

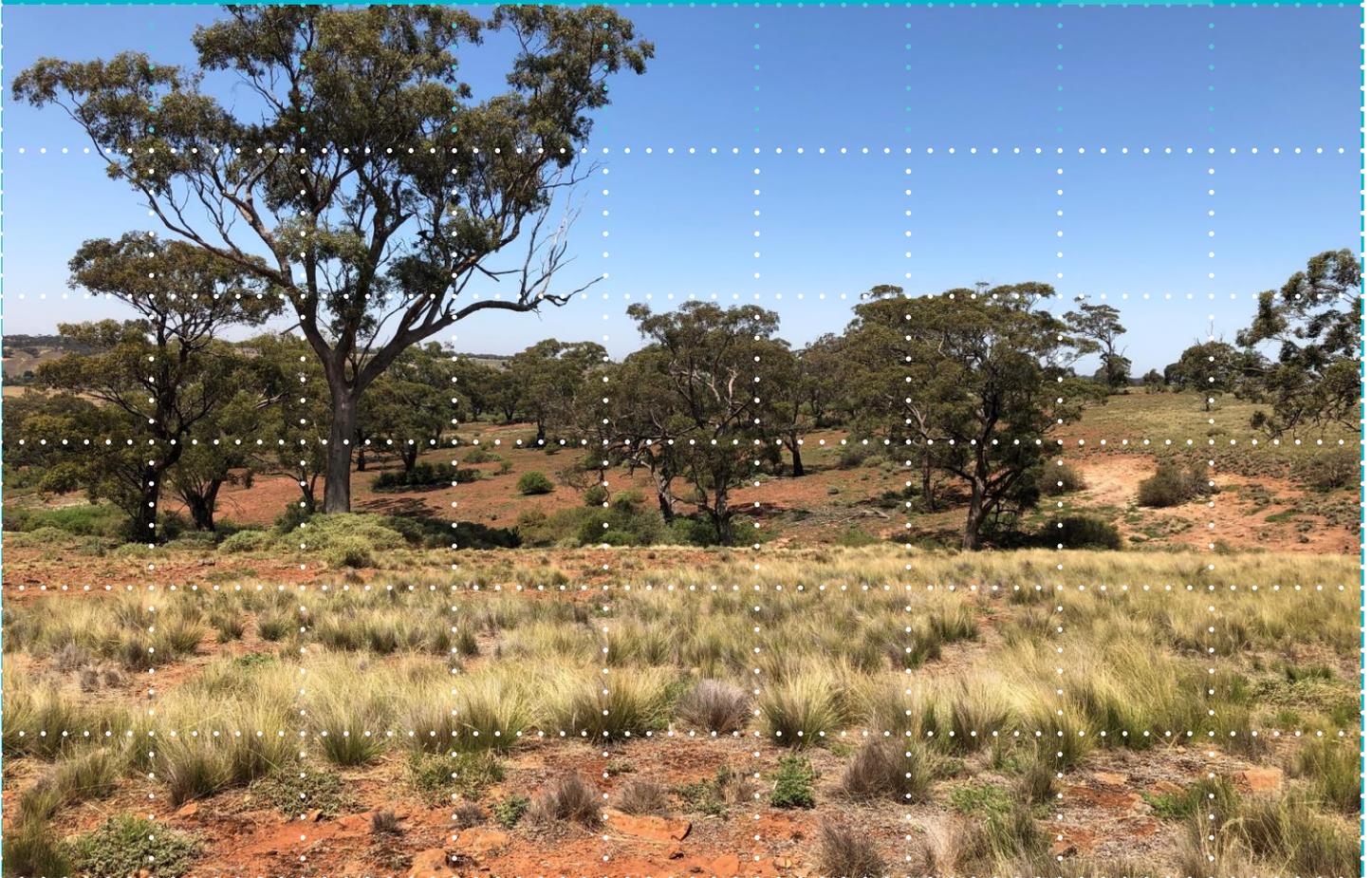
Final Report

# Ecological Values: Merrimu Precinct Structure Plan Areas 1-6, Victoria

Prepared for

**Bacchus Marsh Developments Pty Ltd**

March 2020



**Ecology and Heritage Partners Pty Ltd**

## Document Control

<b>Assessment</b>	Ecological Values
<b>Address</b>	Merrimu Precinct Structure Plan Areas 1-6, Victoria
<b>Project number</b>	13476
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<b>File name</b>	13370_EHP_PSP_MerrimuPSP_A1-A6_Final_05032020
<b>Client</b>	Bacchus Marsh Developments Pty Ltd
<b>Bioregion</b>	Victorian Volcanic Plain
<b>CMA</b>	Port Philip and Westernport
<b>Council</b>	Moorabool Shire Council

Report versions	Comments	Comments updated by	Date submitted
Preliminary Draft	Submitted to client for review		28/02/2020
Final	No comments from Client		05/03/2020

### Acknowledgements

We thank the following people for their contribution to the project:

- Yvonne Bartonek and Nick Parthimos (Bacchus Marsh Developments) for project and site information;
- Tim Peggie, Henry Wallis and Paul Beatty (Ethos Urban) for project information;
- The landowners who provided access to the study area;
- The Victorian Department of Environment, Land, Water and Planning and the Commonwealth Department of Agriculture, Water and Environment for access to ecological databases.

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## Glossary

Acronym	Description
AVW	Atlas of Victorian Wildlife
BCS	Biodiversity Conservation Strategy
CaLP Act	Victorian <i>Catchment and Land Protection Act 1994</i>
CAMBA	China Australia Migratory Bird Agreement
CMA	Catchment Management Authority
DAWE	Commonwealth Department of Agriculture, Water and Environment
DELWP	Victorian Department of Environment, Land, Water and Planning
DoEE	(former) Commonwealth Department of the Environment and Energy
EES	Environment Effects Statement
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Conservation Act 1999</i>
EVC	Ecological Vegetation Class
FFG Act	Victorian <i>Flora and Fauna Guarantee Act 1988</i>
HabHa	Habitat Hectare
JAMBA	Japan Australia Migratory Bird Agreement
MSA	Melbourne Strategic Assessment
NES	National Environmental Significance
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain ecological community
NVIM Tool	Native Vegetation Information Management Tool (DELWP)
NVPP	Native Vegetation Precinct Plan
PMST	Protected Matters Search Tool
PSP	Precinct Structure Plan. Also used to denote all land within the Merrimu PSP
Study Area	Refers to areas within the Merrimu PSP that were subject to the on-ground assessments
TRZ	Tree Retention Zone
VBA	Victorian Biodiversity Atlas
VPA	Victorian Planning Authority
WoNS	Weeds of National Significance

## Summary

### Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Bacchus Marsh Developments Pty Ltd (herein referred to as BMD) in collaboration with the Victorian Planning Authority (VPA) to undertake an ecological assessment within several parcels located within the Merrimu Precinct Structure Plan (PSP) area.

The parcels are within an area identified for potential future urban development as part of the expansion of Bacchus Marsh, and Moorabool Shire Council and the Victorian Planning Authority (VPA) have jointly prepared the draft Bacchus Marsh Urban Growth Framework (UGF).

This ecological values report summarises the methods and results of ecological studies undertaken within the additional parcels, including detailed desktop assessments, vegetation mapping and habitat assessments. This baseline ecological data is intended to be used by the VPA and Moorabool Shire Council to inform land-use decisions, including which biodiversity values to avoid and/or minimise impacts to in the subsequent Precinct Structure Plan/Native Vegetation Precinct Plan preparation.

### Methods

Relevant literature, online-resources and databases were reviewed to provide an assessment of flora and fauna values associated with the study area

#### *Ecological Assessment*

A field assessment was undertaken on 31 January 2020 to obtain information on terrestrial flora and fauna values within the study area. A habitat hectare assessment was undertaken in conjunction with the flora survey. Vegetation within the study area was assessed according to the habitat hectare methodology, which is described in the Vegetation Quality Assessment Manual.

The field assessments 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.

Where access to parcels within the PSP was not granted, accurate on-ground field assessments were not able to be undertaken. Area 1 was accurately assessed from the neighbouring property and roadside. The potential presence of ecological values that may occur within parcels not accessed is based wholly on the modelled extent of ecological values as determined by the Department of Environment, Land, Water and Planning (DELWP), and those values known to occur within the immediate vicinity based on previous assessments undertaken by Ecology and Heritage Partners within adjacent land.

All fieldwork was carried out under the appropriate licences, including a Research Permit (10006893) and Scientific Procedures Fieldwork Licence (SPFL 410) issued by the Department of Environment, Land, Water and Planning (DELWP) under the *Wildlife Act 1975*, and an Animal Research permit issued by the Wildlife and Small Institutions Animal Ethics Committee (22.13).

## Results

The study area is highly modified due to past and current agricultural and cattle grazing practices and supports extensive areas of non-indigenous grasses and weeds with scattered occurrences of native flora. Despite historical impacts, areas ranged in cover and quality of native vegetation ranging from isolated patches as identified in Area 3 (Figure 2c), to larger and diverse patches of Plains Grassland qualifying as Natural Temperate Grassland of the Victorian Volcanic Plain identified within Area 1 (Figure 2a). Typically, areas not supporting native vegetation are dominated by the Weed of National Significance Serrated Tussock *Nassella trichotoma*.

### Flora

A total of 83 flora species (35 indigenous and 48 non-indigenous or introduced) were recorded within the study area during the field assessment. No State or nationally significant flora were recorded in the study area. However, the FFG Act 'protected' flora Lemon Beauty-heads *Calocephalus citreus*, Drooping Cassinia *Cassinia arcuata*, Cotton Fireweed *Senecio quadridentalis* and Fuzzy New Holland Daisy *Vittadinia cuneata* were present within Area 1, and Area 3. Observations of FFG Act protected flora within Area 1 were observed from the road reserve.

Due to the location of previous records of nationally significant flora within (Area 1) or immediately adjacent to the study area, it is recommended that targeted surveys for the nationally significant Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* are undertaken in areas of potential habitat (Figure 3).

Based on the landscape context and proximity of previous records, surveys for other nationally significant species are not considered to be required.

### Fauna

Due to the location of previous records and presence of moderate quality habitat for nationally significant fauna within or immediately adjacent to the study area, it is recommended that targeted surveys for the nationally significant Golden Sun Moth *Synemon plana* are undertaken in areas of potential habitat.

Based on habitat condition, and the proximity of previous records, there is also low to moderate quality habitat within the study area for the State-significant Speckled Warbler *Chthonicola sagittatus*, Barking Owl *Ninox connivens connivens* and Crested Bellbird *Oreoica gutturalis gutturalis* as well as the Regionally significant Fat-tailed Dunnart *Sminthopsis crassicaudata* and Spotted Harrier *Circus assimilis*.

Some migratory species may occasionally forage within or adjacent to the study area. However, there is a low likelihood that these species utilise or rely on habitats within the study areas due to the poor condition of habitat present (i.e. waterbodies lack dense emergent aquatic and terrestrial vegetation utilised for breeding/important foraging resources), and higher quality habitat is located immediately north-east of the PSP (i.e. Merrimu Reservoir).

### Communities

Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) community was recorded within Area 1, and Area 3 (PG1 Figure 2a, Figure 2c). Habitat zone PG1 supports a total of 4.989 hectares that qualifies as the listed ecological community (Figure 2a, Figure 2c). This habitat zone also meets the description of the State significant ecological community *Western (Basalt) Plains Grassland*.

A summary of the ecological values recorded within the study area is provided in Table S1.

**Table S1.** Summary of the ecological values that occur within the study area

<b>Species diversity</b>	Moderate assemblage of plants and animals, with 83 flora species recorded during the field surveys.
<b>Confirmed Native vegetation</b>	<ul style="list-style-type: none"> <li>• 18.162 hectares of native vegetation represented by a single EVC: <ul style="list-style-type: none"> <li>○ Low rainfall Plains Grassland (EVC 132_63) 18.162 hectares;</li> </ul> </li> <li>• 9 Scattered Trees (3 Large Trees; 6 Small Trees);</li> <li>• No Large Trees in patches.</li> </ul>
<b>Modelled Native Vegetation</b>	<ul style="list-style-type: none"> <li>• 88.18 hectares represented by four EVCs: <ul style="list-style-type: none"> <li>○ Grassy Woodland (EVC 175) 49.27 hectares;</li> <li>○ Red Gum Swamp (EVC 292) 1.56 hectares;</li> <li>○ Low rainfall Plains Grassland (EVC 132_63) 30.15 hectares;</li> <li>○ Rocky Chenopod Woodland (EVC 64) 7.2 hectares</li> </ul> </li> </ul>
<b>Significant ecological communities</b>	<ul style="list-style-type: none"> <li>• A total of 4.989 hectares of the nationally significant ecological community <i>Natural Temperate Grassland of the Victorian Volcanic Plain</i> is present in the study area;</li> <li>• A total of 4.989 hectares of the State significant Western (Basalt) Plains Grassland (WBPG) ecological community;</li> </ul>
<b>Significant flora species</b>	<ul style="list-style-type: none"> <li>• No nationally significant flora were recorded in the study area.</li> <li>• Suitable habitat for Spiny Rice-flower is present.</li> <li>• No State-significant flora observed</li> <li>• The presence of four flora species ‘protected’ under the FFG Act (Lemon Beauty-heads, Drooping Cassinia, Cotton Fireweed and Fuzzy New Holland Daisy).</li> </ul>
<b>Significant fauna species</b>	<ul style="list-style-type: none"> <li>• No national or State significant fauna were recorded in the study area.</li> <li>• Potential habitat for nationally significant Striped Legless Lizard and Golden Sun Moth;</li> <li>• Potential habitat for State significant Speckled Warbler, Barking Owl, Crested Bellbird and Regionally Significant Fat-tailed Dunnart and Spotted Harrier.</li> </ul>

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## **1 Introduction**

### **1.1 Background**

Ecology and Heritage Partners Pty Ltd was commissioned by Bacchus Marsh Developments Pty Ltd (herein referred to as BMD) in collaboration with the Victorian Planning Authority (VPA) to undertake an ecological assessment within several parcels located within the Merrimu Precinct Structure Plan (PSP) area.

Bacchus Marsh Developments are a major landowner within the Merrimu PSP, and have previously engaged Ecology and Heritage Partners to undertake a suite of ecological investigations on land in which they have an interest in (Ecology and Heritage Partners 2018a, 2018b, 2019a, 2019b). Further, BMD wish to commence the PSP process as soon as possible, and as such are funding additional background assessments to assist the VPA prepare and progress the PSP to completion in a timely manner.

The parcels are within an area identified for potential future urban development as part of the expansion of Bacchus Marsh, and Moorabool Shire Council and the Victorian Planning Authority (VPA) have jointly prepared the draft Bacchus Marsh Urban Growth Framework (UGF).

This ecological values report summarises the methods and results of ecological studies undertaken within the additional parcels, including detailed desktop assessments, vegetation mapping and habitat assessments. This baseline ecological data is intended to be used by the VPA and Moorabool Shire to inform land-use decisions, including which biodiversity values to avoid and/or minimise impacts to in the subsequent Precinct Structure Plan/Native Vegetation Precinct Plan preparation.

#### **1.1.1 Amendment C81 – Bacchus Marsh Urban Growth Framework**

With the population of Bacchus Marsh expected to double from 20,000 today to 40,000 residents by 2041, the draft UGF is crucial to guide growth. It is expected that the Urban Growth Framework Plan will be incorporated into the planning scheme in 2018 (Amendment C81), and that a Precinct Structure Plan will thereafter be prepared in relation to the land.

Amendment C81 affects land in the urban and rural areas of Bacchus Marsh, Darley, Maddingley and Pentland Hills, together with the rural fringe areas of Merrimu, Parwan, Hopetoun Park, Coimadai (part), Long Forest (part) and Rowsley (part).

Amendment C81 promotes coordinated, master-planned development of identified areas in and around Bacchus Marsh, by identifying a need to:

- Contain short to medium term residential development within the existing settlement boundary (infill and greenfield);
- Prepare for medium to long term residential growth within the investigation areas at Merrimu, Parwan Station and Hopetoun Park;
- Require precinct structure plans for any urban growth precincts at Merrimu and Parwan Station, and a development plan for any growth precinct at Hopetoun Park, and ensure that such plans provide for

appropriate community and social infrastructure, activity centres, schools, integrated transport, reticulated services and local job opportunities;

- Prepare a precinct structure plan for Parwan Employment Precinct, to address key infrastructure and land use priorities that will deliver value-added and vertically or horizontally integrated agribusiness/industries; and
- Work with State Government and other relevant servicing authorities towards the servicing of Parwan Employment Precinct, with particular emphasis on the provision of reticulated water and gas.

It is important to note that Amendment C81 does not rezone any land. It provides a strategic framework for determining where future urban growth precincts and employment growth precincts will occur. A future, separate planning scheme amendment will be required, to identify exact boundaries for these precincts and to rezone land to facilitate master-planned urban development (Moorabool Shire 2017).

## 1.2 Objectives

The purpose of the assessment was to provide a baseline assessment to quantify the extent and type of native vegetation present within several parcels within the Merrimu PSP outside of those which Bacchus Marsh Developments has an interest in, and to determine the likely presence, or otherwise, of significant flora and fauna species and/or ecological communities.

The objectives of the ecological assessment were to:

- Review the relevant flora and fauna databases and available literature;
- Conduct detailed field assessments to identify flora and fauna values within the land identified as Areas 1 – 6 (Figure 1);
- Provide maps showing any areas of remnant native vegetation (both mapped and modelled) and locations of any significant flora and fauna species, and/or fauna habitat (if present);
- Classify any flora and fauna species and vegetation communities identified or considered likely to occur within the study area in accordance with Commonwealth and State legislation; and,
- Advise whether any additional flora and/or fauna surveys are required (e.g. targeted surveys for significant flora and fauna species).

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

- A habitat hectare assessment of any areas of remnant native vegetation within the study area;
- Quantify the presence of scattered trees and Large Trees in patches (LTs) and habitat for rare or threatened species that may be impacted as a result of any proposed future development.

### 1.3 Study Area

The study area is segregated into areas identified as Area 1 through to Area 6 (Figure 1, Figure 2). Within the Merrimu PSP, the on-ground ecological assessments focussed on parcels of land where access was permitted (Table 1; Figure 2).

**Table 1.** Consent to access land within the Merrimu PSP.

Area ID *	Address / Title Info	Land Accessed
1	1\TP961174 (part)	No ^
2	1\TP957892 (part); 1\TP419506 (part).	Yes
3	109\PS420001 (part); 7\PS318904 (part).	Yes
4	Several properties on Flanagans Lane, Tuckers Drive; Streeton Drive, Lindsay Avenue,	No
5	Several properties south of Oconnell Road, Wells Road and McKenzie Court	No
6	Several parcels east and west of Flanagans Drive, below Area 4.	No

**Note.** See Figure 2 for location of areas within the study area. ^ Values accurately assessed from adjoining roadside.

Where access to Areas within the PSP was not granted, accurate on-ground field assessments were not able to be undertaken. The potential presence of ecological values that may occur within parcels not accessed is based wholly on the modelled extent of ecological values as determined by the Department of Environment, Land, Water and Planning (DELWP) (DELWP 2020a), or those values known to occur due to previous assessments undertaken by Ecology and Heritage Partners within adjacent land.

#### 1.3.1 Overview

The land within and surrounding the study area predominantly supports agricultural activities in the form of grazing, cropping, market gardens, orchards, and vineyards. Two operating quarries are located immediately opposite the Merrimu PSP on the west of Gisborne Road, while the Long Forest Flora and Fauna Reserve is located to the east of Bences road in close proximity to the study area (Figure 1).

The study area is highly modified due to past and current agricultural and cattle grazing practices and supports extensive areas of non-indigenous grasses and weeds with scattered occurrences of native grasses. Despite historical impacts, areas ranged in cover and quality of native vegetation ranging from isolated patches as identified in Area 3 (Figure 2c), to larger and diverse patches of Plains Grassland qualifying as the nationally significant ecological community *Natural Temperate Grassland of the Victorian Volcanic Plain* identified within Area 1 (Figure 2a). Typically, areas not supporting native vegetation are dominated by the Weed of National Significance Serrated Tussock *Nassella trichotoma*.

According to the Department of Environment, Land, Water and Planning (DELWP) Native Vegetation Information Management (NVIM) Tool (DELWP 2019b), the study area occurs within the Victorian Volcanic Plain bioregions. It is located within the jurisdiction of the Port Philip and Westernport Catchment Management Authority (CMA) and the Moorabool Shire Council municipality.

## 2 Methods

This section details the desk-based and field methods used in surveying the current environment as well as the methods used to assess the likelihood of significant flora and fauna species occurring within the study area. It is noted that the methodology detailed below is in accordance with the standard ecological assessment requirements used to inform the precinct structure planning process.

### 2.1 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 DELWP NVIM Tool (DELWP 2020a) and NatureKit Map (DELWP 2020b) for:
- Modelled data for location risk, remnant vegetation patches, scattered trees and habitat for rare or threatened species;
- The extent of historic and current Ecological Vegetation Classes (EVCs);
- Previously documented flora and fauna records within the project locality
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DELWP 2020c);
- EVC benchmarks (DELWP 2020d) for descriptions of EVCs within the Victorian Volcanic Plain and Otway Plain bioregions;
- VicPlan Online (DELWP 2020e) to ascertain current zoning and environmental overlays in the study area;
- The Illustrated Flora Information System of Victoria (IFLISV) (Gullan 2017) for assistance with the distribution and identification of flora species;
- The Commonwealth Department of Agriculture, Water and Environment (DAWE) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DoEE 2020);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened and Protected Lists (DELWP 2017a; 2018a; 2020f);
- Aerial photography of the study area; and,
- Previous ecological reports, or other relevant assessments within or adjacent to the study area; and,
- Any relevant reports, legislation and policy, including:
- Ramsar Plans;

- National Species Recovery Plans; and,
- Conservation advice.

