



Mount Fyans Wind Farm:  
Targeted surveys and impact assessment

FINAL REPORT

Prepared for Hydro Tasmania

10 April 2017

## Biosis offices

### AUSTRALIAN CAPITAL TERRITORY

#### Canberra

Phone: (02) 6102 1200  
Email: [canberra@biosis.com.au](mailto:canberra@biosis.com.au)

### NEW SOUTH WALES

#### Newcastle

Phone: (02) 4911 4040  
Email: [newcastle@biosis.com.au](mailto:newcastle@biosis.com.au)

#### Sydney

Phone: (02) 9101 8700  
Email: [sydney@biosis.com.au](mailto:sydney@biosis.com.au)

#### Wollongong

Phone: (02) 4201 1090  
Email: [wollongong@biosis.com.au](mailto:wollongong@biosis.com.au)

### QUEENSLAND

#### Brisbane

Phone: (07) 3831 7400  
Email: [brisbane@biosis.com.au](mailto:brisbane@biosis.com.au)

### TASMANIA

#### Hobart

Phone: (03) 8686 4821  
Email: [hobart@biosis.com.au](mailto:hobart@biosis.com.au)

### VICTORIA

#### Ballarat

Phone: (03) 5304 4250  
Email: [ballarat@biosis.com.au](mailto:ballarat@biosis.com.au)

#### Melbourne (Head Office)

Phone: (03) 8686 4800  
Fax: (03) 9646 9242  
Email: [melbourne@biosis.com.au](mailto:melbourne@biosis.com.au)

#### Wangaratta

Phone: (03) 5718 6900  
Email: [wangaratta@biosis.com.au](mailto:wangaratta@biosis.com.au)

## Document information

**Report to:** Hydro Tasmania

**Prepared by:** Matthew Gibson (Ecologist)  
Shona Arber (Botanist)  
Gavin Thomas (Zoologist)  
Tony Cable (Aquatic Ecologist)  
Anthony Byrne (Aquatic Ecologist)  
Mark Venosta (Zoologist)  
Katrina Sofo (Zoologist)

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## Biosis offices

### AUSTRALIAN CAPITAL TERRITORY

#### Canberra

Phone: (02) 6102 1200  
Email: [canberra@biosis.com.au](mailto:canberra@biosis.com.au)

### NEW SOUTH WALES

#### Newcastle

Phone: (02) 4911 4040  
Email: [newcastle@biosis.com.au](mailto:newcastle@biosis.com.au)

#### Sydney

Phone: (02) 9101 8700  
Email: [sydney@biosis.com.au](mailto:sydney@biosis.com.au)

#### Wollongong

Phone: (02) 4201 1090  
Email: [wollongong@biosis.com.au](mailto:wollongong@biosis.com.au)

### QUEENSLAND

#### Brisbane

Phone: (07) 3831 7400  
Email: [brisbane@biosis.com.au](mailto:brisbane@biosis.com.au)

### TASMANIA

#### Hobart

Phone: (03) 8686 4821  
Email: [hobart@biosis.com.au](mailto:hobart@biosis.com.au)

### VICTORIA

#### Ballarat

Phone: (03) 5304 4250  
Email: [ballarat@biosis.com.au](mailto:ballarat@biosis.com.au)

#### Melbourne (Head Office)

Phone: (03) 8686 4800  
Fax: (03) 9646 9242  
Email: [melbourne@biosis.com.au](mailto:melbourne@biosis.com.au)

#### Wangaratta

Phone: (03) 5718 6900  
Email: [wangaratta@biosis.com.au](mailto:wangaratta@biosis.com.au)

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- BirdLife Australia for access to the New Atlas of Australian Birds 1998-2017.

Biosis staff involved in this project were:

- Dr Matt Dell, Tony Byrne, Felicity Humann, Thea Shell & Martin Lee (assistance in the field).
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## Summary

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Biosis Pty Ltd was commissioned by Hydro Tasmania to undertake a detailed flora and fauna assessment of the site of the proposed Mount Fyans Wind Farm, Victoria. The study area is located near the township of Mortlake in western Victoria, approximately 200 kilometres west of Melbourne.

The purpose of the assessments was to describe the existing conditions within the proposed wind farm site, undertake detailed targeted surveys for threatened flora and fauna, and use the information to inform the design development of the wind farm to help reduce impacts to biodiversity values.

A preliminary flora and fauna assessment was undertaken in 2012 to document and map the extent of native vegetation and fauna habitats present. Subsequent detailed assessments and targeted surveys for threatened species were undertaken from 2013 to 2017. The details of the general flora and fauna assessments of the study area, with the purpose of documenting the existing conditions for the site, are presented in Biosis (2017a).

### **Ecological values**

The key ecological values identified within the study area are as follows:

- Nine Endangered EVCs and one Vulnerable EVC.
- Scattered remnant trees.
- Eight fauna habitat types, including creeks, wetlands, grasslands and rock walls.
- Habitat or potential habitat for EPBC Act and FFG Act listed species, including:
  - One flora species
  - 14 fauna species
- Endangered communities, including Natural Temperate Grasslands of the Victorian Volcanic Plain and Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains.

### **Government legislation and policy**

An assessment of the project in relation to key biodiversity legislation and policy is provided and summarised below.

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
<b>EPBC Act</b>	<p>The following threatened species/communities were recorded on site:</p> <ul style="list-style-type: none"> <li>• Spiny Rice-flower</li> <li>• Corangamite Water Skink</li> <li>• Striped Legless Lizard</li> <li>• Dwarf Galaxias</li> <li>• Migratory species</li> <li>• Natural Temperate Grassland of the Victorian Volcanic Plain</li> <li>• Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains</li> </ul>	No referral required as development is not likely to have a significant impact on these threatened species/communities.	The proposed Development Plan footprint has been designed to minimise and avoid impacts on these species/communities.
<b>Environment Effects Act</b>	Presence of native vegetation and habitat for threatened species.	No ecological referral triggers are likely to be exceeded.	Further assessment of criteria required for environmental effects not covered in this report.
<b>FFG Act</b>	Flora species and communities present.	Protected Flora Permit may be required.	The majority of the site is within Private Land. A protected flora permit will be required if any Protected Flora species are proposed to be removed from public land including roadsides.
<b>Planning &amp; Environment Act</b>	All indigenous vegetation to be cleared.	Planning permit required, including permission to lop or remove native vegetation.	Permit application needs to outline measures taken to address Victoria's Permitted Clearing of Native Vegetation: Biodiversity Assessment Guidelines (No Net Loss).
<b>CaLP Act</b>	Seven noxious weeds and two pest animals	N/A	Comply with requirements to control / eradicate.
<b>Water Act</b>	Blind Creek including tributaries and tributaries of Mount Emu Creek.	Works on waterways permits required from Glenelg-Hopkins CMA.	Comply with Glenelg-Hopkins CMA requirements.
<b>Fisheries Act</b>	The occurrence of protected aquatic biota; Hairy Burrowing Crayfish. Dwarf Galaxias Yarra Pygmy Perch	A permit may be required to disturb protected aquatic biota.	Disturbance to protected aquatic biota is expected to be avoided through Development Plan design, and compliance with the mitigation measures outlined in this report.



Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
SEPP	Blind Creek including tributaries and tributaries of Mount Emu Creek.	No permit required.	Comply with mitigation measures outlined in this report.

### **Permitted clearing of native vegetation: Biodiversity assessment guidelines (the Guidelines)**

Based on the current development design, the proposed development will require the removal of 0.422 hectares of vegetation, comprising 6 scattered trees from within location risk A. Therefore the planning permit application will be assessed on the low risk-based pathway. The strategic biodiversity score of the native vegetation to be removed is 0.177.

If a permit is granted, the offset requirements would be 0.022 general biodiversity equivalence units.

The general offset must be within the Glenelg Hopkins catchment management authority area and must have a minimum strategic biodiversity score of 0.142.

### **Recommendations**

During the course of the project, the results of detailed biodiversity surveys have been used to refine the current Development Plan with the aim of avoiding and minimising negative impacts on key biodiversity values where possible. The final results presented in this report can be used to further refine the project design and provide additional measures to avoid and reduce impacts if the design of proposed works changes as the project progresses.

The results of this assessment should be incorporated into the project design, by adding the flora and fauna mapping information into planning maps and choosing options that retain as much of the mapped vegetation/habitats as possible.

# 1. Introduction

---

## 1.1 Project background

Biosis Pty. Ltd. was commissioned by Hydro Tasmania to undertake a detailed flora and fauna assessment of the site of the proposed Mount Fyans Wind Farm, Victoria. The purpose of the assessments was to describe the existing conditions within the proposed wind farm site, undertake detailed targeted surveys for threatened flora and fauna, and use the information to inform the design development of the wind farm to help reduce impacts on biodiversity values.

A preliminary flora and fauna assessment was undertaken in March 2012 to assess the general values for native vegetation and terrestrial fauna within the study area. Surveys were conducted in spring of 2012 following removal of grazing stock from several areas, to determine the potential extent of native vegetation across different vegetation types.

The Wind Farm study area was subsequently extended to the west ('Western Extension') and additional survey of the entire study area, including new western extension, was undertaken in spring/summer 2012/13 (two visits) to accurately map the extent of native vegetation as well as the distribution and extent of ecological communities and habitat for threatened flora/fauna listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)..

An assessment of roadside vegetation within and surrounding the study area was undertaken in June 2013 and January 2017. All potential habitat for threatened fauna was mapped during the 2013 survey to inform any targeted assessments that were required over the spring/summer period 2013-14.

The proposed External Transmission Line was assessed in June 2013. Targeted survey for threatened flora and fauna species has been carried out within the study area and the western extension between 2012 and 2015.

The details of the general flora and fauna assessments of the study area, with the purpose of documenting the existing conditions for the site, are presented in Biosis (2017a). Details of the targeted surveys for threatened flora and fauna, including the implications of relevant biodiversity legislation and policy assessed against the proposed Development Plan, are outlined in this report. A detailed assessment for potential Brolga *Antigone rubicunda* breeding and flocking habitats within and adjacent to the proposed wind farm has been undertaken and is outlined in Biosis (2017b).

## 1.2 Scope of assessment

The objectives of this investigation are to document the results of the targeted surveys for threatened flora and fauna species for the proposed wind farm site, roadsides and associated external transmission route. The objectives are to be achieved by:

- Undertaking targeted survey for threatened flora species, including:
  - Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*
  - Curley Sedge *Carex tasmanica*
  - Matted Flax-lilly *Dianella amoena*
  - Small Golden Moths *Diuris basaltica*

- Clover Glycine *Clycine latrobeana*
- Adamson's Blown-grass *Lachnagrostis adamsonii*
- White Sunray *Leucochrysum albicans* var. *tricolor*
- Salt-lake Tussock-grass *Poa sallucustris*
- Fragrant Leek-orchid *Prasophyllum suaveolens*
- Basalt Rustyhood *Pterostylis basaltica*
- Undertaking targeted survey for threatened fauna species, including:
  - Migratory shorebirds
  - Corangamite Water Skink *Eulamprus tympanum marnieae*
  - Striped Legless Lizard *Delma impar*
  - Golden Sun Moth *Synemon plana*
  - Growling Grass Frog *Litoria raniformis*
  - Southern Bent-wing Bat *Miniopterus schreibersii bassanii*
  - Aquatic fauna (Dwarf Galaxias *Gallaxiella pusilla*, Yarra Pygmy Perch *Nannoperca obscura*, Hairy Burrowing Crayfish *Engaeus sericatus*).
- Review the implications of biodiversity legislation and policy relevant to the proposed wind farm Development Plan.
- Identifying potential implications of the proposed Development Plan and provide recommendations to assist with reducing impacts.

### 1.3 Study area

The study area is located near the township of Mortlake, approximately 200 kilometres west of Melbourne (Figure 1). It covers approximately 12,549 hectares and is bordered to the south by the Hamilton Highway, to the north by Woorndoo-Dundonnell Road, to the east by Six Mile Lane and Darlington-Nerrin Road and to the west by the Hamilton Highway and Salt Creek (Figure 1).

The majority of the study area is within the Farming Zone (FZ, Moyne Shire), with some areas of roadside within Road Zone (RDZ1). No overlays relevant to flora and fauna are located within the study area.

The study area is contained within the Victorian Volcanic Plain Bioregion, and the surface geology is the result of quaternary basalt flows, with small areas of more recent alluvial sediments (derived from basalt) around lakes and waterways. The most recent basalt flows, which are confined to the northern section of the study area, have formed complex stony rises, interspersed with low-lying areas and wetlands. Older basalt flows in the southern section of the study area have weathered to an undulating or flat landscape.

Most of the study area has been cleared of native vegetation and is currently managed for grazing and cropping. However areas of remnant native vegetation persist within the stony rises, and in low-lying areas associated with depressions and drainage lines. Several roadsides within the wider area are known to support high-value native grasslands. Very few remnant native trees are present within the main wind farm area.

The study area includes upper reaches of Blind Creek, a number of unnamed tributaries of Stony Creek and Mount Emu Creek and a number of wetlands and farm dams (Figure 2).

The study area also includes the proposed transmission line corridor, which extends from the south-western edge of the wind farm, through an area supporting open River Red Gum woodland and a commercial Blue Gum plantation before terminating at the Mortlake Power Station.

Data and information gathered during the ecological assessments undertaken within the Mount Fyans study area has been used to prepare a detailed Development Plan that aims to avoid and minimise impacts on biodiversity values. The current Development Plan (February 2017) is shown in Figure 3 and includes the following:

- Turbine Development Envelope, in which turbines and associated infrastructure such as access tracks and underground cables may be developed.
- Works Exclusion areas, in which all works will be excluded, including works within the Turbine Development Envelope.

The study area is within the:

- Victorian Volcanic Plain Bioregion
- Hopkins River Basin
- Management area of the Glenelg Hopkins CMA
- Moyne Shire Local Government Area.

