Site for roosting and foraging activity on occasion.

A significant impact assessment for Vulnerable Blue-winged Parrot, Brown Treecreeper and White-throated Needletail is provided below in Table 27, which summaries that a significant impact is unlikely to these species as a result of the proposed wind farm.

An important concept for determining the potential significance of an impact under the EPBC Act is that of 'habitat critical to the survival' of a species. The EPBC Act Significant impact guidelines 1.1 (Commonwealth of Australia 2013) provides the following guidance for determining whether an action may affect habitat critical to the survival of a species:

- Habitat critical to the survival of a species or ecological community' refers to areas that are necessary:
- for activities such as foraging, breeding, roosting, or dispersal;
- for the long-term maintenance of the species or ecological community (including the maintenance of species essential to the survival of the species or ecological community, such as pollinators);
- to maintain genetic diversity and long term evolutionary development; or,
- for the reintroduction of populations or recovery of the species or ecological community.

Table 27. Significant impact assessment – Blue-winged Parrot, Brown Treecreeper and White-throated Needletail

Significant Impact Criteria	Blue-winged Parrot (Vulnerable) and Brown Treecreeper (Vulnerable)	White-throated Needletail
Lead to a long-term decrease in the size of an important population of a species	The Project Area is not considered to support an 'important population'* as it is not a key source for breeding or dispersal, is not necessary for maintaining genetic diversity and is not at the limit of these species known range. The project is unlikely to result in a significant disturbance to areas of suitable habitat for these species, as most of the native grasslands, woodlands and wetlands have been avoided. Four Blue-winged parrot and four Brown Treecreeper were observed during Bird Utilisation surveys. The removal of Large Trees and small areas of native grassland will not result in a long-term decrease in the size of an important population as the habitat proposed for removal is not critical to an important populations persistence. Both Blue-winged parrot and Brown Treecreeper are known to forage at the ground or canopy level, and as such, the risk of collision for these species is considered to be low. It is considered unlikely that the proposed activity will result in a long-term decrease to any important populations within, and immediate surrounds of the Project Area, as minimal impact to suitable habitat within and adjoining the Project Area is proposed to occur and the risk of direct impact to turbines is minimal for this species.	The population of White-throated Needletail is estimated at 10,000 individuals or more (Higgins 1999). While the species is known to collide with turbines in Australia, the risk for the species in the study area is low due in part due to their wide distribution, the species' highly manoeuvrable flight behaviour which enables birds to avoid turbines and the fact that the species is highly mobile and has the ability to cover large distances in a day. The loss of occasional individuals due to collision is not expected to result in the long-term decrease in the population of the species.
Reduce the area of occupancy of an important population	The Project Site is not considered to support an important population. Any individuals occurring in the project footprint would not be classified as an important population.	Given the wide distribution of the species along Australia's eastern and southern seaboard, the Project will not reduce the area of occupancy for White-throated Needletail.
Fragment an existing important population into two or more populations	Given the highly mobile nature of these species it is considered unlikely that the project would result in the fragmentation of any populations present within the Project Site.	The project will not fragment the population. Although the species may fly through the site, the species is also able to pass over or between turbines or go around the windfarm infrastructure
Adversely affect habitat critical to the survival of a species	No critical habitat for these species is listed under the EPBC Act, nor is the project footprint critical to the survival of these species.	Habitat critical to the survival of the species includes the breeding grounds in the Northern Hemisphere, as well as important non-breeding habitat. Given the native vegetation removal is predominantly located outside of large tracts of native vegetation, the impacted vegetation is not classified as critical habitat for White-throated Needletail.
Disrupt the breeding cycle of an important population	Not applicable. Any individuals potentially occurring in the project footprint would not be classified as an important population.	White-throated Needletail breeds in the Northern Hemisphere, so the Project will not disrupt the breeding cycle of the species.

Significant Impact Criteria	Blue-winged Parrot (Vulnerable) and Brown Treecreeper (Vulnerable)	White-throated Needletail
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project will remove small areas of potential habitat for these species, including potential foraging, roosting and breeding resources. Give the availability of higher quality habitat in the project locality and region, it is considered unlikely that these species would decline as a result of the proposed activity, and significant impacts are not likely to occur.	Habitat critical to the survival of the species includes the breeding grounds in the Northern Hemisphere, as well as important non-breeding habitat. The species is widely distributed, and the Project will not result in the species population numbers to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Assuming the implementation of appropriate mitigation measures, it is not likely that harmful invasive species would become further established as a result of the project.	With the implementation of appropriate mitigation measures, it is not likely that harmful invasive species would become further established as a result of the project.
Introduce disease that may cause the species to decline	It is not likely that disease would be increased by the project.	With the implementation of appropriate mitigation measures, it is not likely that any diseases would be introduced to the Project Site that would cause these species to decline.

Note: *An important population is a population that is necessary for a species' long-term survival and recovery. This may include species identified in recovery plans and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or;
- Populations that are near the limit of the species range.

Golden Sun Moth and Striped Legless Lizard

Habitat for Striped Legless Lizard and Golden Sun Moth, listed as Vulnerable, was observed within the Assessment Area. The infrastructure footprint impacts upon limited areas of suitable habitat, with impacts to road reserves throughout the Assessment Area limited to a few cross over points. The proposed impacts are not likely to result in a significant impact to the species, as the proposed impacts are minimal (≤0.330 hectares) and does not result in the removal of a significant area of potential habitat.

A significant impact assessment for the Vulnerable Striped Legless Lizard and Golden Sun Moth are provided below in Table 28, which summaries that a significant impact is unlikely as a result of the proposed wind farm.

Table 28. Assessment against the Significant Impact Guidelines for the vulnerable Golden Sun Moth and Striped Legless Lizard (DoE 2013).

Significant Impact Criteria	Golden Sun Moth (Vulnerable) and Striped Legless Lizard (Vulnerable)
An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	
1. Lead to a long-term decrease in the size of an important population* of a species.	The Project Area is not considered to support an 'important population'* of Golden Sun Moth or Striped Legless Lizard. The maximum area of disturbance to potential habitat is 0.330 hectares of low-moderate quality habitat, which occurs across 18 patches of Plains Grassland within the Project Area. Based on the area of potential impact, the action is highly unlikely to lead to the decrease in the size of an important population of Golden Sun Moth or Striped Legless Lizard.
2. Reduce the area of occupancy of an important population.	The Project Site is not considered to support an important population. Any individuals occurring in the project footprint would not be classified as an important population.
3. Fragment an existing important population into two or more populations.	Any existing populations are unlikely to be fragmented as a result of the action.
4. Adversely affect habitat critical to the survival of a species.	The proposed action will not adversely affect habitat critical to the survival of the species. While the proposed action will result in the removal of up to 0.330 hectares of habitat for the creation of access tracks associated with the Project Area, the existing habitat is not considered to be critical to the survival of Golden Sun Moth or Striped Legless Lizard, as it is already fragmented, of predominately low quality and isolated from other larger areas of nearby, confirmed habitat. Further, it is within a modified agricultural landscape, so is subject to ongoing edge effect in terms of weed invasion and habitat disturbance from exotic species.
5. Disrupt the breeding cycle of an important population.	The alignment is unlikely to be considered to support an 'important population' as: • The population is not necessary for the species' long-term survival or recovery; • A key source population for breeding or dispersal is not present; • The population is not considered necessary to maintain genetic diversity; and, • The population is not at the limit of the species range (DEECA 2023d).
6. Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.	Although a maximum of 0.330 hectares of habitat for Golden Sun Moth and Striped Legless Lizard is proposed to be removed as a result of the action, this habitat is already highly fragmented and isolated from other known populations due to road infrastructure and agricultural activities. While there is a potential impact to 0.330 hectares of habitat, this will be a one-off impact (during construction), and will not result in the modification of habitat, or decrease the quality or availability of habitat to the extent that either species will decline as a result of the action.
7. Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.	The construction of the action will result in a one-off impact. Provided appropriate management during the construction process ensures weed species, pollutants and/or pathogens are not inadvertently spread into areas of adjacent, retained habitat there is not considered to be a risk that invasive species will become established as a result of the action.

Significant Impact Criteria	Golden Sun Moth (Vulnerable) and Striped Legless Lizard (Vulnerable)
8. Introduce disease that may cause the species to decline.	The construction of the action will result in a one-off impact. Provided appropriate management during the construction process ensures weed species, pollutants and/or pathogens are not inadvertently spread into areas of adjacent, retained habitat there are not considered to be a risk that any diseases will be introduced that will cause the Golden Sun Moth or Striped Legless Lizard population to decline.
9. Interfere substantially with the recovery of the species.	Given the proposed area of soil disturbance is not anticipated to be greater than 0.330 hectares, this level of soil disturbance is not considered to substantially interfere with the recovery of the species.

Note: *An important population is a population that is necessary for a species' long-term survival and recovery. This may include species identified in recovery plans and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or;
- Populations that are near the limit of the species range.

Grey-headed Flying-fox

A significant impact assessment for the Vulnerable Grey-headed Flying-fox is provided below in Table 29, which summaries that a significant impact is unlikely as a result of the proposed wind farm.

Table 29. Assessment against the Significant Impact Guidelines for the vulnerable Grey-headed Flying-fox (DoE 2013).

Significant Impact Criteria	Grey-headed Flying Fox (Vulnerable)
Lead to a long-term decrease in the size of an important population of a species	The Project Area is not considered to support an 'important population'* as it is not a key source for breeding or dispersal, is not necessary for maintaining genetic diversity and is not at the limit of these species known range. The Lismore camp is estimated to support a population in the low thousands. The overall population was estimated to be approximately 680,000 in 2015, and is thought to be relatively stable (Westcott *et. al.,* 2015). Although there have been a number of mortalities recently recorded due to turbine strikes at other wind farms in the broader locality, the wind farm is located at the edge of the species usual foraging range (up to 15 kilometres [Tidemann 1999) from the Lismore camp (20 kilometres south), although the species has been known to travel up to 50 kilometres from a roost site (Tidemannn and Nelson 2004). Given the broad spread of foraging habitat within the broader region (i.e. remnant eucalypts, fruit trees and eucalypt windrows) indicates that the species is unlikely to regularly fly through the windfarm site. it is considered unlikely that the proposed activity will result in a long-term decrease to any important populations within, and immediate surrounds of the Project Area, as all suitable foraging habitat within and adjoining the Project Area is proposed to be avoided.
Reduce the area of occupancy of an important population	The Project Site is not considered to support an important population. Any individuals occurring in the project footprint would not be classified as an important population.
Fragment an existing important population into two or more populations	Given the highly mobile nature of the species it is considered unlikely that the project would result in the fragmentation of any populations present within the Project Site.
Adversely affect habitat critical to the survival of a species	No critical habitat for these species is listed under the EPBC Act, nor is the project footprint critical to the survival of these species.

Significant Impact Criteria	Grey-headed Flying Fox (Vulnerable)
Disrupt the breeding cycle of an important population	Not applicable. Any individuals potentially occurring in the project footprint would not be classified as an important population. Further, the species is likely to only pass through the study area or utilise it for foraging purposes.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The project will not result in the removal of any foraging habitat for this species which may be utilised by individuals residing in the Lismore camp. It is considered unlikely that the species would decline due to the proposed activity.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	It is not considered likely that harmful invasive species would become further established as a result of the project.
Introduce disease that may cause the species to decline	It is not likely that disease would be increased by the project.

Note: *An important population is a population that is necessary for a species' long-term survival and recovery. This may include species identified in recovery plans and/or that are:

- Key source populations either for breeding or dispersal;
- Populations that are necessary for maintaining genetic diversity; and/or;
- Populations that are near the limit of the species range.

6.1.3 Significant Ecological Communities

A total of 3.6 hectares of NTGVVP was recorded along Willowvale Road within the Assessment Area, and a total of 0.20 hectares is proposed to be impacted for the construction of the underground power cabling along Willowvale Road.

An assessment of the impact footprint against the significant impact guidelines for Critically Endangered ecological communities (DoE 2013) is provided below in Table 30.

Table 30. Assessment against the Significant Impact Guidelines for Critically Endangered Ecological Communities:

Significant Impact Guidelines 1.1 – Significant Impact Criteria for Critically Endangered Ecological Communities	
1. Reduce the extent of an ecological community.	The proposed action will result in a reduction in extent of the ecological community, with the proposed removal of a maximum of 0.20 hectares out of a mapped area of 3.6 hectares of the community within the Willowvale Road corridor. The proposed impacts are all directly associated with the construction of the underground power cabling, where the western edge of the construction footprint impacts upon the eastern edge of the NTGVVP patches, reducing their extent- but not removing any patches entirely.
2. Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	The NTGVVP community is present within several road reserves in the local region and is surrounded by a modified agricultural landscape. The 0.20 hectares proposed to be removed occurs within a road reserve Although access roads will be constructed through some road reserves, it is not considered that the community will be fragmented, or result in its ecological function significantly altered as a result of the proposed action due to the small nature of impact at each location within the construction footprint.
3. Adversely affect habitat critical to the survival of an ecological community.	The proposed action is not likely to adversely affect the long-term survival of the ecological communities, given that the majority of the mapped area of each community within the Assessment Area are being avoided by the proposed action (Figure 4).

Significant Impact Guidelines 1.1 – Significant Impact Criteria for Critically Endangered Ecological Communities	
4. Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	The proposed action will result in the removal of surface soil within the construction footprint required to construct and install reticulation. Soil and rock removal will only be taken to the extent necessary to facilitate the construction works. Soil will not be stockpiled outside of the activity area and will be reinstated as soon as possible. Given the small, localised nature of works within the impact areas supporting the ecological communities and the existing presence of the roads, groundwater levels, water drainage patterns and nutrient loads are unlikely to be affected by the proposed action.
5. Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.	The overall functionality of the impacted community will not be affected by the proposed action. This is due to the small, localised nature of the proposed impacts to the community, and the retention of the remainder of the community adjacent to the infrastructure footprint.
6. Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:	The overall quality of the ecological community is not likely to be affected by the proposed action. The community is present within existing road reserves in the broader region, and the installation of the underground power cabling will not cause a substantial reduction in the quality or integrity of the remaining ecological community. Appropriate management of the construction process and machinery will be used to ensure that any weed species, pollutants and/or pathogens are not inadvertently spread into areas supporting retained areas of NTGVVP.
a. assisting invasive species, that are harmful to the listed ecological community, to become established or;	
b. causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.	
7. Interfere with the recovery of an ecological community.	The proposed action is not likely to interfere with the ecological processes or recovery of the ecological community, due to the retention of larger, adjacent patches of the community.

6.1.1 Implications

It is understood that the proponent will be referring the action for assessment under the EPBC Act for legislative certainty

6.2 *Environment Effects Act 1978* (Victoria)

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. Actions that may be referred for an EES decision are discussed in Table 31.

The following implications are based on the current preliminary impact assessment. Further impact minimisation will be demonstrated via micro siting of infrastructure during the detailed design phase of the project.

Table 31. Referral criteria under the EE Act (DSE 2006).

Referral criteria	Potential Impacts
Individual potential environment effects Individual types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:	
Potential clearing of 10 hectares or more of native vegetation from an area that: • is of an EVC identified as endangered by DEECA in accordance with Appendix 2 of Victoria's Native Vegetation Management – A Framework for Action (DSE 2002); • is of Very High conservation significance (as defined in accordance with Appendix 3 of Victoria's Native Vegetation Management – A Framework for Action (DSE 2002); or, • is not authorised under an approved Forest Management Plan or Fire Protection Plan	**No.** A total area of 0.330 hectares of Plains Grassland native vegetation patches are proposed to be impacted. Plains Grassland is identified as an endangered EVC and the patches are all considered of Very High conservation significance.
Potential 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	**No.** Two threatened flora species were observed within the Assessment Area, Spiny Rice-flower and Pale Swamp Everlasting. No impacts are proposed to either species. Two threatened fauna species, Brolga and Little Eagle were recorded within the Project Area during the bird utilisation surveys. There are no known Brolga collisions with turbines in Victoria, while one Little Eagle fatality has been recorded. The call complex for Eastern bent-wing Bat and Southern Bent-wing Bat was recorded during microbat surveys however given the results from the surveys, the call complex is more consistent with Chocolate Wattled Bat. These species all have a widespread distribution range, and the removal of habitat within the Assessment Area is unlikely to result in a long-term loss of a significant proportion of known remaining habitat or population of these species within Victoria.
Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Dictionary of Important Wetlands in Australia'	**No.** The Project Area is not listed under the Ramsar Convention or in 'A Dictionary of Important Wetlands in Australia'.
Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long time	**No.** The project does not directly impact on any waterways within the Project Area and will implement mitigation measures to ensure that any adverse indirect impacts are avoided.
Potential extensive or major effect on the health, safety or well-being of a human community, due to emissions to air or water or chemical hazards or displacement of residents	Unknown. Outside the scope of this report.
Potential greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility	Unknown. Outside the scope of this report.

Referral criteria	Potential Impacts
A combination of potential environmental effects A combination or two or more of the following types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:	
Potential clearing of 10 hectares or more of native vegetation, unless authorised under an approved Forest Management Act or Fire Protection Plan	**No.** The current impact footprint proposes to remove a maximum of 0.330 hectares of native vegetation patches.
Potential extensive or major effects on landscape values of regional importance, especially where recognised by a planning scheme overlay or within or adjoining land reserved under the *National Parks Act 1975*	**No.** The Project Area is not within or adjoining a National Park. Two Environmental Significance Overlay's – Schedule 1 (ESO1) and Schedule 2 (ESO2) and one Vegetation Protection Overlay – Schedule 2 (VPO2) occur within sections of the Project Area, following a watercourse and along some roadsides. Impacts to vegetation in these areas is limited and will not result in any major effects on the landscape values sought to be protected by the overlays. Any works proposed within these areas must consider the decision guidelines listed in the relevant overlays.
Matters listed under the FFG Act: • Potential loss of a significant area of a listed ecological community; • Potential loss of a genetically important population of an endangered or threatened species; • Potential loss of critical habitat; or, • Potential significant effects on habitat values of a wetland supporting migratory birds.	Unlikely. Two flora species listed as Threatened under the FFG Act were recorded within the Assessment Area, Spiny Rice-flower and Pale Swamp Everlasting. Both species will be avoided. Several small patches of the Western (Basalt) Plains Grassland community were recorded within the Assessment Area. A total of 0.330 hectares of the state significant community falls within the current impact footprint. The loss of 0.330 hectares of the community is not considered a significant area. Potential habitat for Striped Legless Lizard was recorded in the Assessment Area, however due to the linear, fragmented nature of the habitat, it is not considered to be critical habitat for the species, nor support an important population. There are historical flocking and breeding records for Brolga within proximity to the Project Area. There are on-going investigations to determine the current impacts and implications associated with Brolga's. The objective of the Brolga investigations is to ensure no net impact to the Victorian Brolga population.
Potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short of long term	Unknown. Outside the scope of this report.
Potential extensive or major effects on beneficial uses of waterbodies over the long term due to changes in water quality, streamflows or regional groundwater levels	Unknown. Outside the scope of this report.
Potential extensive or major effects on social or economic well-being due to direct or indirect displacement of non-residential land use activities	Unknown. Outside the scope of this report.
Potential for extensive displacement of residences or severance or residential access to community resources due to infrastructure development	Unknown. Outside the scope of this report.

Referral criteria	Potential Impacts
Potential significant effects on the amenity of a substantial number of residents, due to extensive or major, long-term changes in visual, noise and traffic conditions	Unknown. Outside the scope of this report.
Potential exposure of a human community to severe or chronic health or safety hazards over the short or long term, due to emissions to air or water or noise chemical hazards or associated transport	Unknown. Outside the scope of this report.
Potential extensive or major effects on Aboriginal cultural heritage	Unknown. Outside the scope of this report.
Potential extensive or major effects on cultural heritage places listed on the Heritage Register of the Archaeological Inventory under the *Heritage Act 1995*.	Unknown. Outside the scope of this report.

6.2.1 Implications

A recommendation to refer the project under the EE Act is unlikely to be triggered by the Project based on assessment of ecological thresholds alone as:

- None of the thresholds relating to any of the individual ecological criteria are likely to be exceeded; and,
- None of the thresholds relating to the combination of ecological criteria are likely to be exceeded.

It should be noted that Ecology and Heritage Partners' have not undertaken a detailed assessment of other non-ecological referral criteria detailed in DSE (2006).

6.3 *Flora and Fauna Guarantee Act 1988* (Victoria)

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' threatened and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (e.g. within road reserves, drainage lines and public reserves/parks). 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. However, the *Flora and Fauna Guarantee Amendment Act 2019* 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.

6.3.1 Implications

Two flora species Listed as threatened under the FFG Act were recorded within the Assessment Area; Spiny Rice-flower and Pale Swamp Everlasting. Spiny Rice-flower was recorded along Rankin Road and Willowvale Road, and Pale Swamp Everlasting was recorded along Rankin Road. Both species are avoided.

Five flora species listed as protected under the FFG Act were observed within the Assessment Area; Golden Wattle *Acacia pycnantha,* Milky Beauty-heads, Common Everlasting *Chrysocephalum apiculatum*, Onion Orchid *Microtis* spp. and Slender Sun-orchid *Thelymitra pauciflora*. These species were commonly observed in higher quality patches of native vegetation along road reserves and are predominately avoided.

Several small patches of the Western (Basalt) Plains Grassland community were recorded within the Assessment Area. A total of 0.330 hectares of the state significant community falls within the current impact footprint on areas of public land.

6.4 *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 requires a planning permit to remove, destroy or lop native vegetation, unless an exemption at Clause 52.17-7 of the Victoria Planning Provisions applies.

In addition to Clause 52.17, Wind Energy Facility proposals require a permit under Clause 52.32.

6.4.1 Local Planning Scheme

The study area is located within the Corangamite Shire and Golden Plains Shire. The following zoning and overlays apply (DTP 2023):

- Farming Zone (FZ)
- Bushfire Management Overlay (BMO)
- Environmental Significance Overlay – Schedule 1 (ESO1)
- Environmental Significance Overlay – Schedule 2 (ESO2)
- Vegetation Protection Overlay – Schedule 2 (VPO2)
- Salinity Management Overlay (SMO)

6.4.1.1 Environmental Significance Overlay – Schedule 1 Watercourses, Water Body and Wetland Protection Overlay

ESO1 covers a narrow band in the southern section of the Project Area east of Gillespies Road and crossing Lismore – Pittong Road, directly adjacent to a portion of ESO2. The overlay seeks the protection of the watercourse and associated natural values. One of the decision guidelines for the ESO1 is the conservation of natural habitats and the preservation of native flora, fauna, fish and other aquatic life.

Several Golden Wattles were mapped within the ESO1 area along the road reserve of Lismore – Pittong Road, but are not proposed to be impacted. No native vegetation removal is proposed within the ESO1 area.

A permit is required to remove any vegetation within an area covered by an ESO. The table of exemptions in clause 42.01-3 lists planted vegetation, included cropped areas or areas that are direct seeded for grazing. The area covered by the ESO1 is wholly within a cropped paddock, therefore a permit would not be required.

6.4.1.2 Environmental Significance Overlay – Schedule 2 *Watercourse protection*

Several watercourses that intersect the Project Area are covered by an Environmental Significance Overlay – Schedule 2. ESO2 covers Hoyles Creek and Gnarkeet Chain of Ponds within the Project Area. ESO2 seeks to protect the watercourse and ecological values it supports, including vegetation, fauna habitat and water quality.

Any proposed impacts to native vegetation in areas covered by the ESO must review the environmental objectives and consider the decision guidelines listed under the ESO. The ESO2 occurs in the following areas within the Project Area:

- Access track to Turbine 53 leading from Parker Road: No native vegetation present. Agricultural paddock;
- Portion of Lismore – Pittong Road in far south, adjacent to plantation: Small areas of Plains Grassy Woodland mapped along road reserve which will not be impacted. Electrical reticulation running through agricultural paddock;
- Electrical reticulation between Turbine 57 and Turbine 58: Two power pole instalments are proposed in this area to support the overhead powerlines. The poles are located outside of mapped patches of native vegetation.

Under the ESO (clause 42.01), a permit is required to remove any vegetation (native or exotic), including dead vegetation. The table of exemptions in clause 42.01-3 lists planted vegetation, included cropped areas or areas that are direct seeded for grazing. The areas covered by ESO2 are within a cropped paddocks and direct seeded paddocks for grazing, therefore a permit would not be required.

6.4.1.3 Vegetation Protection Overlay – Schedule 2 Bushland Reserves and Roadside Vegetation Areas

One Vegetation Protection Overlay – Schedule 2 (VPO2), applies to areas of the Project Area. VPO2 seeks the protection of significant areas of remnant vegetation. Within the Project Area, this occurs along roadsides including Rankin Road and Willowvale Road. Much of the surrounding private land has historically been cleared of native vegetation, with narrow bands remaining along the road corridors often supporting high quality fragments of local biodiversity.

Any proposed impacts to native vegetation in areas covered by the VPO must review the environmental objectives and consider the decision guidelines listed under the VPO. The following areas within the Project Area are covered by the VPO2:

- Rankin Road, south of Hendersons Road and north of Parker Road: No impacts proposed to any native vegetation mapped within this area. Electrical reticulation will run within ploughed agricultural paddock to east;
- Willowvale Road, between Lismore – Pittong Road and Lismore – Scarsdale Road: native vegetation mapped between Lismore – Pittong Road and Crambs Road will be impacted for the installation of the underground power cabling, which falls entirely within the VPO2;
- Lismore – Pittong Road and Rokewood – Skipton Road intersection: No impacts to native vegetation proposed; and,
- Spring Hill Road / Browns Road intersection and entrance into private property in far north west of Project Area: Access will use existing roads and gravel crossover, no impacts proposed to mapped native vegetation.

Under the VPO (clause 42.02), a permit is required to remove any vegetation (native or exotic). The table of exemptions in clause 42.02-3 lists planted vegetation, included cropped areas or areas that are direct seeded for grazing. Of the above four locations, one contains native vegetation (Willowvale Road) and one contains

predominately exotic vegetation (Lismore – Pittong Road and Rokewood – Skipton Road). Both of these locations will trigger a permit under the VPO2 where impacts to vegetation are proposed.

6.4.1.4 Salinity Management Overlay

The northern portion of the Project Area contains several tributaries and low-lying areas covered by a Salinity Management Overlay (SMO). A permit is required to remove any vegetation (native or exotic) within areas covered by the SMO, unless otherwise specified in the Clause. The table of exemptions in clause 44.02-5 lists planted vegetation, included cropped areas or areas that are direct seeded for grazing.

The infrastructure footprint intersects areas of the SMO, therefore the impacts to areas outside of cropped or paddocks direct seeded for grazing will trigger a permit requirement under clause 44.02.

6.4.1.5 Clause 52.32 – Wind Energy Facility

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

- Site and context analysis ecological application requirements in relation to the site:
    - Existing vegetation types, condition and coverage (see Section 3.1);
    - The landscape of the site (see Section 1.2 and Figure 4);
    - The impact of the proposal on any species listed under the FFG Act or EPBC Act (see Section 3.8 and Section 4); and,
    - Any other notable features, constraints or other characteristics of the site.
- Site and context analysis ecological application requirements in relation to the surrounding area:
    - Direction and distances to significant conservation and recreation areas, and water features (see Section 1.2);
    - Sites of flora and fauna listed under the FFG Act or EPBC Act, including significant habitat corridors, and movement corridors for these fauna (See Section 3.8, Figure 7 and Figure 8);
    - National Parks, State Parks, Coastal Reserves and other land subject to the *National Parks Act 1975* (see Section 1.2);
    - Land declared a Ramsar wetland as defined under section 17 of the EPBC Act (see Section 3.8.4 and Section 6.1); and,
    - Bushfire risks.
- Design response ecological application requirements:
    - A rehabilitation plan for the site;
    - A description of how the proposal responds to any significant landscape features for the area identified in the planning scheme;
    - An assessment of the impact of the proposal on any species (including birds and bats) listed under the EPBC Act or FFG Act (see Section 3.8 and Section 6) (further details to be provided once final infrastructure footprint is provided); and,

- An environmental management plan including any rehabilitation and monitoring requirements.

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

The State Planning Policy Framework and the decision guidelines at Clause 52.17 (Native Vegetation) and Clause 12.01 require Planning and Responsible Authorities to have regard for 'Guidelines for the removal, destruction or lopping of native vegetation' (Guidelines) (DELWP 2017). Where the clearing of native vegetation is permitted, the quantity and type of vegetation to be offset is determined using methodology specified in the Guidelines. The primary objective of the regulations is '*no net loss in the contribution made by native vegetation to Victoria's biodiversity*'.

Implications

The study area is within Location 2, with 0.330 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Intermediate assessment pathway.

The offset requirement for native vegetation removal is 0.149 General Habitat Units.

A planning permit from the DEECA Minister for Planning required to remove, destroy or lop any native vegetation under Clause 52.17 of the Planning Scheme. A permit may also be required to remove any vegetation (i.e. native or non-native) under Clause 44.02 (SMO).

6.5 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 and those recognised through planning schemes such as the State Planning Policy Framework.

Responsible authorities 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.

6.5.1 Implications

Impacts on flora and fauna species and habitats as a result of wind energy facilities and associated infrastructure can be minimised through facility placement and design measures at the project planning stage. Minimisation of impacts to native vegetation patches, scattered trees, and significant impacts to environmental values at the site can be further achieved by focusing construction and other project activity in agricultural areas.

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 (DCCEEW 2021). 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 2020b).

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

Three weeds listed as noxious under the *Catchment and Land Protection Act 1994* were recorded during the vegetation assessments within the Assessment Area, Spear Thistle, Spiny Rush and Sweet Briar *Rosa rubiginosa*.

Similarly, there is evidence that sections of the Assessment Area are currently occupied by two pest fauna species listed under the CaLP Act, European Rabbit *Oryctolagus cuniculus* and Red Fox *Vulpes vulpes*. A Weed and/or Pest Management Plan may be required.

6.7 *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 DEECA.

6.8 *Water Act 1989* (Victoria)

Several small creeks occur in the Project Area, including Hoyles Creek, Naringhhil Creek and smaller tributaries running from Mount Emu Creek, which occurs north of the Project Area.

A 'works on waterways' permit from the Corangamite CMA is likely to be required where any action impacts on waterways within the study area. Additionally, where structures are installed within or across waterways that potentially interfere with the passage of fish or the quality of aquatic habitat, these activities should be referred to DEECA with the Corangamite CMA included for comment.