## 2.2 Field Assessment

### 2.2.1 Flora

A field assessment by a qualified ecologist was undertaken within the study area on 31 January 2020 to obtain information on flora values within the study area.

The study area was walked and/or driven, with all observed vascular flora species recorded, any significant records mapped and the overall condition of vegetation and habitats noted. Remnant vegetation in the local area was also investigated to assist in determining the pre-European vegetation within the study area. Ecological Vegetation Classes were determined with reference to DELWP pre-1750 and extant EVC mapping (DELWP 2019a) and their published descriptions (DELWP 2020d).

Where remnant vegetation was identified a habitat hectare assessment was undertaken following methodology described in the Vegetation Quality Assessment Manual (DSE 2004).

The surveys 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.

All fieldwork was carried out under the appropriate licences, including a Research Permit (10008283) and Scientific Procedures Fieldwork Licence (SPFL 20005) issued by DELWP under the *Wildlife Act 1975*, and an Animal Research permit issued by the Wildlife and Small Institutions Animal Ethics Committee (22.13).

Native vegetation was classified in accordance with the definitions provided in Table 2, as defined in the Guidelines (DELWP 2017b).

### Vegetation Assessment

Native vegetation was classified in accordance with the definitions provided in Table 2, as defined in the Guidelines (DELWP 2017b), and was 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 field assessments.

In addition, the type and general condition of all vegetation was assessed and a determination made as to whether it qualifies for further consideration under local, State or national legislation and policy.

**Table 2.** Determination of remnant native vegetation (DELWP 2017b)

Category	Definition	Extent	Condition
<b>Remnant patch of native vegetation</b>	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; <b>OR</b> An area with three or more native canopy trees where the drip line of each tree touches	Measured in hectares. Based on hectare area of the remnant patch.	Vegetation Quality Assessment Manual (DSE 2004).  Modelled condition for <i>Current Wetlands</i> .

Category	Definition	Extent	Condition
	the drip line of at least one other tree, forming a continuous canopy; <b>OR</b> Any mapped wetland included in the <i>Current Wetlands map</i> , available in DELWP systems and tools.		
<b>Scattered tree</b>	A native canopy tree that does not form part of a remnant patch.	Measured in hectares. Each Large scattered tree is assigned an extent of 0.071 hectares (30m diameter). Each Small scattered tree is assigned a default extent of 0.31 hectares (10 metre diameter)	Scattered trees are assigned a default condition score of 0.2 (outside a patch).

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

### 2.2.2 Fauna

A fauna habitat suitability assessment was undertaken concurrently with the flora assessment at accessible properties to obtain information on terrestrial fauna values within the study area (Figure 2). The study area was visually assessed and active searching under and around ground debris for reptiles, frogs and small mammals was undertaken. Binoculars were also used to scan the area for birds, and observers listened for calls and searched for other signs of fauna such as nests, remains of dead animals, droppings and footprints. Potential habitat for fauna was assessed, with an emphasis on waterbodies and other habitats that may provide shelter, food or other resources for significant species.

### 2.1 Likelihood of Occurrence Assessment

Relevant biological databases, literature and expert advice were used to identify all species records of national, State and regional conservation significance within 5 kilometres of the study 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 study area) were considered to determine a species’ likelihood of occurrence within the study 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 3 and Table 4, respectively.

The results of the likelihood of occurrence assessment for significant flora and fauna species are provided in Appendices 2.2 and 3.2, respectively.

**Table 3.** Decision guidelines for determining a flora species likelihood of occurrence within the study area.

Likelihood of occurrence	Ecology and Heritage Partners Decision Criteria
<b>1 – Known occurrence</b>	Recorded within the study area recently (i.e. within ten years).
<b>2 - High</b>	Previous records of the species in the local vicinity; and/or, the study area contains areas of high-quality habitat.
<b>3 – Moderate</b>	Limited previous records of the species in the local vicinity; and/or, the study area contains some characteristics of the species’ preferred habitat.
<b>4 – Low</b>	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.
<b>5 – Unlikely</b>	No suitable habitat and/or outside the species range.

**Table 4.** Decision guidelines for determining fauna species likelihood of occurrence within the study area.

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

## 2.2 Assessment Qualifications and Limitations

The ecological site assessment was restricted to parcels/properties where access was permitted (Figure 2). Where access to parcels/properties was not permitted, an on-ground assessment was not conducted. The presence and extent of potential ecological values within these parcels has therefore been assessed wholly on the information interrogated during the desktop assessment.

Data and information held within the ecological databases and mapping programs reviewed as part of the desktop assessment (e.g. VBA, PMST, NatureKit Maps etc.) are unlikely to represent all flora and fauna observations within, and surrounding the study area. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent. Furthermore, a documented record may indicate a species’ presence in an area at a given point in time, but it generally does not offer information about how a species is making use an area (e.g. foraging, nesting, dispersing). This can be important information when determining the potential impact of a proposed action on a threatened species.

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.

Targeted surveys for significant flora and fauna were not undertaken as this was beyond the scope of the assessment. Nevertheless, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered adequate to provide an accurate assessment of the ecological values present, or those that are likely to be present, within the study area.

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

Where appropriate, a precautionary approach has been adopted in the discussion of implications. That is, where insufficient evidence is available on the occurrence or likelihood of occurrence of a species, it is assumed that it could be in an area of habitat, if suitable, and the implications under legislation and policy are considered accordingly.

#### **2.2.1 Access Constraints**

Permission to access Areas 1, 4, 5, and 6 was not granted by the landowners. As such, the presence of ecological values could not be accurately assessed.

Assessment of Area 1 was completed from observations taken from the public road reserve, which was deemed accurate to assume quality, however the extent and refinement of habitat hectare scoring is required through a site assessment.

The eastern parcel within Area 2 was observed from the adjacent properties. Native vegetation within this area appeared to support scattered native grasses, however, was considered highly unlikely to support patches of native vegetation due to the high cover of exotic grasses present. A site assessment is recommended to confirm these values.

### **3 Existing Environment**

The following description of the existing environment is based on the landscape, vegetation, fauna habitats and species identified from the desktop assessment and within the study area during the field surveys.

#### **3.1 Ecological Values**

Ecological values of the study area as determined throughout the field assessments within the accessible parcels is provided below.

##### **3.1.1 Overview**

The study area is highly modified due to past and current agricultural and cattle grazing practices and supports extensive areas of non-indigenous grasses and weeds with scattered occurrences of native flora. Despite historical impacts, areas ranged in cover and quality of native vegetation ranging from isolated patches as

identified in Area 3 (Figure 2c), to larger and diverse patches of Plains Grassland qualifying as Natural Temperate Grassland of the Victorian Volcanic Plain identified within Area 1 (Figure 2a). Typically, areas not supporting native vegetation are dominated by the Weed of National Significance Serrated Tussock *Nassella trichotoma*.

Much of the indigenous vegetation and terrestrial fauna habitat remaining within the study area is distributed across all areas with the exception of Area 4, which has been subdivided for residential development. However, this area is predicted to support smaller isolated patches of Plains Grassland.

The field assessment recorded a single EVC, *Low Rainfall Plains Grassland* (EVC 132\_63), within accessed areas. The presence of this EVC is generally consistent with the modelled extent (2005) native vegetation mapping (DELWP 2020b). Scattered remnant trees are present in low numbers within Area 3, with little or no associated indigenous vegetation.

Grey Box *Eucalyptus microcarpa* was the recorded tree species within the study area, however several non-indigenous planted eucalypt species, and Olive tree *Olea europaea* also occurs within the study area around dwellings or farm sheds/maintenance areas.

The study area supports two main fauna habitat types. Each of these habitat types are unique in their habitat provisions and subsequently support a unique suite of fauna species.

Although mostly comprised of degraded landscape dominated by exotic pasture grasses, native vegetation is predicted to persist in the form of four Ecological Vegetation Classes (EVCs). The field assessment recorded *Low Rainfall Plains Grassland* (EVC 132\_63) within accessed areas. The presence of this EVC is generally consistent with the modelled extent (2005) native vegetation mapping (DELWP 2020b). Scattered remnant trees are present in low numbers within Area 3, with little or no associated indigenous vegetation.

A small area of Plains Grassland meets the condition threshold that defines the nationally significant ecological community Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) (Area 1).

Specific details relating to observed EVC is provided below, with a summary of the extent of each vegetation type provided in Table 5.

**Table 5.** Extent of vegetation type (EVC) within the study area.

Ecological Vegetation Class	Area (hectares)
Grassy Woodland (EVC 175)	49.27 hectares (Modelled)
Red Gum Swamp (EVC 292)	1.56 hectares (Modelled)
<i>Low rainfall Plains Grassland</i> (EVC 132_63)	18.162 (Field Assessment); 30.15 hectares (Modelled)
Rocky Chenopod Woodland (EVC 64)	7.2 hectares (Modelled)
<b>Total</b>	<b>106.342</b>

### 3.1.2 Species

#### 3.1.2.1 Flora

A total of 100 flora species (52 indigenous and 48 non-indigenous or introduced) were recorded within the study area during the field assessment. No state or nationally significant flora species were recorded in the study area.

A consolidated list of flora species recorded is provided in Appendix 2.1.

A total of 9 species recorded in the study area are declared noxious weeds listed under the Victorian *Catchment and Land Protection Act 1994* (CaLP Act) (Table 6). Chilean Needle-grass *Nassella neesiana*, Serrated Tussock *Nassella trichotoma*, and African Box-thorn *Lycium ferocissimum* are of importance as they are Weeds of National Significance (WoNS) under national management as part of the National Weeds Strategy (Natural Resource Management Ministerial Council 2006).

**Table 6.** Noxious weeds recorded within the study area

Species Name	Common Name	CaLP Act Category <sup>1</sup>	WoNS <sup>2</sup>
<i>Nassella neesiana</i>	Chilean Needle-grass	<b>Restricted Weed</b>	Yes
<i>Oxalis pes-caprae</i>	Soursob		No
<i>Lycium ferocissimum</i>	African Box-thorn	<b>Regionally Controlled</b>	Yes
<i>Cirsium vulgare</i>	Spear Thistle		No
<i>Cynara cardunculus</i>	Artichoke Thistle		No
<i>Marrubium vulgare</i>	Horehound		No
<i>Nassella trichotoma</i>	Serrated Tussock		Yes
<i>Opuntia</i> sp.	Prickly Pear		No
<i>Rosa rubiginosa</i>	Sweet Briar		No

#### Fauna

Two declared pest fauna species listed under the Victorian CaLP Act: European Rabbit *Oryctolagus cuniculus* and Red Fox *Vulpes vulpes* were observed during the assessment. There is also a high likelihood that the declared pest fauna European Hare *Lepus europaeus* also utilises the study area. These species are classified as Established Pest Animals, which indicates they pose a serious threat to primary production, Crown Land, the environment or community health in Victoria.

### 3.1.3 Native Vegetation

Modelling undertaken by DELWP provides an indication of the likely extent and type of native vegetation (native patches) present within the study area prior to European settlement (1750), and in 2005 (DELWP 2020b). The 2005 modelling indicates that approximately 60% of the un-assessed study area supports native vegetation, with patches of Plains Grassland (EVC 132) and Grassy Woodland (EVC 175) present in large areas, while small fragmented patches of Red Gum Swamp (EVC 292) and Rocky Chenopod Woodland (EVC 64) are predicted to occur in the west of the PSP in Area 5 (DELWP 2020b).

Vegetation mapping completed as part of this assessment largely confirms the presence of modelled native vegetation within the study area. Detailed vegetation mapping completed across the study area recorded a single EVC, *Low Rainfall Plains Grassland* (EVC 132\_63) totalling 18.162 hectares of native vegetation and nine scattered trees (3 Large Trees and 6 Small Trees) (Table 5; Appendix 2.4). Properties not able to be accessed were predominantly confirmed to support area of modelled vegetation in a similar extent to that mapped by DELWP.

The remainder of the study area comprises introduced and planted vegetation. Specific details relating to observed EVC is provided below.

### 3.1.3.1 Plains Grassland

*Low-rainfall Plains Grassland* (EVC 132\_63) typically consists of treeless vegetation mostly less than one metre in height and dominated by a mixture of grasses and herbs. This EVC usually occupies cracking basalt soils prone to seasonal waterlogging in areas receiving less than 500 millimetres of annual rainfall (DELWP 2019d).

Plains Grassland was recorded in Area 1, 2, and 3 during the field assessment. Area 1 was dominated by high quality Plains Grassland (PG1) exceeding 70% native perennial grass cover, and supporting a diversity of both grasses and herbs (Plate 1). The cover and distribution of grassland was clearly observed from the public road reserve and identified to support a contiguous cover throughout the majority of Area 1 (Figure 2a).

Area 2 supports a consistent coverage of Common Wallaby-grass *Rytidosperma caespitosum* maintaining a minimum of 25% cover, but not exceeding 40% (PG3, Plate 2). The area is heavily grazed, with a large herd of Kangaroos observed within. Grass height rarely exceeded 5cm in height as a result of grazing pressure, and is the likely contributor to a lack of diversity. Additionally, the regionally controlled Spear Thistle was observed throughout this area, as well as an olive plantation.

Area 3 supports scattered patches of Plains Grassland, with small yet diverse patches recorded in the north (PG1, Figure 2c, Plate 3), with larger less diverse patches recorded within the southern section (PG2, PG3, Figure 2c, Plate 4).

Dominant native grasses recorded throughout most patches included Spurred Spear-grass *Austrostipa gibbosa*, Rough Spear-grass *Austrostipa scabra* subsp. *falcata*, Common Wallaby-grass *Rytidosperma caespitosa*, Bristly Wallaby-grass *Rytidosperma setaceum*, and Kneed Wallaby-grass *Rytidosperma geniculatum* (Plate 3). Commonly observed shrubs and herbs within this vegetation type comprised Tall Bluebell *Wahlenbergia stricta*, Berry Saltbush *Atriplex semibaccata*, Sheep's Burr *Acaena echinata*, Nodding Saltbush *Einadia nutans*, Ruby Saltbush *Enchylaena tomentosa* var. *tomentosa*, Native Flax *Linum marginale* and occasional specimens of Fuzzy New Holland Daisy *Vittadinia cuneata* (Plate 2).

A total of three habitat zones comprising 18.162 hectares were recorded within the study area (PG1 – PG3) (Figure 2), with habitat zones differing in quality predominantly due to the diversity and/or of native species present, and the type and extent of weeds present in the habitat zone (Appendix 2.3).

Habitat zone PG1 in Area 1, and Area 3 met the thresholds that define the nationally significant *Natural Temperate Grasslands of the Victorian Volcanic Plain* (NTGVVP) ecological community. However, not all patches of PG1 qualified as NTGVVP within Area 3 due to not meeting the minimum size requirement (0.05ha).



**Plate 1.** Wallaby-grass dominated Plains Grassland / NTGVVP within Area 1 (Ecology and Heritage Partners Pty Ltd 31/01/2020).



**Plate 2.** Plains Grassland EVC within Area 2 (Ecology and Heritage Partners Pty Ltd 31/01/2020).



**Plate 3.** Isolated patches within the north of Area 3 (Ecology and Heritage Partners Pty Ltd 31/01/2020).



**Plate 4.** Plains Grassland EVC within Area 2 (Ecology and Heritage Partners Pty Ltd 31/01/2020).

### 3.1.3.2 Large Trees and Scattered Trees

A total of 9 scattered trees were recorded within Area 3, the majority being Grey Box, with a single specimen of Drooping Sheoak *Allocasuarina verticillata*. The majority of these trees would once likely have been part of the Grassy Woodland/Plains Grassland ecotone between the two EVCs, however the understorey vegetation consists of predominantly introduced species (mainly exotic pasture grasses) and the trees no longer form a patch of native vegetation (Plate 5; Plate 6).

Of the 9 scattered trees, a total of 3 are Large Trees (LTs), with 6 Small Trees (STs) (Appendix 2.4). No scattered trees were present in Area 1 or Area 2.



**Plate 5.** Large Scattered Grey Box within Area 3 (Ecology and Heritage Partners Pty Ltd 31/01/2020).



**Plate 6.** Scattered Grey Box within Area 3 (Ecology and Heritage Partners Pty Ltd 09/12/2019).

### 3.1.4 *Introduced and Planted Vegetation*

#### 3.1.4.1 **Introduced Vegetation**

Areas not supporting remnant native vegetation have a high cover (>90%) of exotic grass species, many of which have been historically direct seeded for use as pasture. Scattered native grasses are generally present in these areas, however they did not have the required 25% cover to be considered a remnant patch. Removal of embedded rock has also been undertaken as part of historical agricultural activities throughout much of the study area (Plate 7).

Exotic flora was dominant throughout most areas within and adjacent to Plains Grassland vegetation. Common environmental weeds present in moderate to high abundance throughout included Galenia *Galenia pubescens*, Wild Turnip *Brassica* spp., Perennial Rye-grass *Lolium perenne*, Barley *Hordeum* spp., Rat's-tail Fescue *Vulpia myuros*, St John's Wort *Hypericum perforatum*, Ribwort *Plantago lanceolata* and Soft Brome *Bromus hordeaceus*. The declared noxious weeds and Weeds of National Significance (WoNS) Serrated Tussock *Nassella trichotoma* and Chilean Needle-grass *Nassella neesiana* were also present in high abundance. Other noxious weeds observed in lower abundance included African Box-thorn *Lycium ferocissimum*, Artichoke Thistle *Cynara cardunculus* and Horehound *Marrubium vulgare*.

Noxious weeds are common throughout the study area, with common occurrences of Artichoke Thistle, Horehound and Spear Thistle *Cirsium vulgare* along with the Weeds of National Significance (WONS) African Boxthorn, Serrated Tussock, Chilean Needle-grass, and Prickly Pear (Plate 7; Plate 8).



**Plate 7.** Prickly Pear and Galenia-dominated grassland within Area 3 (Ecology and Heritage Partners Pty Ltd 31/01/2020).



**Plate 8.** Serrated Tussock-dominated grassland in Area 3 (Ecology and Heritage Partners Pty Ltd 31/01/2020).

#### 3.1.4.2 Planted Vegetation

Planted vegetation in the study area consists of native and non-native Victorian tree and shrub species including Peppercorn *Shoenus molle*, Southern Mahogany *Eucalyptus botryoides*, Sugar Gum *Eucalyptus cladocalyx* and specimens of Grey Box and Yellow Gum. An Olive Grove is present in the northern portion within Area 2 (Plate 9).



**Plate 9.** Planted Olive within Area 2 (Ecology and Heritage Partners Pty Ltd 31/01/2020).

Most planted vegetation is situated in windrows, or around dwellings, sheds and laneways. A variety of ornamental shrubs have also been planted around sheds and dwellings.

### 3.1.5 Fauna Habitat

#### 3.1.5.1 Native and Introduced Grasslands

The majority of the study area consists of paddocks which contain improved exotic pastures and scattered native grasses, likely to be used as a foraging resource by common generalist bird species which are tolerant of modified open areas. Fauna observed using this habitat included; Australian Magpie *Cracticus tibicen*, Common Blackbird *Turdus merula*, Little Raven *Corvus mellori*, Magpie-lark *Grallina cyanoleuca*, House Sparrow *Passer domesticus*, Willie Wagtail *Rhipidura leucophrys* Red Fox *Vulpes vulpes* and European Rabbit *Oryctolagus cuniculus*.

Patches of native grassland occur throughout the study area. These vary in quality and floristic composition according to grazing regimes and historical land use. Habitat attributes of the native grassland are suitable for an array of common native fauna, including snakes, lizards and skinks, and grassland birds. Diurnal and nocturnal raptors are also likely to forage across these areas, with Wedge-Tailed Eagle *Aquila audax* and Black-shouldered Kite *Elanus axillaris* observed during the field assessment. Several Eastern Grey Kangaroos *Macropus giganteus* was also observed foraging in grassland areas.

Areas of native grassland, particularly those with a high cover of Wallaby-grasses *Rytidosperma* spp. may provide habitat for the nationally significant Golden Sun Moth *Synemon plana*. Some of these areas have cracking soils which may provide sheltering habitat for reptiles and small mammals including Striped Legless Lizard and Fat-tailed Dunnart.

#### 3.1.5.2 Woodland and Scattered Trees

Woodland and scattered remnant trees occur throughout the study area and provide an important resource for arboreal fauna. Although woodland areas were not mapped within the areas approved for access, observations from adjacent parcels sited the majority of the eucalypts to be mature, providing an array of small, medium and large, bark fissures and crevices. These are likely to be used for shelter and nesting by a range of hollow-dependent fauna including parrots, microbats, possums, gliders and owls. Scattered trees provide habitat for more mobile fauna species, vantage points and nesting areas for diurnal and nocturnal raptors, as well as stepping stones for more mobile fauna moving through the study area, enhancing landscape permeability for native fauna.

#### 3.1.5.3 Planted Vegetation

Planted vegetation is located throughout the study area predominantly as ornamental plantings around dwellings. These areas provide foraging, roosting and nesting habitat for mobile generalist fauna including locally common birds and microbats.

## 4 Modelled Environment

The following description of the modelled environment is based on the landscape, vegetation, fauna habitats and species identified from the desktop assessment. Modelled information has been interrogated for areas not permitting access (Figure 2, Areas 4, 5 and 6). A site assessment is required to confirm the values discussed below.