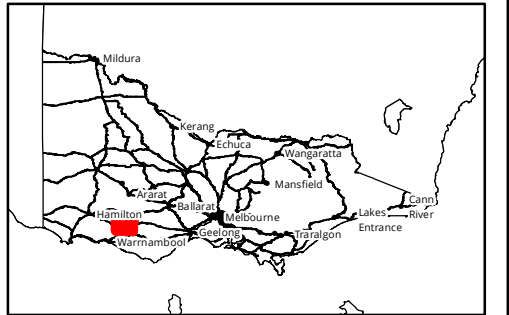
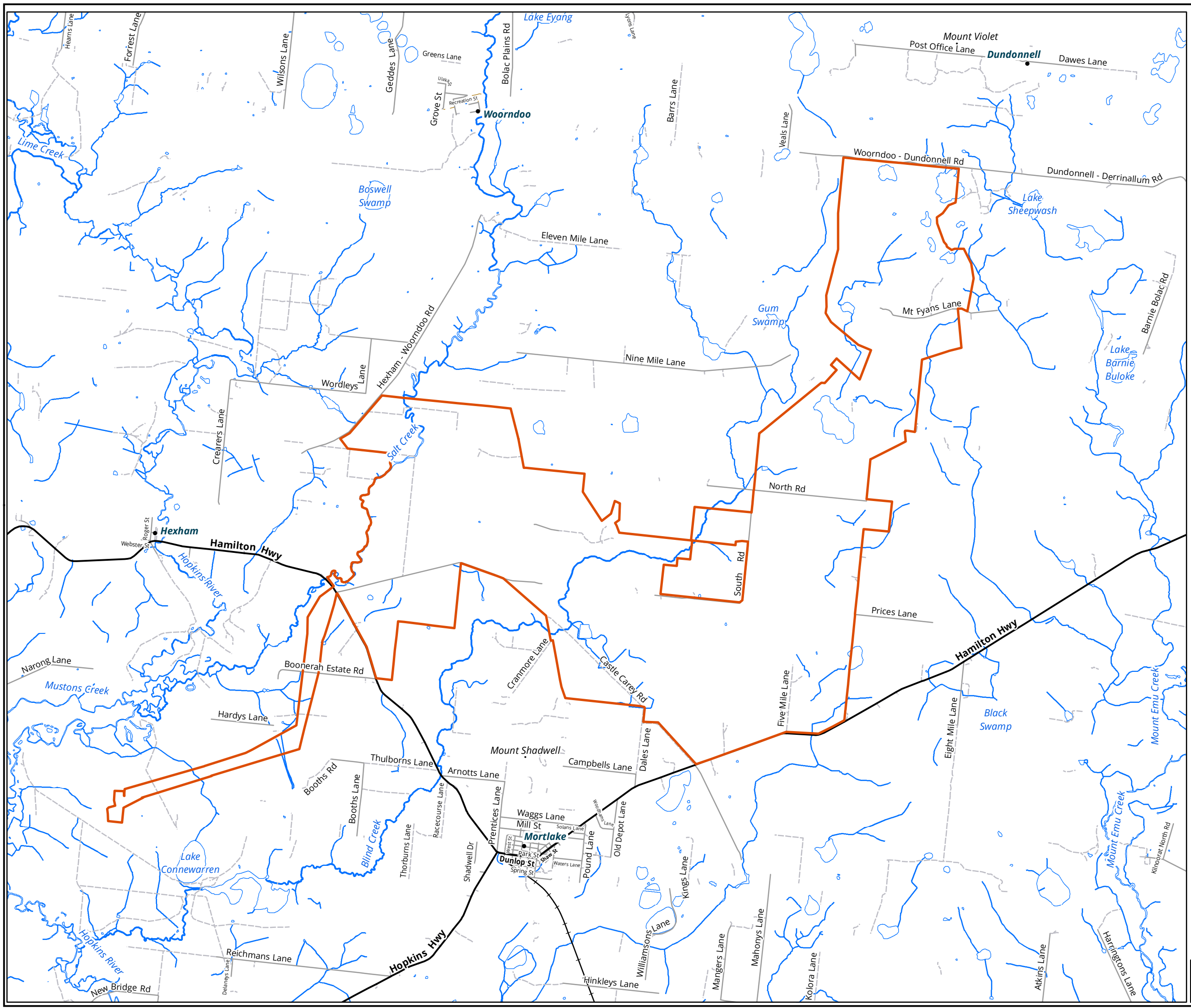
## 1.4 Landscape context

The study area falls within a section of the volcanic plain which has very few areas of remnant vegetation and habitats managed for conservation. The largest nearby conservation areas are the Cobra Killuc Wildlife Reserve, between Hexham and Woorndoo, and the Mortlake Common Flora Reserve to the west of Mortlake. The study area is typical of much of the surrounding landscape, being largely cleared with low relief and intersected by intermittently flowing creeks and ephemeral and permanent wetlands.

A large proportion of the study area, particularly adjacent to creeks and drainage lines are subject to flooding (VicMap Hydro 1:25,000 flat\_sti (subject to inundation) mapping layer).

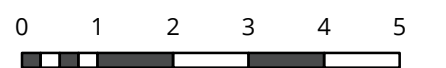
The Western District Lakes Ramsar site includes a number of wetlands that are primarily located within the Lake Corangamite Basin, however, the most westerly component of this Ramsar site (Lake Bookar) is located within the Mount Emu Creek catchment (Hopkins River Basin) and is located approximately 25 kilometres south-east of the study area. There does not appear to be any direct hydrological connectivity between the study area and Lake Bookar.

The section of Blind Creek within the study area (Reach 24 – a 54 kilometres reach upstream of Salt Creek) was assessed in the 2004 Index of Stream Condition assessment to be in moderate condition (DSE 2005a). Aquatic life was not assessed, and the streamside zone was considered to be in excellent condition, with all other sub-indices (physical form, hydrology and water quality) considered to be in poor-moderate condition (3-4/10). The condition of Blind Creek within the study area is primarily affected by extensive historical clearing and hydrological alterations associated with extraction for agricultural purposes and subsequent summer stress (4/10) (DSE 2005a).



**Legend**  
 Study area

**Figure 1 Location of the Mt Fyans Wind Farm study area**

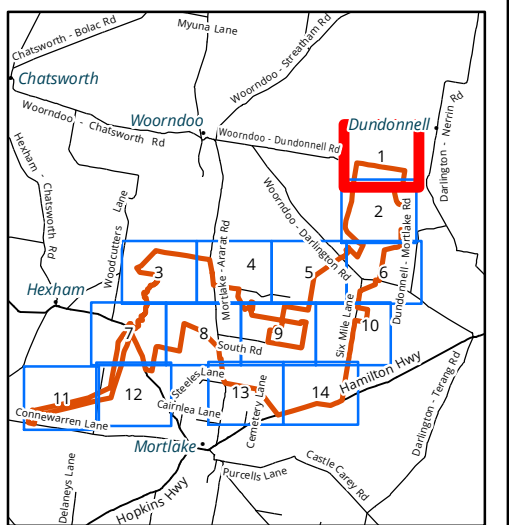
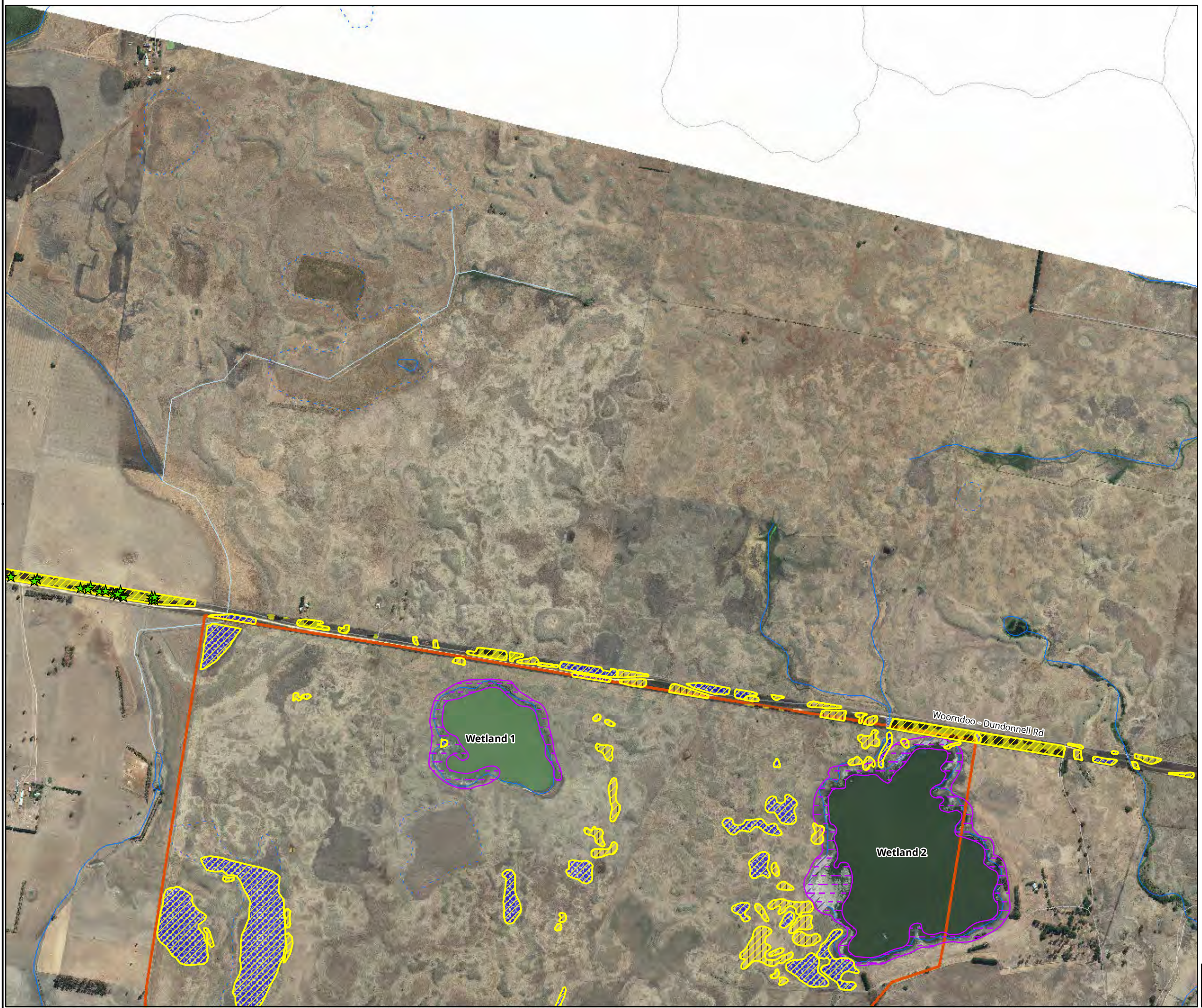


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- Legend**
- Study Area
  - Spiny Rice Flower location
  - Threatened Fauna Habitat**
  - Corangamite Water Skink
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland
  - 649 Stony Knoll Shrubland
  - 653 Aquatic Herbland
  - 656 Brackish Wetland
  - 821 Tall Marsh

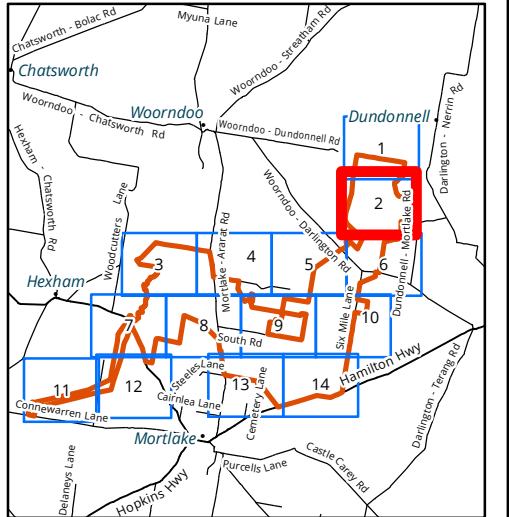
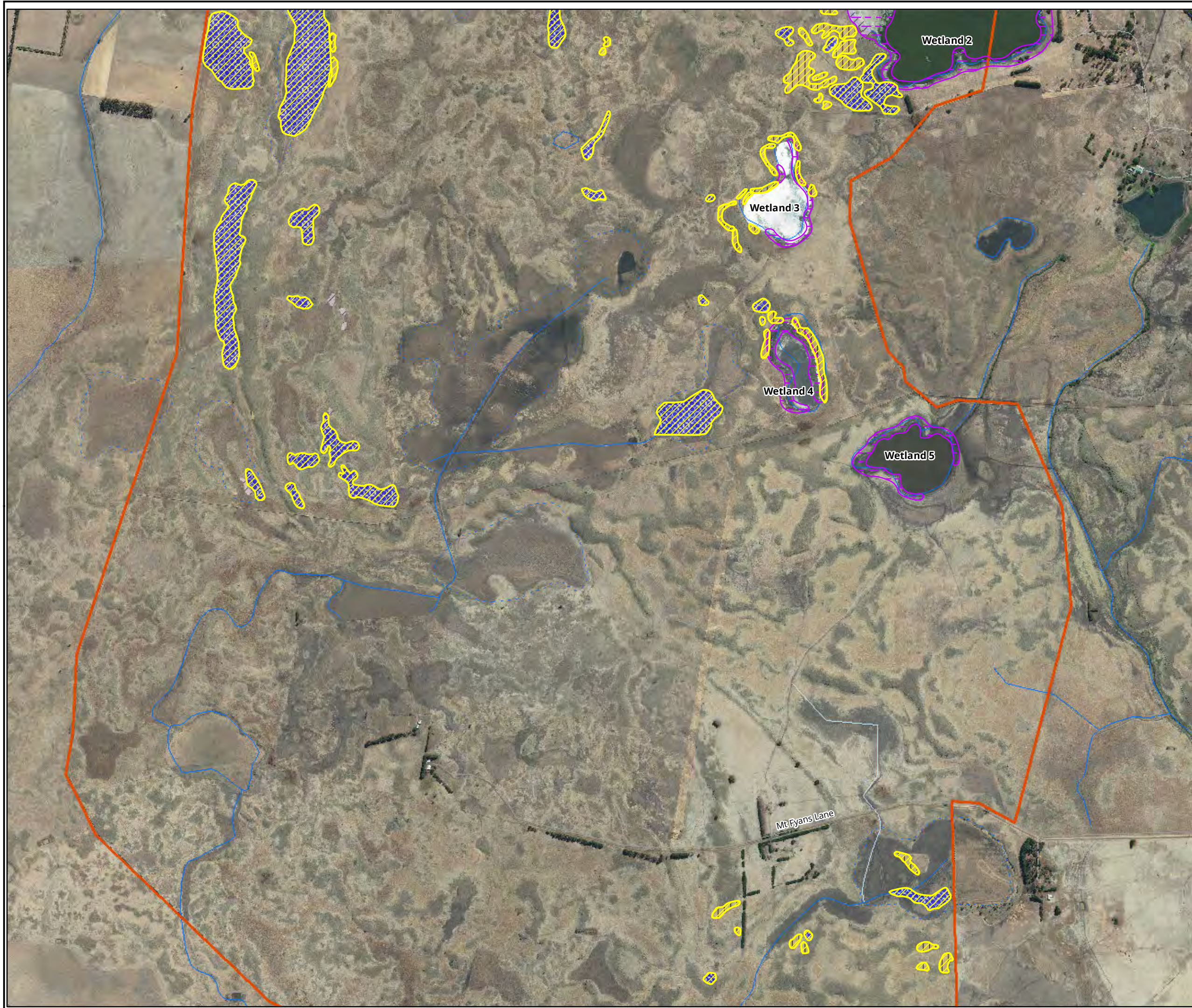
**Figure 2.1 Ecological features of the study area**