7 MITIGATION MEASURES

7.1 General Mitigation Measures

Recommended measures to mitigate impacts upon terrestrial values present within the study area include:

- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation where mapped native vegetation is identified within proximity to the construction footprint;
- 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;
- Tree Protection Zones (TPZs) must be implemented to prevent indirect losses of native vegetation during construction activities, including near turbines and along access roads. A TPZ applies to a tree and is a specific area above and below the ground, with a radius 12 x the Diameter at Breast Height (DBH) (DSE 2011a). At a minimum standard a TPZ should consider the following:
    - A TPZ of trees should be a radius no less than two metres or greater than 15 metres;
    - Construction, related activities and encroachment (i.e. earthworks such as trenching that disturb the root zone) should be excluded from the TPZ;
    - Where encroachment is 10% or more of the total area of the TPZ, the tree should be considered as lost and offset accordingly (unless an arboricultural report specifies otherwise);
    - Directional drilling may be used for works within the TPZ without being considered encroachment. The directional bore should be at least 600 millimetres deep;
    - The above guidelines may be varied if a qualified arborist confirms the works will not significantly damage the tree (including stags / dead trees). In this case the tree would be retained, and no offset would be required; and,
    - Where the minimum standard for a TPZ has not been met an offset may be required.
- All construction stockpiles, laydown areas, parking and storage must be within the designated areas, to prevent any indirect impacts to native vegetation;
- Ensure that best practice sedimentation and pollution control measures are undertaken at all times, in accordance with Environment Protection Authority guidelines (EPA 1991; EPA 2020; Victorian Stormwater Committee 1999) to prevent offsite impacts to waterways and wetlands;
- Revegetate the Willowvale Road construction corridor with local provenance species representative of the Plains Grassland EVC once construction has been completed;
- Undertake weed monitoring and control along the Willowvale Road corridor to ensure that weed cover does not increase during or post construction, and that no new weeds are introduced as a result of construction related activities.

7.2 Specific Mitigation Measures

7.2.1 Bat and Avifauna Management Plan

A Bat and Avifauna Management (BAM) Plan will be prepared to provide greater detail regarding proposed mitigation of impacts to potentially impacted birds and bats as part of the Project. The BAM Plan will include the components:

- An Impact Risk Assessment will be undertaken to assess the potential risks and impacts to target species due to the proposed action, and is proposed to include the following:
    - A description of the relevant components of the Moreton Hill Windfarm;
    - An assessment of the potential impacts (including direct mortality) to all target species during the construction and operational phases of the Project, with consideration for potential changes to their utilisation of the site;
    - Consideration of listing advice, conservation advice, recovery plans, and threat abatement plans for each target species to inform their potential impacts.
- An Adaptive Management Framework will be prepared to ensure achievement of environmental outcomes. The Adaptive Management Framework is intended to provide a dynamic approach to mitigation for target species through all project phases, and will deliver corrective actions, informed by site-utilisation, monitoring and existing mitigation measures, to ensure environmental outcomes are achieved.
- Species specific adaptive mitigation measures (with consideration to evolving bird and bat technology) commensurate with the identified and assessed risks will be documented as part of management plans prepared for the construction and operational stages of the project;
- A statement of the long-term objectives and strategy for minimising bird and bat strike risk within the Moreton Hill Wind Farm site will be prepared, including but not limited to objectives such as:
    - An improved understanding of site utilisation changes for target species throughout Project phases; and,
    - The development of corrective actions to promote a long-term reduction in turbine collision risk (e.g. via a Bird and Bat adaptive management framework).
- Standards for post-commissioning monitoring and mitigation will be prepared, responding to the scale and environmental risks of the proposed project.
- A long-term bat and avifauna site utilisation monitoring program informed by the Before and After Control-Impact (BACI) monitoring framework and consistent with pre-commissioning site utilisation survey methodology;
- A long-term bat and avifauna mortality monitoring program, including carcass persistence and searcher efficiency trials that will be submitted for the approval of DEECA and DCCEEW;
- Procedural instruction of the requirement for ongoing reporting compliance to DEECA and/or DCCEEW, including to report any fauna strikes, annual mortality rates for target species, and species occurrence records;

- Procedures for the regular removal of carcasses likely to attract raptors; and,
- Ongoing reporting commitments and timeframes for the provision of site-specific information to the relevant authorities.

8 RECOMMENDATIONS

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

- Prior to construction, develop a Construction Environmental Management Plan (CEMP) with specific management actions to mitigate against potential impacts to areas of ecological value;
- Develop a Weed Management Plan, which should be incorporated into the CEMP; and,
- Before commissioning, prepare a Bat and Avifauna Management Plan to the satisfaction of DEECA Environment and the Minister for Planning. 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 DEECA;

  c) A post-construction monitoring period of no 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 monitoring period.

8 SUMMARY OF PLANNING IMPLICATIONS

Further requirements associated with development of the study area, as well as additional studies or reporting that may be required, are provided in Table 32.

Table 32. Further requirements associated with development of the study area.

Relevant Legislation	Implications	Further Action
Environment Protection and Biodiversity Conservation Act 1999	One nationally significant flora species, Spiny Rice-flower, and one nationally significant ecological community, Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP), were recorded within the Assessment Area. Spiny Rice-flower was recorded along Rankin Road and Willowvale Road, and no individuals are proposed to be impacted. NTGVVP was recorded along sections of Willowvale Road, with a total of 3.6 hectares recorded. Of this, 0.20 hectares is proposed to be impacted for the construction of the underground power cabling. Two nationally significant fauna species were observed within the Project Area, Blue-winged Parrot and Brown Treecreeper. Both species are listed as Vulnerable under the EPBC Act. Potential habitat for Striped Legless Liard observed within the Assessment Area, with up to 0.330 hectares proposed to be impacted.	It is understood that the proponent will be referring the action for assessment under the EPBC Act for legislative certainty.
Environment Effects Act 1978	Based on the current review of ecological impacts associated with the proposed development, it is unlikely that an EES will be triggered based on ecological impacts alone as: • None of the thresholds relating to any of the individual ecological criteria are likely to be exceeded; and, • None of the thresholds relating to the combination of ecological criteria are likely to be exceeded.	It is understood the proponent is seeking to refer the action under the EE Act.

Relevant Legislation	Implications	Further Action
Flora and Fauna Guarantee Act 1988	Two flora species Listed as threatened under the FFG Act were recorded within the Assessment Area; Spiny Rice-flower *and Pale* Swamp Everlasting. *Spiny Rice-flower* was *recorded* along *Rankin* Road and Willowvale *Road*, and Pale Swamp *Everlasting* was recorded along Rankin Road. Both species are avoided. Five flora species listed as protected under the FFG Act were observed within the Assessment Area; Golden Wattle *Acacia pycnantha,* Milky Beauty-heads, Common Everlasting *Chrysocephalum apiculatum*, Onion Orchid *Microtis* spp. and Slender *Sun-orchid Thelymitra* pauciflora. These species were commonly observed in higher quality patches of native vegetation along road reserves and are predominately avoided. Several small patches of the Western (Basalt) Plains Grassland community were recorded within the Assessment Area. A total of 0.330 hectares of the state significant community falls within the current impact footprint on areas of public land.	Prepare and submit an FFG Act permit for impacts to protected flora and the Western (Basalt) Plains Grassland community.
Planning and Environment Act 1987	The study area is within Location 2, with 0.330 hectares of native vegetation proposed to be removed. As such, the permit application falls under the Intermediate assessment pathway. The offset requirement for native vegetation removal is 0.149 General Habitat Units. A planning permit from the DEECA Minister for Planning is required to remove, destroy or lop any native vegetation under Clause 52.17 of the Planning Scheme. A permit will also be required to remove any vegetation (i.e. native or non-native) under Clause 44.02 (SMO).	Prepare and submit a Planning Permit application.
Catchment and Land Protection Act 1994	Three weed species (Spear Thistle, Spiny Rush and Sweet Briar) and two pest species (European Rabbit and Red Fox) listed under the CaLP Act were recorded within the study area. To meet requirements under the CaLP Act, listed noxious weeds and pests should be appropriately controlled throughout the study area.	Planning Permit conditions may include a requirement for a Weed and Pest Management Plan.
Wildlife Act 1975	Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Ensure wildlife specialists hold a current Management Authorisation.
Water Act 1989	A 'works on waterways' permit is likely to be required from the Corangamite CMA where any action impacts on waterways within the study area.	Obtain a 'works on waterways' permit from the Corangamite CMA.

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FIGURES

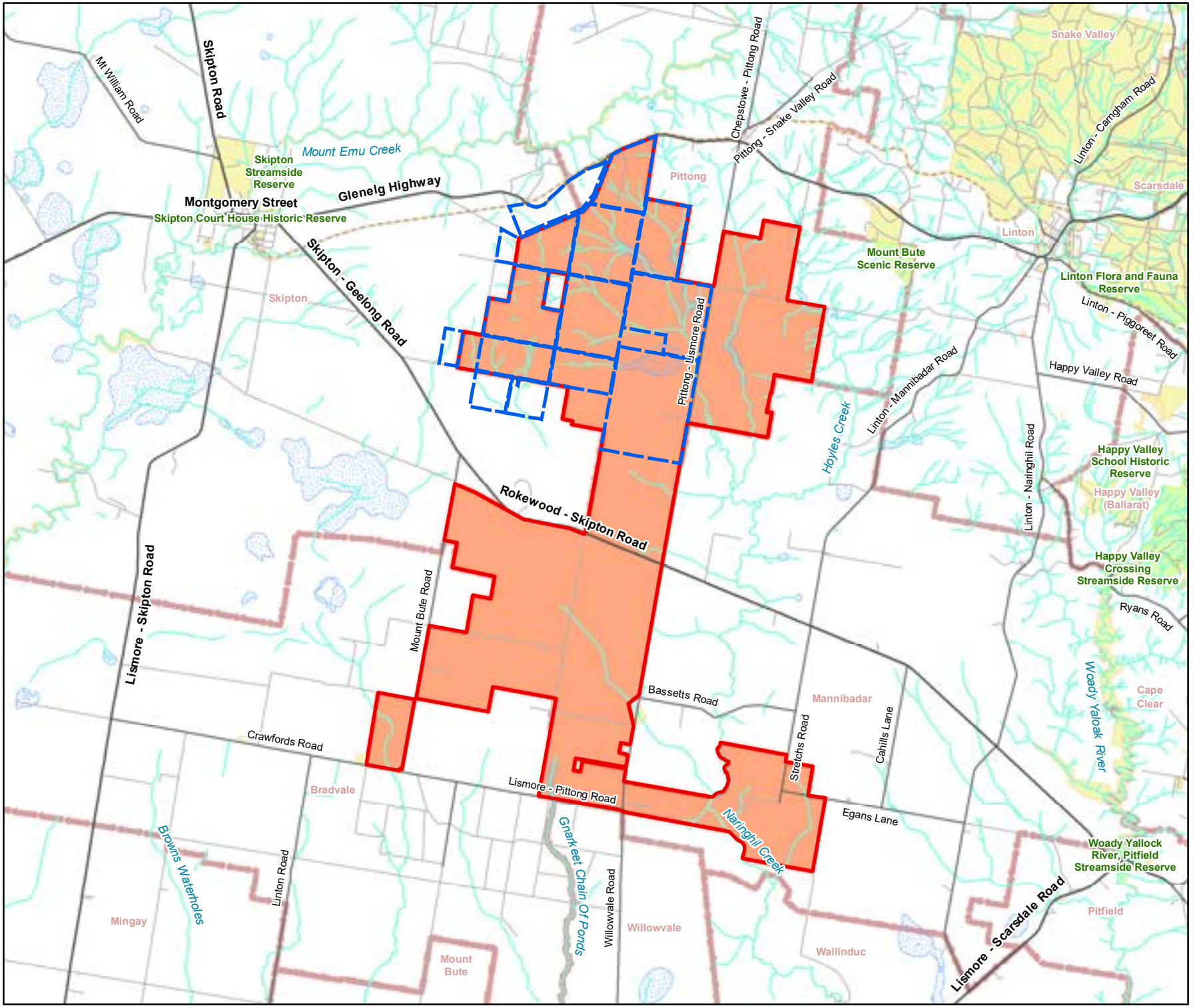
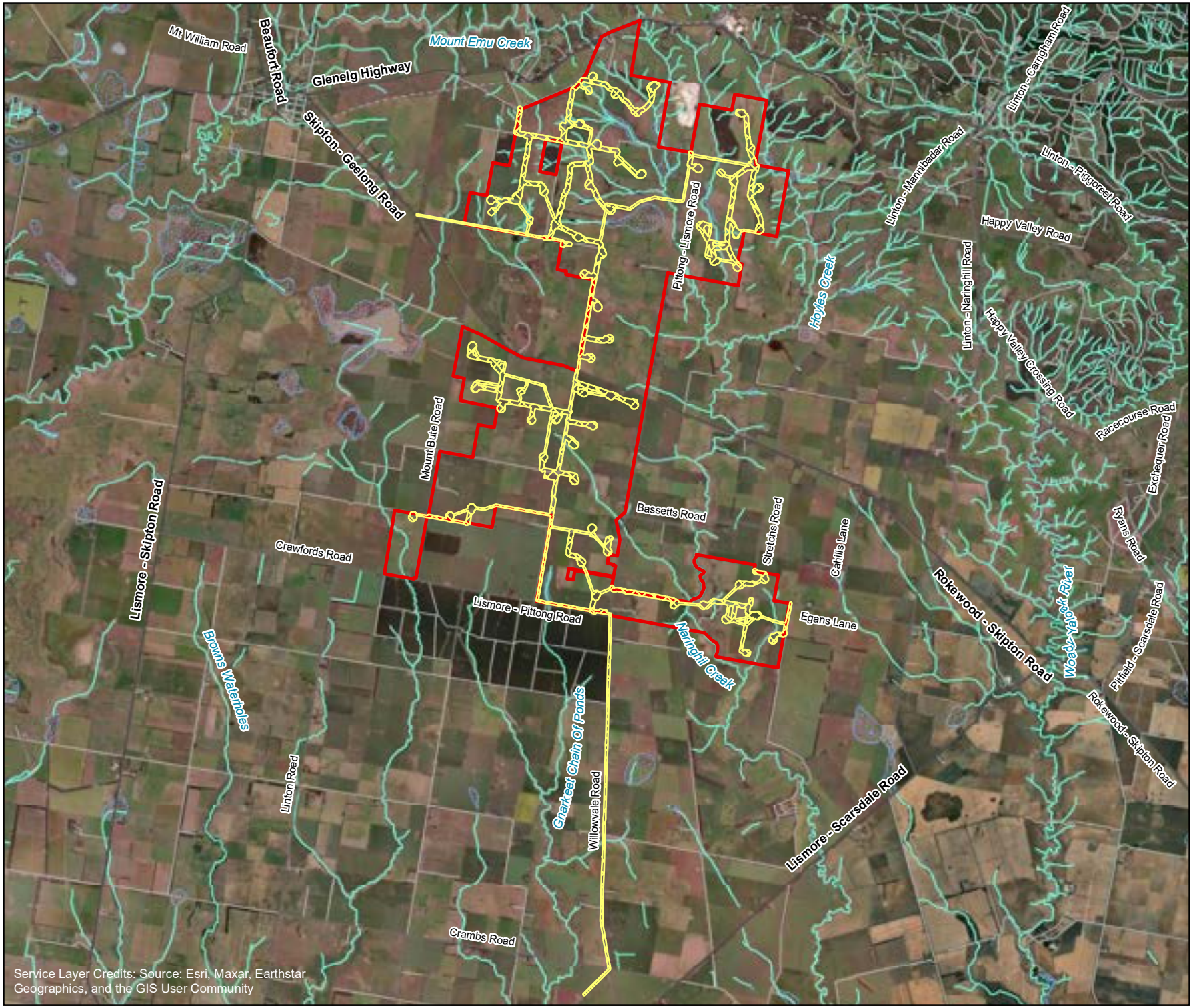


Figure 1a

Location of the project area

Ecological Assessment for Moreton Hill Wind Farm, Pittong



Legend

- Project Area
- Assessment Area

Figure 1b

Location of the assessment area

Ecological Assessment for Moreton Hill Wind Farm, Pittong

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Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

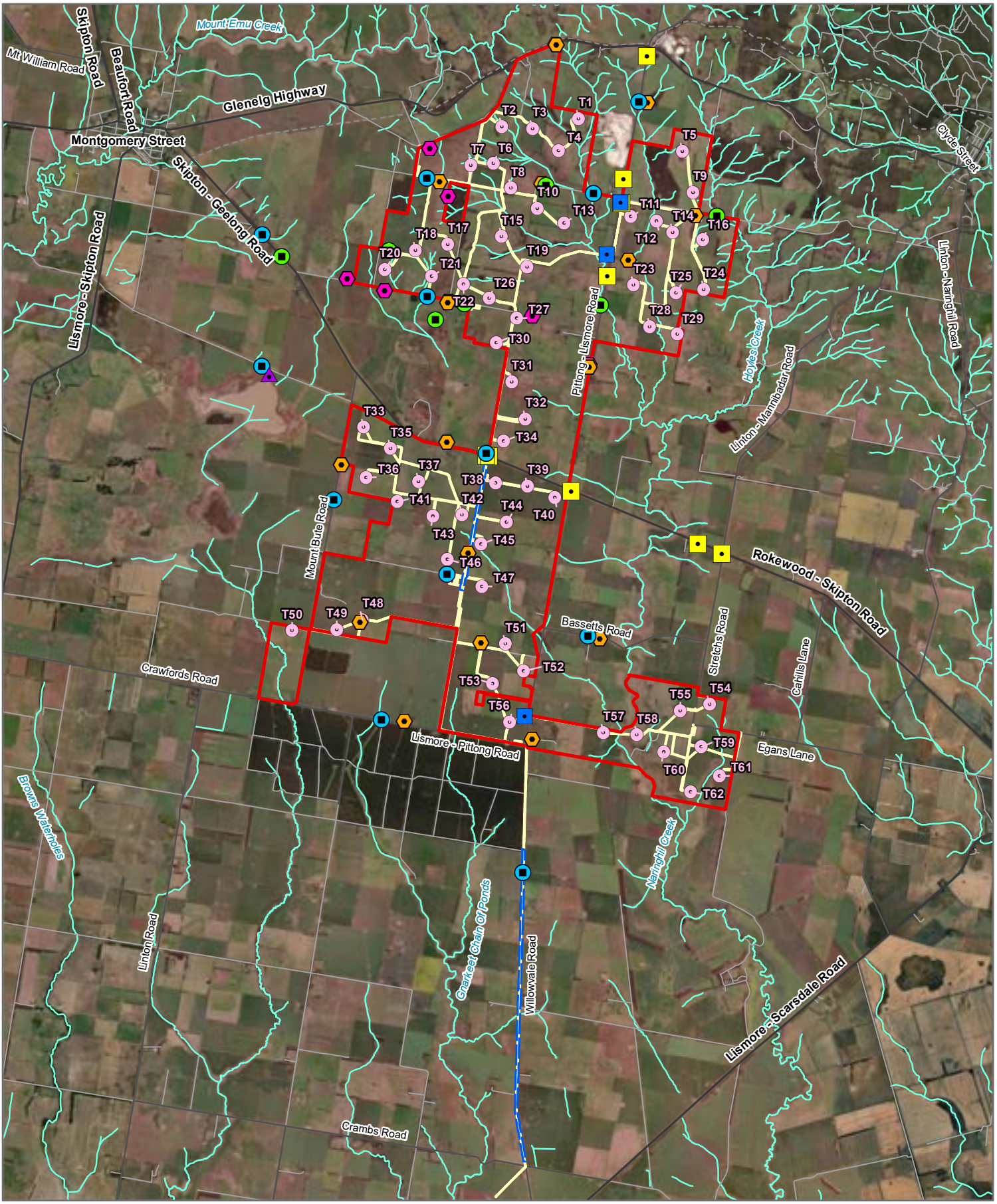


Figure 2 Overview

Significant Fauna Surveys

Ecological Assessment for Moreton Hill Wind Farm, Pittong

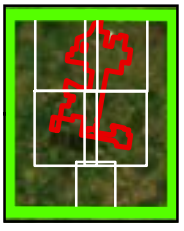
ecology & heritage partners

Legend

- Project Area
- Construction footprint
- WTG

Fauna survey locations

- Bird utilisation survey (2022/23)
- Bird utilisation survey (2020/21)
- Microbat survey (2022/23)
- Microbat survey (2020/21)
- Migratory Bird Survey (2020/21)
- Golden Sun Moth survey (2022/23)
- Golden Sun Moth survey (2023/24)
- Golden Sun Moth survey (2023/24)



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Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

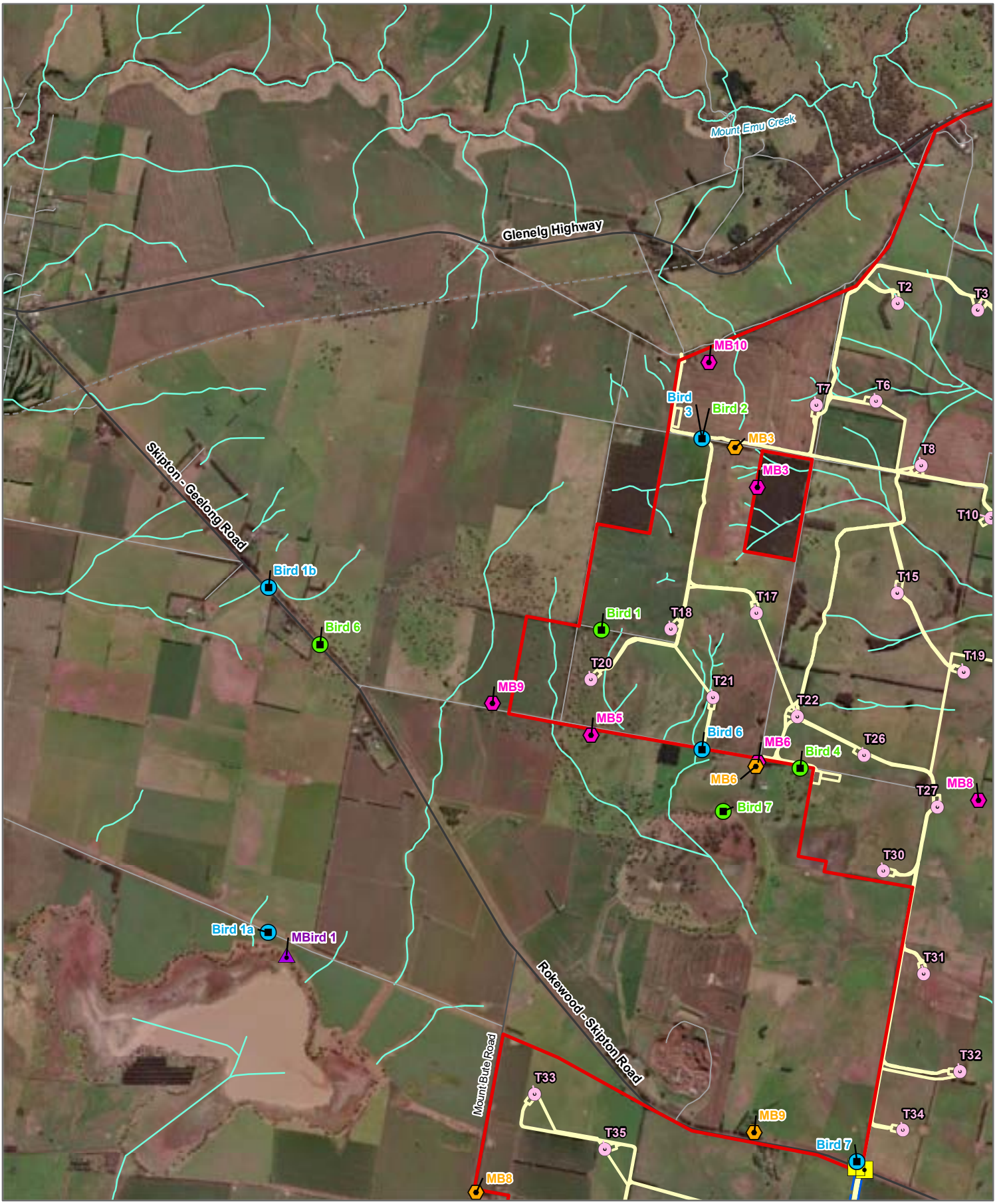


Figure 2a

Significant Fauna Surveys

Ecological Assessment for Moreton Hill Wind Farm, Pittong

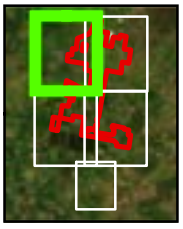
ecology & heritage partners

Legend

- Project Area
- Construction footprint
- WTG

Fauna survey locations

- Bird utilisation survey (2022/23)
- Bird utilisation survey (2020/21)
- Microbat survey (2022/23)
- Microbat survey (2020/21)
- Migratory Bird Survey (2020/21)
- Golden Sun Moth survey (2022/23)
- Golden Sun Moth survey (2023/24)



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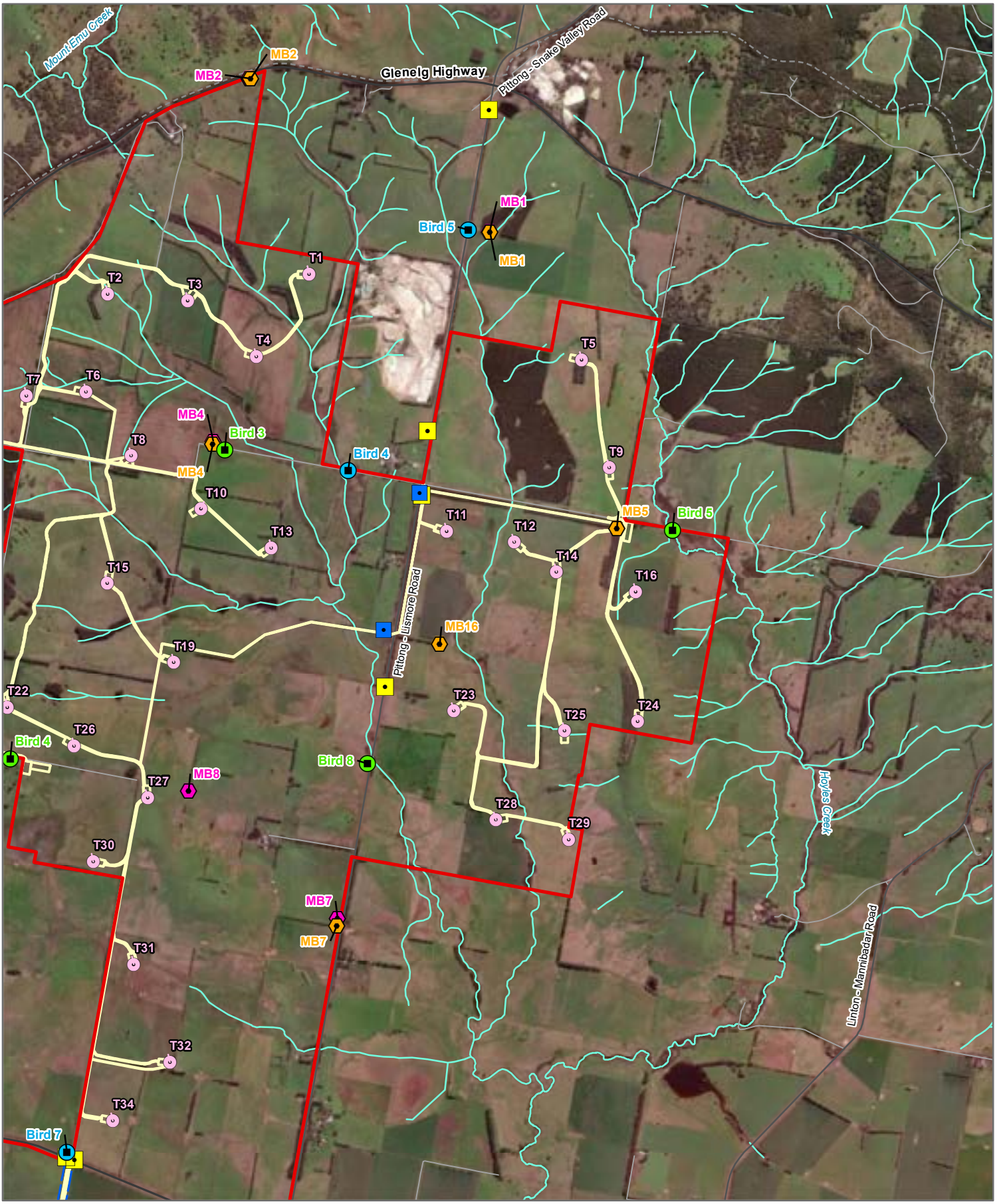


Figure 2b

Significant Fauna Surveys

Ecological Assessment for Moreton Hill Wind Farm, Pittong

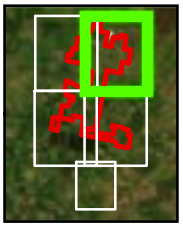
ecology & heritage partners

Legend

- Project Area
- Construction footprint
- WTG

Fauna survey locations

- Bird utilisation survey (2022/23)
- Bird utilisation survey (2020/21)
- Microbat survey (2022/23)
- Microbat survey (2020/21)
- Golden Sun Moth survey (2022/23)
- Golden Sun Moth survey (2023/24)
- Golden Sun Moth survey (2023/24)