#### 4.1 Modelled Ecological Values

Ecological values within areas unable to be accessed within the study area were determined through desktop assessments using tools outlined in section 2.1. Four EVC's are modelled to occur within Areas 4, 5 and 6 and their corresponding listed communities (FFG Act and EPBC Act) are presented within Table 7.

**Table 7.** Vegetation types (EVC) modelled within the study area.

EVC	Low rainfall Plains Grassland (EVC 132_63)	Grassy Woodland (EVC 175)	Rocky Chenopod Woodland (EVC 64)	Red Gum Swamp (EVC 292)
<b>Area 4</b>	15.36	0.38		
<b>Area 5</b>	0.2	19.84	7.2	1.55
<b>Area 6</b>	14.59	29.05		0.01
<b>Total (hectares)</b>	<b>30.15</b>	<b>49.27</b>	<b>7.2</b>	<b>1.56</b>

##### 4.1.1 Area 4

Area 4 (Figure 2d) is predominantly modelled as Plains Grassland with minor occurrences of Grassy Woodland. This area has been subdivided and urbanised with rural residential housing. As such, the modelled extent is likely to be reduced as a result of residential development, however smaller isolated patches of native grassland may persist. The presence of FFG Act and EPBC Act listed communities within this area is unlikely due to disturbance associated with residential development. Further, if any matters of NES were present at the time of subdivision and development, any implications under the EPBC Act should have been investigated at that time.

##### 4.1.2 Area 5

Area 5 supports the modelled presence of four EVCs (Figure 2e). The dominant EVC within this area is Grassy Woodland which is shown to typically follow the visible canopy from aerial photographs to the west, and to the east, is modelled to occur immediately south of a patch of Grassy Woodland previously mapped on the adjacent parcels by Ecology and Heritage Partners (Ecology and Heritage Partners 2019).

Rocky Chenopod Woodland is also present immediately adjacent to a large, high quality remnant previously mapped on the adjacent parcels by Ecology and Heritage Partners (Ecology and Heritage Partners 2019). (Figure 2e).

The western extent of Area 5 is also modelled to support the Red Gum Swamp EVC. A drive-by of these areas confirmed that these EVCs are present in Area 5. However, a site assessment would be required to accurately confirm the quality and extent of these EVCs, and confirm the presence of any FFG Act and/or EPBC Act listed communities.

Rocky Chenopod Woodland is likely to meet the description of the FFG Act listed Rocky Chenopod Open Scrub Community. Ecological communities listed under the EPBC Act are considered unlikely to occur in Area 5.

### 4.1.3 Area 6

Area 6 is predominantly modelled as Grassy Woodland with minor areas of Plains Grassland. The modelled extent of Grassy Woodland appears relatively consistent with aerial photographs clearly displaying treed sections of the landscape (Figure 2f). However, it is likely the extent of Grassy Woodland would increase to follow the extent of canopy trees as Plains Grassland is typically a treeless EVC.

Observations taken from Area 3 suggests this area is dominated by eucalypt species such as Grey Box, Swamp Gum *Eucalyptus ovata*, Manna Gum *Eucalyptus viminalis*, Acacia species such as Blackwood *Acacia melanoxylon*, and Drooping Sheoak *Allocasuarina verticillata*. Additional observations determined the understory to be highly modified with extensive cover of serrated tussock and African Boxthorn. A site assessment is required to determine the presence of any FFG Act and/or EPBC Act listed communities, however given the observed disturbance to the understory it is unlikely such communities would occur.

## 5 Significance Assessment

### 5.1 Nationally Significant Features

Matters of National Environmental Significance (NES) are listed and protected under the EPBC Act. Matters of NES relating to biodiversity are discussed below in relation to the study area, and are based on the results of the PMST (DoEE 2019), desktop review of literature, and the results of field surveys.

#### 5.1.1 Flora

The VBA contains records of three nationally significant flora species previously recorded within 10 kilometres of the study area (DELWP 2020c) (Appendix 2.2; Figure 4). The PMST nominated an additional 11 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DAWE 2020). Most records of nationally significant flora are located within and adjacent to the Long Forest Flora and Fauna Reserve to the east of the study area, the Lerderderg State Park to the north-west of the study area, and existing road reserves within the local area where survey effort has likely been greater.

There is a single record for the nationally significant Spiny Rice Flower within Area 1. (Figure 3).

Based on the condition of remnant vegetation, landscape context and the proximity of previous records, the following nationally significant flora species have the highest potential to occur within the study area (Table 8) (Appendix 2.2).

**Table 8.** Nationally significant flora species with the potential to occur within the study area.

Species	Suitable habitat	Closest known Records	Further Requirements
<b>Spiny Rice-flower</b> <i>Pimelea spinescens</i> subsp. <i>spinescens</i>	There are five records of Spiny Rice-flower (SRF) recorded in the VBA within the local area, with a single record within Area 1 (Figure 3) and the most recent from 2003 located east of the study area in Long Forest Flora and Fauna Reserve. Based on previous assessments conducted by Ecology and Heritage	Several hundred records within 5 km.	Undertake targeted surveys in Area 1 and Area 3 during the species known flowering period (April – August)

Species	Suitable habitat	Closest known Records	Further Requirements
	<p>Partners in the local area, we are aware of two large populations located in close proximity to the study area.</p> <p>There is suitable habitat within the study area within Plains Grassland EVC, particularly in Area 1 and Area 3, as well as non-native grassland not previously subject to previous cropping activities (Figure 3).</p> <p>Targeted surveys should be undertaken within areas of suitable habitat to ascertain its presence within the study area.</p>		
<p><b>Small Golden Moths</b> <i>Diuris basaltica</i></p>	<p>There are seven records of Small Golden Moths recorded in the VBA within 5 kilometres of the study area, with all located south of the Western Highway and Bacchus Marsh township (DELWP 2019b). An additional record is located further east near Melton, with another record north-west in Toolern Vale (DELWP 2019b).</p> <p>Small Golden Moth orchids typically grow in herb-rich native grasslands, dominated by Kangaroo Grass <i>Themeda triandra</i> on heavy basaltic soils, often embedded with basalt boulders, with the known distribution of the species highly restricted (DSE 2010a).</p> <p>There is potential for suitable habitat within Area 1 mapped as Plains Grassland (PG1). This area appeared relatively undisturbed and was dominated by Kangaroo Grass.</p> <p>Targeted surveys should be undertaken within areas of suitable habitat to ascertain its presence within the study area.</p>	<p>7 records within 5 km.</p>	<p>Undertake targeted surveys in Area 1 during the species known flowering period (September - October)</p>
<p><b>Large-headed Fireweed</b> <i>Senecio macrocarpus</i></p>	<p>Large-headed Fireweed generally occurs in grassland, sedgeland, woodland and shrubland, generally on relatively heavy soils (DSE 2009a).</p> <p>The decline of the species has been linked to agricultural activities in grassland habitats (ploughing / grazing) and inappropriate disturbance regimes (DSE 2009a).</p> <p>There are no known records of Large-headed Fireweed within 5 kilometres of the study area, with the closest known record located approximately 17 kilometres to the east (DELWP 2020b). Previous surveys for the species in nearby properties did not record the species (Ecology and Heritage Partners 2013a), and the species has not been observed during other ecological surveys undertaken within the locality during the flowering season (Ecology and Heritage Partners 2018a; 2018b). As such, there is considered to be a low likelihood of occurrence that the species occurs in the locality.</p>	<p>No records within 5km.</p>	<p>Targeted surveys not required.</p>
<p><b>Basalt Peppergrass</b> <i>Lepidium hyssopifolium</i></p>	<p>Although there are no records within the VBA within 5 kilometres, there is an informal record recorded in the Atlas of Living Australia (ALA) within a property immediately south of Buckleys Road (ALA 2019). This property has since been cropped, and the specimen would no longer be present.</p> <p>It is understood that almost all remaining populations of Basalt Peppergrass occur in heavily modified, non-natural environments, usually amongst exotic pasture grasses and weed species, sometimes with an overstorey of introduced tree species (DSE 2010b). However, the species appears to rely heavily on favourable microsite conditions, with Basalt Peppergrass appearing to only establish in relatively open bare ground where there is limited competition from other plants</p>	<p>1 informal record within 5 km.</p>	<p>Targeted surveys not required.</p>

Species	Suitable habitat	Closest known Records	Further Requirements
	(both native and introduced species), rather than in areas with thick ground cover (DSE 2010b). As the majority of grassland vegetation (native and non-native) within the study area supports high levels of biomass, with few patches of bare ground present, as well as the lack of other records in close proximity to the study area, there is considered a low likelihood of occurrence within the study area. Further, the biodiversity assessment did not note any specimens that meet the description of the species.		

#### 5.1.1.1 Recommendation

No nationally significant flora species were recorded within the study area during the field assessments. Due to the location of previous records of nationally significant flora within or immediately adjacent to the study area, it is recommended that targeted surveys for Spiny Rice-flower and Small Golden Moths are undertaken in areas of potential habitat (Area 1 and/or Area 3) if these parcels are likely to be subject to future development. The likelihood of any other nationally significant species occurring within the study area is considered low due to the absence of suitable habitat and/or lack of records near the study area (Table 8; Appendix 2.2).

It is also noted that previous targeted surveys and ecological surveys within adjacent properties did not record the presence of any other nationally significant flora (Ecology and Heritage Partners 2013a; 2018a; 2018b).

#### 5.1.2 Fauna

The VBA contains records of nine (9) nationally significant fauna species previously recorded within 5 kilometres of the study area (DELWP 2017c) (Appendix 3.1; Figure 5). The PMST nominated an additional 12 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DoEE 2019). Most records of nationally significant fauna are located within and adjacent to the Long Forest Flora and Fauna Reserve to the east of the study area (Figure 5).

Based on the modified nature of the study area, landscape context and the proximity of previous records, the following significant fauna species have the potential to occur within the study area (Table 9; Appendix 3.1).

**Table 9.** Nationally significant fauna species with the potential to occur within the study area.

Species	Suitable habitat	Closest known Records	Further Requirements
<b>Golden Sun Moth</b> <i>Synemon plana</i>	There are over 300 records of Golden Sun Moth from the local area recorded within the VBA (DELWP 2019c), with the majority of these recorded by Ecology and Heritage Partners in a nearby property to the south-east (Ecology and Heritage Partners 2013a). Recent (2018/2019) targeted surveys have also recorded additional populations of the species in the Merrimu locality (Ecology and Heritage Partners 2018b). There is suitable habitat for this species in areas of native and non-native grassland containing Wallaby-grass and Chilean Needle-grass, and based on the	358 records within 5 km. Known to occur in neighbouring parcels.	Undertake targeted surveys in areas of suitable habitat (Area 1, 2, 3, parts of 4 and 5) Surveys should be undertaken during the species flying season

Species	Suitable habitat	Closest known Records	Further Requirements
	presence of habitat and known populations in the locality, the species has a high likelihood of being present.		(November – early January).
<b>Striped Legless Lizard</b> <i>Delma impar</i>	There are no records of Striped Legless Lizard within 5 kilometres of the study area registered in the VBA (DELWP 2019c), although there is an unverified record located immediately south of the Werribee River approximately three kilometres south (ALA 2020).  Recent targeted surveys undertaken by Ecology and Heritage Partners have not recorded the species in the Merrimu locality, and there is considered to be a low likelihood that the species is present.	No records within 5 kilometres.	Unlikely to be present based on recent surveys undertaken in areas of high quality habitat within Merrimu by Ecology and Heritage Partners.
<b>Swift Parrot</b> <i>Lathamus discolor</i>	There are 15 records of Swift Parrot within 5 kilometres of the study area registered in the VBA (DELWP 2019c),  Swift Parrot may forage on eucalypts within the study area on occasion. However, the species breeds only in Tasmania and migrates to mainland Australia in autumn and is usually recorded between Stawell in the central west and Wodonga in the north-east. As such the study area is not considered to provide important or limiting habitat for this species.	3km east in Log Forest Flora and Fauna Reserve.	Targeted surveys not required.

### Migratory Species

A large permanent waterbody (Merrimu Reservoir) that has the potential to support EPBC Act listed migratory species is present within the local area (but outside the study area). Although highly modified, migratory species that may occasionally utilise ephemeral wetlands when inundated within the PSP for foraging purposes during the species migratory non-breeding visiting periods in Australia (August-April) include Australasian Bittern *Botaurus poiciloptilus*, Curlew Sandpiper *Calidris ferruginea*, Eastern Curlew *Numenius madagascariensis* and Australian Painted Snipe *Rostatula maraena*.

While these migratory species may occasionally forage within or adjacent to the study area, there is a low likelihood that these species utilise or rely on these habitats as due to the poor condition of habitat present (i.e. waterbodies lack dense emergent aquatic and terrestrial vegetation utilised for breeding/important foraging resources), and higher quality habitat is located immediately north-east of the PSP (i.e. Merrimu Reservoir).

All remaining EPBC Act listed migratory and/or marine species are not considered likely to utilise ephemeral or artificial waterbodies within the study area as preferred foraging and breeding habitat is not present (i.e. marine coastal / intertidal mud or sand habitats more suited to marine associated species).

Given the lack of migratory and/or marine species that are likely to utilise such habitats, the study 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.

#### 5.1.2.1 Recommendation

Due to the presence of suitable habitat, targeted surveys are recommended for the nationally significant Golden Sun Moth to ascertain their presence within the study area.

Golden Sun Moth surveys should be undertaken during the species known flying season (generally between November and early January depending on seasonal climatic conditions). Although there is potential habitat for Striped Legless Lizard, the species has not been recorded in Bacchus March and/or Merrimu for several years despite rigorous targeted surveys being undertaken by Ecology and Heritage Partners over multiple years (2013, 2017, 2018, 2019, 2020) for multiple projects. As such, it is considered that they are locally extinct, and further targeted surveys are not required for the species.

The likelihood of any other nationally significant fauna species occurring within the study area is considered low due to the landscape context, absence of suitable breeding and limiting habitat, and proximity of previous records (Table 8; Appendix 2.2).

#### 5.1.3 Communities

Five nationally listed ecological communities are predicted to occur within 5 kilometres of the study area (DoEE 2019):

- 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-Blakeley's Red-gum Grassy Woodland and Derived Native Grassland.

#### Natural Temperate Grassland of the Victorian Volcanic Plain

Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) community was recorded within Area 1 (4.732 ha), and Area 3 (0.257). Habitat zone PG1 supports a total of 4.989 hectares that qualifies as the listed ecological community (Figure 2a).



**Plate 11.** NTGVVP (PG1) within the study area (Ecology and Heritage Partners Pty Ltd 31/01/2020).



**Plate 12.** NTGVVP (PG1) within the study area (Ecology and Heritage Partners Pty Ltd 31/01/2020).

The Commonwealth condition thresholds for the NTGVVP community (DSEWPaC 2011) were applied to determine the community's presence. Zone PG4 qualified as the threatened ecological community due to meeting or exceeding exceeded the following critical criteria:

- Larger than 500 m<sup>2</sup>;
- Dominated by native grasses; and,
- The dominant native species represent at least 50% of the native species and perennial tussock cover.

Other habitat zones did not qualify as the listed ecological community as they were dominated by non-native perennial species (>50%), and therefore failed to meet the criteria above.

#### **Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia**

Areas identified as Grassy Woodland through EVC modelling did not occur within any areas permitting access during the field survey. However, field observations from adjacent properties to Area 6 which supports modelled Grassy Woodland was observed. Area 6 appears to be dominated by Grey Box is likely to contain scattered occurrences of native vegetation, however the native species diversity of the ground-layer is likely to be low due to the high cover of the environmental weed *Galenia*, and the WoNS Serrated Tussock.

It is likely the ground layer does not contain at least a 10% cover of perennial native grass species, or a 50% cover in the ground layer of perennial native species, as such it is unlikely to meet the condition thresholds that describe the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia ecological community (DSEWPaC 2012).

The remaining nationally significant communities are not considered to be present predominantly due to the absence of key indicator species, and/or lack of community structure and low species diversity.

#### 5.1.4 Other Matters of NES

The study area does not support any other features corresponding with matters of NES protected under the EPBC Act (e.g. World or National Heritage Areas) (DoEE 2019). However, there are several values located within close proximity to the PSP including:

- Commonwealth Land:
  - Defence – RSL Hall.
- Nationally Important Wetland:
  - Lerderderg River
- Wetland of International Importance (Ramsar):
  - Port Phillip Bay (Western Shoreline) and Bellarine Peninsula, located approximately 20-30 kilometres upstream kilometres east of the study area.

## 5.2 State Significant Features

### 5.2.1 Flora

The VBA contains records of 64 State significant flora species previously recorded within 10 kilometres of the study area (DELWP 2019c) (Appendix 2.2; Figure 4). Most records are located within and adjacent to the Long Forest Flora and Fauna Reserve to the east of the study area, the Lerderderg State Park to the north-west of the study area, and existing road reserves within the local area where survey effort has likely been greater (Figure 4).

A single record of the state significant (data deficient) Black Roly-poly *Sclerolaena muricata* is within Area 1 (Figure 3).

No State significant species were recorded within the study area during the site assessment (DEPI 2014). However, FFG Act ‘protected’ flora Lemon Beauty-heads *Calocephalus citreus*, Drooping Cassinia *Cassinia arcuata*, Cotton Fireweed *Senecio quadridentalis* and Fuzzy New Holland Daisy *Vittadinia cuneata* were observed.

Based on the condition of remnant vegetation, landscape context and the proximity of previous records, in addition to those observed, the following significant flora species have the highest potential to occur within the study area (Table 10) (Appendix 2.2).

**Table 10.** State significant flora species with the potential to occur within the study area.

Common Name	Scientific Name	Habitat
<b>State Significance*</b>		
<b>Fragrant Saltbush</b>	<i>Rhagodia parabolica</i>	There are over 600 known records of Fragrant Saltbush within the local area, (DEWLP 2020c). No specimens were recorded during the site assessment, although there is potential habitat within Area 5 and Area 6.
<b>Bacchus Marsh Wattle</b>	<i>Acacia rostriformis</i>	A total of 262 records of Bacchus Marsh records have been recorded within 10 kilometres of the study area (DEWLP 2020c). No specimens were

Common Name	Scientific Name	Habitat
		observed during the ecological assessment, although potential habitat is present in Area 5 and Area 6.
<b>Werribee Blue-box</b>	<i>Eucalyptus baueriana</i> subsp. <i>thalassina</i>	A total of 313 records of Werribee Blue-box have been recorded within 10 kilometres of the study area, with all records located within the Long Forest Flora and Fauna reserve (DEWLP 2020c; Figure 4). Although there is suitable habitat in Woodland areas within the study area, no specimens were observed during the ecological assessment.
<b>Austral Tobacco</b>	<i>Nicotiana suaveolens</i>	A total of 57 records of Austral Tobacco have been recorded within 10 kilometres of the study area (DEWLP 2020c). There is potential habitat for the species throughout the broader study area.
<b>Slender Bindweed</b>	<i>Convolvulus angustissimus</i> subsp. <i>omnigracilis</i>	A total of 8 records of Slender Bindweed have been recorded within 10 kilometres of the study area (DEWLP 2020c). Areas supporting remnant vegetation, particularly grassland, may support the species.
<b>Melbourne Yellow-gum</b>	<i>Eucalyptus leucoxylon</i> subsp. <i>connata</i>	A total of 68 records of Melbourne Yellow-gum have been recorded within 10 kilometres of the study area (DEWLP 2020c, with several additional records previously recorded by Ecology and Heritage Partners in nearby properties within the Merrimu PSP (Ecology and Heritage Partners 2018a).

**Note.** \* Those species with the highest likelihood of occurrence.

#### 5.2.1.1 Recommendation

There are confirmed records of State significant species within and adjacent to the study area (Figure 3). Based on habitat condition, and the proximity of previous records, there is also suitable habitat within the study area for the State-significant Melbourne Yellow-gum, Bacchus Marsh Wattle, Werribee Blue-box and Austral Tobacco. There is also considered to be a low to moderate likelihood that the State significant Small Scurf-pea *Cullen parvum* and Arching Flax-lily *Dianella* sp. aff. *longifolia* (Benambra) may occur in higher quality remnants of Plains Grassland within the study area.

Targeted surveys for State significant flora would assist to determine their presence within the study area. However, unless requested by the VPA, based on existing legislative approvals under the *Planning and Environment Act 1987* (P&E Act), further survey for these species is not currently required to determine any offset considerations.

#### 5.2.2 Fauna

The VBA contains records of 36 State significant and 15 regionally significant fauna species previously recorded within 5 kilometres of the study area (DELWP 2019e) (Appendix 3.2; Figure 4). Most records are located within and adjacent to the Long Forest Flora and Fauna Reserve to the east of the study area, the Lerderderg State Park to the north-west of the study area, and existing road reserves within the local area where survey effort has likely been greater (Figure 4).

Based on the condition of remnant vegetation, landscape context and the proximity of previous records, the following significant flora species have the highest potential to occur within the study area (Table 11) (Appendix 2.2).