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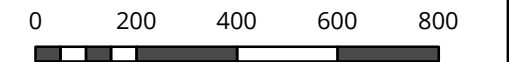
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- Legend**
- Study Area
  - Threatened Fauna Habitat**
  - Corangamite Water Skink
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 649 Stony Knoll Shrubland
  - 653 Aquatic Herbland
  - 656 Brackish Wetland

**Figure 2.2 Ecological features of the study area**

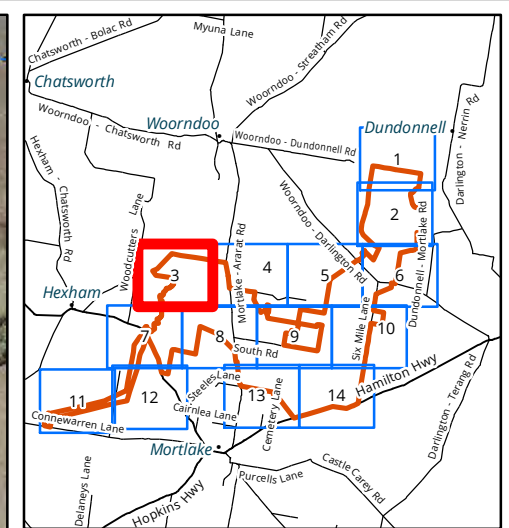
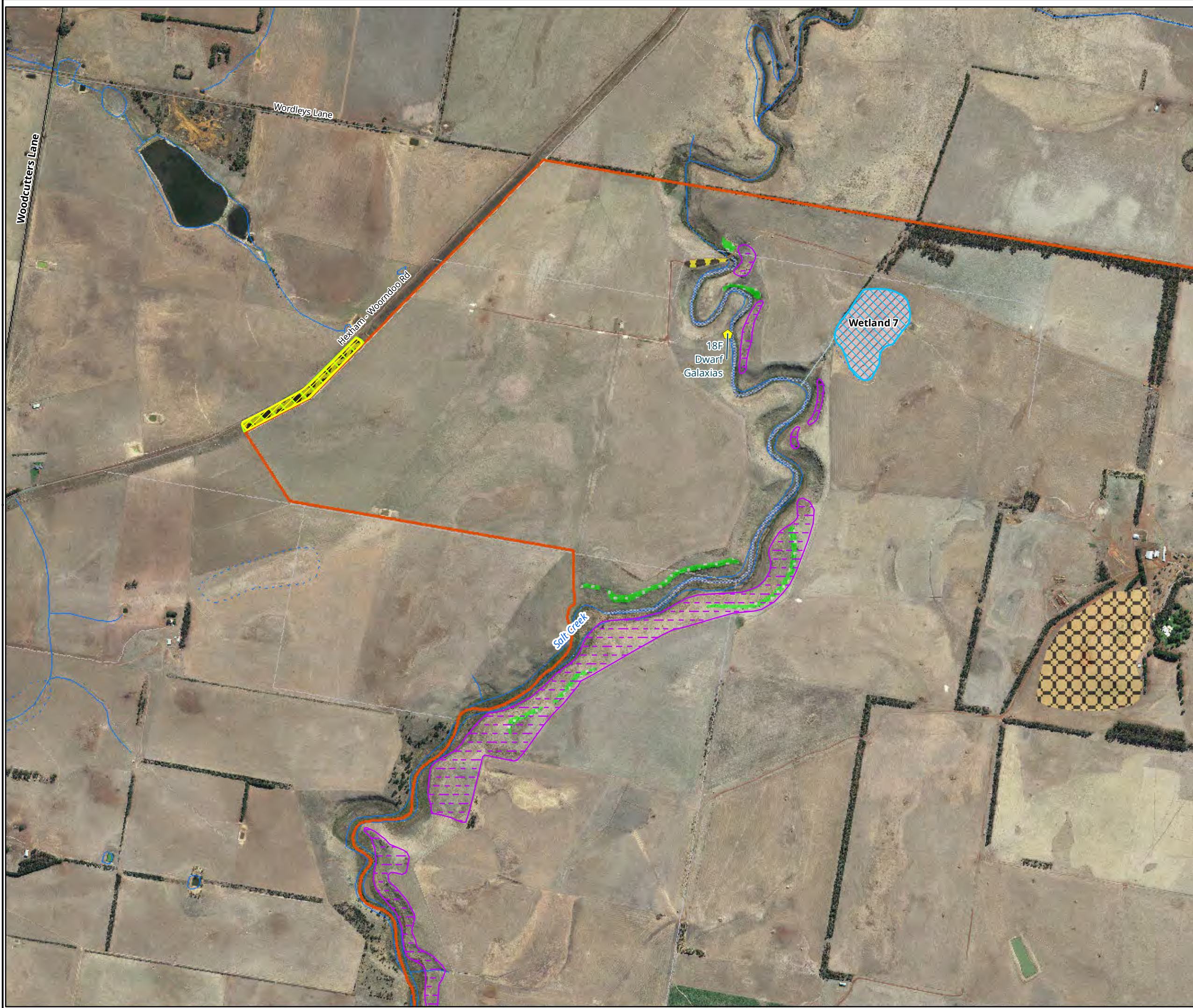


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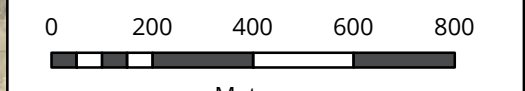
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- Legend**
- Study Area
  - ◆ Dwarf Galaxias recorded
  - Threatened Fauna Habitat**
  - Corangamite Water Skink
  - Striped Legless Lizard
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain Seasonal Herbaceous
  - Wetlands (Freshwater) of the Temperate Lowland Plains
  - Ecological Vegetation Class**
  - 132\_61 Heavier-soils Plains Grassland
  - 653 Aquatic Herbland
  - 821 Tall Marsh
  - 894 Scoria Cone Woodland
  - 895 Escarpment Shrubland

**Figure 2.3 Ecological features of the study area**



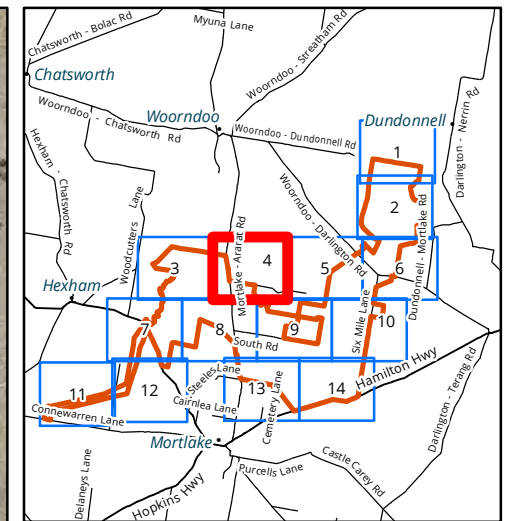
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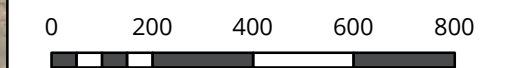
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 Date: 10 March 2017,  
 Checked by: SLA, Drawn by: SKM, Last edited by: Iharley  
 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv





**Legend**  
 Study Area

**Figure 2.4 Ecological features of the study area**

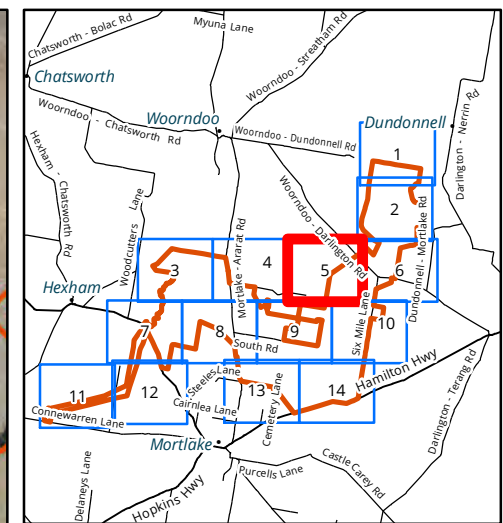


Metres  
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 Coordinate System: GDA 1994 MGA Zone 54



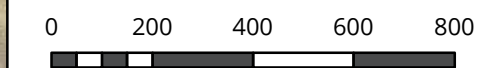
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- Legend**
- Study Area
  - Degraded Treeless Vegetation
- Ecological Vegetation Class**
- Salt Lake

**Figure 2.5 Ecological features of the study area**

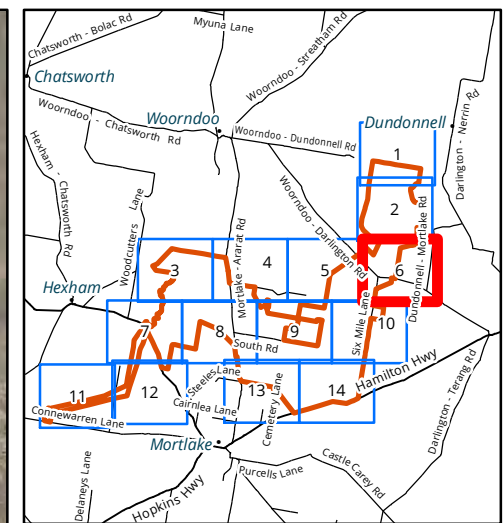


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 Coordinate System: GDA 1994 MGA Zone 54



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 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - Degraded Treeless Vegetation
- EPBC Act Listed**
- Ecological Communities**
- Natural Temperate Grassland of the Victorian Volcanic Plain
  - 132\_61 Heavier-soils Plains Grassland
- Ecological Vegetation Class**
- 125 Plains Grassy Wetland
  - 649 Stony Knoll Shrubland
  - Salt Lake