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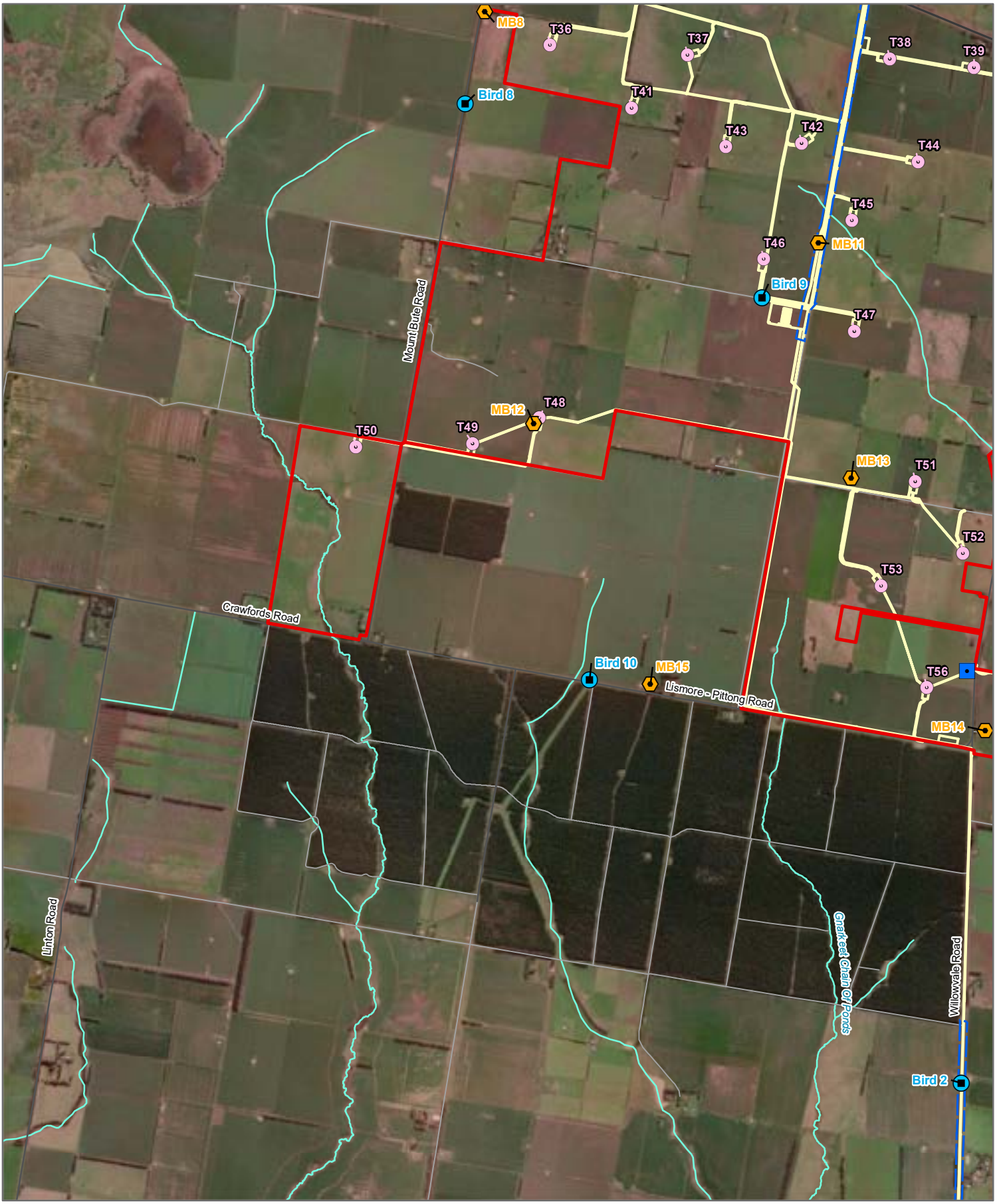


Figure 2c

Significant Fauna Surveys

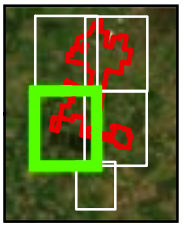
Ecological Assessment for Moreton Hill Wind Farm, Pittong

Legend

- Project Area
- Construction footprint
- WTG

Fauna survey locations

- Bird utilisation survey (2022/23)
- Microbat survey (2022/23)
- Golden Sun Moth survey (2023/24)
- Golden Sun Moth survey (2023/24)



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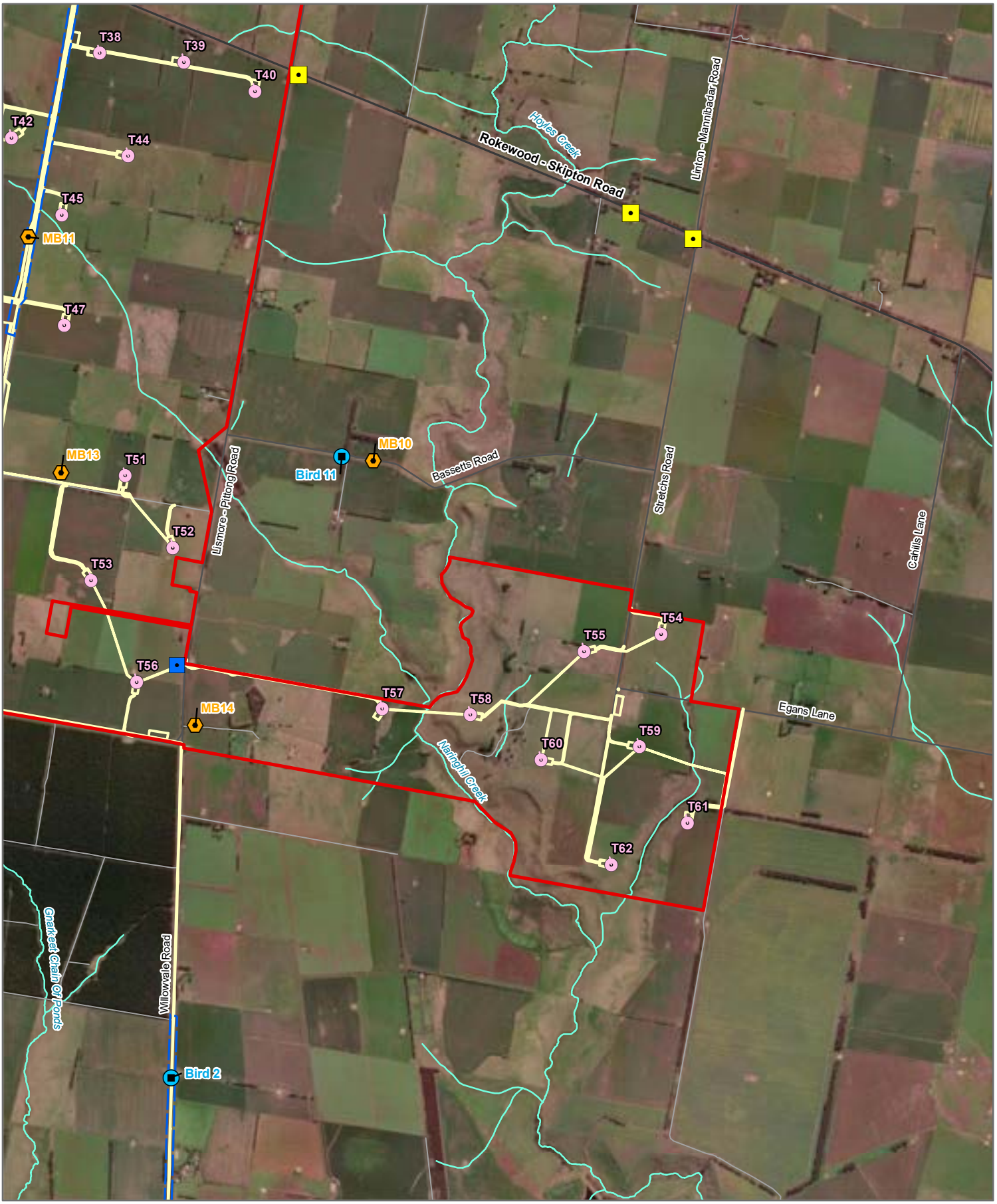


Figure 2d

Significant Fauna Surveys

Ecological Assessment for Moreton Hill Wind Farm, Pittong

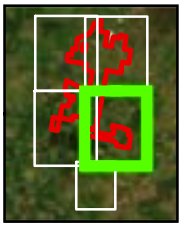
ecology & heritage partners

Legend

- Project Area
- Construction footprint
- WTG

Fauna survey locations

- Bird utilisation survey (2022/23)
- Microbat survey (2022/23)
- Golden Sun Moth survey (2022/23)
- Golden Sun Moth survey (2023/24)
- Golden Sun Moth survey (2023/24)



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Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Figure 2e
Significant Fauna Surveys
Ecological Assessment for Moreton Hill Wind Farm, Pittong

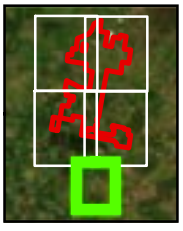
Legend

Construction footprint

Fauna survey locations

Bird utilisation survey (2022/23)

Golden Sun Moth survey (2023/24)



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Metres

Map Scale: 1:30,000 @ A4
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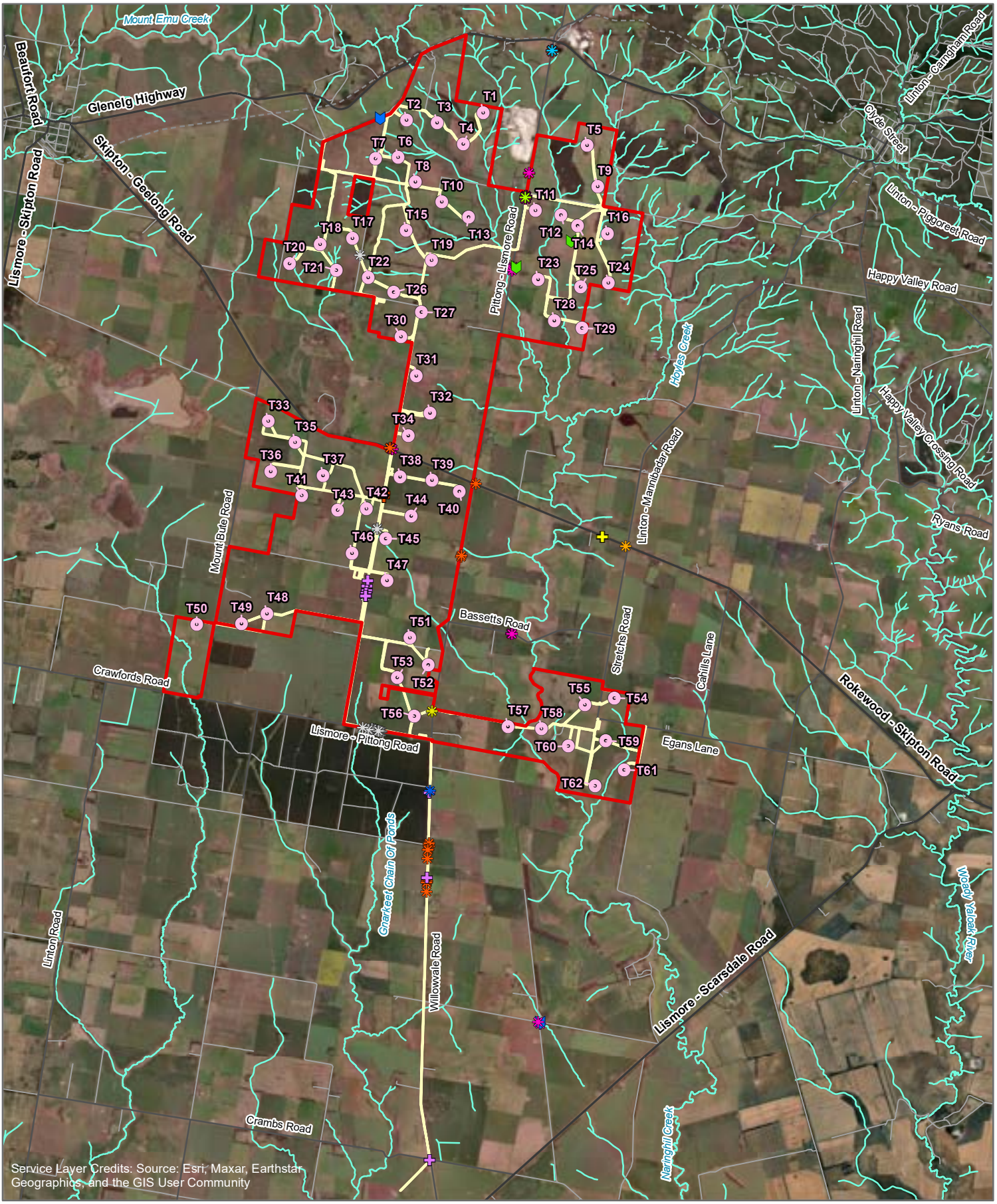


Figure 3 Overview

Surveyed Significant Flora

Ecological Assessment for Moreton Hill Wind Farm, Pittong

ecology & heritage partners

Legend

- Project Area
- Construction footprint
- WTG

EPBC Act Listed Flora

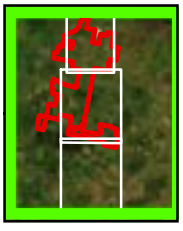
- *Xerochrysum palustre*
- *Pimelea spinescens subsp. spinescens*
- *Leucochyrsum albicans var. tricolour*

FFG Act Listed Flora

- *Dianella longifolia*
- *Allocasurina luehmanni*

FFG Act Protected Flora

- *Calocephalus lacteus*
- *Oleria sp.*
- *Calocephalus lacteus*
- *Acacia pycnantha*
- *Chrysocephalum apiculatum*
- *Diuris sp*
- *Leptorhynchos squamatus*
- *Microtis sp*
- *Thelymitra pauciflora*



N

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Metres

Map Scale: 1:105,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 54

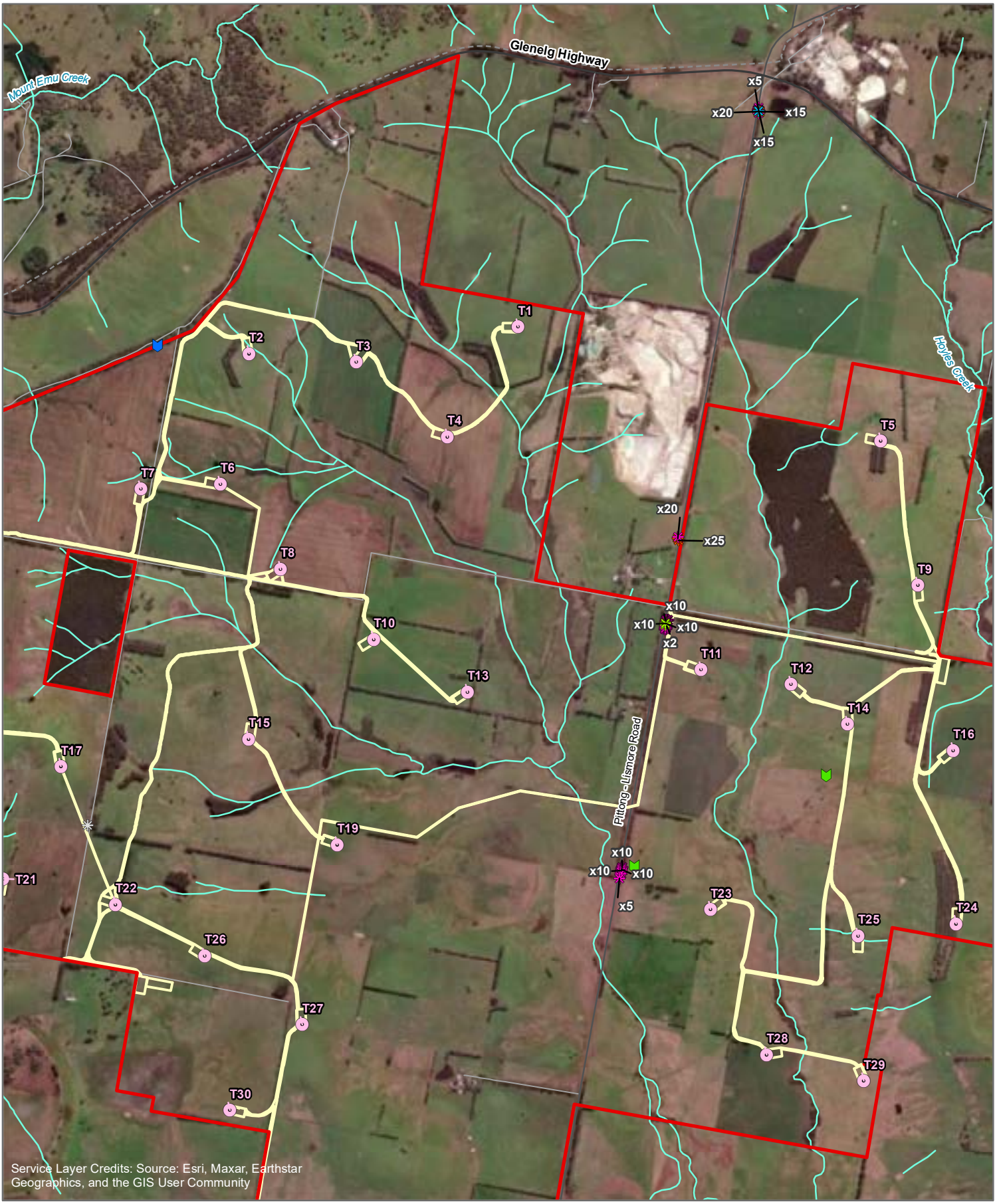


Figure 3a

Surveyed Significant Flora

Ecological Assessment for Moreton Hill Wind Farm, Pittong

Legend

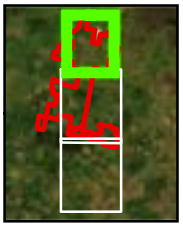
- Project Area
- Construction footprint
- WTG

FFG Act Listed Flora

- *Dianella longifolia*
- *Allocasurina luehmanni*

FFG Act Protected Flora

- *Calocephalus lacteus*
- *Acacia pycnantha*
- *Chrysocephalum apiculatum*
- *Diuris sp*
- *Leptorhynchos squamatus*
- *Microtis sp*
- *Thelymitra pauciflora*



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Metres

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GDA 1994 MGA Zone 54

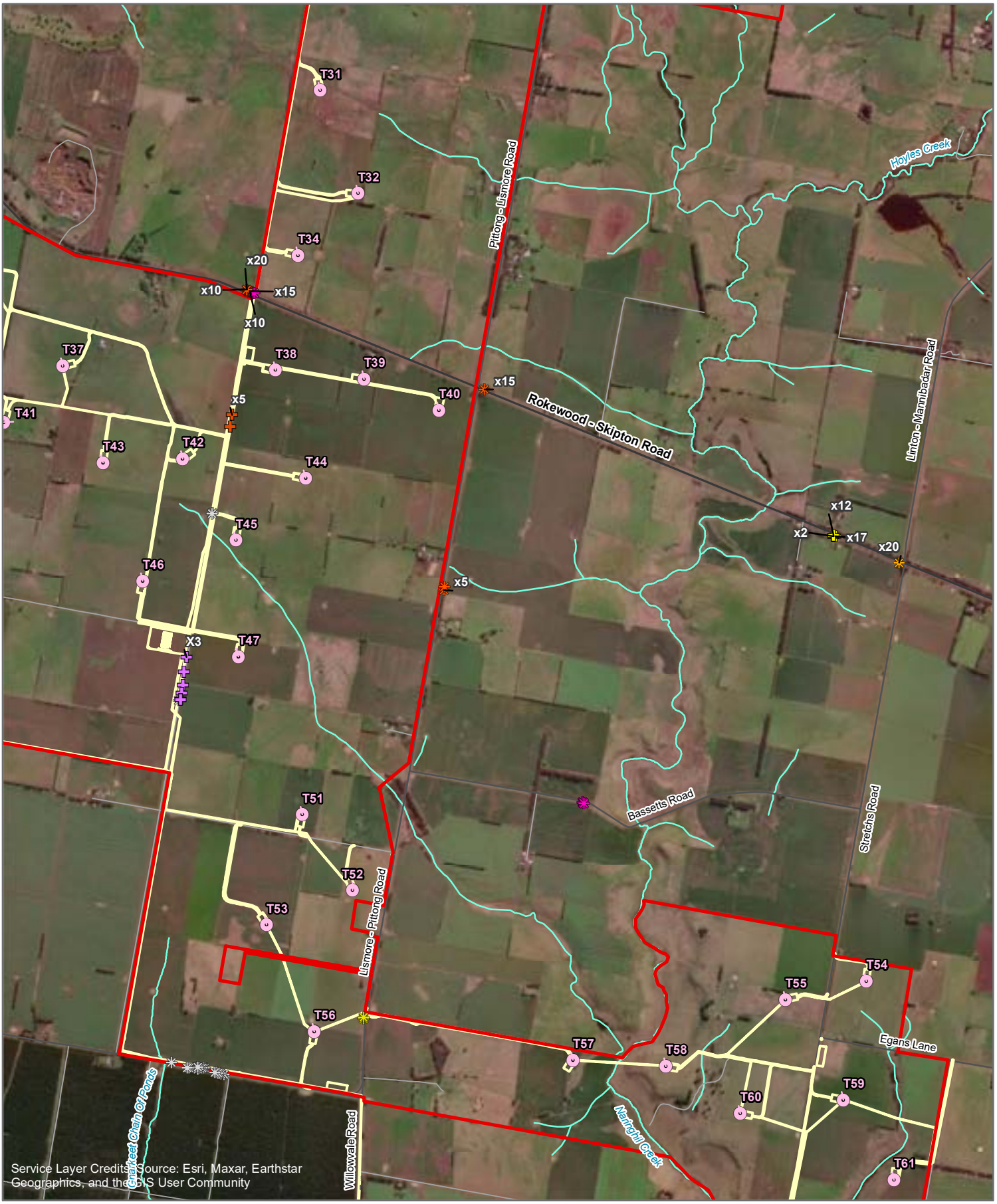


Figure 3b

Surveyed Significant Flora

Ecological Assessment for Moreton Hill Wind Farm, Pittong

ecology & heritage partners

Legend

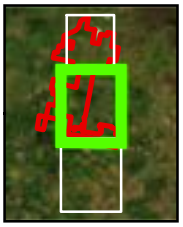
- Project Area
- Construction footprint
- WTG

EPBC Act Listed Flora

- *Xerochrysum palustre*
- *Pimelea spinescens subsp. spinescens*
- *Leucochyrsum albicans var. tricolour*

FFG Act Protected Flora

- *Calocephalus lacteus*
- *Calocephalus lacteus*
- *Acacia pycnantha*
- *Chrysocephalum apiculatum*
- *Thelymitra pauciflora*



N

0 380 760

Metres

Map Scale: 1:38,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 54

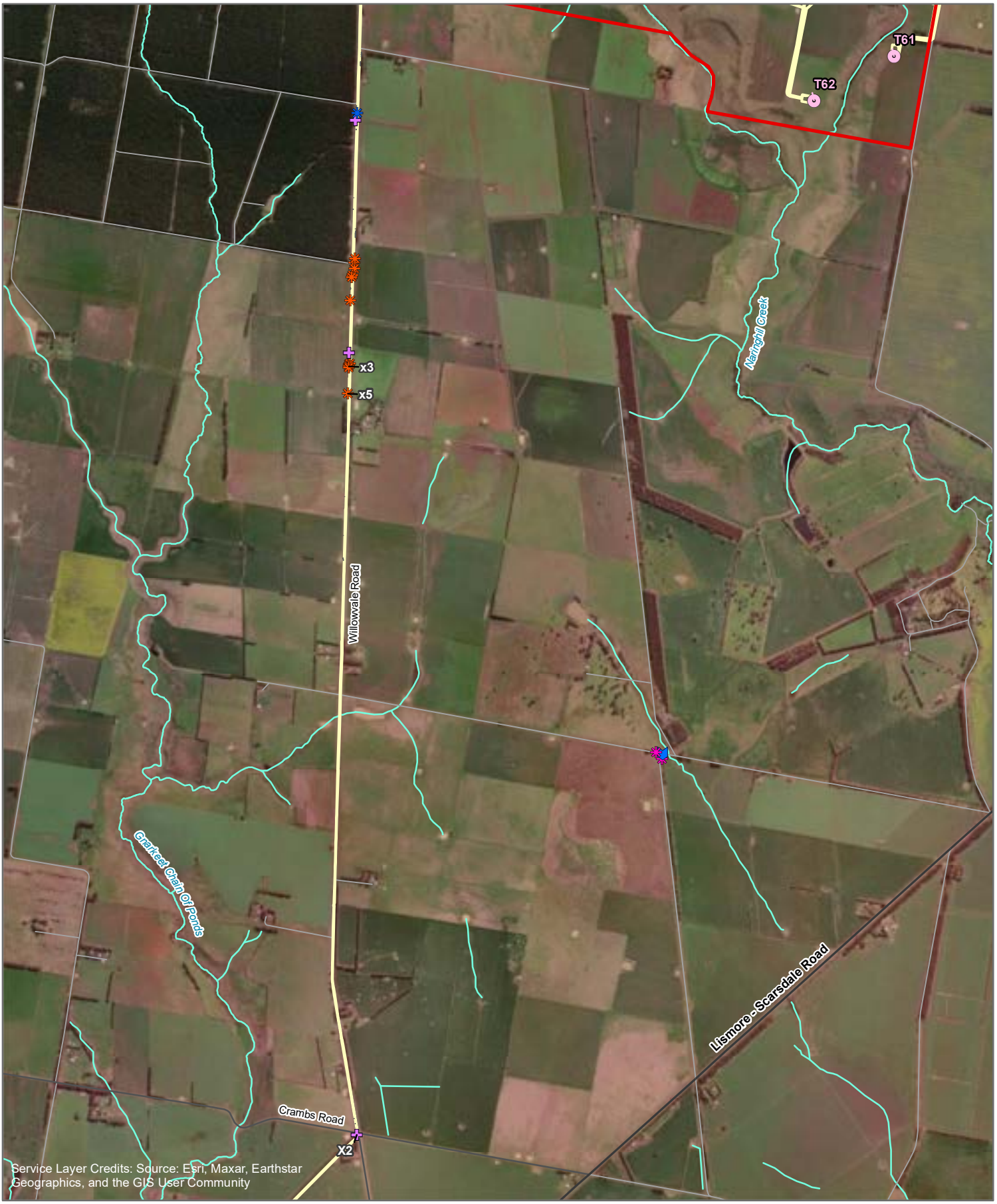


Figure 3c

Surveyed Significant Flora

Ecological Assessment for Moreton Hill Wind Farm, Pittong

ecology & heritage partners

Legend

- Project Area
- Construction footprint
- WTG

EPBC Act Listed Flora

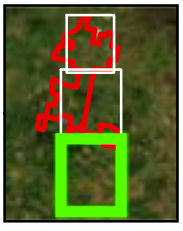
- *Pimelea spinescens subsp. spinescens*

FFG Act Listed Flora

- *Dianella longifolia*

FFG Act Protected Flora

- *Calocephalus lacteus*
- *Oleria sp.*
- *Thelymitra pauciflora*
- *Acacia pycnantha patch*
- *Calocephalus lacteus patch*
- *Dianella sp. patches*



N

0 380 760

Metres

Map Scale: 1:38,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 54

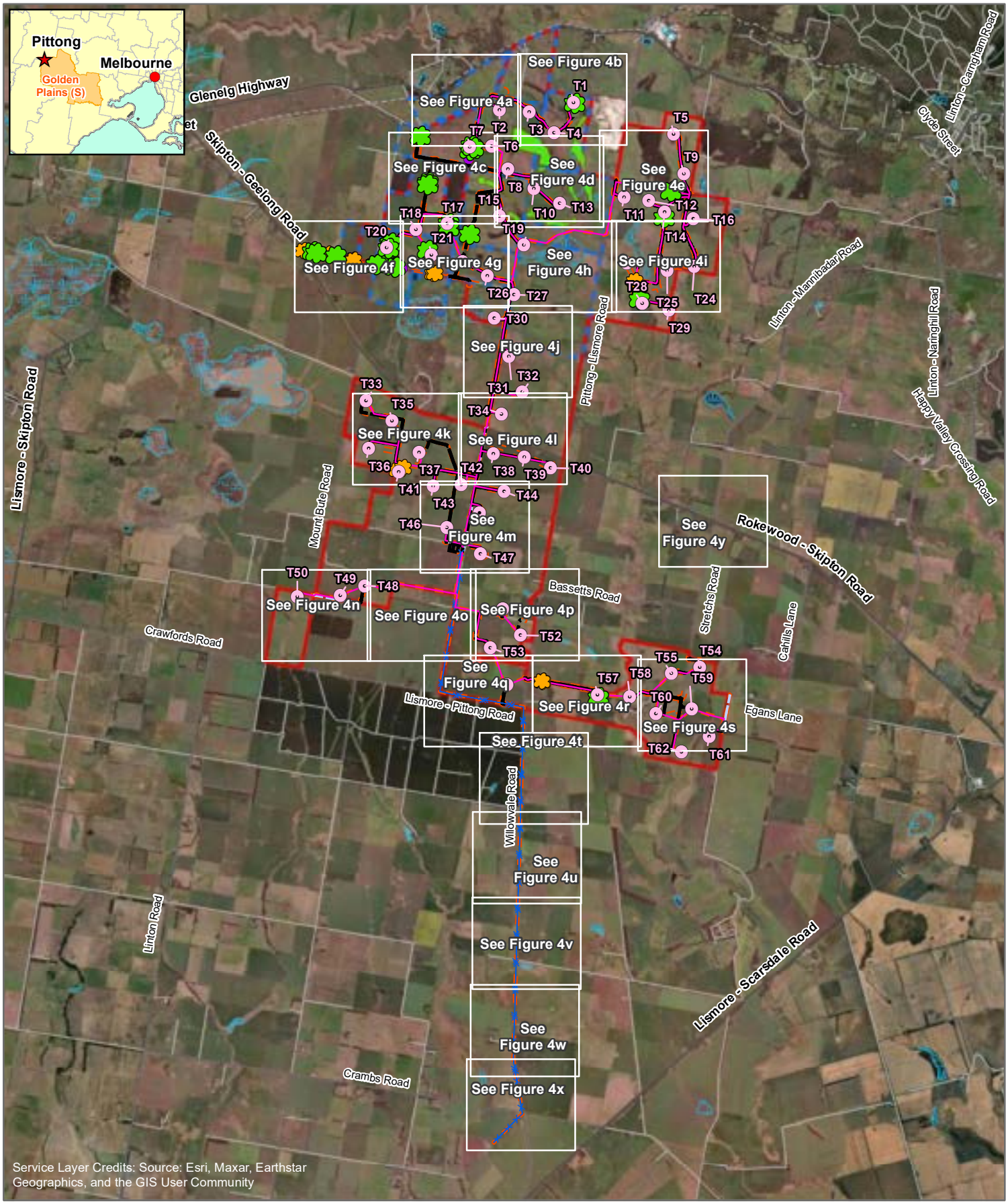


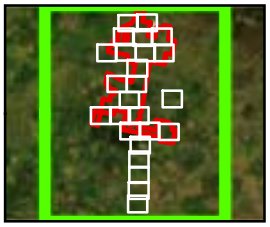
Figure 4 Overview

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Rankin Road and Local Roads Upgrade
- WTG
- Electrical reticulation
- Access track
- 220kV Underground Transmission Line
- Scattered Large Tree
- Scattered Small Tree
- Large Tree in patch
- Small Tree in patch
- Ecological Vegetation Classes
- Current Wetlands



N

0 1,000 2,000

Metres

Map Scale: 1:110,000 @ A4
Coordinate System:
GDA 1994 MGA Zone 54

Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Current Wetlands

Ecological Vegetation Classes

- Grassy Woodland (EVC 175)
- Heathy Dry Forest (EVC 20)
- Plains Sedgy Wetland (EVC 647)

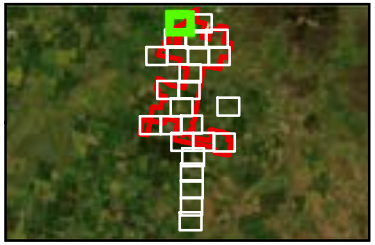


Figure 4a

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

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Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Current Wetlands

Ecological Vegetation Classes

- Plains Sedgy Wetland (EVC 647)