**Table 11.** State significant flora species with the potential to occur within the study area.

Common Name	Scientific Name	Habitat
<b>State Significance *</b>		
<b>Brown Treecreeper</b>	<i>Climacteris picumnus victoriae</i>	There are 81 records of Brown Treecreeper from the local area, with the most recent taken in 2014. Habitat is mainly found in woodland areas within the study area, particularly closer to Long Forest Flora and Fauna Reserve.
<b>Hooded Robin</b>	<i>Melanodryas cucullata cucullata</i>	There are 12 records of Hooded Robin from the local area. Habitat is mainly found in woodland areas within the study area, particularly closer to Long Forest Flora and Fauna Reserve (DEWLP 2019c).
<b>Diamond Firetail</b>	<i>Stagonopleura guttata</i>	There are 74 records of Diamond Firetail from the local area, the most recent in 2011 (DEWLP 2019c). Diamond Firetail generally prefers woodland habitats, but is also associated with grassland habitats as well.
<b>Bullant</b>	<i>Myrmecia</i> sp. 17	Although there are only four records listed in the VBA (DEWLP 2019c), the species has large areas of suitable habitat within the study area.

**Note.** \* Those species with the highest likelihood of occurrence.

#### 5.2.2.1 Recommendation

Based on habitat condition, and the proximity of previous records, there is also low to moderate quality habitat within the study area for the State-significant Speckled Warbler *Chthonicola sagittatus*, Barking Owl *Ninox connivens connivens* and Crested Bellbird *Oreoica gutturalis gutturalis* as well as the Regionally significant Fat-tailed Dunnart *Sminthopsis crassicaudata* and Spotted Harrier *Circus assimilis*.

The survey methodology for Striped Legless Lizard is also suitable for the detection of the Fat-tailed Dunnart (and other small mammals).

Targeted surveys for State significant fauna would assist to determine their presence within the study area. However, unless requested by the VPA, based on existing legislative approvals under the P&E Act, further survey for these species is not currently required to determine any offset considerations.

#### 5.2.3 Communities

A single FFG Act-listed ecological community was observed within the study area, the Western (Basalt) Plains Grassland Community (PG1, Figure 2)

These communities correspond to particular habitat zones of Plains Grassland EVC mapped in Area 1 and Area 3 within the study area, with these patches meeting the relevant description and characteristics described for these respective communities (DELWP 2020f).

Rocky Chenopod Woodland modelled to occur in Area 5 is considered likely to meet the description of the FFG Act listed Rocky Chenopod Open Scrub Community.

##### 5.2.3.1 Western (Basalt) Plains Grassland

Habitat zone PG1 meets the description of the State significant *Western (Basalt) Plains Grassland* (WBPB) ecological community (Figure 2a, Figure 2c). This habitat zone exhibits the structure and diversity detailed in the FFG Act community descriptions (DELWP 2019f). Although habitat zones PG2 and PG3 exhibit moderate

diversity or some structural aspects, these zones are mostly dominated by perennial non-native grasses (Serrated Tussock and Chilean Needle-grass) and/or form a monoculture of one or two native grasses, typically Common Wallaby-grass. These habitat zones are not considered to be consistent with the description of the community.

## 6 Legislative and Policy Implications

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

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) establishes a Commonwealth process for the assessment of proposed actions (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 National Environmental Significance (NES).

For species listed under the EPBC Act, a ‘significant impact’ is defined as an impact which is important, notable, or of consequence, having regard to its context or intensity (DoE 2013). Whether or not an action is likely to have a significant impact depends upon the sensitivity, value, and quality of the environment which is affected, and upon the intensity, duration, magnitude and geographic extent of the impacts. Importantly, for a ‘significant impact’ to be ‘likely’, it is not necessary for a significant impact to have a greater than 50% chance of happening; it is sufficient if a significant impact on the environment is a real or not remote chance or possibility (DoE 2013).

The EPBC Act establishes a Commonwealth process for the assessment of proposed actions likely to have a significant impact on any matters of National Environment Significance (NES), described in Table 12.

**Table 12.** Potential impacts to matters of National Environmental Significance (NES)

Matter of NES	Potential Impacts
<b>World Heritage properties</b>	There are no World Heritage properties within 5 kilometres of the study area.
<b>National heritage places</b>	There are no National Heritage Places within 5 kilometres of the study area.
<b>Ramsar wetlands of international significance</b>	The study area occurs approximately 35 kilometres upstream of one Ramsar wetland – Port Phillip Bay (western shoreline) and Bellarine Peninsula (DoEE 2019). Provided management practices and construction techniques are consistent with Construction Techniques for Sediment Pollution Control (EPA 1991) and Environmental Guidelines for Major Construction Sites (EPA 1996), the proposed action is unlikely to impact the ecological character of any Ramsar wetland.
<b>Threatened species and ecological communities</b>	<p>The study area has potential to support one nationally significant flora species (Section 3.2.1):</p> <ul style="list-style-type: none"> <li>- Spiny Rice-flower.</li> </ul> <p>The study area has potential to support two nationally significant fauna species (Section 3.2.2):</p> <ul style="list-style-type: none"> <li>- Golden Sun Moth; and,</li> <li>- Striped Legless Lizard.</li> </ul> <p>One ecological community listed under the EPBC Act (NTGVVP) was recorded within the study area (Section 3.2.3).</p>

Matter of NES	Potential Impacts
<b>Migratory and marine species</b>	<p>Twenty Migratory and/or Marine species have been recorded, or are predicted to occur within 5 kilometres of the study area (DELWP 2019c; Appendix 3.1). However, the study 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:</p> <ul style="list-style-type: none"> <li>• Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species;</li> <li>• Habitat utilised by a migratory species which is at the limit of the species range; or,</li> <li>• Habitat within an area where the species is declining.</li> </ul>
<b>Commonwealth marine area</b>	The proposed action will not impact any Commonwealth marine areas.
<b>Nuclear actions (including uranium mining)</b>	The proposed action is not a nuclear action.
<b>Great Barrier Reef Marine Park</b>	The proposed action will not impact the Great Barrier Reef Marine Park.
<b>Water resources impacted by coal seam gas or mining development</b>	The proposed action is not a coal seam gas or mining development.

### 6.1.1 Implications

Targeted surveys are recommended for Golden Sun Moth and Spiny Rice-flower, within areas of potential habitat if these parcels are likely to be subject to future development.

Although there is potential habitat for Striped Legless Lizard, the species has not been recorded in Bacchus March and/or Merrimu for several years despite rigorous targeted surveys being undertaken by Ecology and Heritage Partners over multiple years (2013, 2017, 2018, 2019, 2020) for multiple projects. As such, it is considered that they are locally extinct, and further targeted surveys are not required for the species.

A total of 4.989 hectares of the nationally significant ecological community NTGVVP is present within the study area (Area 1 and Area 3). According to the significant impact criteria for critically endangered ecological communities (DoE 2013), an action is likely to be significant where there is a real chance or possibility that it will reduce the extent of the ecological community.

Areas modelled as Grassy Woodland are considered unlikely to meet the description of the Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia due to the high cover of exotic flora.

If any matter of National Environmental Significance is proposed to be impacted as part of any future development, a referral to the Commonwealth Environment Minister will be required if impacts to the species or associated habitat(s) are not avoidable.

## 6.2 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’ listed and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (i.e. within road

reserves, drainage lines and public reserves). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species.

### 6.2.1 Implications

There is suitable habitat within the study area for several species listed or protected under the FFG Act (Section 5.2). However, the study area is privately owned, as such a permit under the FFG Act is not required, unless impacts to FFG Act listed matters are impacted on public land (i.e. road reserves). If required, the proponent should allow up to six weeks to obtain an FFG Act permit through DELWP.

## 6.3 Planning and Environment Act 1987 (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17 which require a planning permit from the relevant local Council to remove, destroy or lop native vegetation on a site of more than 0.4 hectares, unless an exemption under clause 52.17-7 of the Victorian Planning Schemes applies (Appendix 1.5.3) or a subdivision is proposed with lots less than 0.4 hectares<sup>1</sup>. Local planning schemes may contain other provisions in relation to the removal of native vegetation.

### 6.3.1 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 The Guidelines (DELWP 2017a). 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.

A permit will be referred to DELWP as a ‘recommending authority’ if vegetation removal meets one or more of the below thresholds (Table 13).

**Table 13.** Permit to remove native vegetation – application referral triggers (Clause 66, Referral and Notice Provisions)

Native Vegetation	<ul style="list-style-type: none"> <li>Remove, destroy or lop native vegetation which is to be considered under the Detailed Assessment pathway</li> </ul>
Other Circumstances	<ul style="list-style-type: none"> <li>Remove, destroy or lop native vegetation if a property vegetation plan applies to the site</li> <li>Remove, destroy or lop native vegetation on Crown land which is occupied or managed by the responsible authority</li> </ul>

### 6.3.2 Implications

A Planning Permit from Moorabool Shire Council is required to remove, destroy or lop any native vegetation.

<sup>1</sup> In accordance with the Victorian Civil and Administrative Tribunal’s (VCAT) decision *Villawood v Greater Bendigo CC* (2005) VCAT 2703 (20 December 2005) all native vegetation is considered lost where proposed lots are less than 0.4 hectares in area and must be offset at the time of subdivision.

#### 6.4 **Wildlife Act 1975 and Wildlife Regulations 2013 (Victoria)**

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

#### 6.5 **Catchment and Land Protection Act 1994 (Victoria)**

The *Catchment and Land Protection Act 1994* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals.

Weeds listed as noxious under the CaLP Act were recorded during the assessment (See Table 6). Similarly, there is evidence that the study area is currently occupied by several pest fauna species listed under the CaLP Act (European Rabbit, Red Fox). Landowners are responsible for the control of any infestation of noxious weeds and pest fauna species to minimise their spread and impact on ecological values.

## 7 **Summary of Ecological Features**

The study area is representative of many areas within the broader areas west of Melbourne in that it has been previously disturbed, is highly modified, and possesses large areas of degraded land with scattered patches of native vegetation and regrowth from past clearing.

Much of the indigenous vegetation and terrestrial fauna habitat remaining within the study area is confined to areas less affected by past land clearing and sustained agricultural land use. Native vegetation (PG2 and PG3) within Area 2, and some areas of Area 3, is highly modified with most vegetation communities lacking structure and exhibiting a low diversity of native species.

Habitat zone PG1, located in Area 1 and Area 3 comprising 4.989 hectares, meets the condition thresholds that defines the nationally significant ecological community NTGVVP, and meets the description of the State significant Western (Basalt) Plains Grassland community.

Modelled information for Areas 4, 5 and 6 identifies four EVCs; Plains Grassland, Grassy Woodland, Red Gum Swamp, and Rocky Chenopod Woodland. Field observations of these areas, and the typical quality of vegetation within the study area, suggests it is unlikely these EVC's will meet the condition threshold of national and/or state ecological communities. However, a site assessment is required to confirm these values.

Areas modelled as woodland, and recorded scattered remnant trees occur throughout the study area and provide an important resource for arboreal fauna. Field observations sited the majority of eucalypts to be mature, providing an array of small, medium and large, bark fissures and crevices. The majority of the study area consists of paddocks which contain improved exotic pastures, likely to be used as a foraging resource by common generalist bird species which are tolerant of modified open areas. Areas of native grassland, particularly those with a high cover of Wallaby-grasses *Rytidosperma* spp. may provide habitat for the

nationally significant Golden Sun Moth. Some of these areas have cracking soils which may provide sheltering habitat for reptiles and small mammals including Striped Legless Lizard and Fat-tailed Dunnart.

The desktop and field assessments identified several key ecological features within the study area and surrounding landscape; these are summarised in Table 14.

**Table 14.** Summary of the ecological values that occur within the study area.

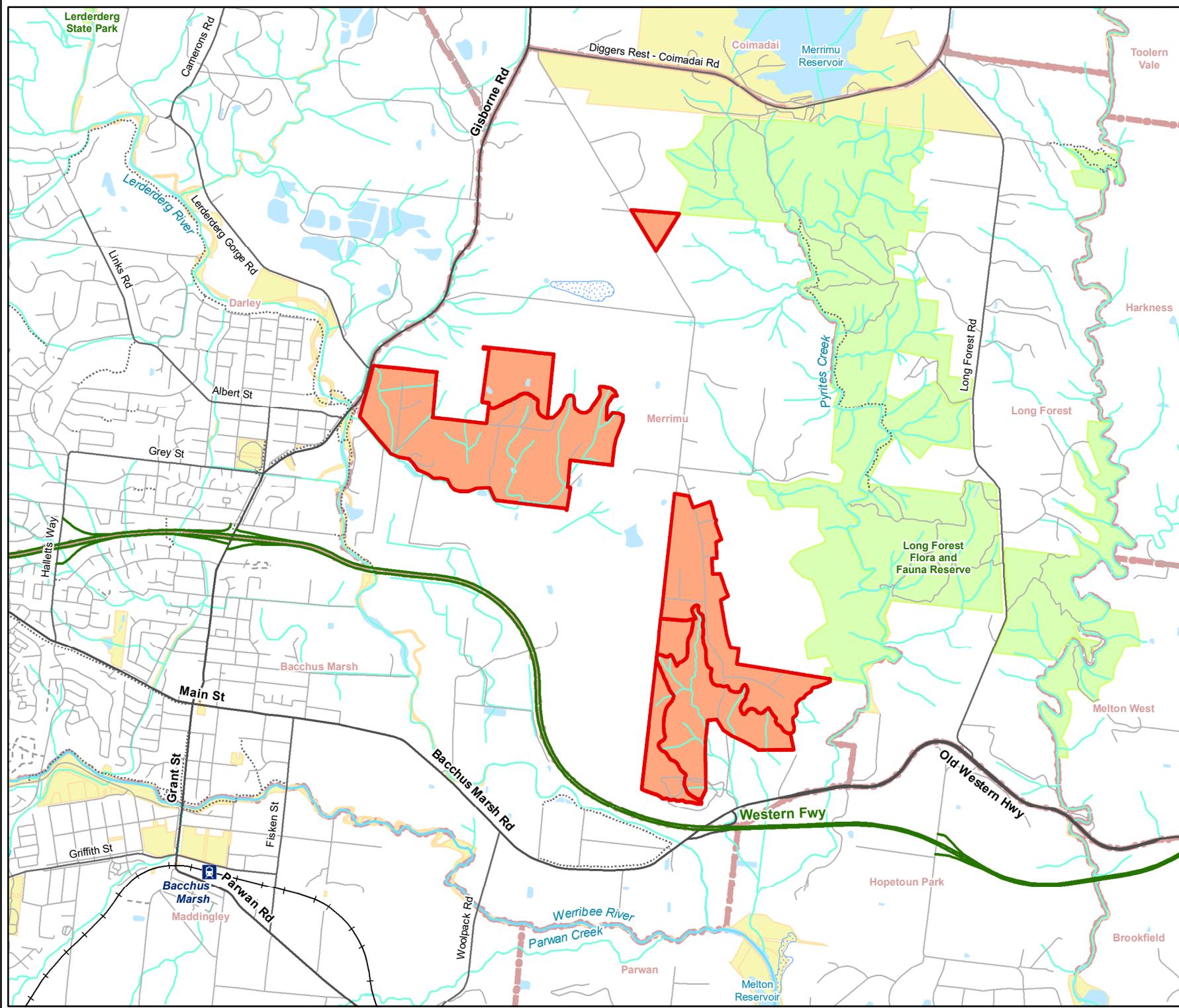
<b>Species diversity</b>	Moderate assemblage of plants and animals, with 83 flora species recorded during the field surveys.
<b>Confirmed Native vegetation</b>	<ul style="list-style-type: none"> <li>• 18.162 hectares of native vegetation represented by a single EVC: <ul style="list-style-type: none"> <li>○ Low rainfall Plains Grassland (EVC 132_63) 18.162 hectares;</li> </ul> </li> <li>• 9 Scattered Trees (3 Large Trees; 6 Small Trees);</li> <li>• No Large Trees in patches.</li> </ul>
<b>Modelled Native Vegetation</b>	<ul style="list-style-type: none"> <li>• 88.18 hectares represented by four EVCs: <ul style="list-style-type: none"> <li>○ Grassy Woodland (EVC 175) 49.27 hectares;</li> <li>○ Red Gum Swamp (EVC 292) 1.56 hectares;</li> <li>○ Low rainfall Plains Grassland (EVC 132_63) 30.15 hectares;</li> </ul> </li> <li>• Rocky Chenopod Woodland (EVC 64) 7.2 hectares</li> </ul>
<b>Significant ecological communities</b>	<ul style="list-style-type: none"> <li>• A total of 4.989 hectares of the nationally significant ecological community <i>Natural Temperate Grassland of the Victorian Volcanic Plain</i> is present in the study area;</li> <li>• A total of 4.989 hectares of the State significant Western (Basalt) Plains Grassland (WBPG) ecological community;</li> </ul>
<b>Significant flora species</b>	<ul style="list-style-type: none"> <li>• No nationally significant flora were recorded in the study area.</li> <li>• Suitable habitat for Spiny Rice-flower is present.</li> <li>• No State-significant flora observed</li> <li>• The presence of four flora species ‘protected’ under the FFG Act (Lemon Beauty-heads, Drooping Cassinia, Cotton Fireweed and Fuzzy New Holland Daisy).</li> </ul>
<b>Significant fauna species</b>	<ul style="list-style-type: none"> <li>• No national or State significant fauna were recorded in the study area.</li> <li>• Potential habitat for nationally significant Golden Sun Moth;</li> <li>• Potential habitat for State significant Speckled Warbler, Barking Owl, Crested Bellbird and Regionally Significant Fat-tailed Dunnart and Spotted Harrier.</li> </ul>

## References

- ALA 2020. Atlas of Living Australia. [www Document]. URL: <http://www.ala.org.au/>. NCRIS – National Research Infrastructure for Australia. Commonwealth of Australia.
- Christidis, L. and Boles, W.E 2008. Systematics and Taxonomy of Australian Birds. CSIRO Publishing, Collingwood, Victoria.
- Cogger, H. G (Ed). 1996. Reptiles and Amphibians of Australia. 5<sup>th</sup> Edition. Reed Books Australia, Victoria.
- Cogger, H. G., Cameron, E. E. And Cogger, H. M. 1983. *Volume 1 of Zoological Catalogue of Australia: Amphibia and Reptilia*. Australian Government Publishing Service, Canberra, ACT.
- Cogger, H.G., Cameron, E.E., Sadler, R.A. and Egger P., 1993. The Action Plan for Australian Reptiles. Australian Nature conservation Agency, Canberra, ACT.
- DELWP 2017b. Guidelines for the removal, destruction or lopping of native vegetation. The State of Victoria Department of Environment, Land, Water and Planning . Melbourne, December 2017.
- DELWP 2017a. *Flora and Fauna Guarantee Act 1988* Protected Flora List – June 2017. Victorian Department of Environment, Land, Water and Planning. Melbourne, Victoria.
- DELWP 2018a. *Flora and Fauna Guarantee Act 1988* Threatened List – April 2018. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DELWP 2020a. Native Vegetation Information Management Tool [www Document]. URL: <https://nvm.delwp.vic.gov.au/>. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DELWP 2020b. NatureKit Map [www Document]. URL: <http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit>. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DELWP 2020c. Victorian Biodiversity Atlas. Sourced from GIS layers: “VBA\_FLORA25”, “VBA\_FLORA100”, “VBA\_FAUNA25”, “VBA\_FAUNA100”, July 2018. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DELWP 2020d. Ecological Vegetation Class (EVC) Benchmarks for each Bioregion [www Document]. URL: <http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/evc-benchmarks#bioregionname>. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DELWP 2020e. VicPlan Online [www Document]. URL: <https://mapshare.vic.gov.au/vicplan/>. Victorian Department of Environment, Land, Water and Planning, Melbourne, Victoria.
- DELWP 2020f. Flora and Fauna Guarantee Act 1988 – Threatened List: Characteristics of Threatened Communities [WWW Document]. URL: [https://www.environment.vic.gov.au/data/assets/pdf\\_file/0018/50418/Flora-and-Fauna-Guarantee-Characteristics-of-Threatened-Communities-.pdf](https://www.environment.vic.gov.au/data/assets/pdf_file/0018/50418/Flora-and-Fauna-Guarantee-Characteristics-of-Threatened-Communities-.pdf).

- DEPI 2014. Advisory List of Rare or Threatened Plants in Victoria. Victorian Department of Environment and Primary Industries, Melbourne, Victoria.
- DoE 2013. Significant Impact Guidelines 1.1. Matters of National Environmental Significance. Commonwealth Department of the Environment, Canberra, ACT.
- DAWE 2020. Protected Matters Search Tool: Interactive Map [www Document]. URL: <http://www.environment.gov.au/epbc/pmst/>. Commonwealth Department of Agriculture, Water and Environment, Canberra, ACT.
- DSE 2004. Vegetation quality assessment manual: Guidelines for applying the habitat hectares scoring method. Version 1.3. Victorian Department of Sustainability and Environment, Melbourne Victoria
- DSE 2009. Advisory list of Threatened Invertebrate Fauna in Victoria – 2009. Victorian Department of Sustainability and Environment, Melbourne, Victoria.
- DSE 2009a. Action Statement. *Flora and Fauna Guarantee Act 1988*. No. 68 (Revised 2009). Large -fruit Fireweed *Senecio macrocarpus*. Victorian Department of Sustainability and Environment, Melbourne Victoria.
- DSE 2010a. National Recovery Plan for the Small Golden Moths Orchid *Diuris basaltica*. Published by the Victorian Government Department of Sustainability and Environment, Melbourne. October 2010.
- DSE 2010b. National Recovery Plan for the Basalt Peppercross *Lepidium hyssopifolium*. Published by the Victorian Government Department of Sustainability and Environment, Melbourne. July 2010.
- DSE 2013. Advisory List of Threatened Vertebrate Fauna in Victoria. Victorian Department of Sustainability and Environment, Melbourne, Victoria.
- DSEWPaC 2012. Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia: A guide to the identification, assessment and management of a nationally threatened ecological community. *Environment Protection and Biodiversity Conservation Act 1999*. Commonwealth Department of Environment, Water, Population and Communities, Canberra, ACT.
- Duncan, A., Baker, G.B. and Montgomery, N. (Eds) 1999. The Action Plan for Australian Bats. Environment Australia. Canberra, ACT.
- Ecology and Heritage Partners Pty Ltd 2013a. Targeted Flora and Fauna Surveys at Long Forest Estate, Merrimu, Victoria. Report prepared for QOD Property Group. December 2013.
- Ecology and Heritage Partners Pty Ltd 2018a. Ecological Assessment: Bacchus Marsh Development Project, Victoria. Report prepared for Bacchus Marsh Developments Pty Ltd. July 2018.
- Ecology and Heritage Partners Pty Ltd 2018b. Targeted Surveys for Golden Sun Moth *Synemon plana* and Striped Legless Lizard *Delma impar*: Bacchus Marsh Development Project, Bacchus Marsh, Victoria. Report prepared for Bacchus Marsh Developments Pty Ltd. June 2018.
- Ecology and Heritage Partners Pty Ltd 2019. Ecological Assessment for State Significant Values: Merrimu Precinct Structure Plan, Victoria. Report prepared for Bacchus Marsh Developments Pty Ltd. February 2019.
- EPA 1991. Construction Techniques for Sediment Pollution Control. Published document prepared by the Victorian Environment Protection Authority, Melbourne, Victoria.