**Figure 2.6 Ecological features of the study area**

0 200 400 600 800  
Metres

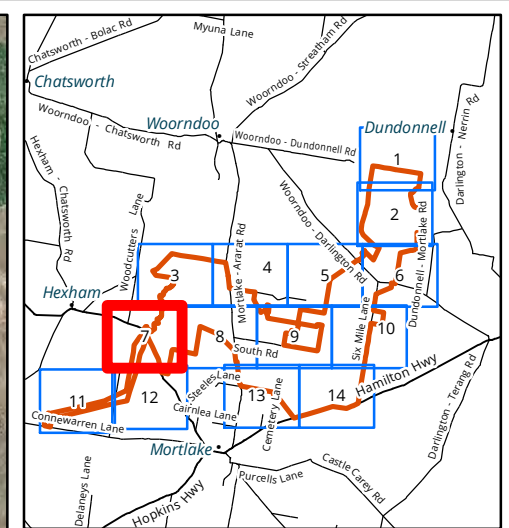
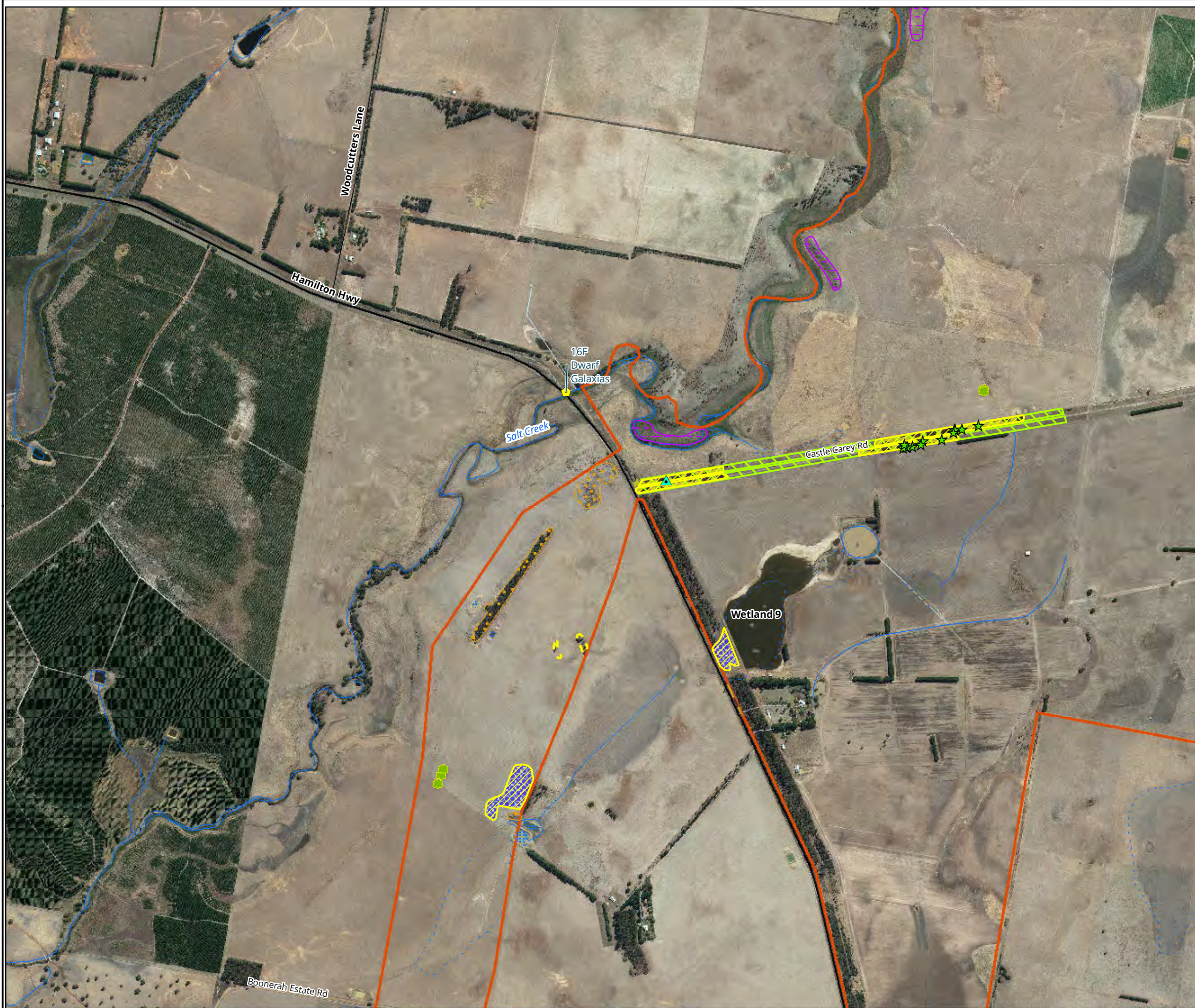
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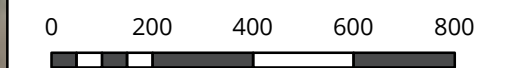
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Date: 10 March 2017,  
Checked by: SLA, Drawn by: SKM, Last edited by: Iharley  
Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - ▲ Striped Legless Lizard recorded
  - ◆ Dwarf Galaxias recorded
  - ★ Spiny Rice Flower location
  - Scattered Tree(s) - River Red Gum
  - Degraded Treeless Vegetation
  - Planted Vegetation
  - Farm Dam (Artificial Wetland)
  - Threatened Fauna Habitat**
  - Corangamite Water Skink
  - Striped Legless Lizard
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland

**Figure 2.7 Ecological features of the study area**

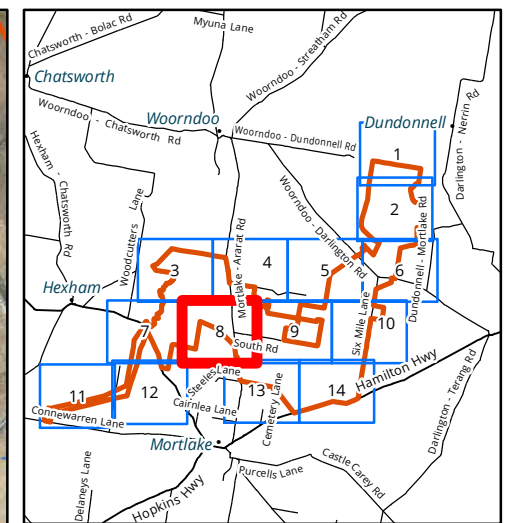


Metres  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54



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 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - ◆ Hairy Burrowing Crayfish recorded
  - Scattered Tree(s) - River Red Gum
  - Threatened Fauna Habitat**
  - Hairy Burrowing Crayfish
  - Striped Legless Lizard
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland

**Figure 2.8 Ecological features of the study area**

0 200 400 600 800  
Metres

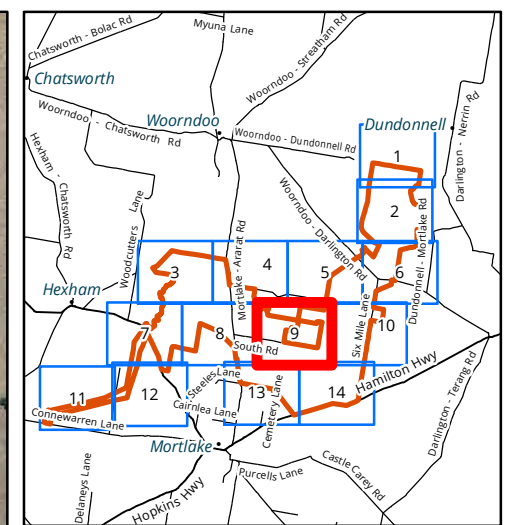
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Coordinate System: GDA 1994 MGA Zone 54

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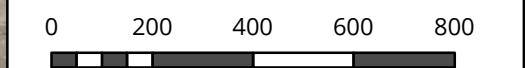
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Matter: 21630,  
Date: 10 March 2017,  
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Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - EPBC Act Listed Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 132\_61 Heavier-soils Plains Grassland
  - 653 Aquatic Hermland

**Figure 2.9 Ecological features of the study area**

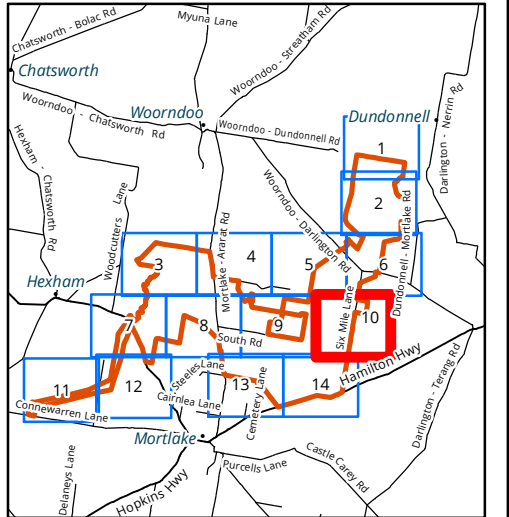


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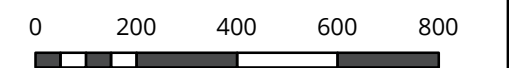
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 Date: 10 March 2017,  
 Checked by: SLA, Drawn by: SKM, Last edited by: Iharley  
 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland

**Figure 2.10 Ecological features of the study area**

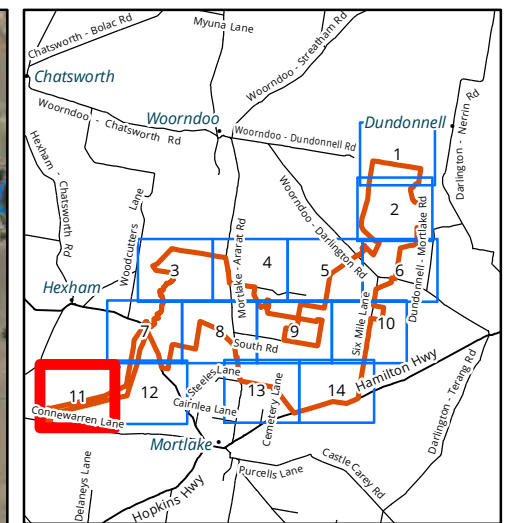
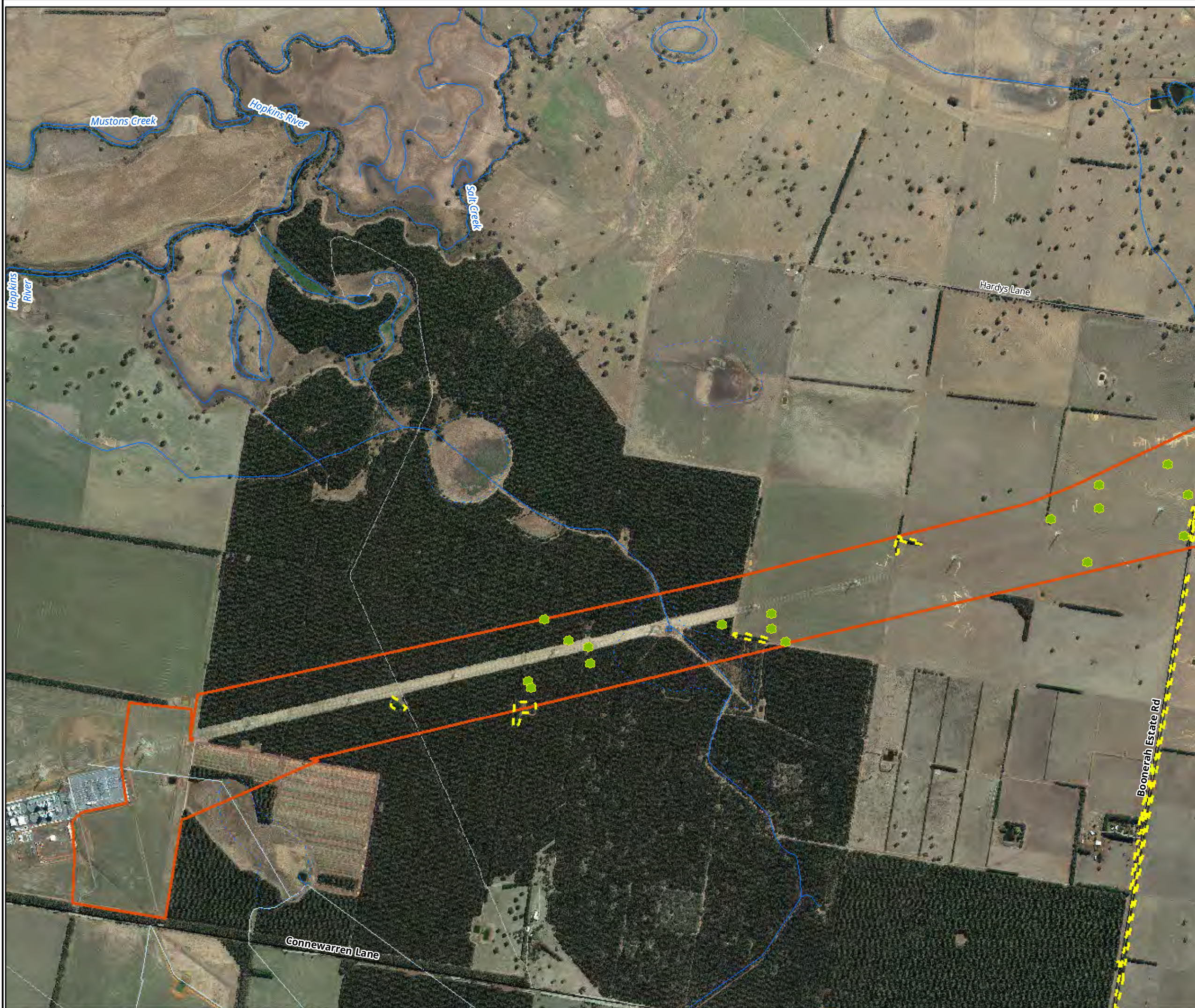


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 Coordinate System: GDA 1994 MGA Zone 54



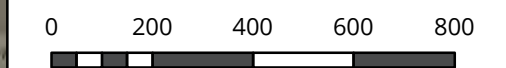
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 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - ★ Scattered Tree(s) - River Red Gum
  - Degraded Treeless Vegetation
  - Planted Vegetation
  - Farm Dam (Artificial Wetland)
- Ecological Vegetation Class**
- 55\_61 Plains Grassy Woodland