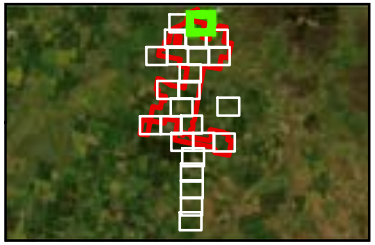

Figure 4b

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

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Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Laydown Areas
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Large Tree in patch

Ecological Vegetation Classes

- Grassy Woodland (EVC 175)
- Plains Sedgy Wetland (EVC 647)

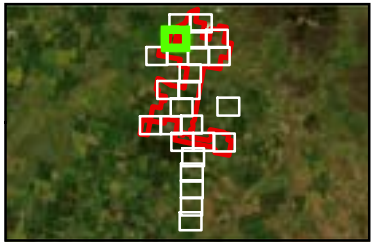

Figure 4c

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

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See Figure 4a

See Figure 4b

PSWe4

PSWe1

GW13

GW12

T8

See Figure 4c

PSWe3

Francis Lane

RW6

GW9

GW8

Moreton Hill Road

PGWe1

RW7

PSWe5

T10

PSWe9

PSWe2

See Figure 4e

PSWe6

GW10

T13

T15

PSWe7

PSWe8

See Figure 4g

See Figure 4h

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassy Wetland (EVC 125)
- Grassy Woodland (EVC 175_61)
- Plains Sedgy Wetland (EVC 647)
- Riparian Woodland (EVC 641)

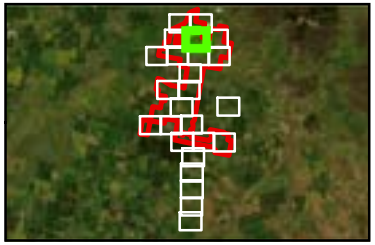


Figure 4d

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Laydown Areas
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Current Wetlands

Ecological Vegetation Classes

- Grassy Woodland (EVC 175_61)

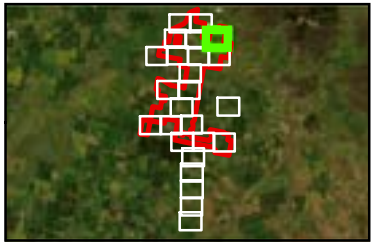


Figure 4e

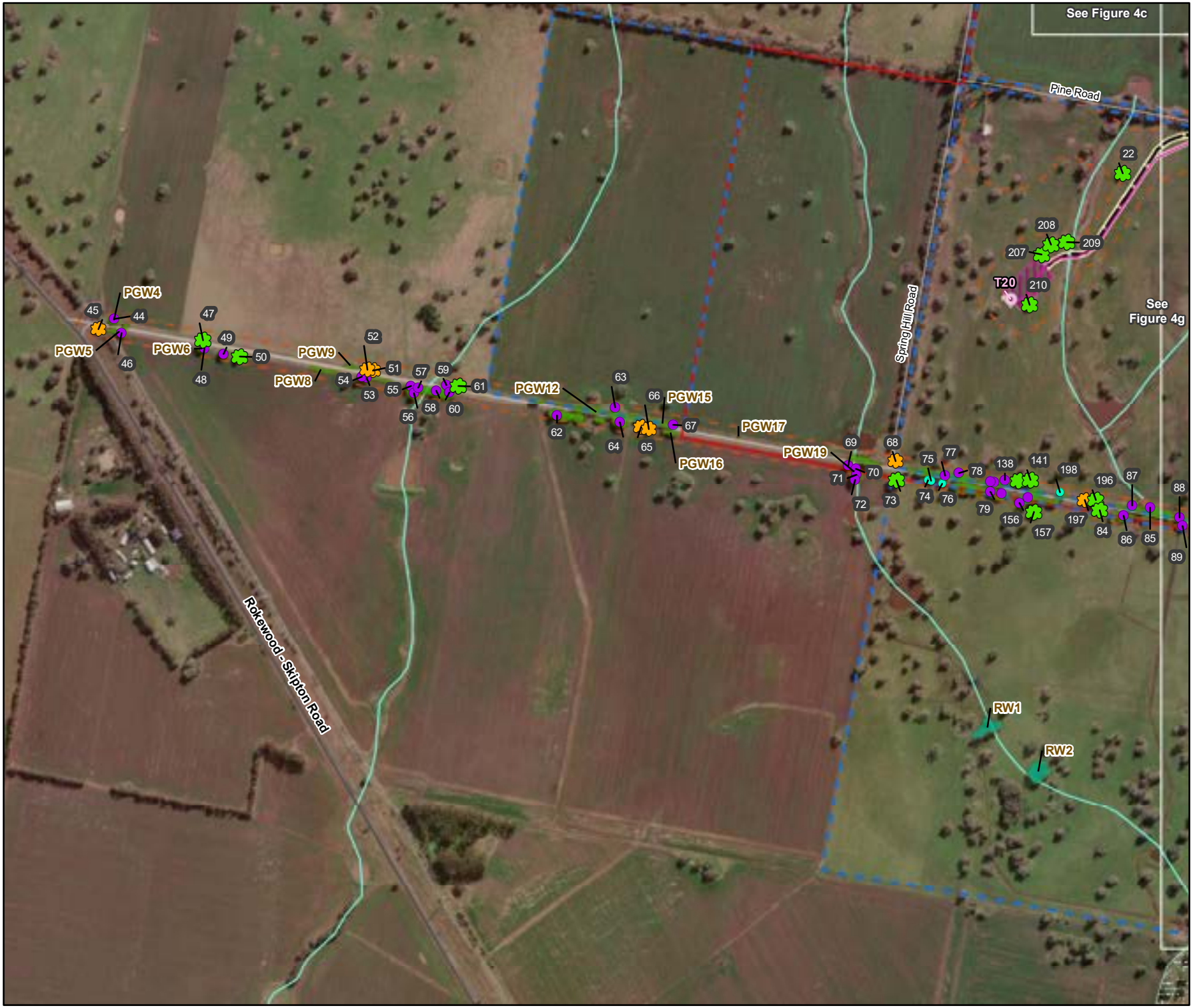
Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

0 100 200
Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners



Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Scattered Small Tree
- Large Tree in patch
- Small Tree in patch
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassy Woodland (EVC 55)
- Riparian Woodland (EVC 641)

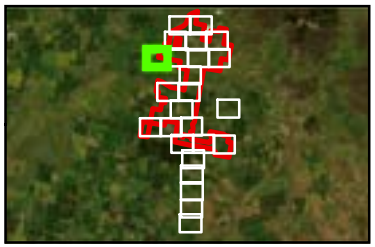


Figure 4f

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

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Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- WTG
- Access track
- Laydown Areas
- Hardstands
- Electrical reticulation
- Temporary Batching Plant
- Scattered Large Tree
- Scattered Small Tree
- Large Tree in patch
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassy Woodland (EVC 55)
- Plains Grassland (Heavier Soils) (EVC 132_61)
- Grassy Woodland (EVC 175)
- Plains Sedgy Wetland (EVC 647)

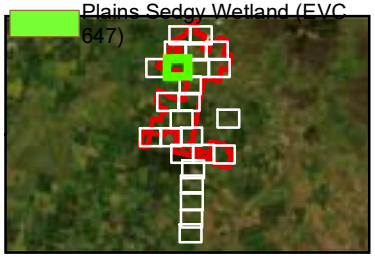

Figure 4g

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

0 100 200
Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

PSWe8
PSWe7
See Figure 4d
PSWe7
See Figure 4e
T19
Pittong - Lismore Road
See Figure 4i
T27
See Figure 4j

Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Current Wetlands

Ecological Vegetation Classes

- Plains Sedgy Wetland (EVC 647)

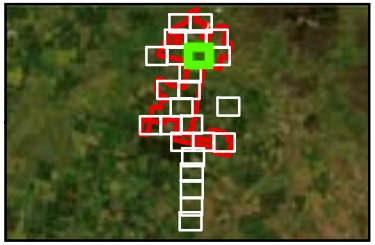

Figure 4h

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Scattered Small Tree
- Current Wetlands
- Wedge-tail Eagle nest

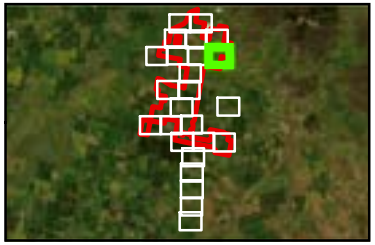

Figure 4i

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Legend

- Project Area
- 2020 Study Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Current Wetlands

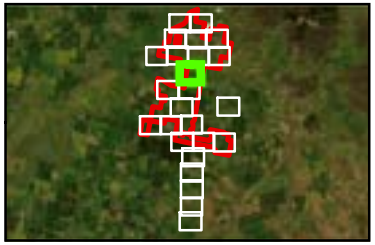

Figure 4j

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Scattered Small Tree

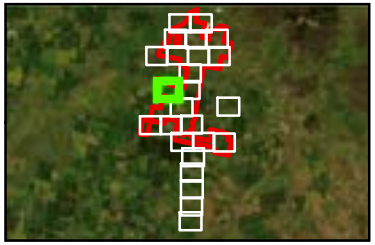

Figure 4k

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Temporary Batching Plant

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

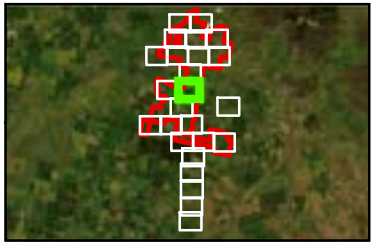

Figure 4l

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Site Substation
- BESS, Office and Maintenance Compound
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

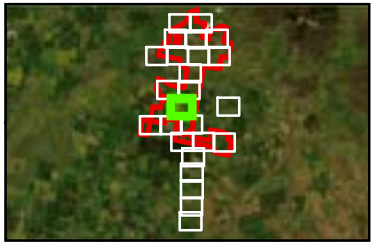

Figure 4m

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- WTG
- Access track
- Hardstands
- Electrical reticulation

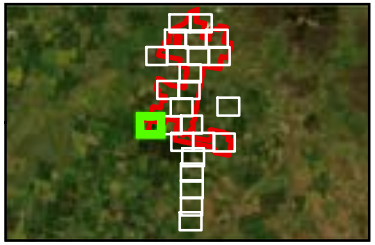

Figure 4n

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Access track
- Electrical reticulation
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)

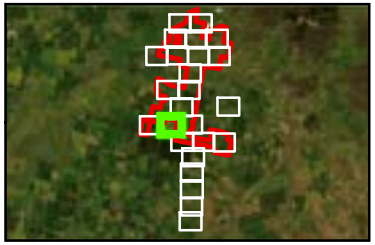

Figure 4o

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

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Legend

- Project Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Hardstands
- Electrical reticulation
- Current Wetlands

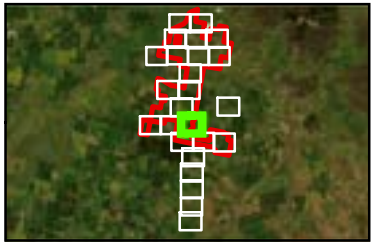


Figure 4p

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig04_EcoFeatMB 24/01/2024 melsley

Legend

- Project Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Laydown Areas
- Hardstands
- Electrical reticulation
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassy Woodland (EVC 55)
- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

EPBC Act Listed Community

- Natural Temperate Grassland of the Victorian Volcanic Plain

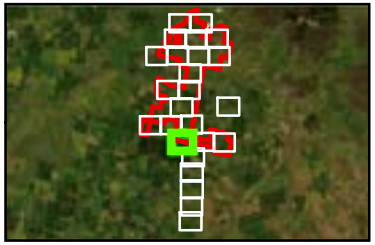


Figure 4q

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig04_EcoFeatMB 24/01/2024 melsley

Legend

- Project Area
- Assessment Area
- Construction Footprint
- WTG
- Access track
- Poles
- Hardstands
- Electrical reticulation
- Scattered Large Tree
- Scattered Small Tree
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassy Woodland (EVC 55)
- Plains Sedgy Wetland (EVC 647)

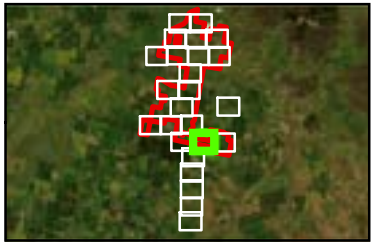


Figure 4r

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig04_EcoFeatMB 24/01/2024 melsley

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- WTG
- Access track
- Laydown Areas
- Hardstands
- Electrical reticulation

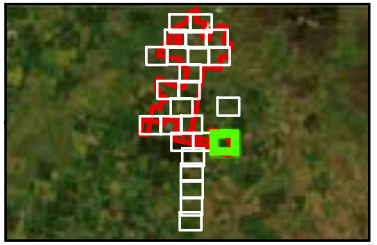


Figure 4s

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 110 220

Metres

Map Scale: 1:11,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

EPBC Act Listed Community

- Natural Temperate Grassland of the Victorian Volcanic Plain

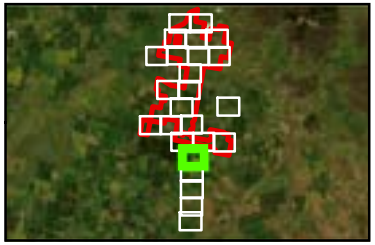


Figure 4t

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

EPBC Act Listed Community

- Natural Temperate Grassland of the Victorian Volcanic Plain

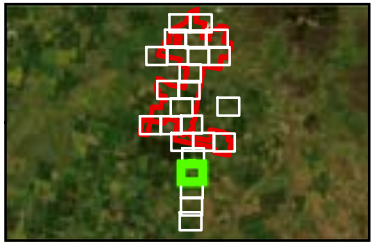


Figure 4u

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig04_EcoFeatMB 24/01/2024 melsley

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

EPBC Act Listed Community

- Natural Temperate Grassland of the Victorian Volcanic Plain

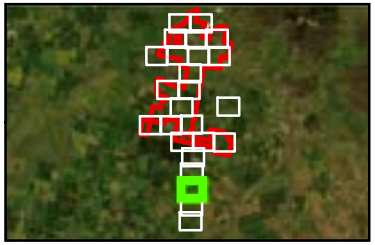


Figure 4v

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

EPBC Act Listed Community

- Natural Temperate Grassland of the Victorian Volcanic Plain

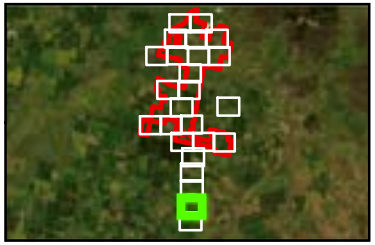


Figure 4w

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

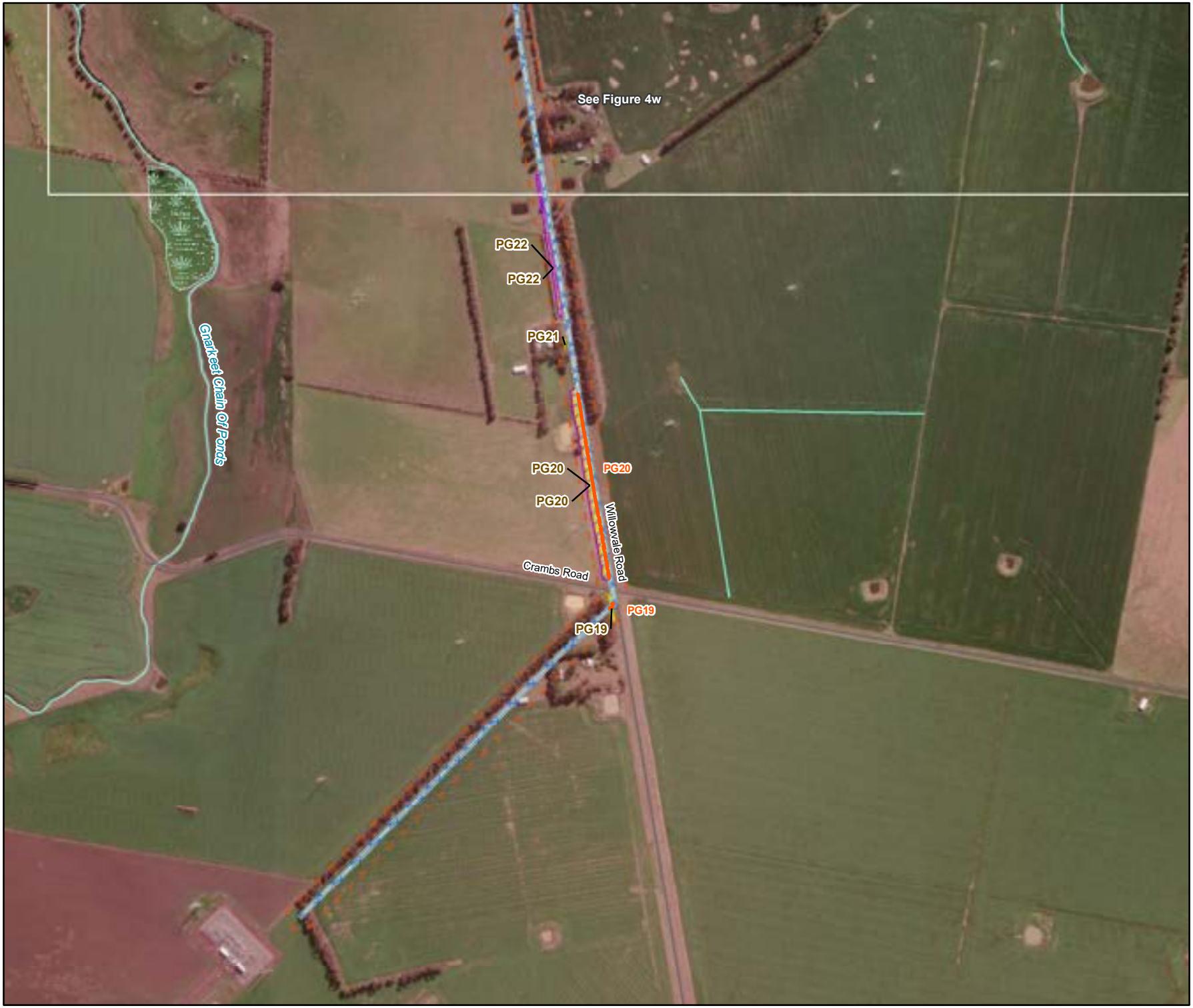
N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners



Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line
- Current Wetlands

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

EPBC Act Listed Community

- Natural Temperate Grassland of the Victorian Volcanic Plain

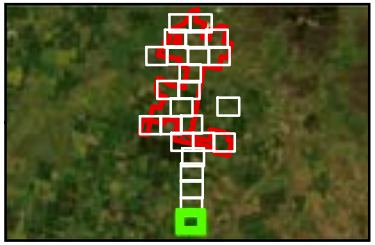


Figure 4x

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig04_EcoFeatMB 24/01/2024 melsley

Legend

Ecological Vegetation Classes

Plains Grassland (Heavier Soils) (EVC 132_61)

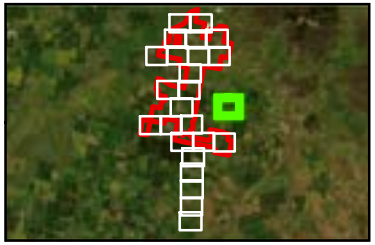


Figure 4y

Ecological features

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 100 200

Metres

Map Scale: 1:10,000 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Access track
- Electrical reticulation

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation
- Retained vegetation

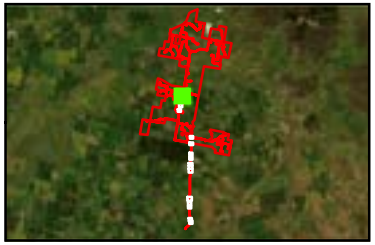


Figure 5a

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG64

PG64

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- Access track
- Electrical reticulation

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation
- Retained vegetation

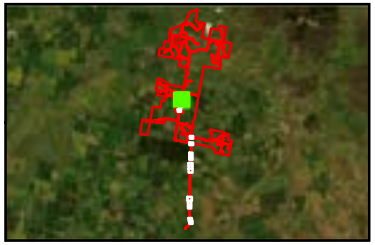


Figure 5b

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG63

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- Access track
- Electrical reticulation

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Retained vegetation

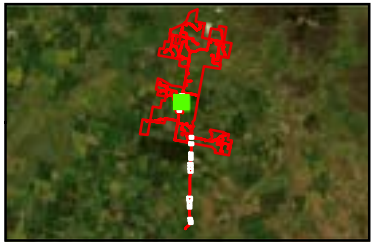


Figure 5c

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG17

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Hardstands
- Electrical reticulation

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Retained vegetation

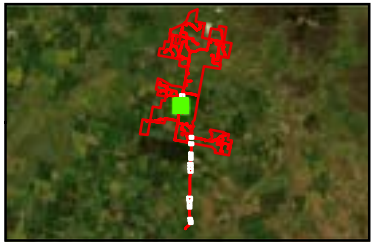


Figure 5d

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

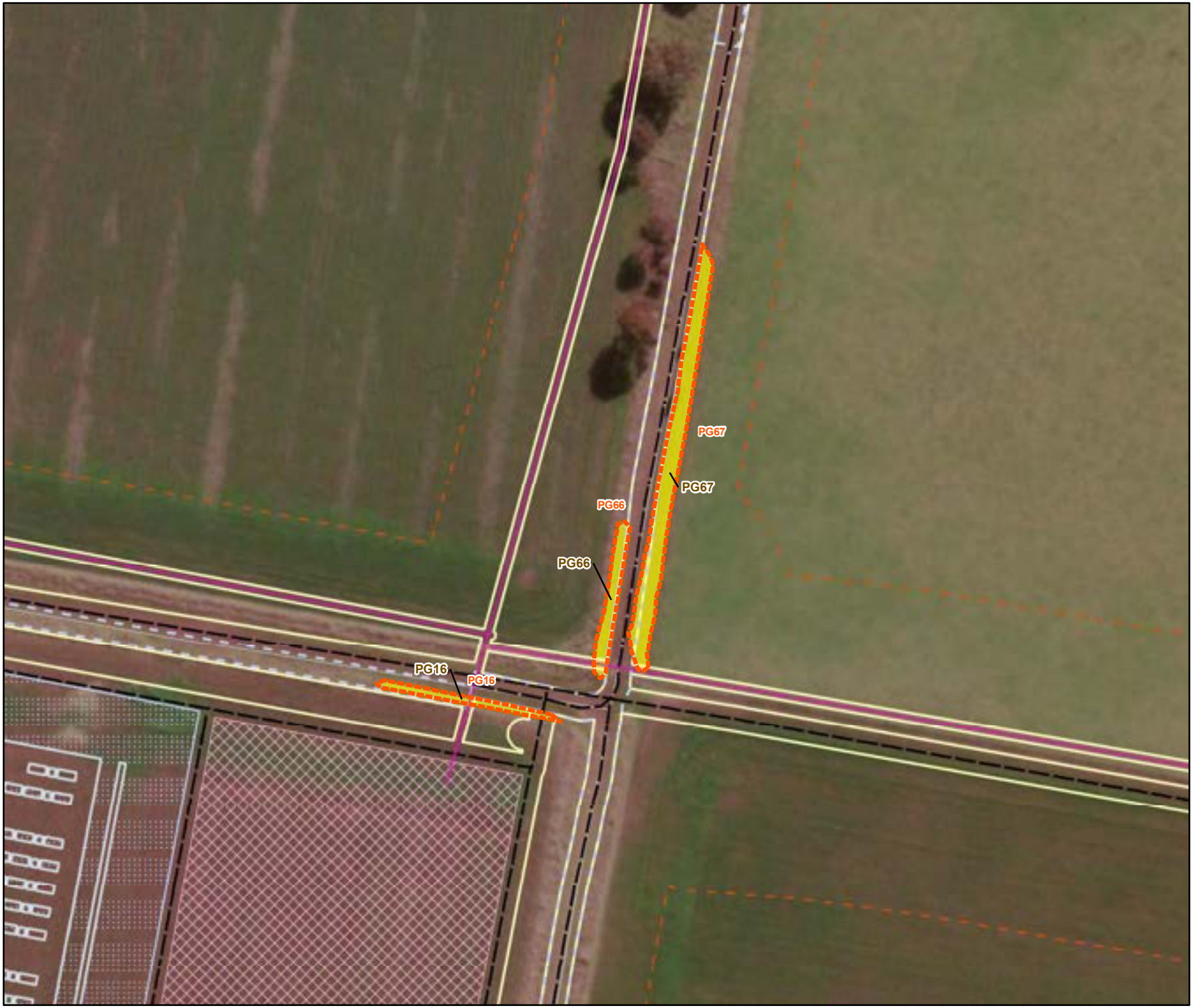
0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley



Legend

- Project Area
- Assessment Area
- Construction Footprint
- Rankin Road and Local Roads Upgrade
- Access track
- Electrical reticulation
- Site Substation

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

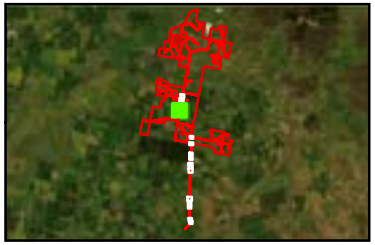


Figure 5e

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Access track
- Electrical reticulation

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

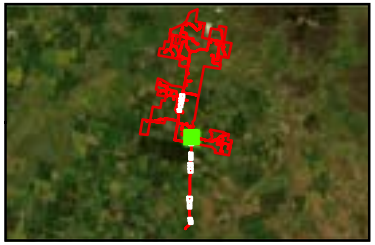


Figure 5f

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG48
PG48
PG48
PG48
PG49
PG47

Legend

- Project Area
- Assessment Area
- Construction Footprint
- Laydown Areas
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

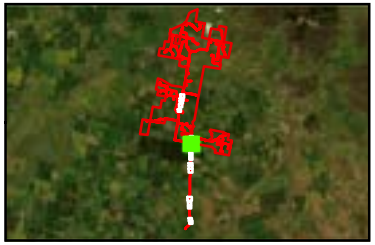


Figure 5g

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

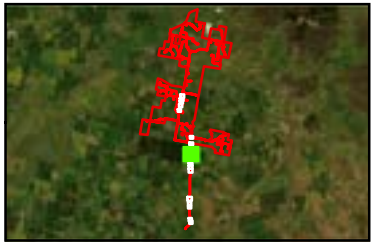


Figure 5h

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

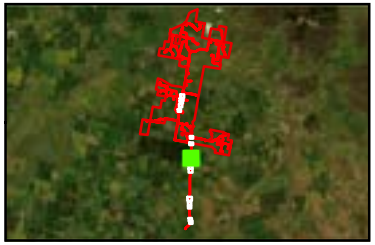


Figure 5i

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG38

PG38

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

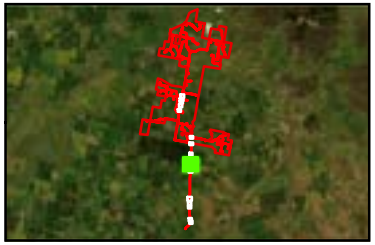


Figure 5j

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG38

PG38

PG38

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

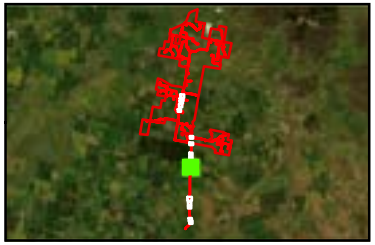


Figure 5k

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 25 50

Metres

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

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

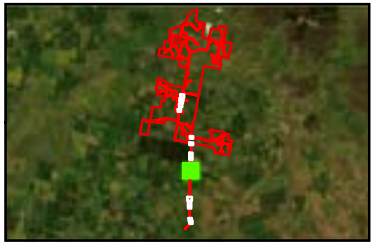


Figure 5l

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

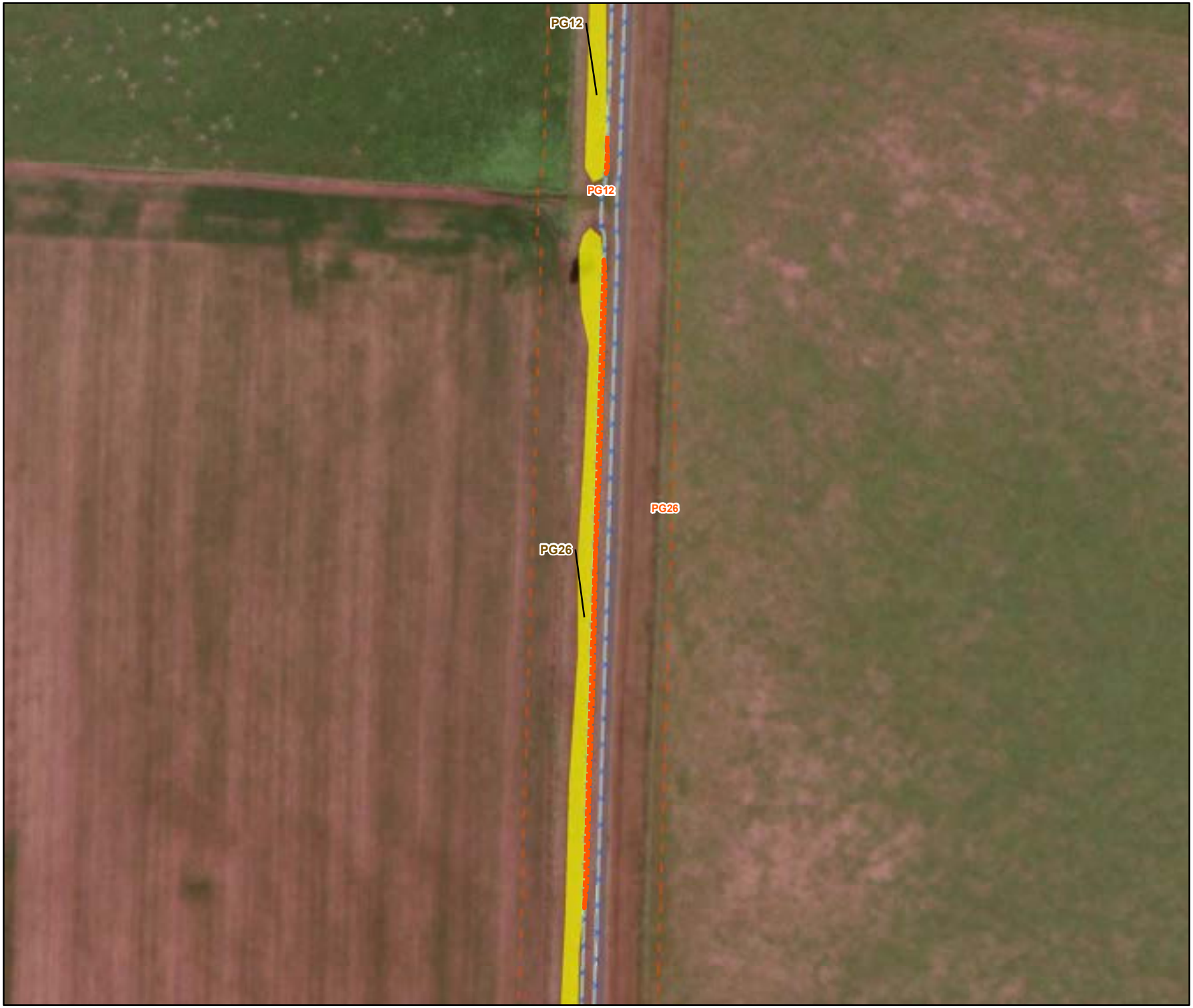
0 25 50

Metres

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

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley



Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

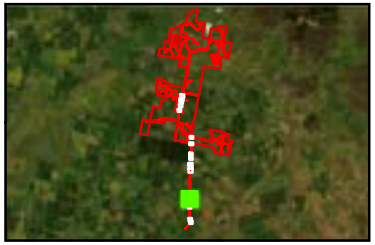


Figure 5m

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 25 50

Metres

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

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG26

PG26

PG25

PG25

PG25

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

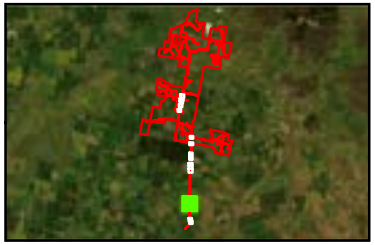


Figure 5n

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

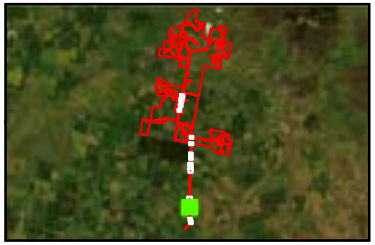


Figure 5o

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

PG21

PG20

PG20

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

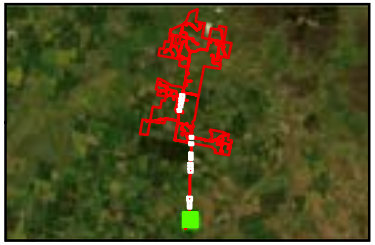


Figure 5p

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

Legend

- Assessment Area
- Construction Footprint
- 220kV Underground Transmission Line

Ecological Vegetation Classes

- Plains Grassland (Heavier Soils) (EVC 132_61)
- Impacted vegetation

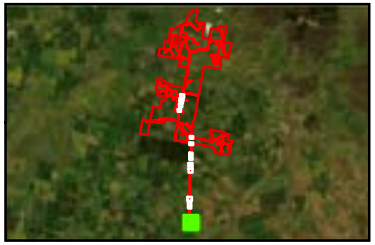


Figure 5q

Vegetation impacts

Ecological Assessment for Moreton Hill Wind Farm, Pittong

N

0 20 40

Metres

Map Scale: 1:1,600 @ A4
Coordinate System: GDA 1994 MGA Zone 54

ecology & heritage partners

14178_Fig05_VegImpactsMB 25/01/2024 melsley

Figure 6a

Previously documented Brolga records within 4km of the study area

Ecological Assessment for Moreton Hill Wind Farm, Pittong

Legend

- Project Area
- 4km buffer
- Waterbodies
- Current Wetlands
- Wetland/Swamp

VBA 2023

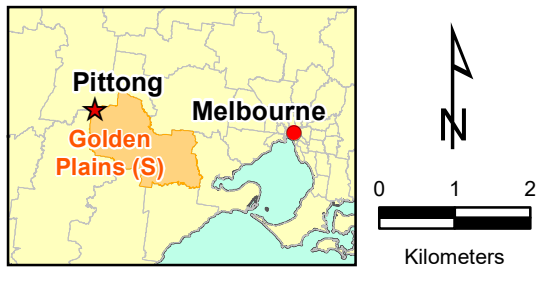
- Brolga breeding records
- Brolga records