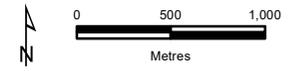
- EPA 1996. Environmental Guidelines for Major Construction Sites. Published document prepared by the Victorian Environmental Protection Authority, Melbourne, Victoria.
- Garnett, S., J. Szabo and G. Dutson 2011. The Action Plan for Australian Birds 2010. CSIRO Publishing, Collingwood, Victoria.
- Gullan, P 2017f. Illustrated Flora Information System of Victoria (IFLISV). Viridans Pty Ltd, Victoria.
- Menkhorst, P. and Knight, F. 2004. A Field Guide to the Mammals of Australia . 2<sup>nd</sup> Edition. Oxford University Press, Victoria.
- Moorabool Shire 2017. Amendment C81 Bacchus Marsh Urban Growth Framework. [www Document]. URL: <https://www.moorabool.vic.gov.au/consultations/amendment-c81-bacchus-marsh-urban-growth-framework>. Moorabool Shire Council, Victoria.
- Natural Resource Management Ministerial Council 2006. Australian Weeds Strategy – A national strategy for weed management in Australia. Australian Government Department of the Environment and Water Resources, Canberra ACT
- Nelson, J. S. 1994. Fishes of the World, 3<sup>rd</sup> Edition. John Wiley & Sons, New York, USA.
- Sands, D.P.A. and New, T.R. 2002. The Action Plan for Australian Butterflies, Environment Australia, Canberra, ACT.
- Strahan, R. (Ed) 1995. The Mammals of Australia. Reed Books, Sydney, NSW.
- Tyler, M.J. 1997. The Action Plan for Australian Frogs. Wildlife Australia: Canberra, ACT.
- Victorian Urban Stormwater Committee 1999. Urban Stormwater: Best Practice Environmental Management Guidelines. CSIRO, Collingwood, Victoria.
- Woinarski J. C. Z., Burbidge A. A. and Harrison P. 2014. The action plan for Australian mammals 2012. CSIRO Publishing, Collingwood, Victoria.



- Legend**
- Study Area
  - Railway
  - Freeway
  - Major Road
  - Collector Road
  - Minor Road
  - Proposed Road
  - Walking Track
  - Minor Watercourse
  - Major Watercourse
  - Permanent Waterbody
  - Land Subject to Inundation
  - Wetland/Swamp
  - Parks and Reserves
  - Crown Land
  - Localities



**Figure 1**  
**Location of the study area**  
*Biodiversity Assessment for additional properties within the Merrimu PSP*

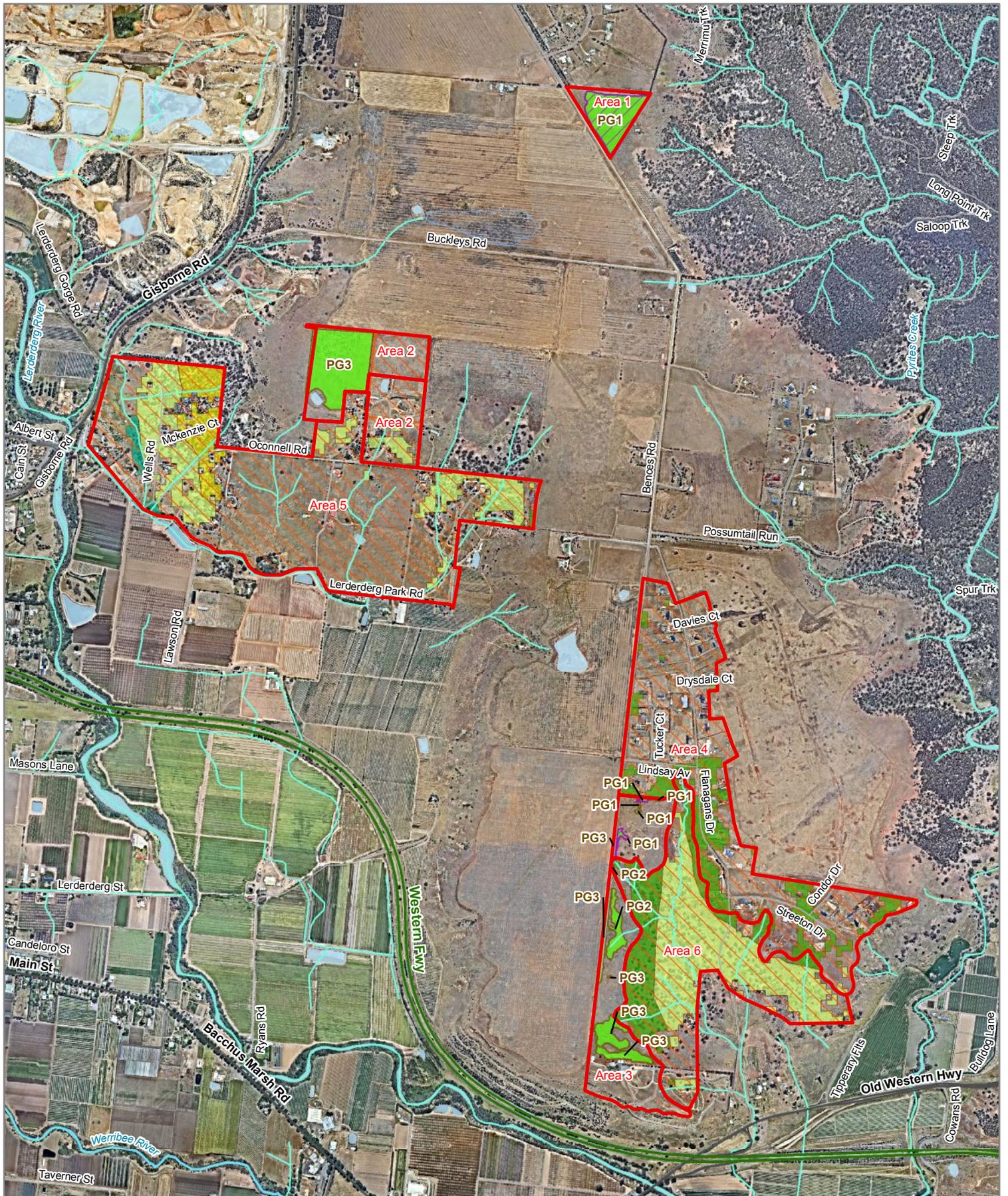


Map Scale: 1:40,000 @ A4  
 Coordinate System: GDA2020 MGA Zone 55



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

13476 Fig01\_StudyArea\_G20\_20/02/2020 melsley



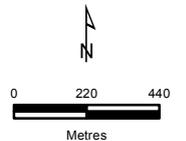
**Figure 2 Overview**  
**Ecological features**  
*Biodiversity Assessment for additional properties within the Merrimu PSP*

**Legend**

- Study Area
- No Access or not assessed
- Ecological Vegetation Class**
- Plains Grassland (EVC 132)
- EPBC Act vegetation community**
- Natural Temperate Grassland of the Victorian Volcanic Plain

**Modelled 2005 Ecological Vegetation Classes**

- Grassy Woodland (EVC 175)
- Plains Grassland (EVC 132)
- Red Gum Swamp (EVC 292)
- Rocky Chenopod Woodland (EVC 64)

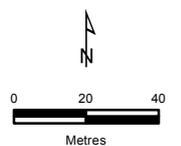


VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

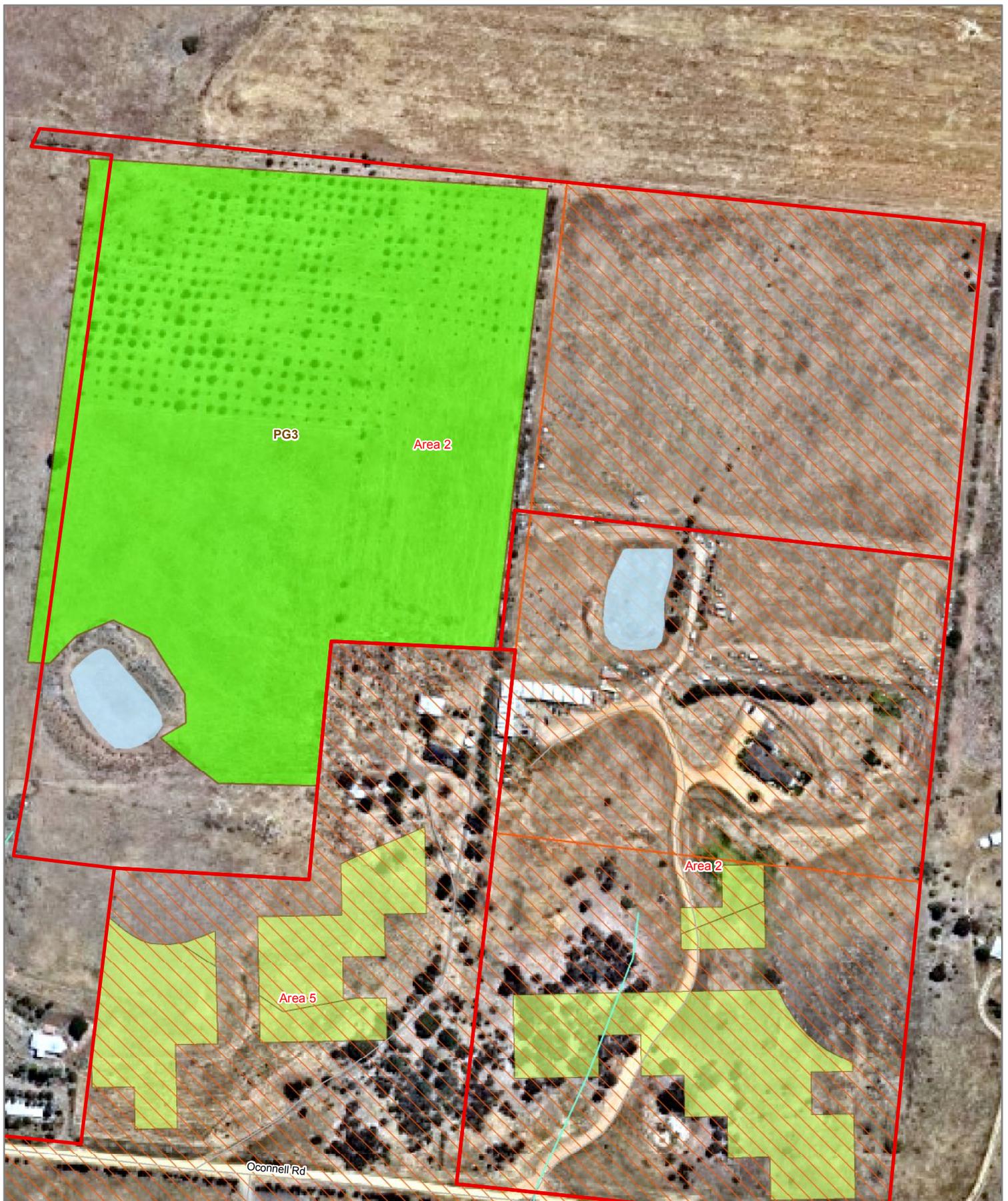


**Figure 2a**  
**Ecological features -**  
**Area 1**  
*Biodiversity Assessment*  
*for additional properties*  
*within the Merrimu PSP*

- Legend**
- Study Area
  - Ecological Vegetation Class**
  - Plains Grassland (EVC 132)
  - EPBC Act vegetation community**
  - Natural Temperate Grassland of the Victorian Volcanic Plain



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



**Figure 2b**  
**Ecological features - Area 2**  
*Biodiversity Assessment for additional properties within the Merrimu PSP*

**Legend**

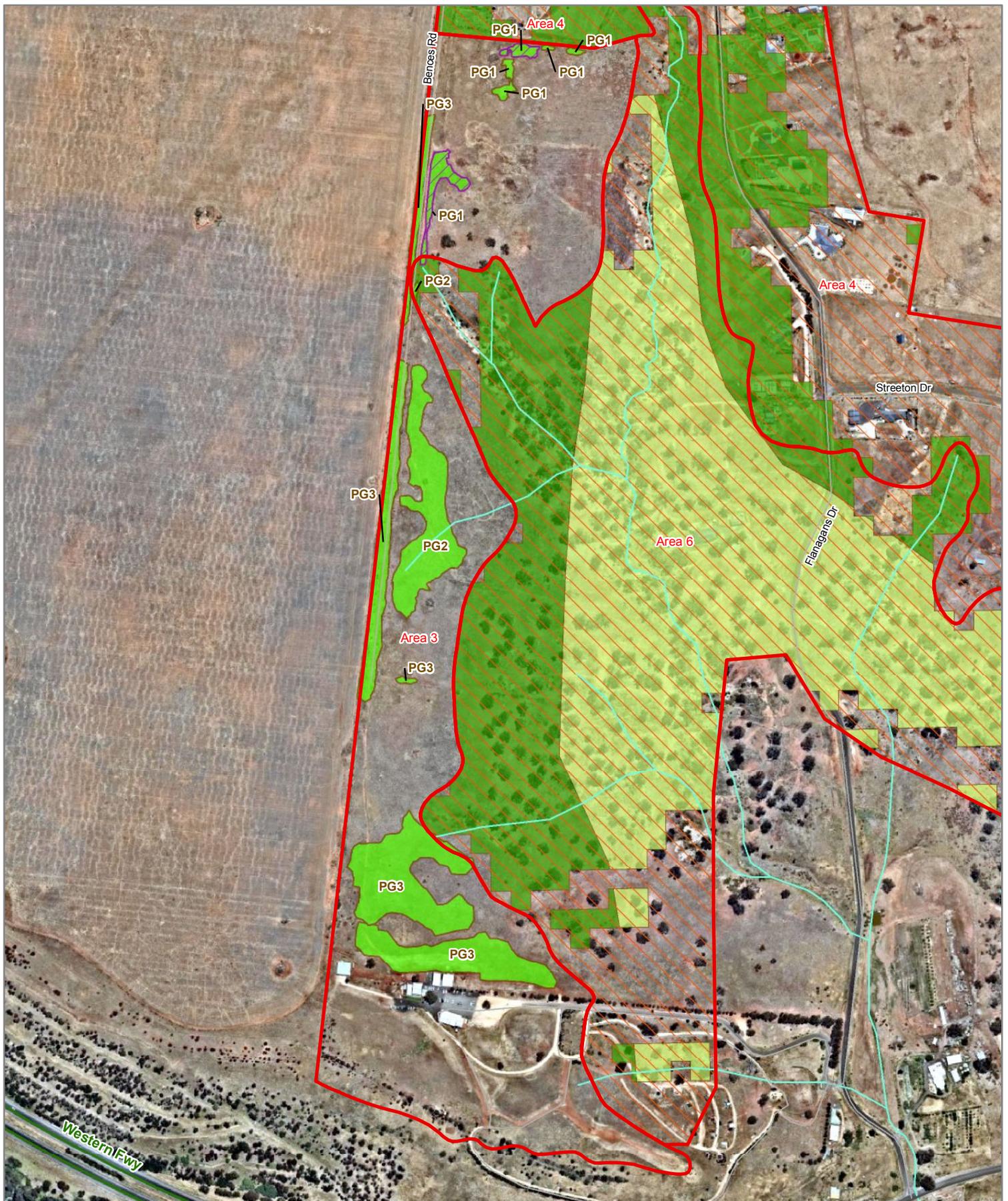
- Study Area
- No Access or not assessed
- Ecological Vegetation Class**
- Plains Grassland (EVC 132)

**Modelled 2005 Ecological Vegetation Classes**

- Grassy Woodland (EVC 175)



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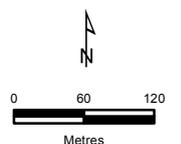
**Figure 2c**  
**Ecological features - Area 3**  
*Biodiversity Assessment for additional properties within the Merrimu PSP*

**Legend**

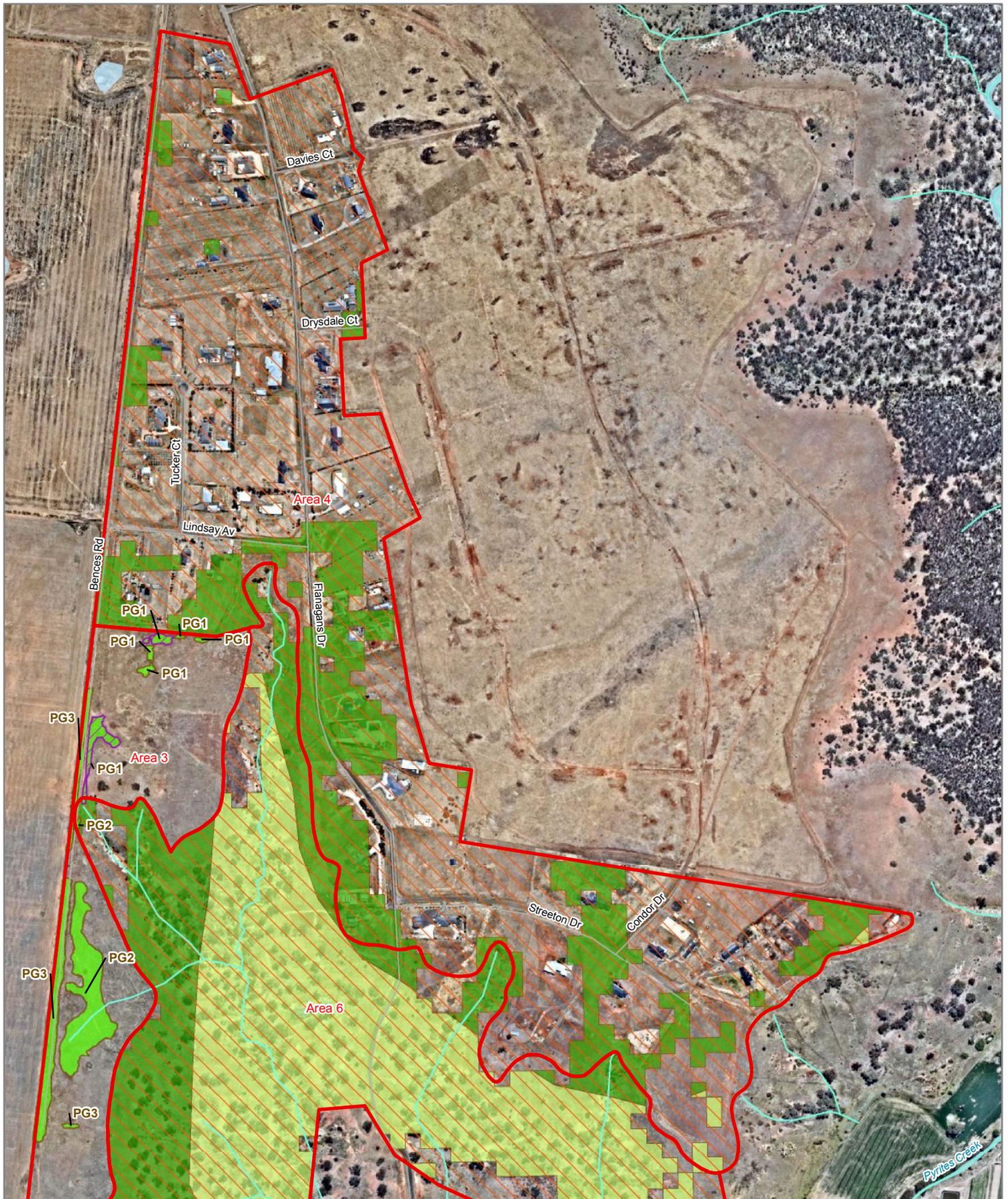
- Study Area
- No Access or not assessed
- Ecological Vegetation Class**
- Plains Grassland (EVC 132)
- EPBC Act vegetation community**
- Natural Temperate Grassland of the Victorian Volcanic Plain

**Modelled 2005 Ecological Vegetation Classes**

- Grassy Woodland (EVC 175)
- Plains Grassland (EVC 132)



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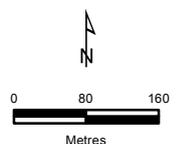
**Figure 2d**  
**Ecological features - Area 4**  
*Biodiversity Assessment for additional properties within the Merrimu PSP*