**Figure 2.11 Ecological features of the study area**



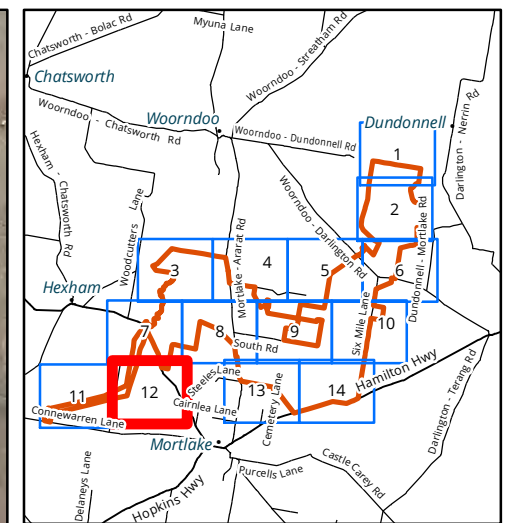
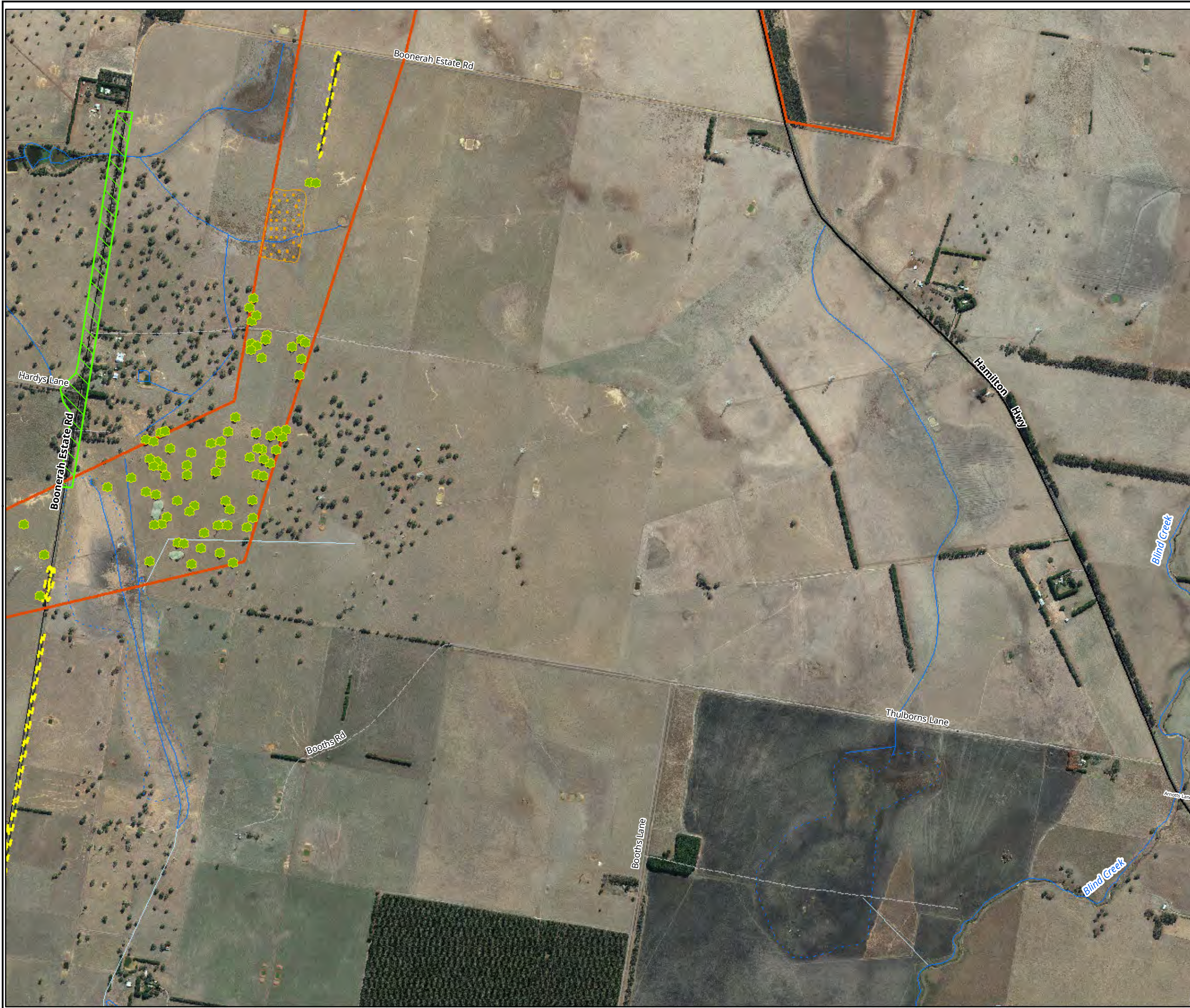
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 Scale: 1:15,000 @ A3  
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 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv





- Legend**
- Study Area
  - ★ Scattered Tree(s) - River Red Gum
  - Degraded Treeless Vegetation
  - Planted Vegetation
  - Farm Dam (Artificial Wetland)
  - Threatened Fauna Habitat
  - Toadlet
  - Ecological Vegetation Class
  - 55\_61 Plains Grassy Woodland

**Figure 2.12 Ecological features of the study area**

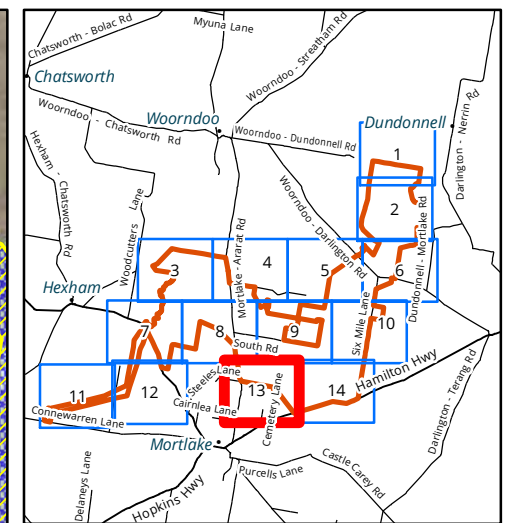
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Metres  
Scale: 1:15,000 @ A3  
Coordinate System: GDA 1994 MGA Zone 54



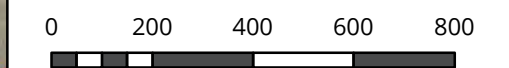
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Date: 10 March 2017,  
Checked by: SLA, Drawn by: SKM, Last edited by: Iharley  
Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - Threatened Fauna Habitat**
  - Striped Legless Lizard
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland
  - 55\_61 Plains Grassy Woodland
  - 653 Aquatic Herbland

**Figure 2.13 Ecological features of the study area**



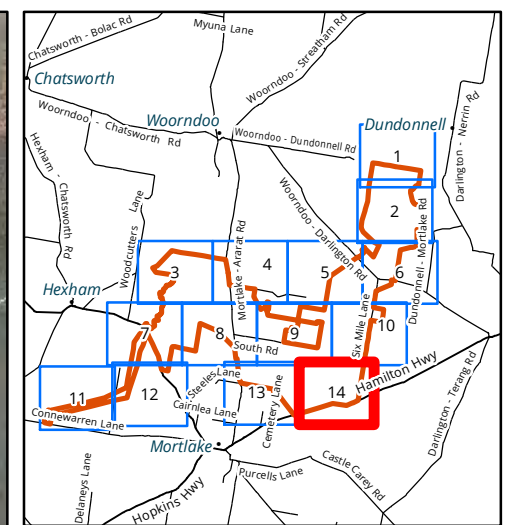
Metres  
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 Coordinate System: GDA 1994 MGA Zone 54

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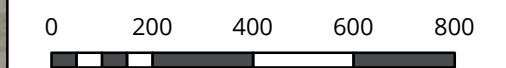
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Mapper: 21630,  
 Date: 10 March 2017,  
 Checked by: SLA, Drawn by: SKM, Last edited by: Iharley  
 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv



- Legend**
- Study Area
  - EPBC Act Listed**
  - Ecological Communities**
  - Natural Temperate Grassland of the Victorian Volcanic Plain
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 653 Aquatic Herbland

**Figure 2.14 Ecological features of the study area**



Metres  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54

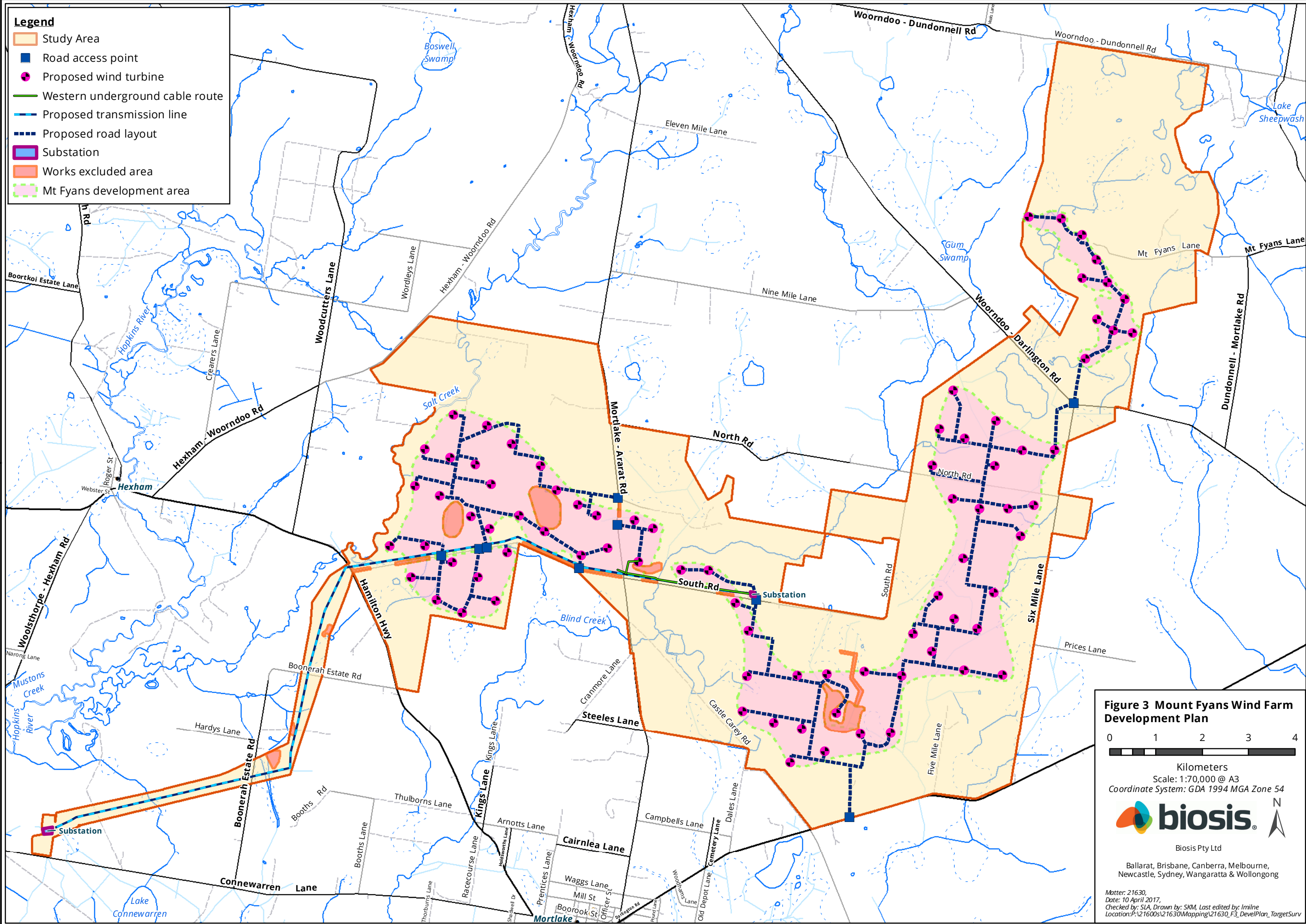


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Matter: 21630,  
 Date: 10 March 2017,  
 Checked by: SLA, Drawn by: SKM, Last edited by: Iharley  
 Location: P:\21600s\21630\Mapping\21630\_F2\_EcoFeatures\_TargetSurv

**Legend**

- Study Area
- Road access point
- Proposed wind turbine
- Western underground cable route
- Proposed transmission line
- Proposed road layout
- Substation
- Works excluded area
- Mt Fyans development area



**Figure 3 Mount Fyans Wind Farm Development Plan**

0 1 2 3 4  
Kilometers

Scale: 1:70,000 @ A3  
Coordinate System: GDA 1994 MGA Zone 54

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Location: P:\21600s\21630\Mapping\21630\_F3\_DevelPlan\_TargetSurv

## 2. Methods

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### 2.1 Targeted surveys

#### 2.1.1 Flora

Targeted surveys for threatened flora species were conducted between July 2013 and February 2015. The details of the species surveyed and the methods used are provided in Section 3, and the survey locations are shown in Figure 4.

#### 2.1.2 Fauna

Targeted surveys for threatened fauna species was conducted between 2012 and 2015. The details of the species surveyed and the methods used are provided in Section 4, and survey locations are shown in Figure 4.

### 2.2 Permits

Biosis undertakes flora and fauna assessments under the following permits and approvals:

- Research Permit/Management Authorisation and Permit to Take Protected Flora & Protected Fish issued by DELWP under the *Wildlife Act 1975*, *Flora and Fauna Guarantee Act 1988* and *National Parks Act 1975* (Permit number 10007569).
- Approvals 07.15 and 14.12 from the Wildlife and Small Institutions Animal Ethics Committee.
- Permit RP1220 issued by DELWP (Fisheries Victoria) under the *Fisheries Act 1995*.

### 2.3 Qualifications

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as low abundance, patchy distribution, species dormancy, seasonal conditions, and migration and breeding behaviours. In many cases these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

The current fauna assessment was conducted over successive years and this has allowed surveys to be conducted for a range fauna species and across multiple seasons. This has allowed us to conduct targeted assessment for fauna species during the most appropriate timeframe for the survey of those species.

Additionally, due to the ephemeral nature of the waterbodies within the study area many aquatic assessment sites were dry at time of survey. The number of sites assessed for aquatic fauna still allowed for a reasonable determination of the likelihood of occurrence to be assessed for aquatic fauna, as the target species typically occupy ephemeral habitats; with the exception of Screech Beetle. Aquatic sites were assessed downstream of the study area to provide an indication of the suite of aquatic species that occur within the sub-catchments of the study area which are likely to occur during inundation of ephemeral waterbodies

At the time of the initial assessment in 2012, many areas of roadside reserve vegetation had been recently burnt as part of DELWP's controlled burning regime. These areas were re-assessed in January 2017.

Access was restricted in a small area of transmission line at the most southern extent (Figure 4) however this area was visible from the boundary fence of adjoining land. An over the fence assessment was adequate as the area supported only Blue Gum plantation and degraded treeless vegetation (cleared plantation).

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## 2.4 Mapping

Hydro Tasmania supplied aerial photography, the study area boundary and the project Development Plan.

Mapping was conducted using hand-held (uncorrected) GPS units (WGS84) and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the GPS units (generally  $\pm 7$  metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files which contain our flora and fauna spatial data are available to incorporate into design concept plans. However this mapping may not be sufficiently precise for detailed design purposes.