Birdlife 2023

- Brolga records

Sheldons Flocking Database 2004

- Brolga flocking records



Map Scale: 1:100,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

14178_Fig06a_Brolga4kmP 24/10/2023 melsley

ecology & heritage partners

Figure 6b

Previously documented Brolga records within 10km of the study area

Ecological Assessment for Moreton Hill Wind Farm, Pittong

Legend

- Project Area
- 10km buffer
- Waterbodies
- Current Wetlands
- Wetland/Swamp

VBA 2023

- Brolga breeding records
- Brolga records

Birdlfe 2023

- Brolga records

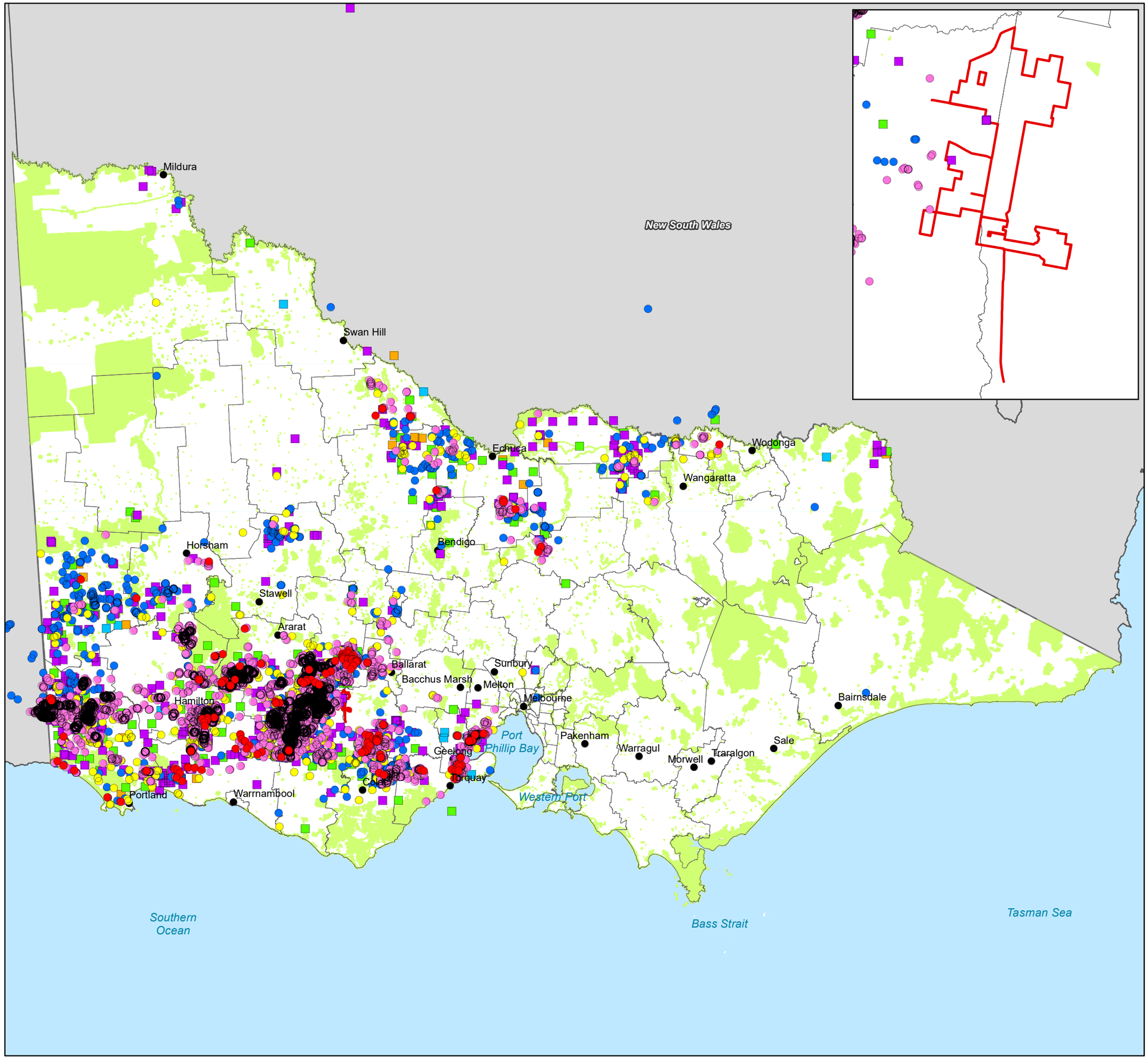
Sheldons Flocking Database 2004

- Brolga flocking records
- Brolga records

Map Scale: 1:140,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

14178_Fig06b_Brolga10kmP 24/10/2023 melsley

ecology & heritage partners



Legend

- Project Area
- Towns
- Parks and Reserves
- Local Government Areas

Brolga records (VBA 2023)

- 2020-2023
- 2010s
- 2000s
- 1990s
- 1980s
- 1970s
- 1960s
- 1950s

Figure 6c

Previously documented Brolga recorded across Victoria

Morton Hill Wind Farm, Pittong

N

0 80 160

Kilometres

ecology & heritage partners

Figure 7

Previously documented significant flora within 5km of the study area

Ecological Assessment for Moreton Hill Wind Farm, Pittong

ecology & heritage partners

Legend

- Project Area

Significant flora

- Adamson's Blown-grass
- Arching Flax-lily
- Bog Gum
- Brackish Plains Buttercup
- Buxton Gum
- Clover Glycine
- Creeping Rush
- Cut-leaf Burr-daisy
- Enfield Grevillea
- Giant Honey-myrtle
- Golden Cowslips
- Hairy Tails
- Large-fruit Yellow-gum
- Matted Flax-lily
- Mugga
- Pale Swamp Everlasting
- Plains Yam-daisy
- Purple Blown-grass
- Red Bloodwood
- Rough Daisy-bush
- Salt Blown-grass
- Salt Paperbark
- Salt-lake Tussock-grass
- Small Milkwort
- Snowy River Wattle
- Southern Blue-gum
- Spiny Rice-flower
- Spotted Gum
- Sticky Wattle
- Swamp Everlasting
- Trailing Hop-bush
- White Sunray
- Wind-blown Tussock-grass
- Woolly Wattle
- Yarra Gum

0 1 2

Kilometers

Map Scale: 1:105,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

14178_Fig07_SigFloraP 24/10/2023 melsley

Figure 8

Previously documented significant fauna within 5km of the study area

Ecological Assessment for Moreton Hill Wind Farm, Pittong

ecology & heritage partners

Legend

Project Area

Significant fauna

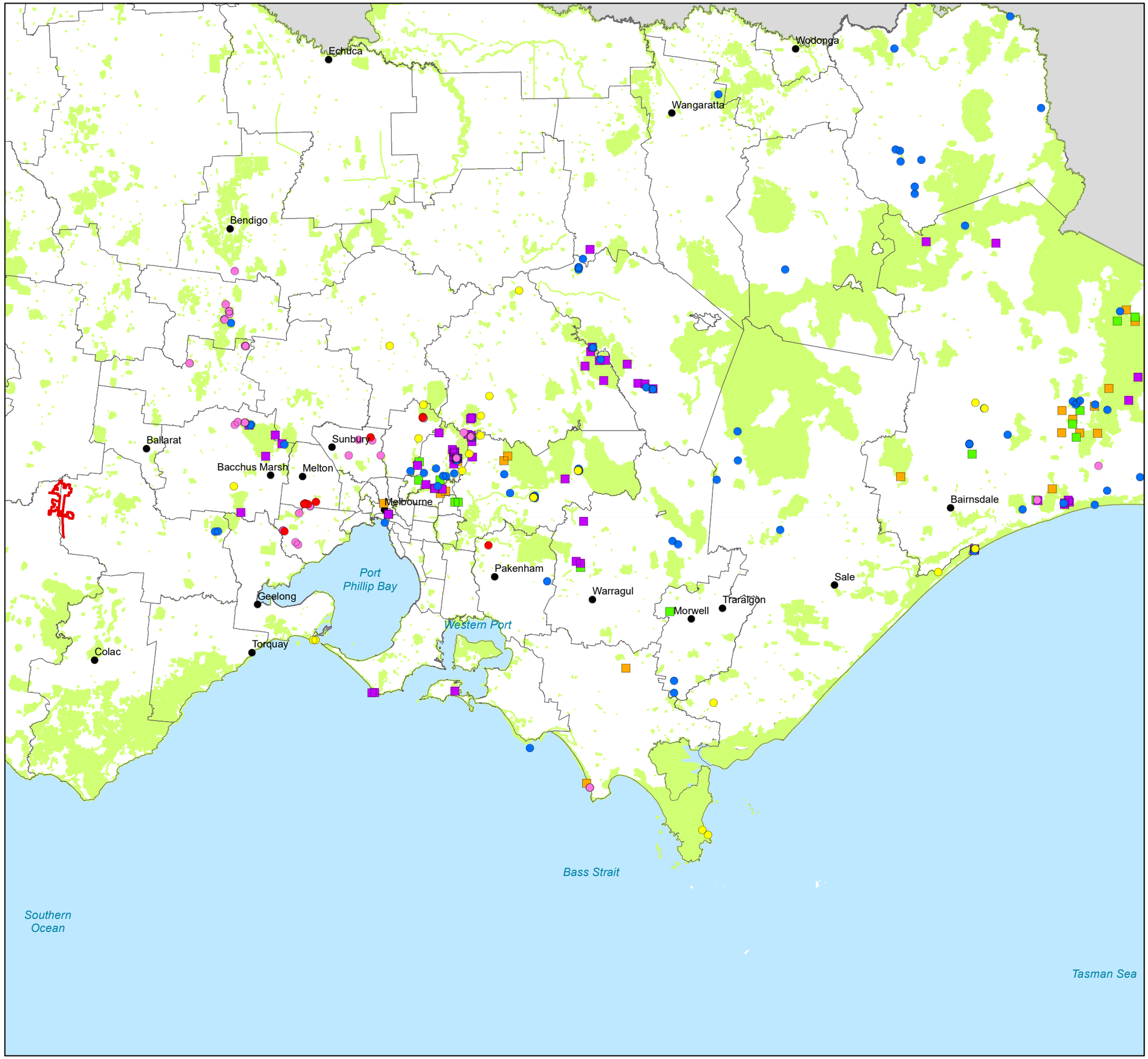
- Australasian Bittern
- Australasian Shoveler
- Australian Bustard
- Australian Gull-billed Tern
- Barking Owl
- Black Falcon
- Blue-billed Duck
- Blue-winged Parrot
- Brolga
- Brown Treecreeper
- Brush-tailed Phascogale
- Bush Stone-curlew
- Common Dunnart
- Common Greenshank
- Crested Bellbird
- Curlew Sandpiper
- Diamond Dove
- Diamond Firetail
- Eastern Barred Bandicoot
- Eastern Great Egret
- Fat-tailed Dunnart
- Gang-gang Cockatoo
- Grey Goshawk
- Growling Grass Frog
- Hardhead
- Hooded Robin
- Lewin's Rail
- Little Eagle
- Macquarie Perch
- Murray Cod
- Musk Duck
- Painted Honeyeater
- Platypus
- Powerful Owl
- Southern Toadlet
- Speckled Warbler
- Striped Legless Lizard
- Swift Parrot
- White-bellied Sea-Eagle
- White-throated Needletail
- Yarra Pygmy Perch

0 1 2

Kilometers

Map Scale: 1:105,000 @ A3
Coordinate System: GDA 1994 MGA Zone 54

14178_Fig08_SigFaunaP 24/10/2023 melsley



Legend

- Project Area
- Towns
- Parks and Reserves
- Local Government Areas

Eastern Bent-winged Bat records (VBA 2023)

- 2020-2022
- 2010s
- 2000s
- 1990s
- 1980s
- 1970s
- 1960s

Figure 9

Previously documented Eastern Bent-winged Bat recorded across Victoria

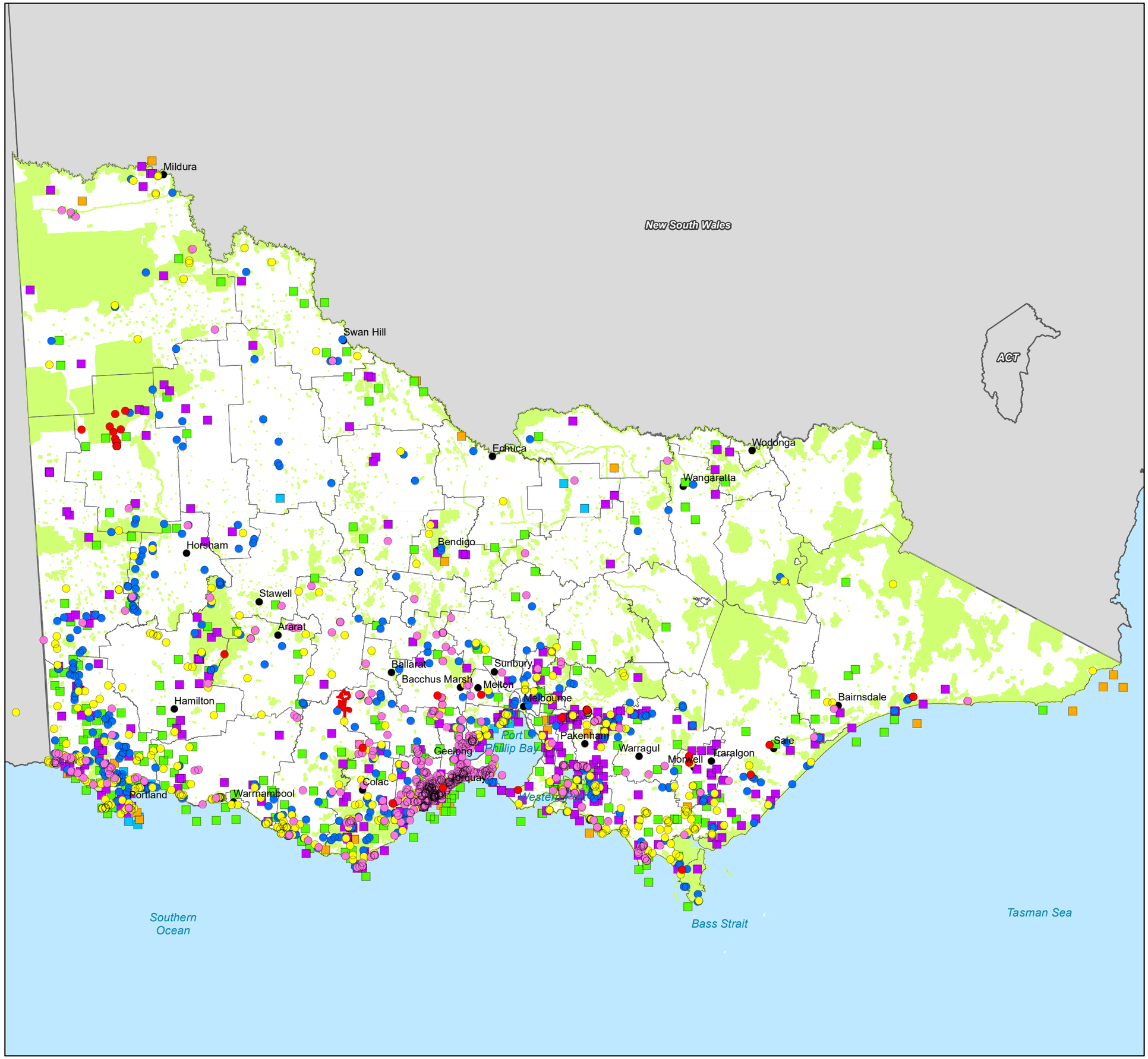
Ecological Assessment for Morton Hill Wind Farm, Pittong

N

0 40 80

Kilometres

ecology & heritage partners



Legend

- Project Area
- Towns
- Parks and Reserves
- Local Government Areas

Blue-winged Parrot records (VBA 2023)

- 2020-2022
- 2010s
- 2000s
- 1990s
- 1980s
- 1970s
- 1960s
- 1950s

Figure 10

Previously documented Blue-winged Parrot recorded across Victoria

Ecological Assessment for Morton Hill Wind Farm, Pittong

N

0 80 160

Kilometres

ecology & heritage partners

APPENDIX 1 LANDOWNER QUESTIONNAIRE

ecology & heritage partners

www.ehpartners.com.au

Dear Landowner,

Re: Landowner Questionnaire for the proposed Moreton Hill Wind Farm

Ecology and Heritage Partners have been engaged to undertake a series of ecological investigations to inform the planning application for the proposed Moreton Hill Wind Farm Wind Farm.

As part of our ecological investigations, and concurrently with the drone surveys, we are seeking to better understand the potential presence and location of ecological habitats and other values located within the broader locality, and invite you to participate in the process via our questionnaire.

Information provided by you will remain confidential, and will ultimately assist in informing the design and operation of the proposed wind farm, and also ensure any mitigation measures implemented are appropriate, and directly respond to relevant ecological considerations. Please respond by Monday 30 October 2023 to ensure your feedback is received in time to be reviewed, and considered as part of the proposed design, operation and mitigation phases of the project.

Alternatively, we are happy to hear from you directly, and welcome an email or a phone call via the details below. Also, you are welcome to send through a photo/scan of your questionnaire responses to the details below rather than sending through by mail, if preferred.

Kind regards,

ecology & heritage partners

www.ehpartners.com.au

Landowner Consultation Questionnaire

The aim of the following survey is to enable Ecology and Heritage Partners to develop a broad-scale understanding of the environment within the general locality of the proposed Moreton Hill Farm through acquiring information on land use, management practices, and the presence of habitat for a range of flora and fauna. This information will assist in inform the design and operation of the proposed Moreton Hill Wind Farm.

Date: _____

Landholder's Name: _____

Property Address: _____

_____

What is the primary use for your land? (i.e. cropping, grazing, mixed alternating)

_____

What broad land types exist on your land? (i.e. arable, stony, aquatic, mixed, cleared)

_____

How long have you owned or farmed the land?

_____

Are you aware of feral animals on your land? Rabbits and warrens, foxes, deer etc.

_____

Do you manage feral animals of your land? (Please circle one)

Yes/ No

Do you have any wetlands/waterbodies on your property? If so, how many/what type (i.e. farm dams, creek/stream, ephemeral wetlands)

_____

_____

Have there been any changes to waterbodies/wetlands within your property? When and why did these changes occur? (i.e. drainage for cropping purposes)

_____

_____

1 **Are you aware of any threatened or protected fauna species on your land? If so, please indicate the number of individuals and frequency of sightings when applicable.**

(i.e. 2-3 Wedge-tailed eagles observed up to 5 times during spring/summer)

_____

_____

_____

_____

_____

2 **If you have observed Brolga on your property, please indicate where (using Lat/Longs from Google Maps), when and how many Brolga you have seen on your property.**

Number of Brolga observed together	Date of observations/s	Frequency of observation	Lat/Longs from Google Maps

3 **Have you observed Brolga breeding on your property (i.e. nest sites)? If so, where (using lat/longs from Google Maps), and how often (i.e. 3 out of every 10 years)?**

_____

_____

_____

_____

4 **Have you observed any Brolga 'flocking' on your property? (flocking indicates at least 10 or more Brolga utilizing wetland habitat overnight). If so, how often have you observed this and where and at what times of the year?**

_____

_____

_____

5 **Are you aware of bat caves or bat daytime roosting areas in and around your property?**

_____

_____

_____

6 **Any other comments related to Brolga, birds or bats?**

_____

_____

_____

7 **Are you aware of any significant flora or vegetation communities that occur on your land? If so, please summarise.**

_____

_____

_____

Are you happy for Ecology and Heritage Partners to call you to discuss your answers to the questionnaire in more detail? If so, please provide you best contact number and time to call:

_____

_____

Please forward your completed responses and any relevant photography or Google Maps screenshots to: David Heaton - 230 Latrobe Terrace, Geelong West VIC 3218. Or please feel free to email your responses to dheaton@ehpartners.com.au, or call via the mobile number below.

David Heaton | Zoologist / Bushfire Consultant

Ecology and Heritage Partners (Geelong)

T 1300 839 325 | M 0438 178 934 | dheaton@ehpartners.com.au | www.ehpartners.com.au

Ecology and Heritage Partners acknowledge the Traditional Owners of the country we live and work on, and we pay our respect to Elders past, present and emerging.

APPENDIX 2 FLORA

Appendix 2.1 Flora Results

Legend:

CR Listed as Critically Endangered under the EPBC Act
L Listed as Threatened under the FFG Act (DEECA 2023e)
I Listed as Protected under the FFG Act (DELWP 2019a)
- Naturally growing (i.e. non-planted) indigenous species to the study area
***** Listed as a noxious weed under the CaLP Act

Table A2.1. Flora observed within the Project Area

Scientific Name	Common Name	Notes
INDIGENOUS SPECIES		
Acacia implexa	Lightwood	-
Acacia paradoxa	Hedge Wattle	-
Acacia pycnantha	Golden Wattle	I
Acaena echinata	Sheep's Burr	-
Acaena novae-zelandiae	Bidgee-widgee	-
Amphibromus nervosus	Common Swamp Wallaby-grass	-
Anthosachne scabra s.s.	Common Wheat-grass	-
Arthropodium strictum s.l.	Chocolate Lily	-
Austrostipa bigeniculata	Kneed Spear-grass	
Austrostipa scabra	Rough Spear-grass	-
Austrostipa semibarbata	Bearded Spear-grass	-
Austrostipa spp.	Spear-grass	-
Brunonia australis	Blue Pincushion	I
Burchardia umbellata	Milkmaids	-
Bursaria spinosa	Sweet Bursaria	-
Calocephalus lacteus	Milky Beauty-heads	I
Chrysocephalum apiculatum s.l.	Common Everlasting	I
Convolvulus angustissimus	Blushing Bindweed	-
Coronidium gunnianum	Pale Swamp Everlasting	L
Dianella revoluta s.l.	Black-anther Flax-lily	-
Dichelachne crinita	Long-hair Plume-grass	-

Scientific Name	Common Name	Notes
Dichondra repens	Kidney-weed	-
Drosera spp.	Sundew	-
Eleocharis acuta	Common Spike-sedge	-
Epilobium billardierianum	Variable Willow-herb	-
Eryngium ovinum	Blue Devil	-
Eucalyptus camaldulensis	River Red-gum	-
Eucalyptus obliqua	Messmate Stringybark	-
Eucalyptus ovata	Swamp Gum	-
Eutaxia microphylla	Common Eutaxia	-
Geranium spp.	Crane's Bill	-
Gonocarpus tetragynus	Common Raspwort	-
Goodenia lanata	Trailing Goodenia	-
Isolepis spp.	Club Sedge	-
Juncus pallidus	Pale Rush	-
Juncus procerus	Tall Rush	-
Juncus subsecundus	Finger Rush	-
Leptorhynchos tenuifolius	Wiry Buttons	I
Leptospermum continentale	Prickly Tea-tree	-
Lomandra filiformis	Wattle Mat-rush	-
Lythrum hyssopifolia	Small Loosestrife	-
Melicytus dentatus s.l.	Tree Violet	-
Microlaena stipoides var. stipoides	Weeping Grass	-
Microtis spp.	Onion Orchid	I
Myriophyllum crispatum	Upright Water-milfoil	-
Oxalis perennans	Grassland Wood-sorrel	-
Pimelea curviflora s.l.	Curved Rice-flower	-
Pimelea humilis	Common Rice-flower	-
Pimelea spinescens	Spiny Rice-flower	CR, L
Poa labillardierei	Common Tussock-grass	-
Poa spp.	Tussock Grass	-
Potamogeton cheesemanii	Red Pondweed	-
Rytidosperma caespitosum	Common Wallaby-grass	-
Rytidosperma carphoides	Short Wallaby-grass	-

Scientific Name	Common Name	Notes
Rytidosperma racemosum var. *racemosum*	Slender Wallaby-grass	-
Rytidosperma spp.	Wallaby-grass	-
Schoenus apogon	Common Bog-sedge	-
Senecio quadridentatus	Cotton Fireweed	I
Stellaria pungens	Prickly Starwort	-
Thelymitra pauciflora	Slender Sun Orchid	I
Themeda triandra	Kangaroo Grass	-
Veronica calycina	Hairy Speedwell	-
NON-INDIGENOUS OR INTRODUCED SPECIES		
Agrostis capillaris	Brown-top Bent	-
Aira elegantissima	Delicate Hair-grass	-
Anthoxanthum odoratum	Sweet Vernal-grass	-
Arctotheca calendula	Cape Weed	-
Avena fatua	Wild Oat	-
Briza maxima	Large Quaking-grass	-
Briza minor	Lesser Quaking-grass	-
Bromus catharticus	Prairie Grass	-
Centaurium erythraea	Common Centaury	-
Cirsium vulgare	Spear Thistle	*
Dactylis glomerata	Cocksfoot	-
Disa bracteata	South African Orchid	-
Eucalyptus cladocalyx	Sugar Gum	-
Holcus lanatus	Yorkshire Fog	-
Hypochaeris radicata	Flatweed	-
Juncus acuta	Spiny Rush	*
Leontodon taraxacoides subsp. taraxacoides	Hairy Hawkbit	-
Lolium perenne	Perennial Rye-grass	-
Lysimachia arvensis	Pimpernel	-
Medicago spp.	Medic	-
Oxalis purpurea	Large-flower Wood-sorrel	-
Paspalum dilatatum	Paspalum	-
Phalaris aquatica	Toowoomba Canary-grass	-
Plantago coronopus	Buck's-horn Plantain	-
Plantago lanceolata	Ribwort	-

Scientific Name	Common Name	Notes
Poa annua	Annual Meadow-grass	-
Romulea rosea	Onion Grass	-
Rosa rubiginosa	Sweet Briar	*
Rumex crispus	Curled Dock	-
Sonchus oleraceus	Common Sow-thistle	-
Stellaria media	Chickweed	-
Trifolium angustifolium var. angustifolium	Narrow-leaf Clover	-
Trifolium repens var. repens	White Clover	-
Ulex europaeus	Gorse	***W**
Vulpia spp.	Fescue	-

Appendix 2.2 Habitat Hectare Assessment

Table A2.2. Habitat Hectare Assessment Table for impacted native vegetation patches.