**Legend**

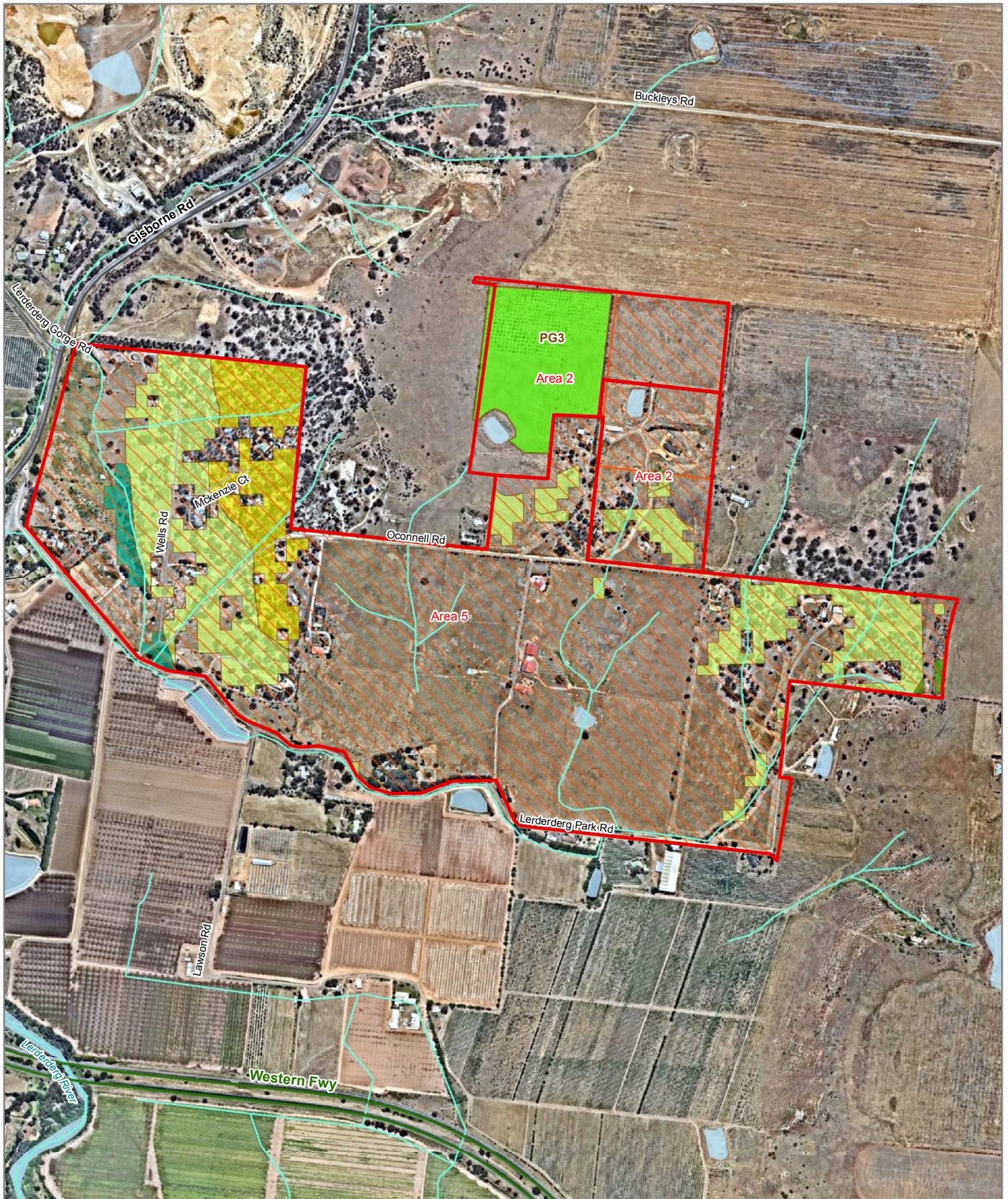
- Study Area
- No Access or not assessed
- Ecological Vegetation Class**
- Plains Grassland (EVC 132)
- EPBC Act vegetation community**
- Natural Temperate Grassland of the Victorian Volcanic Plain

**Modelled 2005 Ecological Vegetation Classes**

- Grassy Woodland (EVC 175)
- Plains Grassland (EVC 132)



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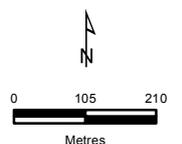
**Figure 2e**  
**Ecological features - Area 5**  
*Biodiversity Assessment for additional properties within the Merrimu PSP*

**Legend**

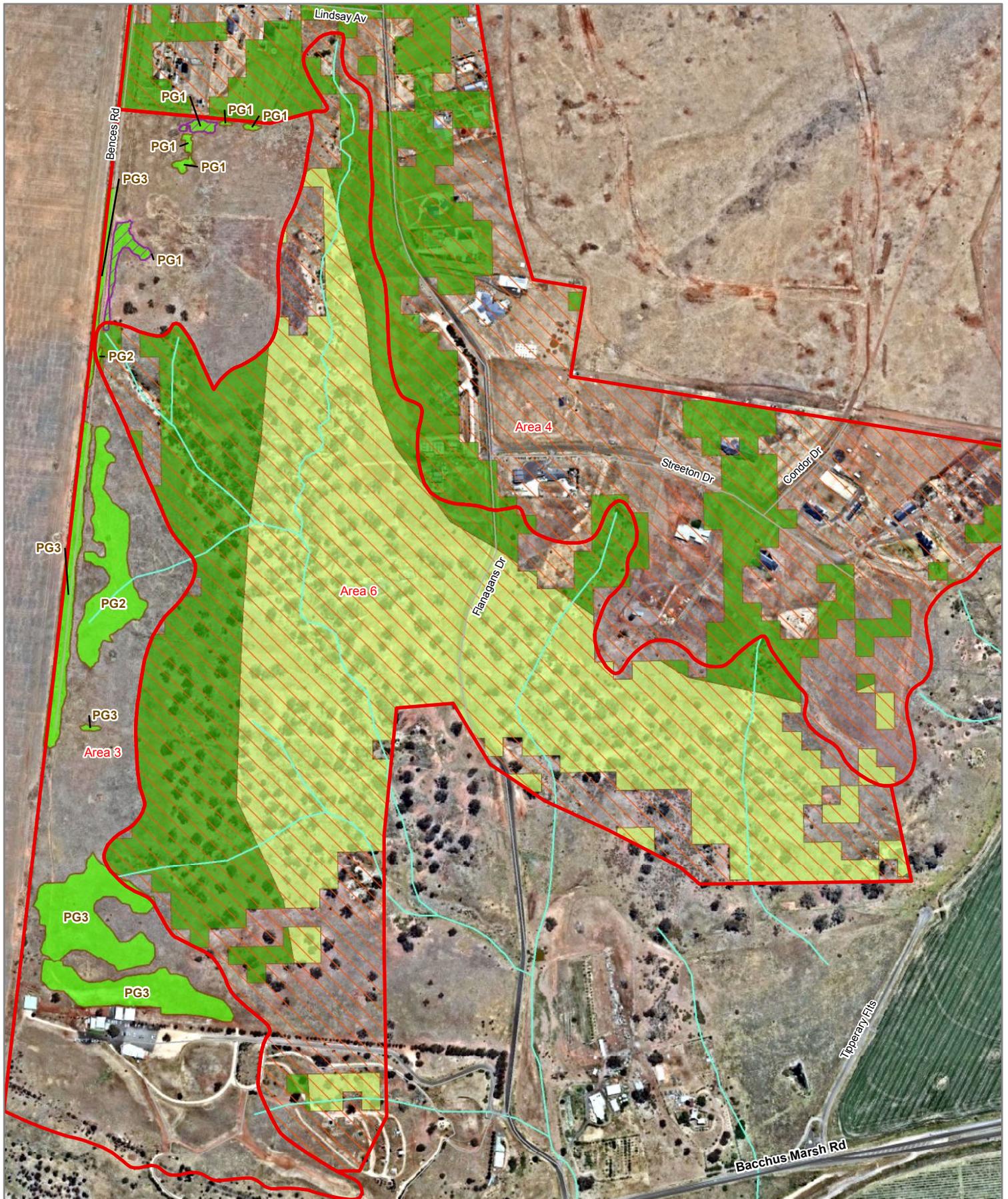
- Study Area
- No Access or not assessed
- Ecological Vegetation Class**
- Plains Grassland (EVC 132)

**Modelled 2005 Ecological Vegetation Classes**

- Grassy Woodland (EVC 175)
- Plains Grassland (EVC 132)
- Red Gum Swamp (EVC 292)
- Rocky Chenopod Woodland (EVC 64)



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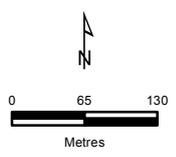
**Figure 2f**  
**Ecological features - Area 6**  
*Biodiversity Assessment for additional properties within the Merrimu PSP*

**Legend**

- Study Area
- No Access or not assessed
- Ecological Vegetation Class**
- Plains Grassland (EVC 132)
- EPBC Act vegetation community**
- Natural Temperate Grassland of the Victorian Volcanic Plain

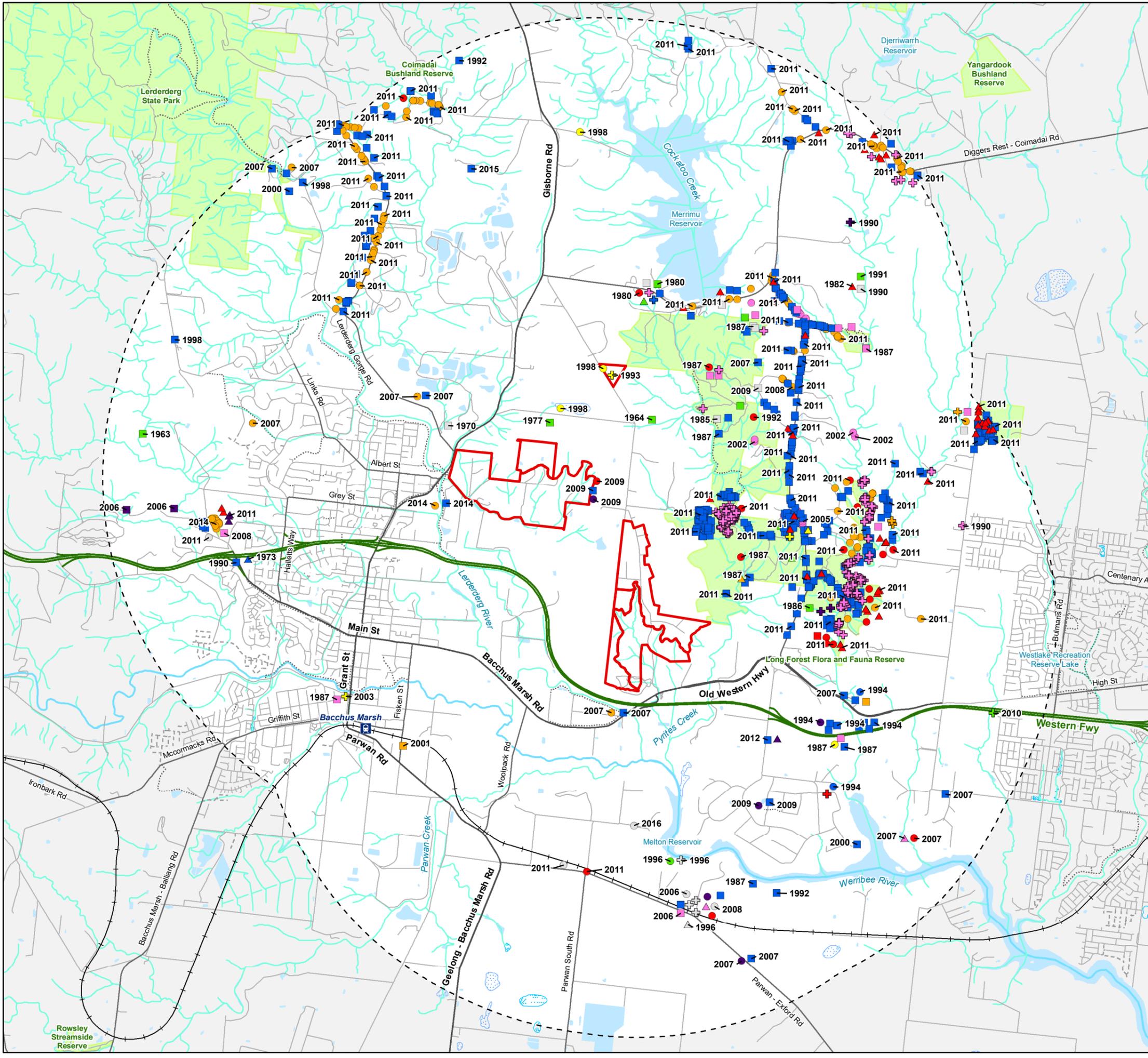
**Modelled 2005 Ecological Vegetation Classes**

- Grassy Woodland (EVC 175)
- Plains Grassland (EVC 132)
- Red Gum Swamp (EVC 292)



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

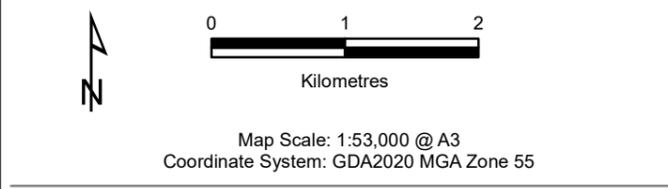


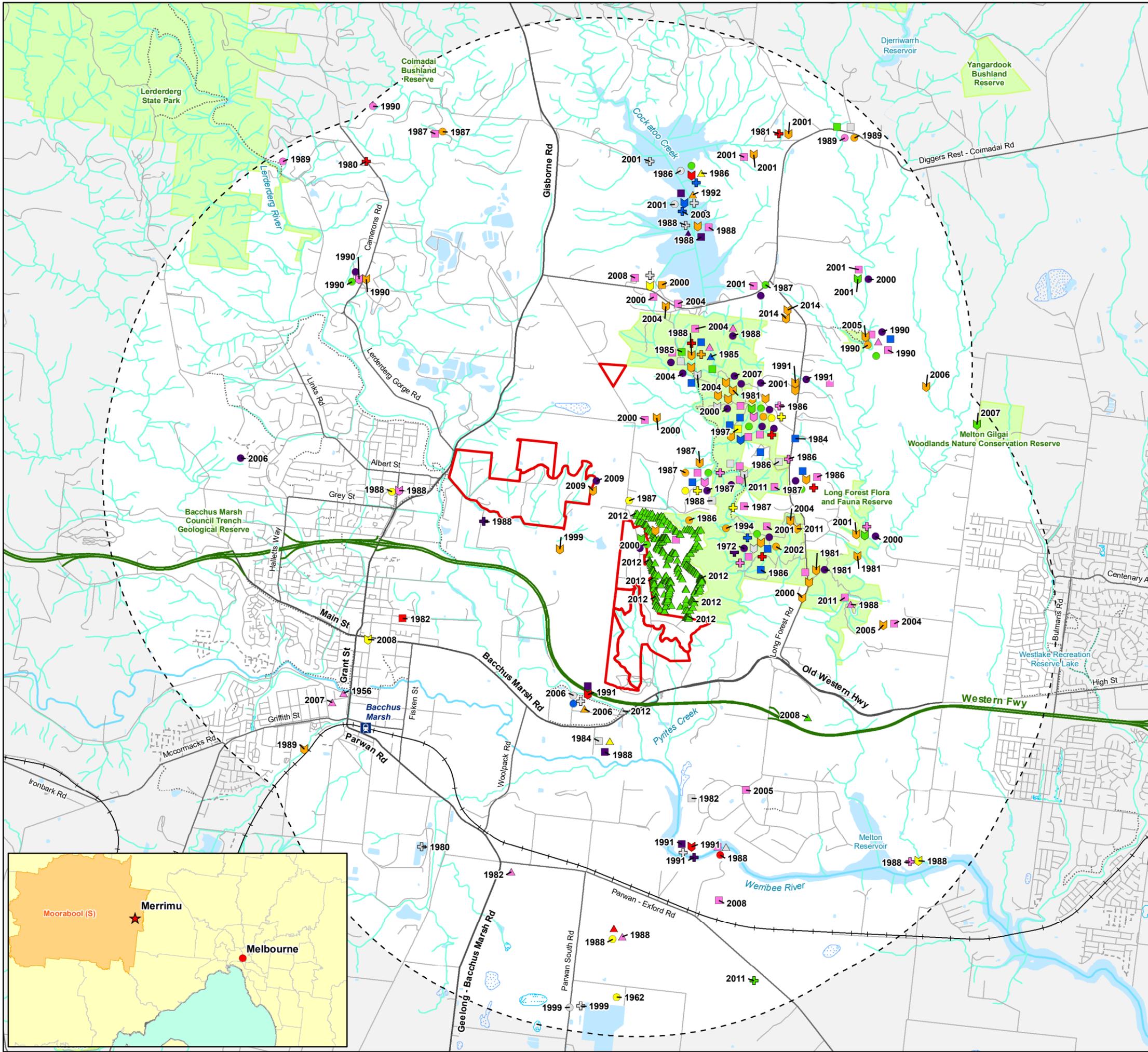


- Legend**
- Study Area
- Significant flora**
- |                          |                          |
|--------------------------|--------------------------|
| ○ Arching Flax-lily      | △ Leprechaun Greenhood   |
| ● Austral Tobacco        | ▲ Melbourne Yellow-gum   |
| ● Bacchus Marsh Wattle   | ▲ Narrow-leaf Wax-flower |
| ● Black Roly-poly        | ▲ Neat Spear-grass       |
| ● Black-tip Greenhood    | ▲ Paperbark Tea-tree     |
| ● Branching Groundsel    | ▲ Rough Wattle           |
| ● Brittle Greenhood      | ▲ Rye Beetle-grass       |
| ● Buloke                 | ▲ Slender Bindweed       |
| ■ Cane Spear-grass       | ⊕ Small Golden Moths     |
| ■ Coast Twin-leaf        | ⊕ Smooth Nardoo          |
| ■ Curved Rice-flower     | ⊕ Snowy Mint-bush        |
| ■ Fine-hairy Spear-grass | ⊕ Spiny Rice-flower      |
| ■ Forked Rice-flower     | ⊕ Spotted Gum            |
| ■ Fragrant Saltbush      | ⊕ Straw Wallaby-grass    |
| ■ Heath Spear-grass      | ⊕ Werribee Blue-box      |
| ■ Leafless Bluebush      | ⊕ Western Golden-tip     |



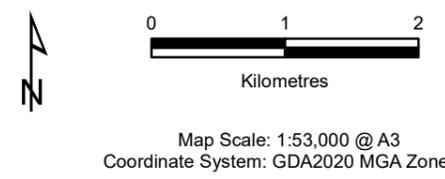
**Figure 3**  
 Previously documented significant flora within 5km of the study area  
*Biodiversity Assessment for additional properties within the Merrimu PSP*





- Legend**
- Study Area
- Significant fauna**
- |  |                             |
|--|-----------------------------|
| ○ Australasian Shoveler                  | ▲ Freckled Duck             |
| ● Azure Kingfisher                       | ▲ Glossy Ibis               |
| ● Barking Owl                            | ▲ Golden Sun Moth           |
| ● Black Falcon                           | ▲ Grey-headed Flying-fox    |
| ● Black-eared Cuckoo                     | ▲ Growling Grass Frog       |
| ● Blue-billed Duck                       | ▲ Gull-billed Tern          |
| ● Brown Toadlet                          | ⊕ Hardhead                  |
| ● Brown Treecreeper (south-eastern ssp.) | ⊕ Hooded Robin              |
| ■ Brush-tailed Phascogale                | ⊕ Lace Monitor              |
| ■ Caddisfly                              | ⊕ Latham's Snipe            |
| ■ Caspian Tern                           | ⊕ Little Button-quail       |
| ■ Chestnut-rumped Heathwren              | ⊕ Musk Duck                 |
| ■ Common Dunnart                         | ⊕ Nankeen Night Heron       |
| ■ Crested Bellbird                       | ⊕ Pied Cormorant            |
| ■ Diamond Firetail                       | ⊕ Powerful Owl              |
| ■ Eastern Great Egret                    | ⊕ Royal Spoonbill           |
| ■ Eastern Snake-necked Turtle            | ⊕ Speckled Warbler          |
| ▲ Fat-tailed Dunnart                     | ⊕ Spotted Harrier           |
|  | ⊕ Swift Parrot              |
|  | ⊕ White-bellied Sea-Eagle   |
|  | ⊕ White-throated Needletail |

**Figure 4**  
 Previously documented significant fauna within 5km of the study area  
*Biodiversity Assessment for additional properties within the Merrimu PSP*



VBA 2018. Victorian Biodiversity Atlas // Sourced from: 'VBA\_FLORA25', 'VBA\_FLORA100', 'VBA\_FAUNA25' and 'VBA\_FAUNA100', March 2018 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.

VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

## Appendix 1

### Appendix 1.1 – Rare or Threatened Categories for Listed Victorian Taxa

**Table A1.1.** Rare or Threatened categories for listed Victorian taxa.

Rare or Threatened Categories
<b>Conservation Status in Australia (Based on the EPBC Act 1999)</b>
<b>EX</b> – Extinct: Extinct is when there is no reasonable doubt that the last individual of the species has died.
<b>CR</b> – Critically Endangered: A species is critically endangered when it is facing an extremely high risk of extinction in the wild in the immediate future.
<b>EN</b> – Endangered: A species is endangered when it is not critically endangered but is facing a very high risk of extinction in the wild in the near future.
<b>VU</b> – Vulnerable: A species is vulnerable when it is not critically endangered or endangered but is facing a high risk of extinction in the wild in the medium-term future.
<b>R*</b> - Rare: A species is rare but overall is not currently considered critically endangered, endangered or vulnerable.
<b>K*</b> - Poorly Known: A species is suspected, but not definitely known, to belong to any of the categories extinct, critically endangered, endangered, vulnerable or rare.
<b>Conservation Status in Victoria (Based on DEPI 2014, DSE 2009 or 2013)</b>
<b>x</b> – Presumed Extinct in Victoria: not recorded from Victoria during the past 50 years despite field searches specifically for the plant, or, alternatively, intensive field searches (since 1950) at all previously known sites have failed to record the plant.
<b>E</b> – Endangered in Victoria: at risk of disappearing from the wild state if present land use and other causal factors continue to operate.
<b>V</b> – Vulnerable in Victoria: not presently endangered but likely to become so soon due to continued depletion; occurring mainly on sites likely to experience changes in land-use which would threaten the survival of the plant in the wild; or, taxa whose total population is so small that the likelihood of recovery from disturbance, including localised natural events such as drought, fire or landslip, is doubtful.
<b>R</b> – Rare in Victoria: rare but not considered otherwise threatened – there are relatively few known populations or the taxon is restricted to a relatively small area.
<b>K</b> – Poorly Known in Victoria: poorly known and suspected, but not definitely known, to belong to one of the above categories (x, e, v or r) within Victoria. At present, accurate distribution information is inadequate.

## Appendix 1.2 – Defining Ecological Significance

**Table A1.2.** Criteria for defining Ecological Significance ratings for significant flora, fauna and communities.

National Significance
<p><b>Flora:</b> National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. extinct, critically endangered, endangered, vulnerable).</p>
<p><b>Fauna:</b> National conservation status is based on the EPBC Act list of taxa considered threatened in Australia (i.e. Extinct, Critically Endangered, Endangered, Vulnerable). Fauna listed as Extinct, Critically Endangered, Endangered, Vulnerable, or Rare under National Action Plans for terrestrial taxon prepared for DoE: mammals (Woinarski <i>et al.</i> 2014), bats (Duncan <i>et al.</i> 1999), birds (Garnett <i>et al.</i> 2011), reptiles (Cogger <i>et al.</i> 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).</p>
<p><b>Communities:</b> Vegetation communities considered critically endangered, endangered or vulnerable under the EPBC Act and considering vegetation condition.</p>
State Significance
<p><b>Flora:</b> Threatened taxa listed under the provisions of the FFG Act. Flora listed in the State Government’s Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014).</p>
<p><b>Fauna:</b> Threatened taxon listed under Schedule 2 of the FFG Act. Fauna listed as Extinct, Critically Endangered, Endangered and Vulnerable on the State Government’s Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013). Listed as Lower Risk (Near Threatened, Conservation Dependent or Least concern) or Data Deficient under National Action Plans for terrestrial species prepared for the DoE: mammals (Woinarski <i>et al.</i> 2014), bats (Duncan <i>et al.</i> 1999), birds (Garnett <i>et al.</i> 2011), reptiles (Cogger <i>et al.</i> 1993), amphibians (Tyler 1997) and butterflies (Sands and New 2002).</p>
<p><b>Communities:</b> Ecological communities listed as threatened under the FFG Act (DELWP 2017h). EVC listed as threatened (i.e. endangered, vulnerable) or rare in a Native Vegetation Plan for a particular bioregion and considering vegetation condition.</p>
Regional Significance
<p><b>Fauna:</b> Fauna with a disjunct distribution, or a small number of documented recorded or naturally rare in the particular Bioregion in which the study area is located. A particular taxon that is has an unusual ecological or biogeographical occurrence or listed as Lower Risk – Near Threatened, Data Deficient or Insufficiently Known on the State Government’s Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013).</p>
<p><b>Communities:</b> EVC listed as depleted or least concern in a Native Vegetation Plan for a particular bioregion) and considering vegetation condition. EVC considered rare by the author for a particular bioregion.</p>
Local Significance
<p>Local significance is defined as flora, fauna and ecological communities indigenous to a particular area, which are not considered rare or threatened on a national, state or regional level.</p>

## Appendix 1.3 – Defining Site Significance

**Table A1.3.** Criteria for defining Site Significance ratings.

National Significance
<p>A site is of National significance if:</p> <ul style="list-style-type: none"> <li>• It regularly supports, or has a high probability of regularly supporting individuals of a taxon listed as ‘Critically Endangered’ or ‘Endangered’ under the EPBC Act and/or under National Action Plans for terrestrial taxon prepared for the DoE.</li> <li>• It regularly supports, or has a high probability of supporting, an ‘important population’ as defined under the EPBC Act of one or more nationally ‘vulnerable’ flora and fauna taxon.</li> <li>• It is known to support, or has a high probability of supporting taxon listed as ‘Vulnerable’ under National Action Plans.</li> <li>• It is known to regularly support a large proportion (i.e. greater than 1%) of a population of a taxon listed as ‘Conservation Dependent’ under the EPBC Act and/or listed as Rare or Lower Risk (near threatened, conservation dependent or least concern) under National Action Plans.</li> <li>• It contains an area, or part thereof designated as ‘critical habitat’ under the EPBC Act, or if the site is listed under the Register of National Estate compiled by the Australian Heritage Commission.</li> <li>• It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of national conservation significance such as most National Park, and/or a Ramsar Wetland(s).</li> </ul>
State Significance
<p>A site is of State significance if:</p> <ul style="list-style-type: none"> <li>• It occasionally (i.e. every 1 to 5 years) supports, or has suitable habitat to support taxon listed as ‘Critically Endangered’ or ‘Endangered’ under the EPBC Act and/or under National Action Plans.</li> <li>• It regularly supports, or has a high probability of regularly supporting (i.e. high habitat quality) taxon listed as ‘Vulnerable’, ‘Near threatened’, ‘Data Deficient’ or ‘Insufficiently Known’ in Victoria (,DSE 2013; DEPI 2014), or species listed as ‘Data Deficient’ or ‘Insufficiently Known’ under National Action Plans.</li> <li>• It contains an area, or part thereof designated as ‘critical habitat’ under the FFG Act.</li> <li>• It supports, or likely to support a high proportion of any Victorian flora and fauna taxa.</li> <li>• It contains high quality, intact vegetation/habitat supporting a high species richness and diversity in a particular bioregion.</li> <li>• It is a site which forms part of, or connected to a larger area(s) of remnant native vegetation or habitat of state conservation significance such as most State Parks and/or Flora and Fauna Reserves.</li> </ul>
Regional Significance
<p>A site is of Regional significance if:</p> <ul style="list-style-type: none"> <li>• It regularly supports, or has a high probability of regularly supporting regionally significant fauna as defined in Table 1.2.</li> <li>• Is contains a large population (i.e. greater than 1% or 5%) of flora considered rare in any regional Native Vegetation Plan for a particular bioregion.</li> <li>• It supports a fauna population with a disjunct distribution, or a particular taxon that has an unusual ecological or biogeographical occurrence.</li> <li>• It is a site which forms part of, or is connected to a larger area(s) of remnant native vegetation or habitat of regional conservation significance such as most Regional Parks and/or Flora and Fauna Reserves.</li> </ul>
Local Significance
<p>Most sites are considered to be of at least local significant for conservation, and in general a site of local significance can be defined as:</p> <ul style="list-style-type: none"> <li>• An area which supports indigenous flora species and/or a remnant EVC, and habitats used by locally significant fauna species.</li> <li>• An area which currently acts, or has the potential to act as a wildlife corridor linking other areas of higher conservation significance and facilitating fauna movement throughout the landscape.</li> </ul>

**Appendix 1.4 – Vegetation Condition and Habitat Quality**

**Table A1.4.1** Defining Vegetation Condition ratings.

Criteria for defining Vegetation Condition
<p><b>High Quality:</b> Vegetation dominated by a diversity of indigenous species, with defined structures (where appropriate), such as canopy layer, shrub layer, and ground cover, with little or few introduced species present.</p>
<p><b>Moderate Quality:</b> Vegetation dominated by a diversity of indigenous species, but is lacking some structures, such as canopy layer, shrub layer or ground cover, and/or there is a greater level of introduced flora species present.</p>
<p><b>Low Quality:</b> Vegetation dominated by introduced species, but supports low levels of indigenous species present, in the canopy, shrub layer or ground cover.</p>

**Table A1.4.2** Defining Habitat Quality.

Criteria for defining Habitat Quality
<p><b>High Quality:</b></p> <ul style="list-style-type: none"> <li>• High degree of intactness (i.e. floristically and structurally diverse), containing several important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.</li> <li>• High species richness and diversity (i.e. represented by a large number of species from a range of fauna groups).</li> <li>• High level of foraging and breeding activity, with the site regularly used by native fauna for refuge and cover.</li> <li>• Habitat that has experienced, or is experiencing low levels of disturbance and/or threatening processes (i.e. weed invasion, introduced animals, soil erosion, salinity).</li> <li>• High contribution to a wildlife corridor, and/or connected to a larger area(s) of high quality habitat.</li> <li>• Provides known, or likely habitat for one or more rare or threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DEPI 2014; DSE 2009 or 2013.</li> </ul>
<p><b>Moderate Quality:</b></p> <ul style="list-style-type: none"> <li>• Moderate degree of intactness, containing one or more important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.</li> <li>• Moderate species richness and diversity – represented by a moderate number of species from a range of fauna groups.</li> <li>• Moderate levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.</li> <li>• Habitat that has experienced, or is experiencing moderate levels of disturbance and/or threatening processes.</li> <li>• Moderate contribution to a wildlife corridor, or is connected to area(s) of moderate quality habitat.</li> <li>• Provides potential habitat for a small number of threatened species listed under the EPBC Act, FFG Act, or species considered rare or threatened according to DEPI 2014; DSE 2009 or 2013.</li> </ul>
<p><b>Low Quality:</b></p> <ul style="list-style-type: none"> <li>• Low degree of intactness, containing few important habitat features such as ground debris (logs, rocks, vegetation), mature hollow-bearing trees, and a dense understorey component.</li> <li>• Low species richness and diversity (i.e. represented by a small number of species from a range of fauna groups).</li> <li>• Low levels of foraging and breeding activity, with the site used by native fauna for refuge and cover.</li> <li>• Habitat that has experienced, or is experiencing high levels of disturbance and/or threatening processes.</li> <li>• Unlikely to form part of a wildlife corridor, and is not connected to another area(s) of habitat.</li> <li>• Unlikely to provide habitat for rare or threatened species listed under the EPBC Act, FFG Act, or considered rare or threatened according to DEPI 2014; DSE 2009 or 2013.</li> </ul>

### Appendix 1.5 – Flora and Fauna Guarantee Act 1988 Protected Species

Protected flora and fauna under the *Flora and Fauna Guarantee Act 1988* (FFG Act) are defined as those that have legal protection under the Act. Protected taxa includes plants and animals from three sources:

- plant or animal taxa (species, subspecies or varieties) listed as threatened under the FFG Act;
- plant taxa belonging to communities listed as threatened under the FFG Act; and,
- plant taxa which are not threatened but require protection for other reasons.

Note that representative plants of a given community are protected as well as the community itself (for example scattered Wallaby-grasses *Rytidosperma* spp. are protected in degraded areas previously supporting the listed Western [Basalt] Plains Grassland Community).

Table A1.6 provides a list of plant groups protected under the FFG Act.

**Table A1.6.** Plant groups (Families, Genera and Kingdom Divisions) protected under the FFG Act (DELWP 2016).

Family/Genera	Common Name	Exclusions
Pteridophyta	Clubmosses, ferns and fern allies	Austral Bracken <i>Pteridium esculentum</i>
Asteraceae	Daisies	N/A
Ericaceae (formerly Epacridaceae)	Heaths	N/A
Orchidaceae	Orchids	N/A
<i>Acacia</i>	Wattles	<i>Acacia dealbata</i> , <i>Acacia decurrens</i> , <i>Acacia implexa</i> , <i>Acacia melanoxylon</i> and <i>Acacia paradoxa</i>
<i>Baeckea</i>	Baeckeas	N/A
<i>Boronia</i>	Boronias	N/A
<i>Calytrix</i>	Fringe-myrtles	N/A
<i>Correa</i> -	Correas	N/A
<i>Darwinia</i>	Darwinias	N/A
<i>Eremophila</i>	Emu-bushes	N/A
<i>Eriostemon</i>	Wax-flowers	N/A
<i>Gompholobium</i>	Wedge-peas	N/A
<i>Grevillea</i>	Grevilleas	N/A
<i>Prostanthera</i>	Mint-bushes	N/A
<i>Sphagnum</i>	Sphagnum mosses	N/A
<i>Stylidium</i>	Trigger-plants	N/A
<i>Thryptomene</i>	Thryptomenes	N/A
<i>Thysanotus</i>	Fringe-lilies	N/A
<i>Xanthorrhoea</i>	Grass-trees	N/A

## Appendix 2 – Flora

### Appendix 2.1 – Flora Results

#### Legend:

I Protected under the FFG Act (DELWP 2016);

L Listed under the FFG Act (DELWP 2017e);

e/v/r Listed as endangered/vulnerable/rare in Victoria under the Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014);

\* Listed as a noxious weed under the CaLP Act;

w Weed of National Significance;

# Planted Victorian and non-Victorian species;

+ Planted indigenous species that also occur in remnant native vegetation in the study area;

\*\* Planted indigenous species in the study area; and,

- Not applicable

**Table A2.1.** Flora recorded within the study area.

Scientific Name	Common Name	Comments
<b>Indigenous Species</b>		
<i>Acaena echinata</i>	Sheep's Burr	-
<i>Asperula conferta</i>	Common Woodruff	-
<i>Atriplex semibaccata</i>	Berry Saltbush	-
<i>Austrostipa bigeniculata</i>	Kneed Spear-grass	-
<i>Austrostipa densiflora</i>	Dense Spear-grass	-
<i>Austrostipa gibbosa</i>	Spurred Spear-grass	-
<i>Austrostipa scabra</i> subsp. <i>falcata</i>	Rough Spear-grass	-
<i>Calocephalus citreus</i>	Lemon Beauty-heads	I
<i>Carpobrotus modestus</i>	Inland Pigface	-
<i>Cassinia arcuata</i>	Drooping Cassinia	I
<i>Chloris truncata</i>	Windmill Grass	-
<i>Crassula sieberiana</i> s.l.	Sieber Crassula	-
<i>Dichondra repens</i>	Kidney-weed	-
<i>Einadia hastata</i>	Salooop	-
<i>Einadia nutans</i>	Nodding Saltbush	-
<i>Enchylaena uricate</i> var. <i>tomentosa</i>	Ruby Saltbush	-
<i>Eucalyptus microcarpa</i>	Grey Box	-
<i>Eutaxia microphylla</i>	Common Eutaxia	-

Scientific Name	Common Name	Comments
<i>Linum marginale</i>	Native Flax	-
<i>Lomandra filiformis</i>	Wattle Mat-rush	-
<i>Maireana enchylaenoides</i>	Wingless Bluebush	-
<i>Oxalis perennans</i>	Grassland Wood-sorrel	-
<i>Rhagodia parabolica</i>	Fragrant Saltbush	<b>r</b>
<i>Rumex brownii</i>	Slender Dock	-
<i>Rytidosperma caespitosum</i>	Common Wallaby-grass	-
<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass	-
<i>Rytidosperma setaceum</i>	Bristly Wallaby-grass	-
<i>Senecio pinnatifolius</i>	Variable Groundsel	<b>l</b>
<i>Senecio quadridentatus</i>	Cotton Fireweed	<b>l</b>
<i>Themeda triandra</i>	Kangaroo Grass	-
<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy	<b>l</b>
<i>Wahlenbergia gracilis</i>	Sprawling Bluebell	-
<i>Wahlenbergia luteola</i>	Bronze Bluebell	-
<i>Walwhalleya prolata</i>	Rigid Panic	-
<b>Introduced / Non-native Species</b>		
<i>Acetosella vulgaris</i>	Sheep Sorrel	-
<i>Aira caryophyllea</i> subsp. <i>caryophyllea</i>	Silvery Hair-grass	-
<i>Arctotheca calendula</i>	Cape weed	-
<i>Asparagus asparagoides</i>	Bridal Creeper	<b>W *</b>
<i>Avena</i> spp.	Oat	-
<i>Brassica</i> spp.	Turnip	-
<i>Briza minor</i>	Lesser Quaking-grass	-
<i>Bromus catharticus</i>	Prairie Grass	-
<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>	Soft Brome	-
<i>Cirsium vulgare</i>	Spear Thistle	<b>*</b>
<i>Conyza</i> spp.	Fleabane	-
<i>Cynara cardunculus</i> subsp. <i>flavescens</i>	Artichoke Thistle	<b>*</b>
<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch	-
<i>Cyperus eragrostis</i>	Drain Flat-sedge	-
<i>Dactylis glomerata</i>	Cocksfoot	-
<i>Ehrharta erecta</i> var. <i>erecta</i>	Panic Veldt-grass	-
<i>Eucalyptus botryoides</i>	Southern Mahogany	-
<i>Eucalyptus cladocalyx</i>	Sugar Gum	-
<i>Galenia pubescens</i> var. <i>pubescens</i>	Galenia	-
<i>Gazania linearis</i>	Gazania	-

Scientific Name	Common Name	Comments
<i>Helminthotheca echioides</i>	Ox-tongue	-
<i>Holcus lanatus</i>	Yorkshire Fog	-
<i>Hordeum (monospecific)</i>	Barley	-
<i>Hypochoeris radicata</i>	Flatweed	-
<i>Lepidium africanum</i>	Common Peppergrass	-
<i>Lolium perenne</i>	Perennial Rye-grass	-
<i>Lycium ferocissimum</i>	African Box-thorn	<b>W *</b>
<i>Marrubium vulgare</i>	Horehound	*
<i>Medicago polymorpha</i>	Burr Medic	-
<i>Nassella neesiana</i>	Chilean Needle-grass	<b>W *</b>
<i>Nassella trichotoma</i>	Serrated Tussock	<b>W *</b>
<i>Olea europaea</i>	Olive	-
<i>Opuntia spp.</i>	Prickly pear	*
<i>Oxalis pes-caprae</i>	Soursob	*
<i>Paspalum dilatatum</i>	Paspalum	-
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	-
<i>Plantago coronopus</i>	Buck's-horn Plantain	-
<i>Plantago lanceolata</i>	Ribwort	-
<i>Romulea rosea</i>	Onion Grass	-
<i>Rosa rubiginosa</i>	Sweet Briar	*
<i>Rubus fruticosus</i> spp. agg.	Blackberry	<b>W *</b>
<i>Rumex crispus</i>	Curled Dock	-
<i>Schinus molle</i>	Pepper Tree	-
<i>Solanum nigrum s.l.</i>	Black Nightshade	-
<i>Sonchus oleraceus</i>	Common Sow-thistle	-
<i>Trifolium spp.</i>	Clover	-
<i>Vulpia bromoides</i>	Squirrel-tail Fescue	-
<i>Vulpia myuros</i>	Rat's-tail Fescue	-

## Appendix 2.2 – Significant Flora Species

**Table A2.2** Significant flora recorded within 10 kilometres of the study area

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

**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 a 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.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
<b>NATIONAL SIGNIFICANCE</b>							
<i>Amphibromus fluitans</i> #	River Swamp Wallaby-grass	-	-	VU	-	-	4
<i>Dianella amoena</i> #	Matted Flax-lily	-	-	EN	L	e	4
<i>Diuris basaltica</i>	Small Golden Moths	7	2012	EN	L	e	4
<i>Diuris fragrantissima</i>	Sunshine Diuris	1	1770	EN	L	e	5
<i>Dodonaea procumbens</i> #	Trailing Hop-bush	-	-	VU	-	v	4
<i>Eucalyptus uricate</i> #	Black Gum	-	-	VU	L	e	5
<i>Glycine latrobeana</i> #	Clover Glycine	-	-	VU	L	v	4
<i>Lachnagrostis adamsonii</i> #	Adamson’s Blown-grass	-	-	EN	L	v	4

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
<i>Pimelea spinescens subsp. spinescens</i>	Spiny Rice-flower	5	2003	CR	L	e	2
<i>Prasophyllum frenchii</i> #	Maroon Leek-orchid	-	-	EN	L	e	4
<i>Rutidosia leptorhynchoides</i> #	Button Wrinklewort	-	-	EN	L	e	3
<i>Senecio macrocarpus</i> #	Large-headed Fireweed	-	-	VU	L	e	3
<i>Thelymitra matthewsii</i> #	Spiral Sun-orchid	-	-	VU	L	v	4
<i>Xerochrysum palustre</i> #	Swamp Everlasting	-	-	VU	L	v	4
<b>STATE SIGNIFICANCE</b>							
<i>Acacia aspera subsp. parviceps</i>	Rough Wattle	2	1995	-	-	r	4
<i>Acacia rostriformis</i>	Bacchus Marsh Wattle	273	2016	-	L	v	2
<i>Allocasuarina luehmannii</i>	Buloke	18	2010	-	L	e	3
<i>Alternanthera sp. 1 (Plains)</i>	Plains Joyweed	4	2010	-	-	k	4
<i>Amyema linophylla subsp. orientalis</i>	Buloke Mistletoe	2	2010	-	-	v	3
<i>Asperula wimmerana</i>	Wimmera Woodruff	1	2010	-	-	r	4
<i>Austrostipa breviglumis</i>	Cane Spear-grass	20	2014	-	-	r	3
<i>Austrostipa exilis</i>	Heath Spear-grass	19	2009	-	-	r	4
<i>Austrostipa mundula</i>	Neat Spear-grass	1	2010	-	-	r	4
<i>Austrostipa puberula</i>	Fine-hairy Spear-grass	1	2010	-	-	r	4
<i>Boronia anemonifolia subsp. aurifodina</i>	Goldfield Boronia	1	1917	-	-	r	4
<i>Bossiaea cordigera</i>	Wiry Bossiaea	1	1980	-	-	r	4
<i>Calotis anthemoides</i>	Cut-leaf Burr-daisy	1	1984	-	L	-	4
<i>Calotis lappulacea</i>	Yellow Burr-daisy	2	1910	-	-	r	4
<i>Convolvulus angustissimus subsp. omnigracilis</i>	Slender Bindweed	8	2012	-	-	k	1