## 3. Targeted surveys for threatened flora

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During assessment of the existing conditions, suitable habitat was identified within the study area for 11 flora species listed under the EPBC Act (Biosis 2017a) (Appendix A1.2). Targeted survey for these species was undertaken in winter 2013 and the spring/summer season of 2014/15. Species surveyed, methods and results are discussed below. The ecological features and location of targeted surveys for threatened species is shown in Figure 4. A list of flora species recorded from the study area during the general and targeted surveys is provided in Appendix A1.1.

### 3.1 Target Species

**Spiny Rice-flower** – *Pimelea spinescens* subsp. *spinescens* (EPBC Act: critically endangered; *Flora and Fauna Guarantee Act 1988* (FFG Act): threatened; DELWP Advisory List: endangered (DSE 2005b)) is known to occur primarily in grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although it is also recorded in grassland dominated by introduced perennial grasses. The closest records (DSE 2010a) to the site include one from 2007 located in Darlington approximately 5 kilometres east of the study area and three records from 1990, 2005 and 2009 along the Woorndoo-Dundonnell Rd about 12 kilometres east of the north-eastern boundary of the site. Floristic information including species cover estimates has been collected at one of these sites. At the Woorndoo-Dundonnell Rd site, Spiny Rice-flower was recorded growing in a grassland dominated by Kangaroo-grass with a diverse assemblage of herbs and grasses including Tussock-grass *Poa* spp., Lemon Beauty-heads *Calocephalus citreus*, Blue Devil *Eryngium ovinum*, Sundew *Drosera* spp., Wallaby-grass *Rytidosperma* spp. and two other state significant species; Small Milkwort *Comesperma polygaloides* and Derrinallum Billy-buttons *Craspedia* sp.2.

**Curly Sedge** – *Carex tasmanica* (EPBC Act: vulnerable; FFG Act: threatened; DELWP Advisory List: vulnerable) occupies seasonally wet areas including the margins of freshwater swamps and intermittent drainage lines on fertile clay soils. The closest record (DSE 2010) is more than 30 kilometres south-east of the site just west of Lake Corangamite. No floristic information is available for this record. In other areas further west Curly Sedge is recorded growing in association with sedge and rush genera including *Carex*, *Eleocharis*, *Baumea*, *Juncus* and *Isolepis*.

**Matted Flax-lily** – *Dianella amoena* (EPBC Act: endangered; FFG Act: threatened; DELWP Advisory List: endangered) grows in lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays. There are two records near the study area. One is from 1978 immediately east of the study area and Six Mile Lane. The second record (2002) is located approximately 5 kilometres southeast of the site. The available floristic information for these sites is limited; however the records indicate that Matted Flax-lily occurs within grassland vegetation also supporting Kangaroo Grass *Themeda triandra* and Sheep's Burr *Acaena* spp.

**Small Golden Moths** – *Diuris basaltica* (EPBC Act: endangered; FFG Act: threatened; DELWP Advisory List: vulnerable) occupies grassland vegetation dominated by tussock-forming perennial grasses (including Kangaroo Grass), often with embedded surface basalt. There are three records within approximately 20 kilometres north of the site. Two of these records, from 2007 and 2009, included detailed floristic information. The vegetation at these locations was recorded as grassland dominated by Kangaroo-grass containing a range of typical grassland species including Blue Devil *Eryngium ovinum*, Sheep's Burr *Acaena echinata*, Common Woodruff *Asperula conferta*, Common Everlasting *Chrysocephalum apiculatum* and Common Raspwort *Gonocarpus tetragynus*.

**Clover Glycine** – *Glycine latrobeana* (EPBC Act: vulnerable; FFG Act: threatened; DELWP Advisory List: vulnerable) typically occurs across south-eastern Australia on a range of soil types within grassland and grassy woodlands on a range of soils (Carter & Sutter 2010). There are a number of records within 5 kilometres to the north along Woorndoo-Dundonnell Road and west within the Cobra Killuc Wildflower Reserve. Overall, these sites support Kangaroo Grass dominated grassland and a suite of graminoid and forb species such as Spear-grass *Austrostipa* spp., Mat-rush *Lomandra* spp., Yellow Rush-lily *Tricoryne elatior*, Chocolate Lily *Arthropodium strictum*, Common Everlasting *Chrysocephalum apiculatum* and Slender Sun-orchid *Thelymitra pauciflora*.

**Adamson's Blown-grass** – *Lachnagrostis adamsonii* (EPBC Act: vulnerable; FFG Act: threatened; DELWP Advisory List: vulnerable) typically occurs in low-lying, seasonally wet or swampy areas of plains communities, often in slightly saline conditions. The nearest records to the site are approximately 30 kilometres from the study area. These records are west (Caramut), north (Lake Bolac) and east (Derrinallum) of the site. Many of these sites lack additional floristic information however species commonly recorded at these sites along with Adamson's Blown-grass include Plains Saltmarsh-grass *Puccinellia perluxa*, Australian Salt-grass *Distichlis distichophylla*, Streaked Arrowgrass *Triglochin striata* and the introduced Water Buttons *Cotula coronopifolia*.

**White Sunray** – *Leucochrysum albicans* var. *tricolor* (EPBC Act: endangered; FFG Act: threatened; DELWP Advisory List: endangered) grows on the grasslands of the Victorian Volcanic Plains, primarily on acidic clay soils derived from basalt, with occasional occurrences on adjacent sedimentary, sandy-clay soils. There are three records within 10 kilometres of the site and another three within 20 kilometres. These sites support Kangaroo Grass *Themeda triandra* dominated grasslands and a suite of typical grassland species including Spear-grass *Austrostipa* spp., Wallaby-grass *Rytidoserma* spp., Rice-flower *Pimelea* spp. and Bluebell *Wahlenbergia* spp.

**Salt-lake Tussock-grass** – *Poa sallucustris* (EPBC Act: endangered; FFG Act: threatened; DELWP Advisory List: endangered) is known from grasslands and herblands on the sloping verges of saline lakes, with the majority of records more than 20 kilometres south-east of the site in the Corangamite Lakes region. Many of these records do not contain any additional floristic data. Those that do suggest a grassy wetland habitat supporting species typical of saline areas including Australian Salt-grass *Distichlis distichophylla*, Plains Saltmarsh-grass *Puccinellia perluxa*, Creeping Brookweed *Samolus repens* var. *repens* and Beaded Glasswort *Sarcocornia quinqueflora* subsp. *quinqueflora*.

**Fragrant Leek-orchid** – *Prasophyllum suaveolens* (EPBC Act: endangered; FFG Act: threatened; DELWP Advisory List: endangered) typically occupies poorly drained *Themeda* grasslands. The closest records of this species are more than 10 kilometres north-east and north-west of the site in grassland vegetation supporting graminoid and forb species including Wallaby Grass *Rytidosperma* spp., Kangaroo Grass *Themeda triandra*, Bluebell *Wahlenbergia* spp., Sun Orchid *Thelymitra* spp., Bulbine Lily *Bulbine bulbosa* and Milkmaids *Burchardia umbellata*.

**Basalt Rustyhood** – *Pterostylis basaltica* (EPBC Act: endangered; FFG Act: threatened; DELWP Advisory List: endangered) is known to occupy stony rises and areas of Plains Grassland supporting embedded surface rock. Suitable habitat within the study area includes Stony Knoll Shrubland dominated by grass and forb species and small areas of Plains Grassland. The presence of this habitat was limited, particularly as most stony rises within the site typically support a high cover of Austral Bracken *Pteridium esculentum*.

There are only seven records of Basalt Rustyhood within Victoria. The majority of these are located within the road reserve of Woorndoo-Dundonnell Road and adjoining private property approximately 3 kilometres south of Dundonnell. Targeted surveys for Basalt Rustyhood were undertaken within all areas of Plains Grassland, on all stony rises dominated by grass and forb species and some rises dominated by Austral Bracken or introduced flora.



## 3.2 Methods

Surveys followed the guidelines specified in the Biodiversity Precinct Structure Planning Kit (DSE 2010b) which include assessment by two botanists walking parallel transect lines a maximum distance of five metres apart within all potential habitat during the flowering period.

### 3.2.1 Investigation Area

Targeted surveys for Spiny Rice-flower were conducted within 39.63 hectares (16 patches) of suitable Plains Grassland habitat in 2013. These areas are also mapped as the EPBC Act listed ecological community Natural Temperate Grassland of the Victorian Volcanic Plain. Spiny Rice-flower was considered to have at least medium likelihood of occurrence within these areas.

Prior to the 2014/2015 targeted surveys, the wind farm investigation area was reduced due to preliminary design changes to avoid impacts to ecological and cultural heritage values. Therefore, the Spring/Summer 2014/15 targeted surveys were undertaken across a reduced study area.

Targeted searches were conducted for 10 species across 74.28 hectare. A total of 22 patches of four Ecological Vegetation Classes (EVCs) as well as vegetation bordering a saline wetland were surveyed. The total area and number of patches of each vegetation type in which survey for each of the targeted species were undertaken are listed below in Table 1. Locations of the areas surveyed for each species within the Mount Fyans study area are shown in Figure 4.

### 3.2.2 Survey Timing and Methods

Targeted surveys were undertaken within the flowering periods of target species, which is considered the optional time as per the species' Survey Guidelines. Dates of survey are listed in Table 1.

In some areas along Castle Carey Road (Figure 4) the cover of native and introduced grasses was dense and therefore survey effort and detection capacity were improved by reducing to 3 metres the distance between the people walking transects.

**Table 1 Threatened flora targeted survey details**

Species	EVCs and Total Area (ha) Surveyed	Flowering Period	Survey Dates (Winter 2013 Spring/Summer 2014/15)
<b>Curly Sedge</b> <i>Carex tasmanica</i>	Brackish Wetland (#6) 4.92 ha Plains Grassy Wetland 45.97 ha	Sept–Nov	Sept 25–26 2014 Oct 28–29 2014 Nov 26–27 2014
<b>Matted Flax-lily</b> <i>Dianella amoena</i>	Plains Grassland 13.35 ha	Oct–Feb	Sept 25–26 2014 Oct 28–29 2014 Nov 26–27 2014 Dec 22–23 2014 Jan 22–23 2015 Feb 26–27 2015
<b>Small Golden Moths</b> <i>Diuris basaltica</i>	Plains Grassland 13.35 ha Stony Knoll Shrubland 2.34 ha	Sept–Oct	Sept 25–26 2014 Oct 28–29 2014
<b>Clover Glycine</b> <i>Glycine latrobeana</i>	Plains Grassland 13.35 ha Stony Knoll Shrubland 2.34 ha	Sept–Dec	Sept 25–26 2014 Oct 28–29 2014 Nov 26–27 2014 Dec 22–23 2014

Species	EVCs and Total Area (ha) Surveyed	Flowering Period	Survey Dates (Winter 2013 Spring/Summer 2014/15)
<b>Adamson's Blown-grass</b> <i>Lachnagrostis adamsonii</i>	Brackish Wetland (#6) 4.92 ha Plains Grassy Wetland 45.97 ha Aquatic Herbland 7.71 ha	Nov	Oct 28-29 2014 Nov 26-27 2014 Dec 22-23 2014
<b>Spiny Peppercress</b> <i>Lepidium aschersonii</i>	Brackish Wetland (#6) 4.92 ha Aquatic Herbland 7.71 ha Plains Grassy Wetland 45.97 ha	Sept-May	Sept 25-26 2014 Oct 28-29 2014 Nov 26-27 2014 Dec 22-23 2014 Jan 22-23 2015 Feb 26-27 2015
<b>White Sunray</b> <i>Leucochrysum albicans</i> var. <i>tricolor</i>	Plains Grassland 13.35 ha Stony Knoll Shrubland 2.34 ha	Sept-Feb	Sept 25-26 2014 Oct 28-29 2014 Nov 26-27 2014 Dec 22-23 2014 Jan 22-23 2015 Feb 26-27 2015
<b>Spiny Rice-flower</b> <i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Plains Grassland 39.63 ha	Apr-Aug	Jul 31 2013 Aug 1 2013
<b>Salt-lake Tussock-grass</b> <i>Poa sallacustris</i>	Brackish Wetland (#6) 4.92 ha	Sept-Dec	Sept 25-26 2014 Oct 28-29 2014 Nov 26-27 2014 Dec 22-23 2014
<b>Fragrant Leek-orchid</b> <i>Prasophyllum suaveolens</i>	Plains Grassland 13.35 ha Stony Knoll Shrubland 2.34 ha	Sept-Oct	Sept 25-26 2014 Oct 28-29 2014
<b>Basalt Rustyhood</b> <i>Pterostylis basaltica</i>	Stony Knoll Shrubland 2.34 ha Plains Grassland 13.35 ha	Nov-Jan	Sept 25-26 2014 Oct 28-29 2014 Nov 26-27 2014 Dec 22-23 2014 Jan 22-23 2015

### 3.3 Results and discussion

Only one of the target species was recorded within the study area – Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*. No Spiny Rice-flower plants were found within the private land portion of the study area. However, Spiny Rice-flower was recorded in several new locations within the Woorndoo-Dundonnell Road reserve and the Castle Carey Road reserve. Eighty-two Spiny Rice-flower plants were recorded within a 5 hectare area along the Woorndoo-Dundonnell Road reserve (Figure 2.1) and 35 plants were recorded within 2.5 hectares along Castle Carey Road (Figure 2.7).

The quality of the surveyed habitat was variable. Ground surface visibility on the days of survey was generally high, with the exception of rank patches of Plains Grassland along Castle Carey Road. As aforementioned, survey intensity was increased in these areas. Overall, following a reduction in the extent of the study area,

patches of potential habitat for threatened species are generally surrounded by farmland consisting predominantly of grazing lands. As a result, there is limited habitat for these species within the immediate surrounds of the study area.