Vegetation Zone		PG64, PG67	PG4	PG12, PG19, pG20, PG24, PG25, PG26, PG38, PG43	PG42, PG48	PG16, PG18, PG41, PG66
Bioregion		VVP	VVP	VVP	VVP	VVP
EVC / Tree		Plains Grassland (Heavier Soils)	Plains Grassland (Heavier Soils)	Plains Grassland (Heavier Soils)	Plains Grassland (Heavier Soils)	Plains Grassland (Heavier Soils)
EVC Number		132_61	132_61	132_61	132_61	132_61
EVC Conservation Status		Endangered	Endangered	Endangered	Endangered	Endangered
Patch Condition	Large Old Trees /10	N/A	N/A	N/A	N/A	N/A
	Canopy Cover /5	N/A	N/A	N/A	N/A	N/A
	Under storey /25	15	10	15	15	10
	Lack of Weeds /15	7	9	7	4	0
	Recruitment /10	3	3	6	3	0
	Organic Matter /5	5	5	5	4	4
	Logs /5	N/A	N/A	N/A	N/A	N/A
	Treeless EVC Multiplier	1.36	1.36	1.36	1.36	1.36
	Subtotal =	40.80	36.72	44.88	35.36	19.04
Landscape Value /25		1	1	1	1	1
Habitat Points /100		42	38	46	36	20
Habitat Score		**0.42**	**0.38**	**0.46**	**0.36**	**0.20**

VVP = Victorian Volcanic Plain

Appendix 2.3 Scattered Trees and Large Trees in Patches

Table A2.3. Scattered Trees and Large Trees in Patches.

Tree # (Figure 2)	Species Name	Common Name	DBH (cm)	Size Class	Scattered / Parch	Status
1	*Eucalyptus viminalis*	Rough-barked Manna Gum	250	Large Tree	Scattered	Retained
2	*Eucalyptus* sp.	Stag	96	Large Tree	Scattered	Retained
3	*Eucalyptus rubida*	Candlebark	122	Large Tree	Scattered	Retained
4	*Eucalyptus rubida*	Candlebark	133	Large Tree	Scattered	Retained
5	*Eucalyptus* sp.	Stag	125	Large Tree	Scattered	Retained
6	*Eucalyptus* sp.	Stag	85	Large Tree	Scattered	Retained
7	*Eucalyptus rubida*	Candlebark	104	Large Tree	Scattered	Retained
8	*Eucalyptus viminalis*	Rough-barked Manna Gum	132	Large Tree	Scattered	Retained
9	*Eucalyptus* sp.	Stag	148	Large Tree	Patch	Retained
10	*Eucalyptus* sp.	Stag	109	Large Tree	Scattered	Retained
11	*Eucalyptus viminalis*	Rough-barked Manna Gum	189	Large Tree	Scattered	Retained
12	*Eucalyptus obliqua*	Messmate Stringybark	162	Large Tree	Scattered	Retained
13	*Eucalyptus obliqua*	Messmate Stringybark	89	Large Tree	Scattered	Retained
14	*Eucalyptus obliqua*	Messmate Stringybark	113	Large Tree	Scattered	Retained
15	*Eucalyptus viminalis*	Rough-barked Manna Gum	75	Large Tree	Scattered	Retained
16	*Eucalyptus viminalis*	Rough-barked Manna Gum	156	Large Tree	Scattered	Retained
17	*Eucalyptus* sp.	Stag	151	Large Tree	Scattered	Retained
18	*Eucalyptus* sp.	Stag		Large Tree	Scattered	Retained
19	*Eucalyptus camaldulensis*	River Red-gum	173	Large Tree	Scattered	Retained

Tree # (Figure 2)	Species Name	Common Name	DBH (cm)	Size Class	Scattered / Parch	Status
20	*Eucalyptus camaldulensis*	River Red-gum	157	Large Tree	Scattered	Retained
21	*Eucalyptus camaldulensis*	River Red-gum	83	Large Tree	Scattered	Retained
22	*Eucalyptus camaldulensis*	River Red-gum	138	Large Tree	Scattered	Retained
23	*Eucalyptus camaldulensis*	River Red-gum	132	Large Tree	Scattered	Retained
24	*Eucalyptus camaldulensis*	River Red-gum	144	Large Tree	Scattered	Retained
25	*Eucalyptus camaldulensis*	River Red-gum	138	Large Tree	Scattered	Retained
26	*Eucalyptus camaldulensis*	River Red-gum	135	Large Tree	Scattered	Retained
27	*Eucalyptus camaldulensis*	River Red-gum	158	Large Tree	Scattered	Retained
28	*Eucalyptus camaldulensis*	River Red-gum	172	Large Tree	Scattered	Retained
29	*Eucalyptus camaldulensis*	River Red-gum	196	Large Tree	Scattered	Retained
30	*Eucalyptus camaldulensis*	River Red-gum	98	Large Tree	Scattered	Retained
31	*Eucalyptus camaldulensis*	River Red-gum	40	Small Tree	Scattered	Retained
32	*Eucalyptus camaldulensis*	River Red-gum	36	Small Tree	Scattered	Retained
33	*Eucalyptus camaldulensis*	River Red-gum	34	Small Tree	Scattered	Retained
34	*Eucalyptus camaldulensis*	River Red-gum	88	Large Tree	Scattered	Retained
35	*Eucalyptus camaldulensis*	River Red-gum	54	Small Tree	Scattered	Retained
36	*Eucalyptus camaldulensis*	River Red-gum	52	Small Tree	Scattered	Retained
37	*Eucalyptus camaldulensis*	River Red-gum	48	Small Tree	Scattered	Retained
38	*Eucalyptus camaldulensis*	River Red-gum	60	Small Tree	Scattered	Retained
39	*Eucalyptus camaldulensis*	River Red-gum	58	Small Tree	Scattered	Retained
40	*Eucalyptus camaldulensis*	River Red-gum	36	Small Tree	Scattered	Retained
41	*Eucalyptus* sp.	Stag	0	Large Tree	Scattered	Retained

Tree # (Figure 2)	Species Name	Common Name	DBH (cm)	Size Class	Scattered / Parch	Status
42	*Eucalyptus viminalis*	Rough-barked Manna Gum	88	Large Tree	Scattered	Retained
43	*Eucalyptus viminalis*	Rough-barked Manna Gum	65	Small Tree	Scattered	Retained
44	*Eucalyptus camaldulensis*	River Red-gum	124	Large Tree	Patch	Retained
45	*Eucalyptus camaldulensis*	River Red-gum	38	Small Tree	Scattered	Retained
46	*Eucalyptus camaldulensis*	River Red-gum	101	Large Tree	Patch	Retained
47	*Eucalyptus* sp.	Stag	78	Large Tree	Scattered	Retained
48	*Eucalyptus camaldulensis*	River Red-gum	87	Large Tree	Patch	Retained
49	*Eucalyptus camaldulensis*	River Red-gum	108	Large Tree	Patch	Retained
50	*Eucalyptus camaldulensis*	River Red-gum	102	Large Tree	Scattered	Retained
51	*Eucalyptus camaldulensis*	River Red-gum	28	Small Tree	Scattered	Retained
52	*Eucalyptus camaldulensis*	River Red-gum	19	Small Tree	Scattered	Retained
53	*Eucalyptus camaldulensis*	River Red-gum	106	Large Tree	Patch	Retained
54	*Eucalyptus camaldulensis*	River Red-gum	84	Large Tree	Patch	Retained
55	*Eucalyptus camaldulensis*	River Red-gum	113	Large Tree	Patch	Retained
56	*Eucalyptus camaldulensis*	River Red-gum	148	Large Tree	Patch	Retained
57	*Eucalyptus camaldulensis*	River Red-gum	84	Large Tree	Patch	Retained
58	*Eucalyptus camaldulensis*	River Red-gum	81	Large Tree	Patch	Retained
59	*Eucalyptus camaldulensis*	River Red-gum	90	Large Tree	Patch	Retained
60	*Eucalyptus camaldulensis*	River Red-gum	85	Large Tree	Patch	Retained
61	*Eucalyptus camaldulensis*	River Red-gum	89	Large Tree	Scattered	Retained
62	*Eucalyptus camaldulensis*	River Red-gum	96	Large Tree	Patch	Retained
63	*Eucalyptus camaldulensis*	River Red-gum	164	Large Tree	Patch	Retained

Tree # (Figure 2)	Species Name	Common Name	DBH (cm)	Size Class	Scattered / Parch	Status
64	*Eucalyptus camaldulensis*	River Red-gum	89	Large Tree	Patch	Retained
65	*Eucalyptus viminalis*	Rough-barked Manna Gum	61	Small Tree	Scattered	Retained
66	*Eucalyptus camaldulensis*	River Red-gum	70	Small Tree	Scattered	Retained
67	*Eucalyptus camaldulensis*	River Red-gum	89	Large Tree	Patch	Retained
68	*Eucalyptus camaldulensis*	River Red-gum	22	Small Tree	Scattered	Retained
69	*Eucalyptus camaldulensis*	River Red-gum	92	Large Tree	Patch	Retained
70	*Eucalyptus camaldulensis*	River Red-gum	169	Large Tree	Patch	Retained
71	*Eucalyptus camaldulensis*	River Red-gum	104	Large Tree	Patch	Retained
72	*Eucalyptus camaldulensis*	River Red-gum	99	Large Tree	Patch	Retained
73	*Eucalyptus camaldulensis*	River Red-gum	130	Large Tree	Scattered	Retained
77	*Eucalyptus camaldulensis*	River Red-gum	88	Large Tree	Patch	Retained
78	*Eucalyptus camaldulensis*	River Red-gum	186	Large Tree	Patch	Retained
79	*Eucalyptus camaldulensis*	River Red-gum	80	Large Tree	Patch	Retained
80	*Eucalyptus camaldulensis*	River Red-gum	124	Large Tree	Patch	Retained
81	*Eucalyptus* sp.	Stag	100	Large Tree	Patch	Retained
82	*Eucalyptus camaldulensis*	River Red-gum	80	Large Tree	Patch	Retained
83	*Eucalyptus camaldulensis*	River Red-gum	86	Large Tree	Patch	Retained
84	*Eucalyptus* sp.	Stag	210	Large Tree	Scattered	Retained
85	*Eucalyptus camaldulensis*	River Red-gum	144	Large Tree	Patch	Retained
86	*Eucalyptus camaldulensis*	River Red-gum	87	Large Tree	Patch	Retained
87	*Eucalyptus camaldulensis*	River Red-gum	174	Large Tree	Patch	Retained
88	*Eucalyptus camaldulensis*	River Red-gum	111	Large Tree	Patch	Retained

Tree # (Figure 2)	Species Name	Common Name	DBH (cm)	Size Class	Scattered / Parch	Status
89	*Eucalyptus camaldulensis*	River Red-gum	91	Large Tree	Patch	Retained
90	*Eucalyptus camaldulensis*	River Red-gum	97	Large Tree	Patch	Retained
91	*Eucalyptus camaldulensis*	River Red-gum	14	Small Tree	Scattered	Retained
92	*Eucalyptus camaldulensis*	River Red-gum	12	Small Tree	Scattered	Retained
93	*Eucalyptus camaldulensis*	River Red-gum	115	Large Tree	Patch	Retained

Appendix 2.4 Significant Flora Species

Significant flora within 10 kilometres of the study area is provided in the Table A2.4.3 at the end of this section, with Tables A2.4.1 and A2.4.2 below providing the background context for the values in Table 2.4.3.

Table A2.4.1 Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 7 in Table A2.4.3.

EPBC (*Environment Protection and Biodiversity Conservation Act 1999*):		FFG (*Flora and Fauna Guarantee Act 1988*):	
EX	Extinct	L	Listed as threatened
CR	Critically endangered	N	Nominated for listing as threatened
EN	Endangered	D	Delisted as threatened
VU	Vulnerable	I	Rejected for listing as threatened; taxon invalid
#	Listed on the Protected Matters Search Tool	X	Rejected for listing as threatened; taxon ineligible

Table A2.4.2 Likelihood of occurrence rankings: Habitat characteristics assessment of significant flora species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area to determine their likelihood of occurrence. The values in this table correspond to Column 8 in Table A1.4.3.

1	Known Occurrence	• Recorded within the study area recently (i.e. within ten years).
2	High Likelihood	• Previous records of the species in the local vicinity; and/or, • The study area contains areas of high-quality habitat.
3	Moderate Likelihood	• Limited previous records of the species in the local vicinity; and/or • The study area contains poor or limited habitat.
4	Low Likelihood	• 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	• No suitable habitat and/or outside the species range.

Table A2.4.3 Significant flora recorded within 10 kilometres of the Assessment Area.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Assessment Area	Rationale for likelihood of occurrence
NATIONAL SIGNIFICANCE							
Amphibromus fluitans #	River Swamp Wallaby-grass	-	-	VU	-	4	Limited areas of suitable habitat in Assessment Area, and no impacts proposed to any potential habitat (i.e. wet/low lying areas).
Caladenia ornata #	Ornate Pink Fingers	-	-	VU	en	5	Limited suitable habitat and lack of past records in local region
Dianella amoena	Matted Flax-lily	8	2015	EN	cr	4	Limited areas of suitable habitat in Assessment Area, and marginal impacts proposed to any potential habitat. Species not observed during vegetation surveys.
Dodonaea procumbens	Trailing Hop-bush	40	2017	VU	-	4	Areas of suitable habitat within the study area were generally low in floristic diversity. Species not observed during vegetation assessments or targeted surveys. Past records located approximately 11 kilometres south east of Willowvale Road Assessment Area.
Eucalyptus crenulata	Buxton Gum	6	2015	EN	en	5	Limited suitable habitat and impacts largely confined to treeless vegetation patches
Glycine latrobeana	Clover Glycine	5	2004	VU	vu	4	Areas of suitable habitat within the study area were generally low in floristic diversity. Species not

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Assessment Area	Rationale for likelihood of occurrence
							observed during vegetation assessments or targeted surveys.
Grevillea bedggoodiana	Enfield Grevillea	2	1994	VU	en	5	No suitable habitat within the Assessment Area (confined to Enfield area on gravelly clay).
Lachnagrostis adamsonii	Adamson's Blown-grass	27	2012	EN	en	4	Previously recorded in local area but no suitable habitat within Assessment Area
Lepidium aschersonii #	Spiny Peppercress	-	-	VU	en	5	Limited suitable habitat and lack of records in local region
Lepidium hyssopifolium #	Basalt Pepper-cress	-	-	EN	en	5	Limited suitable habitat and lack of records in local region
Leucochrysum albicans subsp. *tricolor*	White Sunray	25	2014	EN	en	2	Species recorded during significant flora surveys in local region, however not observed within the limited patches of Plains Grassland proposed to be impacted. The native vegetation within the Assessment Area was comprised of a few common flora species (i.e. Kangaroo Grass or Spear-grass), often in low cover and of lower quality than where the species was observed in the local area.
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	81	2020	CR	cr	1	Individuals observed along Willowvale Road and Rankin Road within the Assessment Area, however are not within the impact area.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Assessment Area	Rationale for likelihood of occurrence
Poa sallacustris	Salt-lake Tussock-grass	6	2015	VU	cr	4	No areas of suitable habitat within the Assessment Area
Prasophyllum validum #	Sturdy Leek-orchid	-	-	VU	-	5	Limited suitable habitat and lack of records in local region
Pterostylis chlorogramma #	Green-striped Greenhood	-	-	VU	en	5	Limited suitable habitat and lack of records in local region
Rutidosis leptorhynchoides	Button Wrinklewort	3	2007	EN	en	4	Limited past records and not observed during vegetation assessments. Limited potential habitat present.
Senecio macrocarpus #	Large-fruit Fireweed	-	-	VU	cr	5	Limited suitable habitat and lack of records in local region
Senecio psilocarpus #	Swamp Fireweed	-	-	VU	-	5	Limited suitable habitat and lack of records in local region
Swainsona murrayana #	Slender Darling-pea	-	-	VU	en	5	No past records in local area and limited suitable habitat.
Thelymitra orientalis #	Hoary Sun-orchid	-	-	CR	cr	5	No past records in local area and limited suitable habitat.
Xerochrysum palustre	Swamp Everlasting	22	2008	VU	cr	4	Previously recorded in local area but no suitable habitat within Assessment Area
STATE SIGNIFICANCE							
Acacia boormanii	Snowy River Wattle	5	2015	-	en	4	Limited past records in local area and species not observed within Assessment Area

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Assessment Area	Rationale for likelihood of occurrence
Acacia howittii	Sticky Wattle	13	2015	-	vu	4	Species not observed within the Assessment Area
Acacia lanigera var. *lanigera*	Woolly Wattle	2	2011	-	vu	4	Limited past records in local area and species not observed within Assessment Area
Amphibromus pithogastrus	Plump Swamp Wallaby-grass	2	2019	-	cr	4	Limited past records in local area and species not observed within Assessment Area
Amphibromus sinuatus	Wavy Swamp Wallaby-grass	2	1990	-	en	4	Limited past records in local area and species not observed within Assessment Area
Calotis anthemoides	Cut-leaf Burr-daisy	8	2009	-	cr	3	Species not observed within the Assessment Area. Habitat within the Assessment Area was of low diversity and contained small, fragmented patches.
Comesperma polygaloides	Small Milkwort	31	2014	-	cr	1	Species recorded previously along Rankin Road within the Assessment Area (DEECA 2023d), however not observed in recent flora surveys.
Coronidium gunnianum	Pale Swamp Everlasting	14	2017	-	cr	1	Species recorded along Rankin Road within the Assessment Area and previous records along road reserve present (DEECA 2023d).
Corymbia gummifera	Red Bloodwood	1	2014	-	vu	5	Species not observed within Assessment Area and limited past records. Outside of natural distribution range for species.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Assessment Area	Rationale for likelihood of occurrence
Corymbia maculata	Spotted Gum	2	2015	-	vu	5	Species not observed within Assessment Area and limited past records
Dianella sp. aff. *longifolia* (Benambra)	Arching Flax-lily	9	2015	-	th	4	Species present in local area. Not observed within Assessment Area, although habitat was observed, primarily along Willowvale Road.
Discaria pubescens	Australian Anchor Plant	1	1994	-	cr	5	Species not observed within Assessment Area and limited past records
Diuris behrii	Golden Cowslips	1	2012	-	en	2	Species observed in higher quality grassland remnants in Project Area, but not within the Assessment Area. Habitat within the Assessment Area was of low diversity and contained smaller, fragmented patches.
Diuris gregaria	Clumping Golden Moths	2	2013	-	cr	4	Low quality habitat present in Assessment Area and limited past records.
Eucalyptus globulus subsp. *globulus*	Southern Blue-gum	3	2008	-	en	5	Species not observed within Assessment Area and limited past records
Eucalyptus kitsoniana	Bog Gum	7	2015	-	cr	5	Species not observed within Assessment Area and limited past records
Eucalyptus leucoxylon subsp. *megalocarpa*	Large-fruit Yellow-gum	4	2015	-	cr	4	Species not observed within Assessment Area during vegetation

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Assessment Area	Rationale for likelihood of occurrence
							surveys. Limited suitable habitat present and limited past records
Eucalyptus sideroxylon subsp. *sideroxylon*	Mugga	6	2015	-	en	4	Species not observed within Assessment Area during vegetation surveys. Limited suitable habitat present and limited past records
Eucalyptus yarraensis	Yarra Gum	66	2015	-	cr	2	Potential for species to occur in woodland areas, however vegetation within the Assessment Area was predominately grassland or derived grassland. No impacts proposed to woodland patches of vegetation
Geranium sp. 1	Large-flower Crane's-bill	1	2019	-	cr	4	Limited suitable habitat present and limited past records
Juncus revolutus	Creeping Rush	1	2015	-	en	4	Limited suitable habitat present and limited past records
Lachnagrostis robusta	Salt Blown-grass	9	2008	-	en	4	Limited suitable habitat present and limited past records
Lachnagrostis semibarbata var. *semibarbata*	Purple Blown-grass	2	2004	-	en	4	Limited suitable habitat present and limited past records
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle	43	2015	-	en	2	Species observed in local area, however as a planted specimen outside of its natural distribution range.
Melaleuca halmaturorum	Salt Paperbark	4	2014	-	en	4	Species not observed within Assessment Area during vegetation surveys and limited past records

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Assessment Area	Rationale for likelihood of occurrence
Microseris scapigera s.s.	Plains Yam-daisy	2	2016	-	cr	4	Limited suitable habitat present and limited past records
Olearia asterotricha	Rough Daisy-bush	1	1992	-	en	5	Species not observed within Assessment Area and limited past records
Poa physoclina	Wind-blown Tussock-grass	6	2015	-	en	4	Limited suitable habitat present and limited past records
Ptilotus erubescens	Hairy Tails	8	2014	-	cr	2	Potential to occur in grassland remnants however not observed during vegetation assessments
Ranunculus diminutus	Brackish Plains Buttercup	2	2004	-	en	4	Limited suitable habitat present and limited past records

Data Sources: Victorian Biodiversity Atlas (DEECA 2023d); Protected Matters Search Tool (DCCEEW 2023a).

APPENDIX 3 FAUNA

Appendix 3.1 Significant Fauna Species

Significant fauna within 10 kilometres of the study area is provided in the Table A3.1.3 at the end of this section, with Tables A3.1.1 and A3.1.2 below providing the background context for the values in Table 3.1.3.

Table A3.1.1 Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 8 in Table A2.1.3.

EPBC (*Environment Protection and Biodiversity Conservation Act 1999*):				FFG (*Flora and Fauna Guarantee Act 1988*):			
EX	Extinct	VU	Vulnerable	ex	Extinct	vu	Vulnerable
CR	Critically endangered	CD	Conservation Dependent	cr	Critically endangered	cd	Conservation Dependent
EN	Endangered	#	Listed on the Protected Matter Search Tool	en	Endangered		

Table A3.1.2 Likelihood of occurrence rankings: Habitat characteristics assessment of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area to determine their likelihood of occurrence. The values in this table correspond to Column 9 in Table A3.1.3.

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.

Table A3.1.3 Significant fauna recorded within 10 kilometres of the Project Area.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
NATIONAL SIGNIFICANCE							
Anthochaera phrygia	Regent Honeyeater	1	1924	CR	cr	4	No recent records of this species exist within the local vicinity. Some characteristics of this species preferred habitat exists within the study area. However, the study area is likely outside this species home range with the only known key breeding region in Victoria situated in Chiltern-Albury in the north of the state.
Aphelocephala leucopsis	Southern Whiteface #	-	-	VU	-	4	No recent records of this species exist within the local vicinity. Some characteristics of this species preferred habitat exists within the study area.
Aprasia parapulchella	Pink-tailed Worm-lizard	-	-	VU	en	4	No records of this species within the local vicinity. Some characteristics of this species preferred habitat exits ion the form of rocky outcrops.
Botaurus poiciloptilus	Australasian Bittern	1	1979	EN	cr	4	Only limited and historical (>20 years) records of this species exists in the local vicinity. Some characteristics of the species preferred habitat exists in the form of wetlands and agricultural dams. Habitat exists that could potentially be used for breeding.
Calidris ferruginea	Curlew Sandpiper	1	1978	CR	cr	4	No records of this species within the local vicinity. Limited characteristics of this species preferred habitat exits in the study area.
Callocephalon fimbriatum	Gang-gang Cockatoo	1	1981	EN	-	3	Only limited and historical (>20 years) exists within the local vicinity. Some characteristics of this species preferred habitat exists within the study

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
							area. This species relies heavily on flowing eucalypts and acacias for foraging.
Climacteris picumnus	Brown Treecreeper	13	2019	VU	-	1	Species observed within the study area during bird utilisation surveys. Suitable foraging habitat for the species across the study area.
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll #	-	-	EN	en	4	No records of this species exist within the local vicinity. Some characteristics of this species habitat exist within the study area but is largely scattered. This species requires high habitat connectivity.
Delma impar	Striped Legless Lizard	7	2019	VU	en	3	Some recent records of this species exist within the local vicinity. However, limited characteristics of the preferred habitat.
Eulamprus tympanum marnieae	Corangamite Water Skink #	-	-	EN	en	3	No records of this species within the local vicinity. Some characteristics of the species preferred habitat exists in the form of treeless grassland and basalt rock formations.
Falco hypoleucos	Grey Falcon #	-	-	VU	vu	3	No records of this species within the local vicinity. Some characteristics of this species preferred habitat exists in the form of woody watercourses in semi-arid regions within the study area. This species may visit the area on occasion for foraging purposes.
Galaxiella pusilla	Dwarf Galaxias #	-	-	VU	en	4	No records of this species exist within the local vicinity. Some characteristics of this species preferred habitat exists on the form of permanent freshwater water bodies.
Grantiella picta	Painted Honeyeater	10	2017	VU	vu	4	Some recent records of this species exist within the local vicinity. Only limited characteristics of this

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
							species preferred habitat. This species may visit the study site on occasion for foraging purposes.
Hirundapus caudacutus	White-throated Needletail	14	2018	VU	vu	3	Some recent records of this species exist within the local vicinity. This species is more present in coastal areas but have rarely been seen landing and often stay airborne at heights of up to 1km.
Lathamus discolor	Swift Parrot	2	1983	CR	cr	3	Only limited and historical records of this species exist in the local vicinity. Few occurrences of known preferred foraging species exist within the Project Area. This species may fly through the site on occasion en-route to foraging grounds.
Lissolepis coventryi	Swamp Skin #	-	-	EN	en	4	No records of this species lin the local vicinity. Only limited characteristics of this species preferred habitat is present within the study area (intertidal or regularly inundated tussock communities).
Litoria raniformis	Growling Grass Frog	26	2020	VU	vu	4	Only limited recent records of this species exist within the local vicinity. Some characteristics of this species preferred habitat exists in the form of permanent water bodies with fringing and emergent vegetation with rocky ledges.
Maccullochella peelii	Murray Cod	2	1970	VU	en	4	Only limited and historical (>20 years) records of this species exist within the local vicinity. Some characteristics of this species preferred habitat exists in the form of permanent freshwater water bodies within the study area.
Macquaria australasica	Macquarie Perch	4	1970	EN	en	4	Only limited and historical (>20 years) records of this species exist within the local vicinity. Some characteristics of this species preferred habitat

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
							exists in the form of permanent freshwater water bodies within the study area.
Melanodryas cucullata	Hooded Robin	5	1981	EN	vu	4	Only limited and historical (>20 years) records exist withing the local vicinity. Some characteristics of this species preferred habitat exist within the study area in the form of lightly wooded farmland and riparian areas. This species may visit the study area on occasion for foraging purposes.
Miniopterus orianae bassanii	Southern Bent-wing Bat #	-	-	CR	cr	4	No records of this species exist in the local vicinity Approx. 65 kilometres from nearest know maternity or roosting cave.
Nannoperca obscura	Yarra Pygmy Perch	3	1990	VU	vu	4	Only limited and historical (>20 years) records of this species exist within the local vicinity. Some characteristics of this species preferred habitat exists in the form of permanent freshwater water bodies within the study area.
Neophema chrysostoma	Blue-winged Parrot	12	2011	VU	-	1	Species observed within the study area during bird utilisation surveys. Suitable foraging habitat for the species across the study area.
Numenius madagascariensis	Eastern Curlew #	-	-	CR	cr	5	No records of this species exist within the local vicinity. Only limited characteristics of this species preferred habitat exist within the study area. This species preferred foraging habitat occurs in coastal regions.
Pedionomus torquatus	Plains-wanderer	4	2000	CR	cr	4	No records of this species within the local vicinity. Some characteristics of the species preferred habitat exist within the study area in the form of wetlands

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
Perameles gunnii	Eastern Barred Bandicoot	4	1967	EN	en	4	Only limited and historical (>20 years) exist within the local vicinity. Some characteristics of their preferred habitat exists within the study area in the form of dense grassland and tree shelter belts near farmland.
Petaurus australis australis	Yellow-bellied Glider (south-eastern) #	-	-	VU	-	4	No records of this species exist within the local vicinity. Very limited characteristics of this species preferred habitat exists within the study area. This species relies highly connected habitat consisting of old growth eucalypts which house large hollows.
Petauroides volans	Greater Glider #	-	-	VU	vu	4	No records of this species exist within the local vicinity. Very limited characteristics of this species preferred habitat exists within the study area. This species relies highly connected habitat consisting of old growth eucalypts which house large hollows.
Pteropus poliocephalus	Grey-headed Flying-fox #	-	-	VU	vu	3	No database records of this species within the local vicinity however recent correspondence with DEECA identified a camp in the low thousands at Lismore, approximately 20km south of the study area. This species forages on flowering eucalypts and may visit the study area on occasion for foraging purposes. The closest other known roosting sites for this species exists at Hexham (60km south west) and Colac (60km south) of the study area.
Rostratula australis	Australian Painted Snipe #	-	-	EN	cr	4	No records of this species within the local vicinity. Some characteristics of the species preferred habitat exist within the study area in the form of wetlands

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
Stagonopleura guttata	Diamond Firetail	3	1998	VU	vu	4	Only limited and historical (>20 years) records exist withing the local vicinity. Some characteristics of this species preferred habitat exist within the study area in the form of lightly wooded farmland and riparian areas. This species may visit the study area on occasion for foraging purposes.
Synemon plana	Golden Sun Moth	4	2020	VU	vu	3	Recent records of this species exist within 10km of the study area. Some characteristics of this species preferred habitat exists in the form of native grassland, however the species was not recorded during targeted surveys.
STATE SIGNIFICANCE							
Accipiter novaehollandiae	Grey Goshawk	7	2019	-	en	3	Some records of this species exist in the local vicinity. This species may fly over the study site and/or opportunistically visit the study site for foraging purposes.
Antigone rubicunda	Brolga	788	2019	-	en	1	Species has previously been recorded within the study area. characteristics of this species preferred habitat exists within the study area in the form of permanent water courses. Brolga have previously been sited (2016) along Skipton-Geelong Road approximately 1km from Skipton town centre.
Ardea alba modesta	Eastern Great Egret	3	2018	-	vu	4	Only limited records of this species exist in the local vicinity. Some characteristics of this spcies preferred habitat in the form of large permanent water sources and wetlands exist within the study area. This species may fly over the study area and/or opportunistically visit the area for foraging purposes.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
Ardeotis australis	Australian Bustard	1	1954	-	cr	4	Only limited and historical records of this species exist within the local vicinity. Some characteristics of this species preferred habitat is present within the study area.
Aythya australis	Hardhead	26	2019	-	vu	3	Some records of this species exits in the local vicinity. However, records within 5km of this study area are mostly historical (>20 years). Other records are confined to Linton Flora and Fauna Reserve approximately 6km east of the study area. This species may opportunistically visit the study area for foraging purposes.
Biziura lobata	Musk Duck	8	2018	-	vu	3	Some records of this species exits in the local vicinity. However, records within 5km of this study area are mostly historical (>20 years). Other records are confined to Linton Flora and Fauna Reserve approximately 6km east of the study area. This species may opportunistically visit the study area for foraging purposes.
Burhinus grallarius	Bush Stone-curlew	1	1951	-	cr	4	Only limited and historical records of this species exist within the local vicinity.
Engaeus sericatus	Hairy Burrowing Crayfish	1	2008	-	vu	4	Only limited records of this species exist within the local vicinity. No records recorded within 5km of the study area.
Falco subniger	Black Falcon	8	2019	-	cr	3	Some records of this species within the local vicinity. Some characteristics of this species preferred habitat exists in the form of woody watercourses in semi-arid regions within the study area. This species may visit the area on occasion for foraging purposes.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
Gelochelidon macrotarsa	Australian Gull-billed Tern	2	1971	-	en	4	Only limited and historical (>20 years) records of this species exist in the local vicinity. This species may opportunistically visit the study site for foraging purposes.
Geopelia cuneata	Diamond Dove	1	1984	-	vu	4	Only limited and historical records of this species exist within the local vicinity.
Haliaeetus leucogaster	White-bellied Sea-Eagle	1	2020	-	en	3	Only limited records of this species exist in the local vicinity. This species may fly over the study site and/or opportunistically visit the study site for foraging purposes.
Hieraaetus morphnoides	Little Eagle	20	2015	-	vu	1	Species recorded in the study area during bird utilisation surveys. Species considered likely to opportunistically visit the study site for foraging purposes.
Lewinia pectoralis	Lewin's Rail	1	1980	-	vu	4	Only limited and historical (>20 years) records of this species exist in the local vicinity.
Ninox connivens	Barking Owl	1	2017	-	cr	4	Only limited records of this species within the local vicinity. Some characteristics of this species preferred habitat exists in the form open agricultural farmland. This species may visit the area on occasion for foraging purposes.
Ninox strenua	Powerful Owl	16	2007	-	vu	4	Some records of this species within the local vicinity. However, this species prefers tall open forest and rainforest not represented within the study area. This species may visit the area on occasion for foraging purposes.
Oreoica gutturalis	Crested Bellbird	1	2017	-	en	4	Only limited records of this species exist in the local vicinity. This species may fly over the study site

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
							and/or opportunistically visit the study site for foraging purposes.
Ornithorhynchus anatinus	Platypus	14	2021	-	vu	4	Only historical (>20 years) records of this species exist in the local vicinity.
Oxyura australis	Blue-billed Duck	1	2017	-	vu	4	Only limited records of this species exist in the local vicinity. Some characteristics exist of this species preferred habitat in the form of permanent water sources. This species may opportunistically visit the study site for foraging purposes.
Phascogale tapoatafa	Brush-tailed Phascogale	1	1959	-	vu	4	Only limited and historical records of this species exist within the local vicinity.
Pseudemoia pagenstecheri	Tussock Skink	16	2013	-	en	3	Some records exist of the species in the local vicinity. However, no records exist within 5km of the study area. Limited habitat in the form of native tussock grasses exist within the study area.
Pseudophryne semimarmorata	Southern Toadlet	1	1992	-	en	4	Only limited and historical (>20 years) records of this species exist in the local vicinity. The limited population present within the local area is unlikely to have dispersed into the study area.
Pyrrholaemus sagittatus	Speckled Warbler	18	1981	-	en	3	Only historical (>20 years) records of this species exists within the local vicinity.
Sminthopsis crassicaudata	Fat-tailed Dunnart	16	2010	-	vu	3	Some recent records of this species exist within the local vicinity. However, limited characteristics of the preferred habitat.
Sminthopsis murina murina	Common Dunnart	2	1983	-	vu	4	Only limited and historical (>20 years) records of this species exist in the local vicinity. This species may opportunistically visit the study site for foraging purposes.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC Act	FFG Act	Likely occurrence in Project Area	Rationale for likelihood of occurrence
Spatula rhynchotis	Australasian Shoveler	9	1996	-	vu	4	Only limited and historical (>20 years) records of this species exist in the local vicinity. Some characteristics exist of this species preferred habitat in the form of permanent water sources. This species may opportunistically visit the study site for foraging purposes.
Tringa glareola	Wood Sandpiper	2	1921	-	en	3	Only limited records of this species exist within the local vicinity. Some characteristics of this species preferred habitat is present within the study area (well vegetated wetlands). This species may visit the study area on occasion for foraging purposes.
Tringa nebularia	Common Greenshank	5	1997	-	en	4	Only limited and historical (>20 years) records of this species exist in the local vicinity. Some characteristics exist of this species preferred habitat in the form of permanent water sources within the study area. This species may opportunistically visit the study site for foraging purposes.