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
<i>Coronidium gunnianum</i>	Pale Swamp Everlasting	1	2012	-	-	v	4
<i>Corymbia maculata</i>	Spotted Gum	1	2010	-	-	v	5
<i>Cullen parvum</i>	Small Scurf-pea	5	2012	-	L	e	2
<i>Cullen tenax</i>	Tough Scurf-pea	1	1853	-	L	e	3
<i>Desmodium varians</i>	Slender Tick-trefoil	4	2010	-	-	k	3
<i>Dianella sp. Aff. Longifolia (Benambra)</i>	Arching Flax-lily	7	2016	-	-	v	3
<i>Diuris gregaria</i>	Clumping Golden Moths	1	2012	-	L	e	4
<i>Eleocharis plana</i>	Flat Spike-sedge	2	2010	-	-	v	4
<i>Eucalyptus aff. Ignorabilis (Lerderderg)</i>	Lerderderg Scentbark	5	2011	-	-	e	4
<i>Eucalyptus baueriana subsp. thalassina</i>	Werribee Blue-box	314	2011	-	-	e	3
<i>Eucalyptus leucoxylon subsp. connata</i>	Melbourne Yellow-gum	68	2016	-	X	v	1
<i>Euphrasia collina subsp. trichocalycina</i>	Purple Eyebright	1	1963	-	-	r	3
<i>Gahnia microstachya</i>	Slender Saw-sedge	6	2011	-	-	r	3
<i>Goodia medicaginea</i>	Western Golden-tip	4	2008	-	-	r	3
<i>Grevillea rosmarinifolia</i>	Rosemary Grevillea	2	1959	-	-	P	4
<i>Grevillea steiglitziana</i>	Brisbane Range Grevillea	1	1966	-	-	r	4
<i>Lepidium pseudohyssopifolium</i>	Native Peppercross	2	2008	-	-	k	3
<i>Leptospermum trinervium</i>	Paperbark Tea-tree	1	1980	-	-	r	4
<i>Leucopogon microphyllus var. pilibundus</i>	Hairy Beard-heath	10	2011	-	-	r	4
<i>Lomandra glauca s.s.</i>	Blue Mat-rush	1	1983	-	-	k	3
<i>Lotus australis var. australis</i>	Austral Trefoil	2	1903	-	-	k	4
<i>Maireana aphylla</i>	Leafless Bluebush	6	2006	-	-	k	3

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
<i>Marsilea mutica</i>	Smooth Nardoo	1	2000	-	-	k	4
<i>Myoporum montanum</i>	Waterbush	1	1853	-	-	r	4
<i>Nicotiana suaveolens</i>	Austral Tobacco	57	2013	-	-	r	2
<i>Olearia minor</i>	Satin Daisy-bush	1	1929	-	-	r	4
<i>Paspalidium flavidum</i>	Yellow Watercrown Grass	1	1927	-	-	e	4
<i>Philothea angustifolia subsp. montana</i>	Narrow-leaf Wax-flower	1	1987	-	-	v	4
<i>Pimelea curviflora var. aff. Subglabrata</i>	Curved Rice-flower	3	2001	-	-	k	2
<i>Pimelea hewardiana</i>	Forked Rice-flower	15	2011	-	-	r	2
<i>Podolepis linearifolia</i>	Basalt Podolepis	3	2000	-	-	e	3
<i>Poranthera corymbosa</i>	Clustered Poranthera	1	1982	-	-	r	4
<i>Prostanthera decussata</i>	Dense Mint-bush	1	1980	-	-	r	4
<i>Prostanthera nivea var. nivea</i>	Snowy Mint-bush	5	2011	-	-	r	3
<i>Prostanthera uricate var. bracteolata</i>	Slender Mint-bush	1	2011	-	-	r	4
<i>Pseudanthus orbicularis</i>	Tangled Pseudanthus	3	1991	-	-	r	4
<i>Pterostylis bicolor</i>	Black-tip Greenhood	1	1996	-	-	k	4
<i>Pterostylis conferta</i>	Leprechaun Greenhood	2	1996	-	L	e	4
<i>Pterostylis truncata</i>	Brittle Greenhood	86	2013	-	L	e	4
<i>Ptilotus erubescens</i>	Hairy Tails	1	1984	-	L	v	3
<i>Pultenaea reflexifolia</i>	Wombat Bush-pea	1	1959	-	-	r	4
<i>Pultenaea weindorferi</i>	Swamp Bush-pea	1	1980	-	X	r	4
<i>Rhagodia parabolica</i>	Fragrant Saltbush	652	2016	-	-	r	1
<i>Rytidosperma richardsonii</i>	Straw Wallaby-grass	1	1980	-	-	v	4

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	DEPI	Likely occurrence in study area
<i>Sclerolaena uricate</i> var. <i>muricata</i>	Black Roly-poly	7	1998	-	-	k	2
<i>Senecio cunninghamii</i> var. <i>cunninghamii</i>	Branching Groundsel	5	2008	-	-	r	3
<i>Tripogon loliformis</i>	Rye Beetle-grass	2	2008	-	-	r	3
<i>Westringia glabra</i>	Violet Westringia	4	1980	-	-	r	4

**Notes:** EPBC = *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), FFG = *Flora and Fauna Guarantee Act 1988* (FFG Act), DEPI= Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014), L = Listed, # = Records identified from EPBC Act Protected Matters Search Tool, Data source: Victorian Biodiversity Atlas (DELWP 2019c); Protected Matters Search Tool (DoEE 2019). Order: Alphabetical.

### Appendix 2.3 – Habitat Hectares

**Table A2.3.** Habitat Hectares results for remnant vegetation recorded within the study area.

Vegetation Zone		PG <sub>1</sub>	PG <sub>2</sub>	PG <sub>3</sub>
<b>Bioregion</b>		VVP	VVP	VVP
<b>EVC / Tree</b>		PG	PG	PG
<b>EVC Number</b>		132	132	132
<b>EVC Conservation Status</b>		En	En	En
<b>Patch Condition</b>	Large Old Trees /10	N/A	N/A	N/A
	Canopy Cover /5	N/A	N/A	N/A
	Under storey /25	15	10	5
	Lack of Weeds /15	4	4	4
	Recruitment /10	6	6	6
	Organic Matter /5	5	4	4
	Logs /5	N/A	N/A	N/A
	Treeless EVC Multiplier	1.36	1.36	1.36
	Subtotal =	40.8	32.64	25.84
	<b>Landscape Value /25</b>		4	5
<b>Habitat Points /100</b>		45	35	31
<b>Habitat Score</b>		<b>0.45</b>	<b>0.35</b>	<b>0.31</b>

**Note.** VVP = Victorian Volcanic Plain bioregion; PG = Plains Grassland; En = Endangered.

## Appendix 2.4 – Large Trees and Scattered Trees

**Table A2.4.** Native scattered trees recorded within the study area.

Tree ID	Species Name	Common Name	DBH	Size Class	Comment	Parcel ID
1	<i>Eucalyptus microcarpa</i>	Grey Box	93	Large	Scattered	Area 3
2	<i>Eucalyptus microcarpa</i>	Grey Box	62	Small	Scattered	Area 3
3	<i>Eucalyptus microcarpa</i>	Grey Box	72	Large	Scattered	Area 3
4	<i>Eucalyptus microcarpa</i>	Grey Box	68	Small	Scattered	Area 3
5	<i>Eucalyptus microcarpa</i>	Grey Box	65	Small	Scattered	Area 3
6	<i>Eucalyptus microcarpa</i>	Grey Box	63	Small	Scattered	Area 3
7	<i>Eucalyptus microcarpa</i>	Grey Box	66	Small	Scattered	Area 3
8	<i>Eucalyptus verticillata</i>	Drooping Sheoak	38	Small	Scattered	Area 3
9	<i>Eucalyptus microcarpa</i>	Grey Box	82	Large	Scattered	Area 3

**Note.** # Tree ID as shown in Figure 2; DBH = Diameter at breast height (i.e. 1.3 metres above ground).

## Appendix 3 – Fauna

### Appendix 3.1 – Fauna Results

**Table A3.1.** Fauna species recorded during the field survey

Common Name	Scientific Name	Native / Introduced	Conservation Status
<b>Birds</b>			
Australian Magpie	<i>Cracticus tibicen</i>	Native	-
Black-shouldered Kite	<i>Elanus axillaris</i>	Native	-
Brown Falcon	<i>Falco berigora</i>	Native	-
Common Blackbird	<i>Turdus merula</i>	Introduced	-
Common Myna	<i>Acridotheres tristis</i>	Introduced	-
Common Starling	<i>Sturnus vulgaris</i>	Introduced	-
Eurasian Skylark	<i>Alauda arvensis</i>	Introduced	-
Grey Fantail	<i>Rhipidura albiscarpa</i>	Native	-
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	Native	-
House Sparrow	<i>Passer domesticus</i>	Introduced	-
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	Native	-
Little Raven	<i>Corvus mellori</i>	Native	-
Magpie-lark	<i>Grallina cyanoleuca</i>	Native	-
Nankeen Kestrel	<i>Lichenostomus penicillatus</i>	Native	-
New Holland Honeyeater	<i>Phylidonyris novaehollandiae</i>	Native	-

Common Name	Scientific Name	Native / Introduced	Conservation Status
Noisy Miner	<i>Manorina melanocephala</i>	Introduced	-
Pacific Black Duck	<i>Anas superciliosa</i>	Native	-
Rainbow Lorikeet	<i>Trichoglossus moluccanus</i>	Native	-
Red Wattlebird	<i>Anthochaera carunculata</i>	Native	-
Red Wattlebird	<i>Anthochaera carunculata</i>	Native	-
Spotted Turtle-Dove	<i>Spilopelia chinensis</i>	Introduced	-
Straw-necked Ibis	<i>Threskiornis spinicollis</i>	Native	-
Superb Fairy-wren	<i>Malurus cyaneus</i>	Native	-
Wedge-Tailed Eagle	<i>Aquila audax</i>	Native	-
Welcome Swallow	<i>Hirundo neoxena</i>	Native	-
Whistling Kite	<i>Haliastur sphenurus</i>	Native	-
White-necked Heron	<i>Ardea pacifica</i>	Native	-
Willie Wagtail	<i>Rhipidura leucophrys</i>	Native	-
Yellow Thornbill	<i>Acanthiza nana</i>	Native	-
<b>Frogs</b>			
No Frogs recorded	-	-	-
<b>Reptiles</b>			
No Reptiles recorded	-	-	-
<b>Mammals</b>			
Eastern Grey Kangaroo	<i>Macropus giganteus</i>	Native	-

Common Name	Scientific Name	Native / Introduced	Conservation Status
Red Fox	<i>Vulpes vulpes</i>	Introduced	-
European Rabbit	<i>Oryctolagus cuniculus</i>	Introduced	-

## Appendix 3.2 – Significant Fauna Species

**Table A3.1** Significant fauna within 10 kilometres of the study area.

Habitat characteristics of significant fauna species previously recorded within 10 kilometres of the study area, or that may potentially occur within the study area were assessed to determine their likelihood of occurrence. The likelihood of occurrence rankings for each of the threatened species are:

1	High Likelihood	<ul style="list-style-type: none"> <li>• Known resident in the study area based on site observations, database records, or expert advice; and/or,</li> <li>• Recent records (i.e. within five years) of the species in the local area (VBA 2011); and/or,</li> <li>• The study area contains the species’ preferred habitat.</li> </ul>
2	Moderate Likelihood	<ul style="list-style-type: none"> <li>• The species is likely to visit the study area regularly (i.e. at least seasonally); and/or,</li> <li>• Previous records of the species in the local area (DSE 2011b); and/or,</li> <li>• The study area contains some characteristics of the species’ preferred habitat.</li> </ul>
3	Low Likelihood	<ul style="list-style-type: none"> <li>• The species is likely to visit the study area occasionally or opportunistically whilst en route to more suitable sites; and/or,</li> <li>• There are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or,</li> <li>• The study area contains few or no characteristics of the species’ preferred habitat.</li> </ul>
4	Unlikely	<ul style="list-style-type: none"> <li>• No previous records of the species in the local area; and/or,</li> <li>• The species may fly over the study area when moving between areas of more suitable habitat; and/or,</li> <li>• Out of the species’ range; and/or,</li> <li>• No suitable habitat present.</li> </ul>

EX Extinct  
 RX Regionally extinct  
 CR Critically endangered  
 EN Endangered  
 VU Vulnerable  
 RA Rare  
 NT Near threatened  
 CD Conservation dependent  
 LC least concern

DD Data deficient (insufficiently or poorly known)  
 L Listed as threatened under FFG Act  
 I Invalid or ineligible for listing under the FFG Act  
 # Listed on the Protected Matters Search Tool  
 \* Additional information from the Victorian Fauna Database

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	Likelihood
<b>NATIONAL SIGNIFICANCE</b>							
Australasian Bittern	<i>Botaurus poiciloptilus</i>	1970	2	EN	L	EN	4
Australian Grayling	<i>Prototroctes maraena</i>	#	-	VU	L	VU	4
Australian Painted Snipe	<i>Rostratula australis</i>	1989	2	VU	L	CR	4
Curlew Sandpiper	<i>Calidris ferruginea</i>	#	-	CR	-	EN	4
Dwarf Galaxias	<i>Galaxiella pusilla</i>	#	-	VU	L	EN	4
Eastern Barred Bandicoot	<i>Perameles gunnii</i>	#	15	EN	L	WX	4
Eastern Curlew	<i>Numenius madagascariensis</i>	#	-	CR	-	VU	4
Golden Sun Moth	<i>Synemon plana</i>	2014	358	CR	L	CR	2
Grassland Earless Dragon	<i>Tympanocryptis pinguicolla</i>	#	-	EN	L	CR	4
Greater Glider	<i>Petauroides volans</i>	1845	2	VU	-	VU	4
Grey-headed Flying-fox	<i>Pteropus poliocephalus</i>	1968	3	VU	L	VU	3
Growling Grass Frog	<i>Litoria raniformis</i>	2007	37	VU	L	EN	4
Painted Honeyeater	<i>Grantiella picta</i>	#	-	VU	L	VU	4
Pink-tailed Worm-Lizard	<i>Aprasia parapulchella</i>	#	-	VU	L	EN	4
Plains-wanderer	<i>Pedionomus torquatus</i>	1880	2	CR	L	CR	4
Regent Honeyeater	<i>Anthochaera phrygia</i>	#	-	CR	L	CR	4
Smoky Mouse	<i>Pseudomys fumeus</i>	#	-	EN	L	EN	4
Spot-tailed Quoll	<i>Dasyurus maculatus maculatus</i>	#	-	EN	L	EN	4
Striped Legless Lizard	<i>Delma impar</i>	#	-	VU	L	EN	2
Superb Parrot	<i>Polytelis swainsonii</i>	1881	1	VU	L	EN	4
Swift Parrot	<i>Lathamus discolor</i>	2008	15	CR	L	EN	3
<b>STATE SIGNIFICANCE</b>							

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	Likelihood
Australasian Shoveler	<i>Anas rhynchotis</i>	2006	13	-	-	VU	3
Australian Bustard	<i>Ardeotis australis</i>	1911	1	-	L	CR	4
Baillon's Crake	<i>Porzana pusilla palustris</i>	1987	1	-	L	VU	4
Barking Owl	<i>Ninox connivens connivens</i>	2002	25	-	L	EN	3
Bearded Dragon	<i>Pogona barbata</i>	1986	2	-	-	VU	3
Black Falcon	<i>Falco subniger</i>	1988	8	-	-	VU	3
Blue-billed Duck	<i>Oxyura australis</i>	2006	4	-	L	EN	4
Brown Toadlet	<i>Pseudophryne bibronii</i>	1990	5	-	L	EN	3
Brown Treecreeper (south-eastern ssp.)	<i>Climacteris picumnus victoriae</i>	2014	81	-	-	NT	3
Brush-tailed Phascogale	<i>Phascogale tapoatafa</i>	1989	9	-	L	VU	3
Bullant	<i>Myrmecia sp. 17</i>	2009	4	-	L	VU	3
Bush Stone-curlew	<i>Burhinus grallarius</i>	1880	1	-	L	EN	4
Caspian Tern	<i>Hydroprogne caspia</i>	2000	1	-	L	NT	4
Chestnut-rumped Heathwren	<i>Calamanthus pyrrhopygius</i>	2004	10	-	L	VU	3
Common Bent-wing Bat	<i>Miniopterus schreibersii</i> GROUP	1999	5	-	L	-	3
Common Dunnart	<i>Sminthopsis murina murina</i>	1990	3	-	-	VU	3
Crested Bellbird	<i>Oreoica gutturalis gutturalis</i>	2003	18	-	L	NT	3
Diamond Dove	<i>Geopelia cuneata</i>	1905	2	-	L	NT	4
Diamond Firetail	<i>Stagonopleura guttata</i>	2011	74	-	L	NT	3
Eastern Great Egret	<i>Ardea modesta</i>	2001	11	-	L	VU	3
Freckled Duck	<i>Stictonetta naevosa</i>	2006	6	-	L	EN	3
Grey-crowned Babbler	<i>Pomatostomus temporalis temporalis</i>	1907	2	-	L	EN	4
Gull-billed Tern	<i>Gelochelidon nilotica macrotarsa</i>	1986	1	-	L	EN	3

Common Name	Scientific Name	Last Documented Record (VBA)	# Records (VBA)	EPBC Act	FFG ACT	DSE (2013)	Likelihood
Hardhead	<i>Aythya australis</i>	2006	21	-	-	VU	3
Hooded Robin	<i>Melanodryas cucullata cucullata</i>	1999	12	-	L	NT	3
Lace Goanna	<i>Varanus varius</i>	1987	2	-	-	EN	3
Lewin's Rail	<i>Lewinia pectoralis pectoralis</i>	1880	1	-	L	VU	3
Little Egret	<i>Egretta garzetta nigripes</i>	1990	1	-	L	EN	3
Musk Duck	<i>Biziura lobata</i>	2003	20	-	-	VU	3
Powerful Owl	<i>Ninox strenua</i>	2011	9	-	L	VU	3
Red-chested Button-quail	<i>Turnix pyrrhotorax</i>	1897	1	-	L	VU	3
Speckled Warbler	<i>Chthonicola sagittatus</i>	2014	88	-	L	VU	3
White-bellied Sea-Eagle	<i>Haliaeetus leucogaster</i>	2006	5	-	L	VU	4
White-throated Needletail	<i>Hirundapus caudacutus</i>	1994	11	-	-	VU	3
REGIONAL SIGNIFICANCE							
Azure Kingfisher	<i>Alcedo azurea</i>	1988	2	-	-	NT	4
Black-eared Cuckoo	<i>Chrysococcyx osculans</i>	2000	14	-	-	NT	3
Eastern Pygmy-possum	<i>Cercartetus nanus</i>	1992	2	-	-	NT	3
Fat-tailed Dunnart	<i>Sminthopsis crassicaudata</i>	1988	1	-	-	NT	3
Glossy Ibis	<i>Plegadis falcinellus</i>	1986	2	-	-	NT	3
Latham's Snipe	<i>Gallinago hardwickii</i>	1990	7	-	-	NT	3
Little Button-quail	<i>Turnix velox</i>	2011	2	-	-	NT	3
Nankeen Night Heron	<i>Nycticorax caledonicus hillii</i>	2000	11	-	-	NT	33
Pied Cormorant	<i>Phalacrocorax varius</i>	2003	5	-	-	NT	3
Red-backed Kingfisher	<i>Todiramphus pyrropygia pyrropygia</i>	1986	1	-	-	NT	4
Royal Spoonbill	<i>Platalea regia</i>	1991	6	-	-	NT	4

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Spotted Harrier	<i>Circus assimilis</i>	2008	8	-	-	NT	3
Spotted Quail-thrush	<i>Cinlosoma punctatum</i>	2010	4	-	-	NT	3
Whiskered Tern	<i>Chlidonias hybridus javanicus</i>	1987	1	-	-	NT	4

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

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

DSE Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013); Advisory List of Threatened Invertebrate Fauna in Victoria (DSE 2009)

NAP National Action Plan (Cogger *et al.* 1993; Duncan *et al.* 1999; Garnet and Crowley 2000; Lee 1995; Maxwell *et al.* 1996; Sands and New 2002; Tyler 1997)

**Data source:** Victorian Biodiversity Atlas (DELWP 2019c); Protected Matters Search Tool (DoEE 2019).

**Taxonomic order:** Mammals (Strahan 1995 *in* Menkhorst and Knight 2004); Birds (Christidis and Boles, 2008); Reptiles and Amphibians (Cogger *et al.* 1983 *in* Cogger 1996); Fish (Nelson 1994)