### **3.4 Potential impacts and recommendations**

The findings of this study indicate that, with the exception of Spiny Rice-flower, the target species are not present.

Spiny Rice-flower was recorded from two locations (Figure 4):

- Within the Woorndoo-Dundonnell Road reserve outside of the study area.
- Within the Castle Carey Road reserve, within the study area but outside of the proposed development area.

The current Development Plan avoids direct impacts on either of these populations.

As a result, there is no requirement to refer the project under the EPBC Act in regard to nationally significant flora species and no further survey is considered necessary for any of these species within the current study area.

## 4. Targeted surveys for threatened fauna

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Targeted assessments have been carried out within the wind farm and the western extension between 2012 and 2015 for a number of threatened fauna species with potential to occur (Appendix A2.2). The survey locations are shown in Figure 4 and are summarized below:

- Migratory wader survey in the wind farm – August 2012 and January/February 2013.
- Migratory wader survey in the western extension – July 2013 and January/February 2014.
- Targeted survey for Corangamite Water Skink - October 2012 – January 2013.
- Targeted survey for Corangamite Water Skink within western extension of study area – October 2013 – January 2014.
- Targeted survey was undertaken over five days for Dwarf Galaxias, Yarra Pygmy Perch, Hairy Burrowing Crayfish and Screech Beetle between November 22, 2012 and January 3, 2013.
- Targeted survey for Striped Legless Lizard – October – November 2013.
- Southern Bent-wing Bat roost site survey – April 2013.
- Targeted survey for Golden Sun Moth – Summer 2014/15.
- Targeted survey for Growling Grass Frog – November/December 2014.

There are specific survey guidelines for the survey of threatened species (including migratory shorebirds). These are detailed in the descriptions below for each species or group of taxa. A list of fauna species recorded from the study area during general and targeted surveys is provided in Appendix A2.1.

In 2009 and 2014 targeted survey was undertaken for Brolga. Aerial survey was conducted to assess Brolga breeding activity within and adjacent to the proposed wind farm site (Biosis 2017b). A survey of Brolga movements around Lake Sheepwash was conducted in May 2013, following detection of flocking activity at the site. Survey was undertaken to conform to relevant survey guidelines (DSE 2012). Studies into how Brolga may utilise the study area have been undertaken and the findings of these surveys are presented in a separate report (Biosis 2017b).

### 4.1 Migratory shorebirds

The study area contains a number of permanent and ephemeral wetlands that may provide habitat for significant populations of migratory shorebirds. Thirty-six international migratory shorebirds are regular visitors to Australia and these species are protected as international migratory species under the EPBC Act. The species listed under the EPBC Act include those listed under the China-Australia Migratory Bird Agreement (CAMBA), the Japan-Australia Migratory Bird Agreement (JAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and the Convention on the Conservation of Migratory species of Wild Animals (Bonn Convention). Actions that may affect migratory shorebirds or their habitat require assessment under the EPBC act as all listed migratory species are considered Matters of National Environmental Significance (NES).

Actions that may have a significant impact on migratory shorebirds by way of the destruction or modification of important habitat and/or where sites contain significant populations of migratory shorebirds requires assessment against the following criteria:

- Sites that contain 0.1% of a population of the listed species in the flyway population;
- At least 2000 migratory shorebirds; or
- An individual site that contains at least 15 species listed in the Significant Impact Guidelines for 36 Migratory Shorebirds (DEWHA 2009a).

The aim of the targeted migratory shorebird surveys was to assess if the study area supports significant populations or important habitat for migratory shorebirds. Surveys were conducted in accordance with the guidelines set out in the Significant Impact Guidelines for 36 Migratory Shorebirds (DEWHA 2009a).

### **Ramsar Wetlands and listing criteria**

The study site is located north-west upstream of the Western District Lakes Ramsar site but does not have any direct waterway connections to this listed site. The Ramsar site, which consists of nine main permanent fresh and brackish lakes, was listed according to criteria 1a, 3a 3b and 3c and has significant ecological values. The site was not listed under criteria 6 which relates to the presence of significant migratory shorebird populations. A Wetland listed under criterion 6 is for sites that are known to contain 0.1% of the flyway population for any of the listed migratory shorebird species. There are no other migratory shorebird habitat areas identified within the general vicinity of the study area.

### **Internationally important shorebird habitat in western Victoria**

There are several sites of international importance for migratory shorebirds in western Victoria (Bamford et. al. 2008). Sites are located east of the study area at Lake Martin (north-east of Colac) and along the coast between Port Fairy and Warrnambool. These two areas support non-breeding populations of Curlew Sandpiper and Sanderling (Bamford et. al. 2008).

#### **4.1.1 Survey methods**

Winter surveys were conducted in August 2012 and July 2013 to locate any over-wintering shorebirds that may have stayed in Australia rather than return to the northern hemisphere to breed. This survey was carried out over two days on 28-29 August 2012 and 17-18 July 2013 within the general wind farm area and the western extension area. Summer surveys were conducted within the general wind farm area on four occasions between January and February 2013. Three additional sites of potentially important habitat have been identified in the western extension area. Winter survey was conducted over two days during July 2013. Summer migratory shorebird surveys were carried out in the western extension area during January and February 2014.



**Plate 1: Migratory shorebird habitat at Lake Myrngrong, Mount Fyans.**

#### **4.1.2 Survey results**

Six locations were identified within the general wind farm area as potentially supporting important habitat for migratory shorebirds. Migratory shorebird habitat is primarily located in the north of the study site (Figure 2) and consists of both permanent and ephemeral fresh and brackish wetland types. Wetlands 1, 2 and 5 (Figure 2.1-2.2) are fed by springs which provide a permanent (but variable) inflow of water throughout the year. Water levels in the various wetlands fluctuate during the year depending on the degree of evaporation and the quantity of inflowing water that is naturally supplied to the wetlands via springs and/or rainfall. There is a general reduction in the water level across all wetlands over the summer and autumn. The majority of these wetlands are fringed by deeply fissured basalt rock and are relatively complex, providing a range of foraging areas for migratory shorebirds (Plate 1).

As water levels drop, rocky platforms, mud flats with shallow channels and small muddy sandbars are revealed, providing feeding and roosting sites for migratory shorebirds. Migratory shorebird habitat identified in the south-west of the study area consists of permanent and ephemeral freshwater wetlands, showing some similarities with the wetlands to the north-east of the study area. However the wetlands in the south-west generally have less complex shoreline habitats and exhibit a greater degree of fluctuation in water levels throughout the year. These wetlands are also identified in Figure 2.7.

Migratory shorebird habitat in the western extension area chiefly consists of ephemeral freshwater wetlands and the permanent freshwater habitat along Salt Creek. Most habitat is not highly complex compared to other wetlands in the general vicinity of the proposed wind farm, however migratory wader habitat show similarities with other wetlands found in the north-east of the study area. Due to changes in the proposed layout of the wind farm many of the wetlands that were formally included within the north-eastern part of the former study area have since been excluded. The data from the wetlands no longer included within the study area is still included in this report as it gives context to the current study area and illustrates more generally what sort of migratory wader habitat is near the proposed wind farm and number of migratory waders observed in the habitats.

A desktop assessment indicated that several species of threatened migratory shorebirds have been recorded within 10 kilometres of the study area (Appendix A2.3). However no significant population of any listed shorebird species has been recorded within the study area. The nearest important sites for migratory

shorebirds are located to the east and south of the study area along the coast between Port Fairy and Warrnambool and at Lakes Martin, Corangamite and Gnarpurt to the north of Colac.

The results of the winter and summer surveys are provided in Appendix A2.4 and A2.5. Four listed migratory shorebird species were identified during the current assessment but the number of species and individuals observed was insufficient for any of the sites to be considered "important habitat".

The four migratory species recorded in the study were:

- **Sharp-tailed Sandpiper** *Calidris acuminata*. Fourteen birds were observed on two occasions at Wetland 2 (Figure 4.1) and were all seen actively foraging. No roosting behaviour was observed.
- **Latham's Snipe** *Gallinago hardwickii*. A single bird was opportunistically flushed from grassland adjacent to Wetland 2.
- **Red-necked Stint** *Calidris ruficollis*. A total of 134 birds were observed over four surveys from Wetland 2 (Figure 4.1). Collectively this was the largest group of any listed migratory shorebird species observed during the current study. All birds were seen foraging or loafing. No roosting behaviour was observed.
- **Common Sandpiper** *Actitis hypoleucos*. Two birds were seen at Wetland 2 during survey 1. They were seen actively foraging and no roosting behaviour was observed.

Most waterfowl and shorebirds were observed at Wetland 2. This site provided the highest quality habitat for the majority of these species present and was the only site that retained permanent water over the life of the study. Minor numbers of migratory shorebirds were observed in the western extension area, however no significant numbers of shorebirds were observed and none of the wetlands in the western extension area are considered to constitute important shorebird habitat

#### 4.1.3 Potential impacts and recommendations

The footprint of the current Development Plan (Figure 3) has been designed to avoid all of the wetlands that were identified as potential migratory bird habitat, particularly those wetlands in the north of the study area where most waterfowl and shorebirds were observed. Therefore, direct impacts on these habitats have been avoided. The closest turbines from the proposed Development Plan are located over 3 kilometres from Wetland 2.

No bird utilisation surveys have been undertaken at this point in the project. If required to be undertaken, bird utilisation surveys could assist in providing additional data on the use of the broader study area by migratory birds.

## 4.2 Corangamite Water Skink

The Corangamite Water Skink is listed as Endangered under the EPBC Act and is considered Critically Endangered in the *Advisory List of Threatened Vertebrate Fauna in Victoria* (DSE 2013). It is also listed under the FFG Act. The Corangamite Water Skink was considered to have a high likelihood of occurrence within suitable habitat within the study area and a number of areas of potential habitat were identified. These areas are described below and shown in Figure 4.

Corangamite Water Skink is generally found in areas of stony knolls that exhibit deep fissures and cracks and that are associated with ephemeral or permanent wetlands on the Victorian volcanic plain. The closest database records both date from 1998 and are located at Lake Myrngrong outside the north-eastern corner of the study area and on a drainage line adjacent to the Darlington-Carranbal Road approximately 9

kilometres east of the study site. There are other records of the species to the north and north-east around Pura Pura.

#### 4.2.1 Survey methods

Targeted survey was undertaken within potential habitat during January and February 2013 and 2014, with four surveys completed at all sites within summer (January and/or February): Surveys were conducted on the following dates:

- 2013: January 8-9, January 22-23, February 5-6
- 2014: January 20, February 6-7, February 18-19, February 28.

Surveys were completed when conditions were warm and with little or no cloud when skinks are most likely to be active. Details of the meteorological conditions at the time of each survey are outlined in Appendix A2.6.

Throughout the surveys the presence and basking activity of all other reptile species was noted as this is also considered to be indicative of the suitability of conditions for observing Corangamite Water Skinks. For the current survey, the technique used by Peterson (2000) was adopted. This entails an observer walking slowly and quietly around the perimeter all suitable habitats. The observer pauses frequently, scanning potential habitat areas with binoculars from up to 10 metres away. Habitat areas were also examined with a 10x60 spotting scope to identify all reptiles initially observed with binoculars. This technique reduces the likelihood of skinks retreating out of view before they can be identified. A hand-held GPS was used to record the position of all sightings.

#### 4.2.2 Survey results

Detailed Corangamite Water Skink survey results are provided in Appendix A2.6, and summarised in Table 2.

**Table 2 Summary of Corangamite Water Skink records**

Wetland	Number of individuals recorded
<b>Wetland 1</b>	19
<b>Wetland 2</b>	0
<b>Wetland 3</b>	3
<b>Wetland 4</b>	4
<b>Wetland 5</b>	0
<b>Wetland 6</b>	0
<b>Wetland 7 (western ext.)</b>	0
<b>Wetland 9 (western ext.)</b>	0
<b>Salt Creek (western ext.)</b>	0

The Corangamite Water Skink was identified at Wetlands 1, 3 and 4 (Figure 4.1 and 4.2). At Wetland 1, 19 individuals were recorded on the north-eastern corner of the wetland. All 19 individuals were contained in an area of highly fissured basalt, occupying approximately 250 metres of shoreline. Individuals were observed basking or actively hunting in rock crevices from the waterline to the upper edge of the rock formations. Plate 2 shows high quality habitat around the margin of Wetland 1. Individuals were also recorded around



Wetlands 3 and 4 over two surveys. No Corangamite Water Skinks were recorded in the western extension area during surveys in 2014.



**Plate 2 Corangamite Water Skink habitat on the margin of Wetland 1**

#### **4.2.3 Potential impacts and recommendations**

As outlined above, the proposed wind farm has been situated to avoid any direct impacts on wetlands 1-9, as shown by the current Development Plan. The locations of Wetlands 1, 3 and 4, where Corangamite Water Skinks are recorded, are well outside the proposed wind farm footprint and the construction and operation of the wind farm is not expected to impact on this species or its habitat.

### **4.3 Striped Legless Lizard**

The Striped Legless Lizard is listed as Vulnerable under the EPBC Act and is considered Endangered in the Advisory List of Threatened Vertebrate Fauna in Victoria (DSE 2013). It is also listed under the FFG Act 1988.

The Striped Legless Lizard inhabits remnant grassland, woodland and rocky areas on Victoria's volcanic plains and adjacent bioregions. The nearest confirmed records of the species, dating from 2007 and 2006, occur on the Woorndoo-Darlington Road approximately 10 kilometres east of the study site and at Pura Pura 12 kilometres from the study site. There are also records from between 2004 and 2009 on the Hexham-Chatsworth Road approximately 5 kilometres south west of the study area. There is a confirmed non-database record of the species dating from 2004 on the Woorndoo-Streatham Road just south of the railway line at Nerrin Nerrin approximately 15 kilometres north-west of the study area (G. Peterson DELWP pers. comm. 2013).