Data Sources: Victorian Biodiversity Atlas (DEECA 2023d); Protected Matters Search Tool (DCCEEW 2023A).

Appendix 3.2 Brolga Wetland Habitat Assessment Results

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
1	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
2	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
3	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
4	DELWP Wetland	Grazing	-	N	-	-	Mod	-	No Visibility	
5	DELWP Wetland	Grazing	-	N	-	-	Mod	-	Limited Visibility	
6	DELWP Wetland	Grazing	-	N	-	-	-	-	No Visibility	
7	DELWP Wetland	Grazing	-	N	-	-	Low	-		
8	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
9	DELWP Wetland	Grazing	-	N	-	-	Low	-		
10	DELWP Wetland	Grazing	-	N	-	-	Low	-		
11	DELWP Wetland	Grazing	-	N	-	-	Low	-		
12	DELWP Wetland	Grazing	-	N	-	-	Low	-		
13	DELWP Wetland	Grazing	0.1	N	-	-	-	-	No Visibility	
14	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
15	DELWP Wetland	Grazing	-	-	-	-	-	-	No Visibility	
16	DELWP Wetland	Grazing	-	-	-	-	Mod	-	Limited Visibility	
17	DELWP Wetland	-	-	-	-	-	Mod	-		
18	DELWP Wetland	Grazing	-	N	-	-	Low	-		
19	DELWP Wetland	Grazing	0.1	N	-	-	High	-	No Visibility	
20	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
21	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
22	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
23	DELWP Wetland	Reserve	-	N	-	-	High	-		
24	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
25	DELWP Wetland	Grazing	-	N	-	-	Low	-		
26	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
27	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
28	DELWP Wetland	Grazing	-	N	-	-	Low	-		
29	DELWP Wetland	Cropping	0.1	N	-	-	Low	-		
30	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
31	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
32	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
33	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
34	DELWP Wetland	Grazing	0.1	N	-	-	Low	-		
35	DELWP Wetland	Grazing	-	N	-	-	Low	-		
36	DELWP Wetland	Grazing	-	N	-	-	Low	-		
37	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
38	DELWP Wetland	-	-	-	-	-	Mod	-	No Visibility	
39	DELWP Wetland	Grazing	-	N	-	-	Low	-		
40	DELWP Wetland	Grazing	-	N	-	-	Low	-		
41	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
42	DELWP Wetland	Grazing	0.1	N	-	-	Low	-		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
43	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
44	DELWP Wetland	Grazing	-	-	-	-	-	-	No Visibility	
45	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
46	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
47	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
48	DELWP Wetland	Grazing	-	N	-	-	Low	-		
49	DELWP Wetland	Grazing	-	N	-	-	Low	-		
50	DELWP Wetland	Grazing	-	N	-	-	Low	-		
51	DELWP Wetland	Grazing	-	N	-	-	Low	-		
52	DELWP Wetland	Reserve?	-	N	-	-	High	-		
53	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
54	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
55	DELWP Wetland	Cropping	-	-	-	-	Low	-	Limited Visibility	
56	DELWP Wetland	Grazing	-	N	-	-	Low	-		
57	DELWP Wetland	Grazing	-	-	-	-	Low	-		
58	DELWP Wetland	Grazing	-	-	-	-	Mod	-	Limited Visibility	
59	DELWP Wetland	Grazing	-	N	-	-	High	-		
60	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
61	DELWP Wetland	Reserve?	-	N	-	-	High	-	No Visibility	
62	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
63	DELWP Wetland	Grazing	-	N	-	-	Low	-	Limited Visibility	
64	DELWP Wetland	Grazing	-	N	-	-	-	-	No Visibility	

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
65	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
66	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
67	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
68	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
69	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
70	DELWP Wetland	-	-	-	-	-	-	-	Limited Visibility	
71	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
72	DELWP Wetland	Grazing	0.1	-	-	-	-	-	Limited Visibility	
73	DELWP Wetland	Grazing	-	N	-	-	Low	-		
74	DELWP Wetland	Grazing	-	N	-	-	High	-		
75	DELWP Wetland	Reserve	-	N	-	-	Mod	-		
76	DELWP Wetland	Grazing	0.1	N	-	-	Low	-		
77	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
78	DELWP Wetland	Reserve	-	N	-	-	Mod	-		
79	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
80	DELWP Wetland	Grazing	-	-	-	-	Mod	-		
81	DELWP Wetland	Grazing	-	N	-	-	High	-	No Visibility	
82	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
83	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
84	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
85	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
86	DELWP Wetland	Grazing	-	N	-	-	Low	-		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
87	DELWP Wetland	Grazing	-	N	-	-	Low	-		
88	DELWP Wetland	Grazing	-	N	-	-	Low	-		
89	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
90	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
91	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
92	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
93	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
94	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
95	DELWP Wetland	Grazing	-	N	-	-	Low	-		
96	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
97	DELWP Wetland	Grazing	-	N	-	-	High	-		
98	DELWP Wetland	Grazing	0.2	N	-	-	Mod	-		
99	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
100	DELWP Wetland	Cropping	-	N	-	-	Low	-		
101	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
102	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
103	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
104	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
105	DELWP Wetland	Grazing	-	N	-	-	Low	-		
106	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
107	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
108	DELWP Wetland	Grazing	0.1	N	-	-	Low	-		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
109	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
110	DELWP Wetland	Grazing	0.3	N	-	-	High	-		
111	DELWP Wetland	Grazing	-	N	-	-	Low	-		
112	DELWP Wetland	Grazing	0.1	N	-	-	Mod	-		
113	DELWP Wetland	-	-	N	-	-	-	-	No Visibility	
114	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
115	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
116	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
117	DELWP Wetland	Grazing	-	N	-	-	-	-	Limited Visibility	
118	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
119	DELWP Wetland	Grazing	-	N	-	-	Low	-		
120	DELWP Wetland	Cropping	0.1	N	-	-	Low	-		
121	DELWP Wetland	Reserve	-	N	-	-	Mod	-		
122	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
123	DELWP Wetland	Cropping	-	-	-	-	Mod	-		
124	DELWP Wetland	Grazing	-	N	-	-	Low	-		
125	DELWP Wetland	-	-	-	-	-	-	-	Limited Visibility	
126	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
127	DELWP Wetland	Grazing	-	N	-	-	Low	-		
128	DELWP Wetland	Grazing	0.1	N	-	-	Low	-		
129	DELWP Wetland	Grazing	-	-	-	-	-	-	No Visibility	
130	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
131	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
132	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
133	DELWP Wetland	Grazing	-	N	-	-	Low	-		
134	DELWP Wetland	Grazing	-	N	-	-	Low	-		
135	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
136	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
137	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
138	DELWP Wetland	Grazing	-	N	-	-	Low	-		
139	DELWP Wetland	Grazing	-	N	-	-	Low	-		
140	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
141	DELWP Wetland	Grazing	-	N	-	-	High	-		2 Black Swan nests
142	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
143	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
144	DELWP Wetland	Grazing	-	N	-	-	Low	-		
145	DELWP Wetland	Grazing	-	N	145	Flooded	Mod	2		
146	DELWP Wetland	Grazing	-	N	-	-	High	-	Limited Visibility	
147	DELWP Wetland	Grazing	-	N	-	-	High	-		
148	DELWP Wetland	Grazing	-	N	-	-	Low	-		
149	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
150	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
151	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
152	DELWP Wetland	Reserve	-	N	-	-	Mod	-		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
153	DELWP Wetland	Grazing	-	N	-	-	-	-	No Visibility	
154	DELWP Wetland	Grazing	-	N	-	-	Mod	-		
155	DELWP Wetland	Reserve	-	N	-	-	Mod	-		
156	DELWP Wetland	Reserve	-	N	-	-	Mod	-		
157	DELWP Wetland	Grazing	-	N	-	-	Low	-		
158	DELWP Wetland	-	-	-	-	-	High	-	Limited Visibility	
159	DELWP Wetland	Grazing	-	N	-	-	Low	-		
160	DELWP Wetland	Grazing	-	N	-	-	Low	-	Limited Visibility	
161	DELWP Wetland	Grazing	-	N	-	-	Low	-		
162	DELWP Wetland	Grazing	0.3	N	-	-	High	-	Limited Visibility	
163	DELWP Wetland	Grazing	-	-	-	-	-	-	No Visibility	
164	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
165	DELWP Wetland	Grazing	-	N	-	-	Low	-	Limited Visibility	
166	DELWP Wetland	Grazing	-	-	166	Flooded	Mod	2	-	
167	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
168	DELWP Wetland	Cropping	-	N	-	-	Low	0		
169	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
170	DELWP Wetland	-	-	-	-	-	High	-	No Visibility	
171	DELWP Wetland	Grazing	-	N	-	-	High	-		
172	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
173	DELWP Wetland	Grazing	-	-	-	-	Mod	-		
174	DELWP Wetland	Grazing	-	N	-	-	-	-	No Visibility	

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
175	DELWP Wetland	Grazing	0.1	N	-	-	Mod	-		
176	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
177	DELWP Wetland	-	0.1	N	-	-	-	-	No Visibility	
178	DELWP Wetland	Reserve	-	N	-	-	Low	-		
179	DELWP Wetland	Grazing	-	N	-	-	Low	-	Limited Visibility	
180	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
181	DELWP Wetland	-	-	-	-	-	-	-	No Visibility	
182	DELWP Wetland	-	-	-	-	-	Low	-		
183	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
184	Additional Waterbodies	Grazing	0.1	N	-	-	Low	-	No Visibility	
185	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
186	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0	No Visibility	
187	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
188	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
189	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0	No Visibility	
190	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
191	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
192	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
193	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
194	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
195	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
196	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
197	Additional Waterbodies	Grazing	0.3	N	-	-	Low	0		
198	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0	No Visibility	
199	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
200	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
201	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
202	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
203	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
204	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
205	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
206	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
207	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
208	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
209	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0	Limited Visibility	
210	Additional Waterbodies	Grazing	0.1	N	-	-	High	0		
211	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
212	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
213	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
214	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
215	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
216	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
217	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
218	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
219	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
220	Additional Waterbodies	Cropping	0.1	N	-	-	Low	0		
221	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
222	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
223	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
224	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
225	Additional Waterbodies	Cropping	0.1	N	-	-	Low	0		
226	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
227	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
228	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
229	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
230	Additional Waterbodies	Grazing	0.1	N	-	-	-	-	No Visibility	
231	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
232	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
233	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
234	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0	Limited Visibility	
235	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
236	Additional Waterbodies	Grazing	0.1	N	-	-	-	-	No Visibility	
237	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
238	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
239	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
240	Additional Waterbodies	Grazing	0.1	N	-	-	-	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
241	Additional Waterbodies	Cropping	0.1	N	-	-	Low	0		
242	Additional Waterbodies	Cropping	0.1	N	-	-	Low	0		
243	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
244	Additional Waterbodies	-	-	-	-	-	Low	-	No Visibility	
245	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
246	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
247	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
248	Additional Waterbodies	Cropping	0.1	N	-	-	Low	0		
249	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
250	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
251	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
252	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
253	Additional Waterbodies	Cropping	0.1	N	-	-	Low	0	Limited Visibility	
254	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
255	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
256	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
257	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
258	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
259	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
260	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0	No Visibility	
261	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
262	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
263	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
264	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
265	Additional Waterbodies	Reserve	0.1	N	-	-	Mod	0		
266	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
267	Additional Waterbodies	Grazing	0.1	N	-	-	High	0		
268	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
269	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
270	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
271	Additional Waterbodies	-	-	-	-	-	-	-	No Visibility	
272	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
273	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
274	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
275	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
276	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
277	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
278	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
279	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
280	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
281	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
282	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
283	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
284	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
285	Additional Waterbodies	Grazing	0.3	N	-	-	Mod	0	Limited Visibility	
286	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
287	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
288	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
289	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
290	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
291	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
292	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
293	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
294	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
295	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
296	Additional Waterbodies	Grazing	0.2	N	-	-	High	0		
297	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
298	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
299	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
300	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
301	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
302	Additional Waterbodies	Grazing	0.2	N	-	-	Mod	0		
303	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
304	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
305	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
306	Additional Waterbodies	Grazing	0.3	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
307	Additional Waterbodies	Grazing	0.2	N	-	-	Low	0		
308	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
309	Additional Waterbodies	Cropping	0.1	N	-	-	Mod	0		
310	Additional Waterbodies	Grazing	0.2	N	-	-	Mod	0		
311	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
312	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
313	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
314	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
315	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
316	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
317	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
318	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
319	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
320	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
321	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
322	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
323	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
324	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
325	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
326	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
327	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
328	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
329	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
330	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
331	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
332	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
333	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
334	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
335	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
336	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
337	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
338	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
339	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
340	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
341	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
342	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
343	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
344	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
345	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
346	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
347	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
348	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
349	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
350	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
351	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
352	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
353	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
354	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
355	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
356	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
357	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
358	Additional Waterbodies	Grazing	0.1	N	-	-	High	0		
359	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
360	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
361	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
362	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
363	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
364	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
365	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
366	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
367	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
368	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
369	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
370	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
371	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
372	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
373	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
374	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
375	Additional Waterbodies	Cropping	0.1	N	-	-	Low	0		
376	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
377	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
378	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
379	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
380	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
381	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
382	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
383	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
384	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
385	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
386	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
387	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
388	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
389	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
390	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
391	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
392	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
393	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
394	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

Wetland/Site #	Wetland Type	Land Use Type	Wetland Size	Chick Present	Location of Brolgas	Notes on Nests	Habitat Quality	# Brolga	Visibility	Notes
395	Additional Waterbodies	Grazing	0.3	N	-	-	Mod	0		
396	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
397	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
398	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		Wedge-tailed Eagle nest nearby
399	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0	Limited Visibility	
400	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
401	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
402	Additional Waterbodies	Grazing	0.1	N	-	-	High	0		
403	Additional Waterbodies	Grazing	0.1	N	-	-	Mod	0		
404	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
405	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
406	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
407	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
408	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
409	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		
410	Additional Waterbodies	Grazing	0.1	N	-	-	Low	0		

APPENDIX 4 TURBINE IMPACT SUMMARY

Table A4.1. Summary of Wind Turbine Location and Turbine Access track native vegetation impacts

Turbine Location	Native vegetation* present	Description	Native Vegetation* Impacted	Comment	Mapbook reference
T1	**Yes**	One Large Scattered tree directly east of turbine footprint	No	Scattered Tree (Tree #8) is located outside of the turbine works footprint. Remainder of area is exotic pasture grass with no native vegetation present, providing ability to easily avoid the TPZ of the scattered tree. No native vegetation mapped along the access track between T1 and T4, including at the drainage line crossing point.	Figure 4b
T2	No	Located in middle of agricultural paddock. Planted wedge of trees and shrubs present along southern and western edge.	No	Turbine footprint and access road skirt around the northern edge of the planted area, which is fenced. No native vegetation patches or scattered trees present. Access tracks occur either on existing internal gravel tracks or along the edge of the modified grazing paddock.	Figure 4a
T3	No	Located in middle of agricultural paddock. No values present.	No	See T4 for access road note.	Figure 4b
T4	No	Located in middle of agricultural paddock. No values present.	No	Access between T4 and T3 is through cropping paddocks and an existing gate and track that passes through the row of planted vegetation.	Figure 4b
T5	No	Partially located in area of planted eucalypt and agricultural paddock.	No	Access track between T5 and T9 is within agricultural paddock.	Figure 4e
T6	**Yes**	Located in middle of agricultural paddock. Scattered trees/stags located near to access.	No	Access track between T6 and T7 passes through an existing gate on the north/south windrow but will impact planted Acacia within the east/west windrow. Access tracks to be diverted around the scattered trees (Tree #203).	Figure 4c

Turbine Location	Native vegetation* present	Description	Native Vegetation* Impacted	Comment	Mapbook reference
T7	**Yes**	Located in middle of agricultural paddock. Scattered trees/stags located near to access.	No	See note for T6. Access track leading south runs along edge of ploughed paddock. One Large Tree in patch (Tree #206) and scattered tree (Tree #205)will be avoided by diverting the track around and scattered tree near turbine (Tree #10) will be avoided.	Figure 4c
T8	No	Located in middle of agricultural paddock. No values present.	No	Turbine footprint and access road in paddock (subject to ploughing). Small dam with Plains Grassy Wetland present located adjacent to track heading to T10, however track diverts around dam and will not be impacted. Planted vegetation along paddock boundaries.	Figure 4d
T9	No	Located in middle of agricultural paddock. No values present.	No	See note for T5. Southern access connecting to Francis Lane is at existing gate with no native veg present.	Figure 4e
T10	No	Located in middle of agricultural paddock. No values present.	No	Access to T13 through agricultural paddock.	Figure 4d
T11	No	Located in middle of agricultural paddock. No values present.	No	Access enters from Pittong-Lismore Road through existing gate and follows internal boundary within the agricultural paddock.	Figure 4e
T12	No	Located in middle of agricultural paddock. No values present.	No	Access between T12 and Francis Lane / T14 is within modified grazing paddocks. Scattered native shrubs (Melicytus) in these paddocks are avoided, and should be included as a note during construction to ensure all shrubs are avoided.	Figure 4e
T13	No	Located in middle of agricultural paddock. No values present.	No	Turbine footprint located in agricultural paddock bordered by planted windrows on the south and east edge. See T10 for access.	Figure 4d
T14	No	Located in middle of agricultural paddock. No values present.	No	Scattered native shrubs (Melicytus) in these paddocks are avoided, and should be included as a note during construction to ensure all shrubs are avoided. Scattered tree (42) will not be impacted by access track, as the track will avoid the TPZ.	Figure 4e

Turbine Location	Native vegetation* present	Description	Native Vegetation* Impacted	Comment	Mapbook reference
T15	No	Located in middle of agricultural paddock. No values present.	No	Access track passes between two low quality patches of Plains Sedgy Wetland, where an existing gravel crossover is present.	Figure 4d
T16	No	Located in middle of agricultural paddock. No values present.	No	Access track follows internal farm track and cuts through grazing paddock.	Figure 4e
T17	**Yes**	Located in middle of agricultural paddock. Scattered trees present	No	Turbine Footprint will avoid the surrounding scattered trees (e.g. tree 4). Reticulation will avoid impacts to scattered trees (Tree #6 and #7). Crossing through GW34 will avoid impacts to the vegetation by boring under the grassland (Kangaroo Grass with no tree canopy).	Figure 4g
T18	No	Located in middle of agricultural paddock. No values present.	No	Turbine footprint and access track located in modified agricultural paddocks.	Figure 4g
T19	No	Located in middle of agricultural paddock. No values present.	No	Track between T19 and T15 within agricultural paddock	Figure 4h
T20	**Yes**	Located in modified grazing paddock with scattered River Red-gum present in general vicinity	No	The turbine footprint avoids all scattered trees. Access track crossing over drainage line does not support native vegetation.	Figure 4f
T21	No	Located in middle of agricultural paddock. No values present.	No	Located between dam and planted windrow, both avoided.	Figure 4f
T22	No	Located in middle of agricultural paddock. No values present.	No	Area previously supported a plantation that has since been cleared. No values present in vicinity.	Figure 4g
T23	**Yes**	Located in middle of agricultural paddock. No values present.	No	One scattered tree (Tree #41) located near access track between T23 and T28. TPZ will be avoided.	Figure 4i
T24	**Yes**	Located in plantation and agricultural paddock. No values present.	No	One scattered tree (Tree #43) located near access track. TPZ will be avoided.	Figure 4i
T25	No	Located in middle of agricultural paddock. No values present.	No	Track and turbine located in grazing paddock, primarily dominated by Phalaris and other over-sown pasture species.	Figure 4i

Turbine Location	Native vegetation* present	Description	Native Vegetation* Impacted	Comment	Mapbook reference
T26	No	Located in middle of agricultural paddock. No values present.	No	Area previously supported a plantation that has since been cleared. No values present in vicinity.	Figure 4g
T27	No	Located in middle of agricultural paddock. No values present.	No	Turbine and access track located in paddocks, with planted vegetation along paddock boundaries.	Figure 4h
T28	**Yes**	Located in middle of agricultural paddock. No values present.	No	One scattered tree (Tree #211) located west of turbine, TPZ will be avoided.	Figure 4i
T29	No	Located in middle of agricultural paddock. No values present.	No	No values present in crossing between T28 and T29.	Figure 4i
T30	No	Located in middle of agricultural paddock. No values present.	No	Access passes through planted vegetation windrow along paddock boundary.	Figure 4j
T31	No	Located in middle of agricultural paddock. No values present.	No	Access track follows internal boundary of paddock.	Figure 4j
T32	No	Located in middle of agricultural paddock. No values present.	No	Access track follows internal boundary of paddock.	Figure 4j
T33	No	Located in middle of agricultural paddock. No values present.	No	Access track follows internal boundary of paddock and cuts through to T35.	Figure 4k
T34	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks. No scattered trees or dams present. No access through to Rokewood-Skipton Road.	Figure 4l
T35	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks. No scattered trees or dams present.	Figure 4k
T36	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks. No scattered trees or dams present.	Figure 4k
T37	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks. No scattered trees or dams present.	Figure 4k
T38	No	Located in middle of agricultural paddock. No values present.	No	Canola crops in paddocks. Access track passes through planted vegetation windrow.	Figure 4l

Turbine Location	Native vegetation* present	Description	Native Vegetation* Impacted	Comment	Mapbook reference
T39	No	Located in middle of agricultural paddock. No values present.	No	Canola crops in paddocks. Access track passes through planted vegetation windrow.	Figure 4l
T40	No	Located in middle of agricultural paddock. No values present.	No	Canola crops in paddocks. Access track passes through planted vegetation windrow.	Figure 4l
T41	**Yes**	Located in agricultural paddock with scattered trees present. Some planted.	No	All trees were generally small in size, and located at a distance a part that they can be avoided with protection (Trees #34 – 38).	Figure 4K
T42	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks.	Figure 4m
T43	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks.	Figure 4m
T44	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks.	Figure 4m
T45	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks. Few planted trees along paddock boundary	Figure 4m
T46	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks.	Figure 4m
T47	No	Located in middle of agricultural paddock. No values present.	No	Access track is within canola paddocks.	Figure 4m
T48	No	Located in middle of agricultural paddock. No values present.	No	Access track through paddock and along existing track on Parkers Road	Figure 4n
T49	No	Located in middle of agricultural paddock. No values present.	No	Access provided by Parkers Road. No values along this section of road.	Figure 4n
T50	No	Located in middle of agricultural paddock. No values present.	No	Access provided by Watkins Road. No values in road reserve.	Figure 4n

Turbine Location	Native vegetation* present	Description	Native Vegetation* Impacted	Comment	Mapbook reference
T51	No	Located in middle of agricultural paddock. No values present.	No	Access from Parker East road through planted rows of Eucs and Acacia. Phalaris understorey.	Figure 4p
T52	No	Located in middle of agricultural paddock. No values present.	No	Access from Parker East Road. No native vegetation present at cross over in road reserve into paddock.	Figure 4p
T53	No	Located in middle of agricultural paddock. No values present.	No	Access from Parker East Road through existing access gate.	Figure 4p
T54	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks, entering off Stretches Lane.	Figure 4s
T55	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks, entering off Stretches Lane.	Figure 4s
T56	No	Located in middle of agricultural paddock. No values present.	No	Access from Lismore-Pittong Road into Canola paddock. No native vegetation in road reserve (dominated by Phalaris)	Figure 4q
T57	**Yes**	Located in middle of agricultural paddock. One scattered tree located to east of turbine footprint	No	Scattered tree is avoided (Tree #30). Reticulation between T57 and T58 crosses creek, poles will be located either side to avoid impacts to PSWe35 patch mapped. Poles re-arranged to avoid impacts to PGW36	Figure 4r
T58	No	Located in middle of agricultural paddock. No values present.	No	Phalaris dominated on rise. Access back to Stretches Lane through paddocks.	Figure 4r
T59	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks, entering off Stretches Lane.	Figure 4s
T60	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks, entering off Stretches Lane.	Figure 4s
T61	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks, entering off Rowes Lane. Passes through area of planted Sugar Gums.	Figure 4s
T62	No	Located in middle of agricultural paddock. No values present.	No	Access track is within paddocks, following internal boundary south from T59	Figure 4s

APPENDIX 5 NATIVE VEGETATION REMOVAL REPORT

Native vegetation removal report

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: **31/10/2023**
Time of issue: **10:51 am**

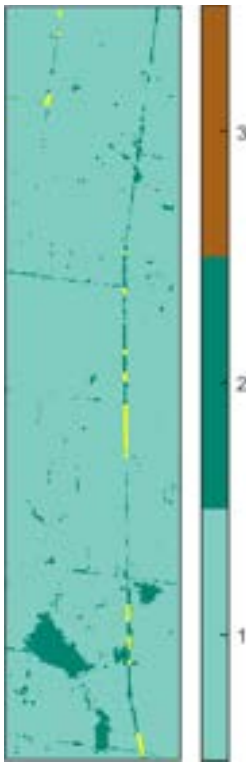
Report ID: EHP_2023_192

Project ID	EHP14178_MoretonWF_combined

Assessment pathway

Assessment pathway	**Intermediate Assessment Pathway**
Extent including past and proposed	0.330 ha
Extent of past removal	0.000 ha
Extent of proposed removal	0.330 ha
No. Large trees proposed to be removed	0
Location category of proposed removal	Location 2 The native vegetation is in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map). Removal of less than 0.5 hectares of native vegetation in this location will not have a significant impact on any habitat for a rare or threatened species.

1. Location map



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 amount[1]	0.149 general habitat units
Vicinity	Corangamite Catchment Management Authority (CMA) or Corangamite Shire, Golden Plains Shire Council
Minimum strategic biodiversity value score[2]	0.278
Large trees	0 large trees

Offset requirements if a permit is granted for Golden Plains

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

General offset amount[3]	0.132 general habitat units
Vicinity	Corangamite Catchment Management Authority (CMA) or Corangamite Shire, Golden Plains Shire Council
Minimum strategic biodiversity value score[4]	0.330
Large trees	0 large trees

Offset requirements if a permit is granted for Corangamite

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

General offset amount[5]	0.017 general habitat units
Vicinity	Corangamite Catchment Management Authority (CMA) or Corangamite Shire, Golden Plains Shire Council
Minimum strategic biodiversity value score[6]	0.259
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

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

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

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

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

6 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 Intermediate Assessment Pathway and it will be assessed under the Intermediate 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 defendable 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.

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

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

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	**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**
3-B	Patch	vvp_0132_61	Endangered	0	no	0.420	0.012	0.012	0.320		0.005	General
4-B	Patch	vvp_0132_61	Endangered	0	no	0.420	0.019	0.019	0.320		0.008	General
25-B	Patch	vvp_0132_61	Endangered	0	no	0.420	0.008	0.008	0.339		0.003	General
1-C	Patch	vvp_0132_61	Endangered	0	no	0.380	0.003	0.003	0.220		0.001	General
2-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.000	0.000	0.390		0.000	General
5-C	Patch	vvp_0132_61	Endangered	0	no	0.420	0.071	0.071	0.316		0.030	General
6-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.004	0.004	0.210		0.002	General
7-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.025	0.025	0.183		0.010	General
8-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.005	0.005	0.170		0.002	General
9-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.008	0.008	0.170		0.003	General
10-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.001	0.001	0.170		0.000	General
11-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.000	0.000	0.720		0.000	General
12-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.001	0.001	0.720		0.000	General
13-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.001	0.001	0.509		0.001	General
14-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.007	0.007	0.370		0.003	General

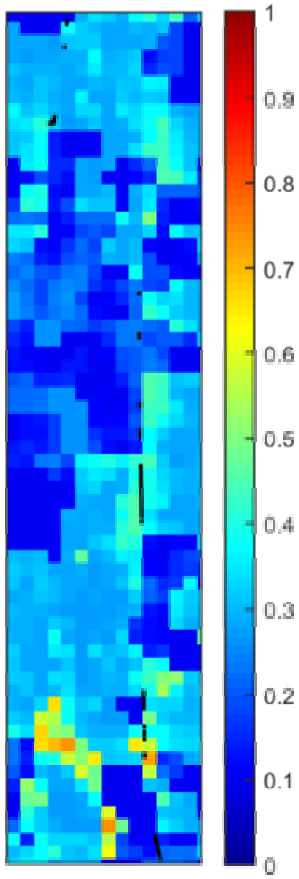
Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
15-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.001	0.001	0.370		0.001	General
16-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.017	0.017	0.355		0.008	General
17-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.002	0.002	0.450		0.001	General
18-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.061	0.061	0.447		0.031	General
19-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.076	0.076	0.401		0.036	General
20-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.002	0.002	0.170		0.001	General
21-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.001	0.001	0.170		0.001	General
22-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.001	0.001	0.230		0.000	General
23-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.000	0.000	0.230		0.000	General
24-C	Patch	vvp_0132_61	Endangered	0	no	0.460	0.000	0.000	0.230		0.000	General
26-C	Patch	vvp_0132_61	Endangered	0	no	0.420	0.003	0.003	0.310		0.001	General

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

This is not applicable in the Intermediate Assessment Pathway.

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation

4. Map of the property in context

Yellow boundaries denote areas of proposed native vegetation removal.

APPENDIX 6 AVAILABLE NATIVE VEGETATION CREDITS

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.

Date and time: 04/10/2023 10:13 **Report ID: 21170**

What was searched for?

General offset

General habitat units	Strategic biodiversity value	Large trees	Vicinity (Catchment Management Authority or Municipal district)	
0.017	0.259	0	CMA	Corangamite
			or LGA	Corangamite Shire

Details of available native vegetation credits on 04 October 2023 10:13

These sites meet your requirements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
BBA-0114	0.545	180	Corangamite	Colac Otway Shire	Yes	Yes	No	VegLink
BBA-0126	0.760	6	Corangamite	Moorabool Shire	Yes	Yes	No	Contact NVOR
BBA-2252	108.097	0	Corangamite	Colac Otway Shire	No	Yes	No	Bio Offsets
BBA-2252	56.708	0	Corangamite	Colac Otway Shire	No	Yes	Yes	Bio Offsets
BBA-2268	0.026	0	Corangamite	Golden Plains Shire	Yes	Yes	No	Contact NVOR
TFN-C0140	0.292	30	Corangamite	Greater Geelong City	Yes	Yes	No	TFN
TFN-C0482	0.302	0	Corangamite	Colac Otway Shire	Yes	Yes	No	TFN
TFN-C1765	0.026	70	Corangamite	Colac Otway Shire	Yes	Yes	No	VegLink
VC_CFL-3058_01	0.036	255	Corangamite	Moorabool Shire	Yes	Yes	No	Bio Offsets, VegLink
VC_CFL-3080_01	6.019	101	Corangamite	Golden Plains Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3697_01	18.297	0	Corangamite	Golden Plains Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3699_01	1.834	45	Corangamite	Colac Otway Shire	Yes	Yes	No	Contact NVOR
VC_CFL-3699_01	2.457	0	Corangamite	Colac Otway Shire	No	Yes	No	Bio Offsets

VC_CFL-3718_01	9.375	918	Corangamite	Corangamite Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3739_01	5.729	279	Corangamite	Colac Otway Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3745_01	0.078	43	Corangamite	Greater Geelong City	Yes	Yes	No	Bio Offsets
VC_CFL-3786_01	3.112	609	Corangamite	Corangamite Shire	Yes	Yes	No	VegLink
VC_CFL-3786_01	0.641	0	Corangamite	Corangamite Shire	Yes	Yes	Yes	VegLink
VC_CFL-3787_01	9.579	895	Corangamite	Colac Otway Shire	Yes	Yes	No	VegLink
VC_CFL-3798_01	2.368	232	Corangamite	Colac Otway Shire	Yes	Yes	No	Contact NVOR
VC_TFN-C2058_01	0.028	54	Corangamite	Colac Otway 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)

There are no potential sites listed in the Native Vegetation Credit Register that meet your offset requirements.

LT - Large Trees *CMA - Catchment Management Authority* *LGA - Municipal District or Local Government Authority*

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 avaliable
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

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

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.

Date and time: 04/10/2023 10:15 **Report ID: 21172**

What was searched for?

General offset

General habitat units	Strategic biodiversity value	Large trees	Vicinity (Catchment Management Authority or Municipal district)	
0.132	0.28	0	CMA	Corangamite
			or LGA	Golden Plains Shire

Details of available native vegetation credits on 04 October 2023 10:15

These sites meet your requirements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
BBA-0114	0.545	180	Corangamite	Colac Otway Shire	Yes	Yes	No	VegLink
BBA-0126	0.760	6	Corangamite	Moorabool Shire	Yes	Yes	No	Contact NVOR
BBA-2252	108.097	0	Corangamite	Colac Otway Shire	No	Yes	No	Bio Offsets
BBA-2252	56.708	0	Corangamite	Colac Otway Shire	No	Yes	Yes	Bio Offsets
TFN-C0140	0.292	30	Corangamite	Greater Geelong City	Yes	Yes	No	TFN
TFN-C0482	0.302	0	Corangamite	Colac Otway Shire	Yes	Yes	No	TFN
VC_CFL-3080_01	6.019	101	Corangamite	Golden Plains Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3697_01	18.297	0	Corangamite	Golden Plains Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3699_01	1.834	45	Corangamite	Colac Otway Shire	Yes	Yes	No	Contact NVOR
VC_CFL-3699_01	2.457	0	Corangamite	Colac Otway Shire	No	Yes	No	Bio Offsets
VC_CFL-3718_01	9.375	918	Corangamite	Corangamite Shire	Yes	Yes	No	Bio Offsets
VC_CFL-3739_01	5.729	279	Corangamite	Colac Otway Shire	Yes	Yes	No	Bio Offsets

VC_CFL-3786_01	3.112	609	Corangamite	Corangamite Shire	Yes	Yes	No	VegLink
VC_CFL-3786_01	0.641	0	Corangamite	Corangamite Shire	Yes	Yes	Yes	VegLink
VC_CFL-3787_01	9.579	895	Corangamite	Colac Otway Shire	Yes	Yes	No	VegLink
VC_CFL-3798_01	2.368	232	Corangamite	Colac Otway Shire	Yes	Yes	No	Contact NVOR

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)

There are no potential sites listed in the Native Vegetation Credit Register that meet your offset requirements.

LT - Large Trees *CMA - Catchment Management Authority* *LGA - Municipal District or Local Government Authority*

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 avaliable
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

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

APPENDIX 7 MICROBAT DESKTOP ASSESSMENT

Moreton Hill Wind Farm Project, Pittong

Bat Roost Desktop Report

by

Dr Susan White

Wakelin Associates Pty Ltd

to

Ecology and Heritage Partners

12 June 2023

Introduction

This desktop study is for specialist geomorphological/cave advice regarding caves and/or other hollows used by or potentially usable as bat roosting sites in an area 80 km radius of the construction site of the planned Moreton Hill Windfarm, of Skipton, Victoria. These sites may be used by the critically endangered Southern Bent-wing Bat (*Miniopterus orianae bassanii*) (SBWB) and the vulnerable Eastern Bent-wing Bat (*Miniopterus orianae oceanensis*) (EBWB).

Dr Susan White OAM has more than 50 years' experience in understanding and managing the world of caves and karst and its complexities. She is a Life Member of the Victorian Speleological Association Inc (VSA) and an Honorary Life Fellow of the Australian Speleological Federation Inc. Over her career she has worked in academic Earth Sciences especially on karst geomorphology and been involved in the documentation of caves in western Victoria and has collaborated with bat researchers regarding potential roosting sites.

Methods and Location

An area, 80 km diameter around the proposed Moreton Hill windfarm site, was investigated using Google Earth, relevant reports, field notes and cave related records.

The 80 km radius of the proposed turbine sites (Figure 1) is chosen as this represents a realistic representation of the potential distance that cave dwelling bats (SBWB & EBWB) move across the turbine field from roosting sites. Recent research (van Harten 2020, and references therein) recorded a flying range of a SBWB of ~80 km in a single night. Similarly the EBWB is found across the area although details of its daily flying range and height above ground are less well known. The data regarding recorded and potential roosting site locations are presented in the present report in a Google Earth image and tabular form that assists location.

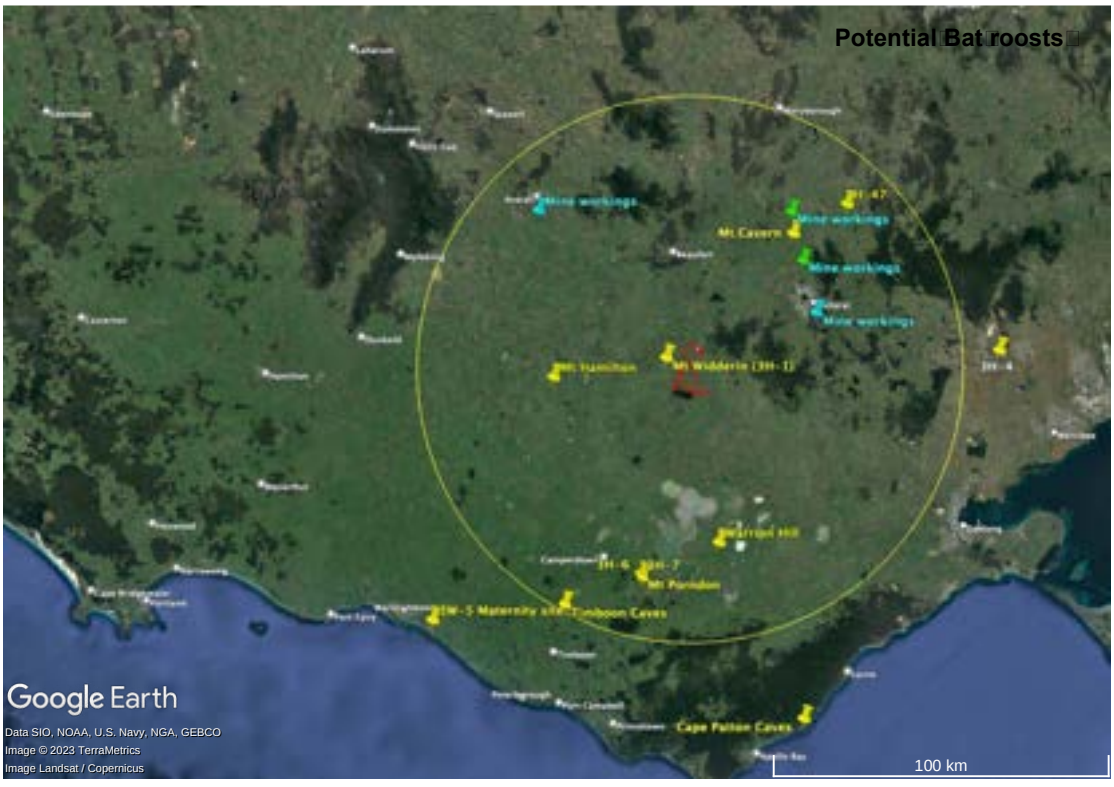


Figure 1 Current significant bat roosting sites shown as yellow pins. Some of these contain more than one cave. The yellow circle is the 80km radius from the Skipton wind farm site. The red outline indicates the site of the proposed windfarm. Teal pins indicate areas where mining has occurred. For site details see Table 1.

A short summary of related bat biology, ecology and behaviour is provided. A summary of the relevant lithologies in which caves are found and a short explanation of their suitability as roosting sites are provided.

Bats

Two cave dwelling bats are found in the area as well as a number of tree dwelling bats. This report only relates to the cave dwelling bats. Both SBWB and EBWB are very similar in physical appearance and were regarded as the same species until relatively recently. They were identified as separate species using modern genetic techniques (Cardinal and Christidis, 2000). However, it had been thought for several decades that as they had different parasites, slightly different breeding times and did not appear to interbreed, they may be different species (Hamilton-Smith, *pers com*)...

Both species cohabit the same caves at various times where their ranges overlap, e.g., both species share roosting sites in the caves at Cape Patton (~105km from the Moreton hill site). A significant maternity site for the SBWB is Starlight Cave (3W-5) to the southwest and large populations also use both Porndon caves (3H-6, 3H-7). Large numbers of the EBWB roost in Ramsdens Cave, Cape Patton (3SW-4) and smaller numbers have been reported as roosting in other sites. SBWBs have a very large nightly flying and feeding range (~80 km) (van Harten et al. 2020). The nearest Maternity site for SBWB just east of Warrnambool, 105 km from Moreton Hill site. The maternity site for EBWB is at Nowa Nowa in East Gippsland and no maternity site is known in the area. The flight patterns of the EBWB are less well known than those of the SBWB.

Geology, Cave Formation and Documentation

This area of western Victoria is predominantly an extensive basalt plain formed from the eruption of basalt flows from hundreds of volcanoes that are the prominent landscape features across an otherwise relatively low relief plain. To the south (Timboon) the marine Port Campbell Limestone occurs. Caves are found in both these major rock types in the area of western Victoria under consideration, but the cave formation processes are significantly different; lava caves are formed as the rock solidifies from molten magma whereas limestone caves are the result of weathering. processes, in particular dissolution of the limestone by fresh water. The largest caves in this area are the lava caves such as at Porndon (e.g., 3H-6) where large groups of SBWB roost. Limestone caves in the area include caves in the Port Campbell Limestone (PCL) at Timboon and the SBWB maternity cave at Warrnambool in Bridgewater Formation. Sea caves often are due to the enlargement of joints by mechanical action of the sea, and may be quite large cavities e.g. Ramsden Cave, (3SW-4). There are less caves known in the northern part of the area but the presence of a large number of mine workings in the Palaeozoic basement rocks that may be used by bats, should be noted.

Caves are explored and documented in Australia predominantly by cavers involved in the various caving clubs, most of which belong to the Australian Speleological Federation Inc. (ASF). The only ASF club in Victoria is the Victorian Speleological Association Inc (VSA) and VSA undertakes cave documentation and maintains records. ASF has an Australia wide documentation system organised through the states and clubs. VSA is the state co-ordinating body and documents the caves. The state prefix for Victoria is 3. Victoria is divided into four general Cave Zones: NE (North East); NW, SW and GP (Gippsland) for an overall coverage and subdivided into specific areas. The areas in this study are locality coded as: Volcanics (H), SW (SW Zone), Timboon (T) and Warrnambool (W). The caves are numbered as entrances and if a cave has more than one entrance, the overall cave system takes the lowest number. Numbers are allocated chronologically. An example is Porndon Arch Cave as **3H-6** i.e., 3 = Vic, H is the letter code used for volcanic (basalt) caves (from Harman Cave at Byaduk) and 6 shows it is the 6th volcanic cave entrance numbered in Victoria. Some caves have names but ideally all should have a number as this solves the problem of duplicating common names e.g., which "Big Cave" or "Wet Cave" is that? However not all potential roosting sites will have been numbered. Artificial (man built) features such as tunnels are not generally numbered.

ASF and its member clubs are very wary of publication of detailed locations and specifically prohibit the publication of detailed location data e.g. GPS co-ordinates, except in very publicly known caves such as tourist caves. This is to limit the potential for over-use, inadvertent and deliberate damage and undue disturbance to cave physical, hydrological and biological components and values. As well, the precise location data for many of these caves is not always available as many of these sites have not been visited since GPS technology has been available.

Bat Roosting sites

Caves and crevices are the main sites that cave-dwelling bats use for roosting. There are two groups of known sites (Timboon and Warrion Hill) and several other lava caves (Figure 1). Other sites may also be used we are not aware of. Ramsden's Cave (Cape Patton) and Starlight Cave (Warrnambool) are included for context reasons as these are significant sites used for roosting and maternity purposes. Parwan Cave (3H-4) has evidence of bat use in the very long distant past as bat guano/basalt phosphate minerals occur there. Porndon Arch Cave (3H-6) has the largest roosting population known in the area.

Short descriptions and any currently known bat use of known and possible bat roosting sites is included in Table 1. The approximate location of sites is shown on Figure 1 but precise and up-to-date location data is not always available. Individual caves (e.g. 3H-5) are shown where possible.

Significant land use change has occurred in the past 150 years and most of the area in this study is agricultural land. Also a substantial area has been extensively mined for gold in the Central Victorian Goldfields (Ballarat, Creswick, Clunes and surrounding areas) and disused mines and shafts are common. Cave dwelling bats, especially the EBWB, use such disused mine workings as suitable roosting sites. Caves can be filled in or collapse and sites lost. Caves can also be modified, e.g. Skipton Lava Cave (3H-1) at Mt Widderin, south of Skipton, which housed a significant bat colony until human interference with the cave resulted in the bats abandoning it in 1866 and never returning. Very few bats have been seen in this cave the past 50+ years. This cave also is an important cave mineral site for guano/basalt phosphate minerals.

Conclusion

There are 2 known significant roosting sites for the cave dwelling bats in the 80 km radius of the proposed Moreton Hill wind farm and a number of much smaller and more intermittently used sites. There are few large known caves in the Moreton Hill Wind Farm area. Limited use of a few caves at Timboon is known. Otherwise only the odd individual has been recorded, that may be partially due to limited monitoring (Table 1).

The ~80 km radius from the wind farm however is important as this places some large roosting sites such as Porndon Arch Cave (3H-6) within the flight range of the night-time feeding activity of the SBWB.

References

Cardinal, B.R. and Christidis, L., 2000. Mitochondrial DNA and morphology reveal three geographically distinct lineages of the large bentwing bat (*Miniopterus schreibersii*) in Australia. *Australian Journal of Zoology*, *48*(1), pp.1-19.

van Harten, E., Lawrence, R., Lumsden, L.F., Reardon, T., Bennett, A.F. and Prowse, T.A., 2022. Seasonal population dynamics and movement patterns of a critically endangered, cave-dwelling bat, *Miniopterus orianae bassanii*. *Wildlife Research*, *49*(7), pp.646-658.

Table 1. Details of current and potential bat roosting sites. Location data is only accurate to between 10 m and 200 m.

Cave Name	Cave Number	General Location	Brief Cave Description	Bat Data	Land tenure	Location data WGS 84 datum	Comments
Volcanics (basalt)							
Skipton Lava Cave; Mt Widderin Cave	3H-1	Mt Widderin	Collapse entrance with 3 large chambers connected by narrow passages, 3rd chamber has small lake. Very important site for guano/basalt phosphate minerals including type location for some.	Large bat population until about ~1866 when bats abandoned the cave. Virtually no bats for a long time due to human interference in 1860s	Private	54H 708085 5820580	Location good; Previously (pre 1860s) large bat maternity? and roosting site. Now abandoned by bats. Occasional bats observed
Mt Hamilton Cave	3H-2	Mt Hamilton; Neerin Neerin	A large (1190m of passages) complex, multi-level cave developed on one side of the cone. Vertical entrance drops into a large collapse chamber floored with rockpile material. Terminates in standing water.	No records of bats or guano	Private	54H 674970 58157790	
Sausage Cave	3H-3	Mt Hamilton; Neerin Neerin	Circular doline entrance tunnel with horizontal and vertical constrictions; irregular roof. Terminates in 3 m high chamber with lava	No records of bats or guano	Private	54H 674970 58157790	
Insect Cave; MT Hamilton West	3H-30	Mt Hamilton; Neerin Neerin	Steep entrance dropping into a simple lava tunnel ~63m long with flat floor.	No records of bats or guano	Private	54H 674970 58157790	
Armchair Shaft	3H-47	Smeaton	Single small vertical shaft (~9m); small tunnel blocked with rocks.	No records of bats or guano	Private	54H 762510 5864240	
Mt Cavern	3H-68	Creswick	Depression filled with soil and rubbish. Old miner's reports indicate shaft exists. Now filled.	No records of bats or guano	Private	54H 746410 5856000	
Parwan Lava Cave	3H-5	South Parwan	A horizontal lava tube with 3 inter-connecting chambers up to ~200 m long & ~20 m wide, One short vertical entrance, Flat floor. Collapse restriction near entrance creates a squeeze to the main part of the cave. Significant rubble piles from old collapse. Guano/basalt phosphate minerals (Parwanite type locality). Tube extends to east and west and other tubes	Occasional in1-3 bats observed in the entrance area; guano/basalt mineral type specimen site but abandoned by bats when rock fall happened in the long distant past.	Private	55H 877690 5823000	Location good; just outside area; very occasional bats observed in entrance area.

			appear to exist parallel (geophysics data) but no other open entrances known.				
Porndon Arch Cave	3H-6	Porndon; SSW of Pomborneit	Large lava tube with semi-circle Xsection; 100m long, varies from 1m-7m wide and from 9m-0.6m high. Vertical range from 8.7m. Arch feature at entrance is remnant of tube roof after collapse. Lava bench alongside walls, 40-60cm high and ~30-40 cm wide. Some lava drip formations.	**Extensive bat roosting site;** ~ 300 bats present February 1986; bats appear to roost in crevices in ceiling; monitored by DEECA (DWELP)	Private	54H 699000 5758200	Location good
Porndon Rubbish Cave	3H-7	Porndon; SSW of Pomborneit	Short tunnel with rockfall but filled with rubbish. 160 m from 3H-6 and therefore un-explored.	Limited use for years by bats due to long standing rubbish dump; now more extensively used by bats as rubbish dumping ceased; monitored by DEECA (DWELP)	Private	54H 699100 5757900	Location good
Warrion Hill (basalt)							
Un-named Cave	3H-34	Near Warrion Hill	Single entrance to a short low tunnel 50 m long.	No records of bats or guano	Private	54H 723800 5768500	Location good
Un-named Cave	3H-35	Near Warrion Hill	Small entrance in stony rise into low tunnel lava tube, ~12m long m long. ~3m wide and 2-2.5m high. Squeeze off at end through silt; rabbit diggings. Rumoured to link to hole some distance away but now blocked by silt.	No records of bats or guano	Private	54H 723500 576900	Location good
Tinkle Cave	3H-36	Near Warrion Hill	Low tunnel Lava tube, 35 m long m long; no leads	No records of bats or guano	Private	54H 723700 576980	Location good
Un-named Cave	3H-37	Near Warrion Hill	Small horizontal/sloping entrance leads to lava blister type of cave ~1m below surface, 0.5-0,75 high, very silted up; 2 small chambers approx. 6m & 2m long respectively, evidence of rabbits which shows possible connection with now covered over hole 20- 25 m away.	No records of bats or guano	Private	54H 723900 5767020	Location good
Native Well	3H-38	McCarthys Rd, Near Warrion Hill	Vertical entrance drops ~2m, to water ~3mdeep. Tunnel seems to lead off at water level but pump would be needed for exploration	No records of bats or guano	Private	54H 725570 5765800	Location good
SW Zone (Otway Group sandstones)							

Ramsden's Cave	3SW-4	Cape Patton	2 chambers joined by small passage; 60m long; entrance partially concealed by rock fall. Floor above current sea-level.	Significant bat roosting site for both SBWB and EBWB; monitored by DEECA (DWELP)	Public	54H 746114 5713597	Location good; outside 80km radius but large roosting population of both species.
Timboon area (Port Campbell Limestone)							
Whey Hole	3T-1	Curies River Rd on edge of Township	Collapse doline, 10 m diameter, 4-5 m deep with undercut sides near township of Timboon. Short passage 12-15m leading to south.	No records of bats; contamination by whey from factory	?? Public Rd or Private Unclear	54H ~670920 ~ 5741301	Location information poor; approximate location only
Natural Crossing	3T-2	19 km South of Cobden on W'boool Rd. Maddons Bridge Rd cave ~1 km SSW of house	Short active through cave with ~ 20 m of walking passage upstream; 10 m low wet passage downstream. 2 entrances; intermittent active inflow; Outflow downstream with 10m of enterable passage. Collapsed chamber inside of dry creek bed. Creek goes underground for 30-40m upstream.	Glow-worms and significant bats recently reported roosting periodically by landowner	Private	54H 673944 5746082	Location information poor; approximate location
Aborigines Cave; Glow-worm cave	3T-3	19 km s of Cobden on W'boool Rd Maddons Bridge Rd owner house; cave ~1 km SSW house	2nd entrance to T2 Natural Crossing. 2m climb down entrance to 4m long passage and sloping fissure. Some flowstone	Glow-worms and significant bats recently reported roosting periodically by landowner	Private	54H 67394 5746082	Location information poor; approximate location
Foxhole	3T-4	Curdies River. High on slope	Small collapse leads down soil covered slope to spacious rockfall passage terminated by soil cone L =56.4 m vert range 7 m	none recorded	Private	54H 672625 5741875	Location information poor and does not seem correct
Un-named cave	3T-5	immediately downstream of T2	Vertical walled canyon, varying depth partially/nearly roofed	none recorded	Private	54H 674570 5746450	Location information poor; approximate location
Karakarook Cave	3T-6	6 km sth Cobden	Intermittently active stream cave fed by 2 springs emerging from volcanic capping. Stream sinks into limestone saddle & re-emerges on other side. 2 entrances good decoration; no doline but gully deep; L=45m	occasional bats	Private	54H 677350 5749100	Location information poor; approximate location

Knee High Cave	3T-7	Moorehouse Bridge Rd ~10 k North of Timboon?	Perennially active out flow; 2 entrances; L=30m short low stream cave	None recorded	Private	54H 674620 5746650	Location information poor; approximate location
Un-named feature	3T-8		Spring fed small passage; 2 minor collapses	None recorded	Private	54H 672350 5742660	Location information poor; approximate location
O'Keefes Cave	3T-9	4km on Nullawarre Rd 200m pre bridge over Curdies R; n to quarry; lime kilns	Vertical entrance; good decoration; Block movement cave due to downcutting of Curdies R	Guano; Mar 1990; ~ 200 bats with young? In far chamber. Subsequent report Apr 91 refers to a few bats ~ 10	Private	54H 669770 5740440	Location information limited; approximate location
Hatchet Cave	3T-10	6 km South of Cobden; near Ellingamite school	Intermittent active stream cave fed by water off volcanics. Under lava capping cave recapturing stream; L = 28m V extent = 8 m; wet;	None reported	Private	54H 677990 5750528 (General only)	Several caves (3T-11; 12; 13; 14; 15 and 16) south of Timboon in this general area but location details are poor for locating onto map. The area is roughly between the Timboon- Peterborough Rd and the Timboon- Pt Campbell Rd. information is not clear as to which of these south roads are relevant.
Eel Tunnel	3T-11	8 km south of Timboon	Stream sink in large doline 60X35m => 90m long joint controlled cave. Muddy stooping walking; end in tight sump. Very wet	None reported	Private	54H 677990 5750528 (General only)	Several caves (3T-11; 12; 13; 14; 15 and 16) south of Timboon in this general area but location details are poor for locating onto map. The area is roughly between the Timboon- Peterborough Rd and the Timboon- Pt Campbell Rd. information is not clear as to which of these south roads are relevant.
Wallaby Ck Cave	3T-12	280 m @ 237º from T11	Wide flooded passage with silt floor; Water depth = 2-1.5 m at entrance	None reported	Private	54H 677990 5750528 (General only)	Several caves (3T-11; 12; 13; 14; 15 and 16) south of Timboon in this general area but location details are poor for locating onto map. The area is roughly between the Timboon- Peterborough Rd and the Timboon- Pt Campbell Rd. information is not clear as to which of these south roads are relevant.

Un-named	3T-13 s	9 km south of Timboon at Gate 157	Features stream sink; previously filled in and now reopening; source of water for T-11	None reported	Private	54H 677990 5750528 (General only)	Several caves (3T-11; 12; 13; 14; 15 and 16) south of Timboon in this general area but location details are poor for locating onto map. The area is roughly between the Timboon- Peterborough Rd and the Timboon- Pt Campbell Rd. information is not clear as to which of these south roads are relevant.
Un-named cave	3T-14	South of Timboon	Out flow for T-12 Deep pool at entrance to cave passage; Entrance 3 m wide 2 m high	None reported	Private	54H 677990 5750528 (General only)	Several caves (3T-11; 12; 13; 14; 15 and 16) south of Timboon in this general area but location details are poor for locating onto map. The area is roughly between the Timboon- Peterborough Rd and the Timboon- Pt Campbell Rd. information is not clear as to which of these south roads are relevant.
Un-named cave	3T-15s	South of Timboon	Impenetrable entrance to low wet passage	None reported	Private	54H 677990 5750528 (General only)	Several caves (3T-11; 12; 13; 14; 15 and 16) south of Timboon in this general area but location details are poor for locating onto map. The area is roughly between the Timboon- Peterborough Rd and the Timboon- Pt Campbell Rd. information is not clear as to which of these south roads are relevant.
Un-named cave	3T-16	9 km South of Timboon	Uvala with runaway holes; vertical entrance; depressions; cave leads to pool	None reported	Private	54H 677990 5750528 (General only)	Several caves (3T-11; 12; 13; 14; 15 and 16) south of Timboon in this general area but location details are poor for locating onto map. The area is roughly between the Timboon- Peterborough Rd and the Timboon- Pt Campbell Rd. information is not clear as to which of these south roads are relevant.
Warnambool (Bridgewater Formation)							

Starlight Cave	3W-5	Close to coast, South of L. Gillear; SW of and close to large limestone quarry	The cave is a large solutional cave comprising a spacious passage leading to large domed chambers with solution tube entrances in the ceiling (daylight holes). The cave is approximately 160m in length and between 5m and 20m in width. The main passage is ~5m high and the 2 main domed chambers are both ~40m high. The floor is covered with rock breakdown and depth to bedrock unknown.	Maternity site for SBWB; substantial population. Site that is the maternity site for the eastern group of bats. Used year round by bats; monitored by DECCA	Public/ strictly controlled access	Restricted	Maternity site detailed location Restricted due to vulnerability