#### **4.3.1 Survey methods**

Striped Legless Lizard habitat has been identified within patches of Plains Grassland (Figure 2.8). These areas consist of linear strips of remnant grassland along roadsides and in road reserves containing loose and lightly

embedded rock and cracking clay soils. All patches of Plains Grassland and potential Striped Legless Lizard habitat identified were surveyed either by non-destructive rock rolling or roof tile survey.

Initial assessment for Striped Legless Lizard within potential habitat areas was carried out during October and November 2013 via non-destructive rock rolling. Late spring is considered optimal time for survey of the species in south-western Victoria (G. Peterson DELWP pers. comm. 2013).

The use of roof tiles, as outlined in *Survey guidelines for Australia's Threatened Reptiles* (DSEWPaC 1999) was also adopted for the targeted assessment. This involves placing a tile grid containing 50 non-glazed roof tiles in a grid pattern with tiles approximately 5 metres apart and distributed over an area of approximately 900 m<sup>2</sup>. A total of eight tile grids were laid out during winter at least 6 weeks prior to commencement of the survey in October 2013 (Figure 4). This allowed tiles to bed-in and provide artificial habitat sites fauna. Tile checks were carried out weekly during October and November with a minimum of eight checks over the period.

### 4.3.2 Survey results

Tile checking for Striped Legless Lizard commenced in October 2013 with eight checked completed by the end of November. Striped Legless Lizards (Plate 3) were recorded on three occasions from one of the tile grids located at the western end of Castle Carey Road adjacent to the Hamilton Highway (Figure 4.7; Table 3). Striped Legless Lizard was not recorded from any other location within the study area during the targeted surveys involving rock rolling.

Other reptile species identified during the period of the tile survey included the Common Brown Snake *Pseudonaja textilis*, Robust Skink *Ctenotus robustus*, Grass Skink *Lampropholis guichenoti* and the Advisory Listed Tussock Skink *Pseudemoia pagenstecheri*. The Fat-tailed Dunnart was recorded on Woorndoo Road at tile grid 2.



**Plate 3** Striped Legless Lizard found during tile survey

**Table 3 Number of individual Striped Legless Lizards recorded during the 2013 tile survey**

Tile survey site	1 Oct.	11 Oct.	17 Oct.	1 Nov.	8 Nov.	15 Nov.	21 Nov.	28 Nov.
1 - Woorndoo-Dundonnell Rd (west) (Fig. 4.1)	-	-	-	-	-	-	-	-
2 - Woorndoo-Dundonnell Rd (centre) (Fig. 4.1)	-	-	-	-	-	-	-	-
3 - Woorndoo-Dundonnell Rd (east) (Fig. 4.1)	-	-	-	-	-	-	-	-
4 - Hexham-Woorndoo Rd (Fig. 4.3)	-	-	-	-	-	-	-	-
5 - Castle Carey Rd (west 1) (Fig. 4.7)	-	1	2	-	-	1	-	-
6 - Castle Carey Rd (west 2) (Fig. 4.7)	-	-	-	-	-	-	-	-
7 - Castle Carey Rd (east 1) (Fig. 4.13)	-	-	-	-	-	-	-	-
8 - Castle Carey Rd (east 2) (Fig. 4.13)	-	-	-	-	-	-	-	-

### 4.3.3 Potential impacts and recommendations

Striped Legless Lizard was recorded within the road reserve along Castle Carey Road. Despite not being recorded elsewhere during the targeted surveys, as a cryptic species, there is still some potential for the species to occur in suitable grassland habitat within the study area. Striped Legless Lizards are known to inhabit native grassland within road reserves throughout their range extending across western Victoria (G. Peterson (DELWP), pers. comm.). However, with the revised Development Plan, construction works associated with the wind farm infrastructure along road reserves has been minimized through the avoidance of these habitat patches.

To further minimize risk and potential impacts on Striped Legless Lizards and their habitat, access tracks that intercept habitat along Castle Carey Road reserve will use existing road access locations. During construction, grassland habitat within the road reserve will be adequately fenced as 'no-go' zones.

## 4.4 Golden Sun Moth

Golden Sun Moth is a medium sized, diurnal (day flying) moth with clubbed antennae (Edwards 1993). The species is sexually dimorphic with the females having an enlarged abdomen and ovipositor that aids in egg laying. The species is also sexually dichromatic in wing colour. The forewings of female Golden Sun Moth are brown and grey while the hind wings are yellow with black spots. Male Golden Sun Moths have dark brown forewings with grey scales and bronze-coloured hind wings. The underside of both pairs of wings is white with small black spots along the margin in females and pale grey with dark brown spots in the males. The females, which only fly irregularly, position themselves on the ground in a conspicuous location (usually inter-tussock spaces), flashing their golden hind wings to attract males, who fly low over the grasses searching for them.

Potential habitat for the Golden Sun Moth consists of areas which previously or currently have native grasslands or grassy woodlands (including derived grasslands) across the historical range of the species. Previous studies found that the moths show a preference for wallaby grasses *Rytidosperma* spp. (particularly *R. carphoides*, *R. auriculata*, *R. setacea*, *R. eriantha*, *R. racemosa*). However, more recent surveys have found Golden Sun Moth present in degraded grasslands and patches invaded with weedy species, including exotic Chilean Needle-grass *Nassella neesiana*, spear grasses *Austrostipa* spp. and Weeping Grass *Microlaena stipoides* (Braby and Dunford 2006; Gilmore et al. 2008).

Inter-tussock spaces are considered important in assisting patrolling males to locate females displaying from a sedentary position (Gilmore et al. 2008). This is supported by observations of male moths showing a preference for relatively open areas with reduced biomass, suggesting females are in turn present in those areas (Gilmore et al. 2008).

Sites considered marginal or unsuitable for Golden Sun Moth include cropped or recently ploughed areas (Gilmore et al. 2008). However, virtually all other grassland and grassy woodland supporting some native grasses or introduced grasses from the genus *Nassella* within the species historic range have the potential to support the species.

The breeding season begins in mid-October and continues through to early January (DEWHA 2009b). Actual timing of breeding differs slightly from year to year depending on climate and location. During this period adult moths emerge continuously in cohorts and males are seen actively flying in search of females.

It was previously thought that Golden Sun Moth only fly on warm (> about 20 degrees Celsius), calm days with little or no cloud and in the hottest part of the day (between 10:00 hrs and 14:00 hrs) (Clarke and O'Dwyer 2000). However, since 2005 Biosis have often recorded active male moths on cooler days, on days of partial or full cloud cover, on days within 24 hours following rainfall, during times of moderate to strong wind conditions and also at times earlier and later in the day than previously thought. Sometimes this involves large numbers of individuals. However more typically this has involved smaller numbers of moths than those observed during 'optimal' conditions. Surveying in less than optimal conditions can be sufficient to determine presence / absence of the species at a locality, but is considered less reliable when trying to determine abundance and extent and distribution at a site.

Male flight is low, to about a metre above the ground, fast and typically in a zig zag pattern as they 'patrol' for females. Females have been observed flying without provocation and are capable of flying distances of > 40 metres and sometimes a number of females can be observed flying across a site (D. Gilmore, pers. obs.). However, compared to males they are relatively sedentary. Females tend to walk from tussock to tussock to lay between 100 and 150 eggs amongst the tillers of a grass (Gibson 2006).

The larval lifespan of Golden Sun Moths is essentially unknown but larvae are thought to spend 1 - 4 years underground. The diet of larvae is thought to consist of the roots of wallaby-grasses, spear-grasses, Red-leg Grass and the introduced Chilean Needle-grass (Braby and Dunford 2006; Gilmore et al. 2008). Adult moths do not have functional mouthparts and are unable to feed. This reduces the adult life to a few days (O'Dwyer and Attiwill 1999).

#### 4.4.1 Survey methods

The EPBC Act Protected Matters Search Tool indicates that the study area is within the broad distributional range of the Golden Sun Moth and thus that habitat may occur there (Appendix A2.2). The nearest records on the DELWP Biodiversity Interactive Map are near Darlington (2012) and Caramut (2009) approximately 9 kilometres east and 14 kilometres west of the study area, respectively.

Patches of potential habitat have been previously identified by Biosis Research (2012) in the general wind farm area and western extension area. These patches are located in patches of *Heavier Soils* Plains Grassland and Stony Knoll Shrubland, as outlined below and shown in Figure 2.

- *Heavier Soils* Plains Grassland on Castle Carey Road (six patches)
- Stony Knoll Shrubland adjacent to the Woorndoo-Darlington Road (three patches)
- *Heavier Soils* Plains Grassland on Hexham-Woorndoo Road (one patch)
- Stony Knoll Shrubland adjacent to Mount Fyans Lane (four patches)

Other patches of grassland that were not considered to be of sufficient habitat quality were not included in the current study.

Survey was undertaken during the 2014/15 Golden Sun Moth flight season. As the timing of the flight season varies annually and geographically, the best indicator of key survey period is the presence of flying males at known local sites. Reference sites were monitored during the expected flying period and used to guide survey timing at the target site, as specified in the *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth* (DEWHA 2009b). Golden Sun Moth activity was monitored throughout Victoria during the flight season through communication between Biosis and other ecological consultants, using an email group maintained by Biosis.

Targeted surveys were undertaken at the study area on 12/12/2014, 22/12/2014, 02/01/2015 and 07/01/2015. The surveys were undertaken at approximately weekly intervals to allow for variations in emergence timing. Surveys took place when conditions were suitable for male flight (generally >20°C, bright, clear days, full sun or sparse cloud, absence of rain and wind other than a light breeze) between 10:00 hrs and 15:00 hrs. The timing of survey was guided by weather information obtained from the Bureau of Meteorology (BOM) website ([www.bom.gov.au](http://www.bom.gov.au)). Actual weather conditions, including temperature, humidity and wind speed including, were measured on site using a Kestrel Weather Meter (Model 4000). Weather data collected on site is provided in Table 4. Where weather data was not able to be collected on site we have used data from the nearest BOM automatic weather station.

On each survey the entire area of each patch of potentially suitable habitat was searched systematically by driving the length of the patch and by walking a series of transects spaced approximately 5 metres apart.

**Table 4 Summary of on-site weather data at the commencement of Golden Sun Moth surveys**

Date	Air temperature (°C)	Cloud cover (%)	Wind direction	Average wind speed (kilometres/hr)	Ground conditions	Humidity (%)
12/12/2014	23	<10	SE	8.7	Dry	23
*22/12/2014	24	<10	ENE	24	Dry	56
02/01/2015	34	10	NW	16	Dry	30
07/01/2015	35	0	NNW	18	Dry	28

\*Weather data sourced BOM automatic weather station at Mortlake, weather recording at 3 pm EDST.

## Limitations

The nearest reference site Biosis was able to monitor was located at Wandobah, approximately 30 kilometres west of the study area. As no other suitable reference sites close to the study area was accessible during the flight season, Biosis has relied on reference site surveys from within the broader region to provide information on the flight activity of Golden Sun Moth at the time of survey within the wind farm site. Other reference locations monitored in that period included sites at Lethbridge and the greater Melbourne area.

The EPBC Act survey guidelines for Golden Sun Moth require that surveys are conducted during the local flying season. As the timing of the flight season varies annually and geographically, the guidelines specify that reference sites should be monitored during the expected flying period and used to guide survey timing at the target site. Outside of the Melbourne Strategic Assessment Area there is no requirement to conduct reference site checks on the same day as subject site surveys, provided surveys are conducted during suitable weather conditions. However, we confirmed that Golden Sun Moth were flying at other reference sites within the broader region at the time of our targeted surveys.

#### 4.4.2 Survey results

No Golden Sun Moths were recorded on site during any of the targeted surveys (Table 5). The weather conditions under which the surveys were undertaken were suitable, as outlined in the guidelines, and are included in Table 4.

Non-target insects were recorded on site during the surveys including other diurnal moths, butterflies, wasps, flies and beetles.

Positive sightings of flying Golden Sun Moth males recorded during the survey period at a range of reference sites are listed in Appendix A2.7.

**Table 5 Golden Sun Moth survey results**

Date	Time Start	Time Finish	Observer initials	GSM observed on site?
12/12/2014	11:35 am	13:40 pm	GLT	No
22/12/2014	13:05 pm	14:35 pm	SLA, CPM	No
02/01/2015	12:30pm	14:00 pm	MSG	No
07/01/2015	12:00 pm	14:10 pm	IV	No

#### 4.4.3 Potential impacts and recommendations

Despite targeted survey being undertaken within potential habitat for Golden Sun Moth across the study area, the species has not been recorded on site. Consequently, Golden Sun Moth is not considered to be present and the proposed wind farm is not expected to impact the species or its habitat. No further survey is considered necessary or recommended.

### 4.5 Growling Grass Frog

Growling Grass Frog is listed as vulnerable under provisions of the EPBC Act and as a threatened species under the FFG Act. It is listed as endangered on DELWP's *Advisory list of Threatened Vertebrate Fauna of Victoria* (DSE 2013).

Historically, the Growling Grass Frog was recorded from much of Victoria, with the exception of Mallee and Alpine areas. However, a decline in the species has been noted throughout its range in eastern Australia. The species is known to have disappeared entirely from many localities where it was previously known (Tyler 1997; Heard *et al.* 2010).

Growling Grass Frog is largely aquatic and prefers permanent or semi-permanent waterbodies (Hero *et al.* 1991; Cogger 2014). It has also been found that a waterbody is much more likely to have a population of Growling Grass Frogs present if there is another population nearby (Robertson *et al.* 2002; Heard *et al.* 2010). Habitat characteristics, such as the extent of fringing aquatic vegetation and submerged vegetation, can also have a positive impact on the use of a waterbody by the Growling Grass Frog, but may not be as important as the distance to the nearest population (Robertson *et al.* 2002; Heard *et al.* 2010). This suggests that dispersal between waterbodies is important for the maintenance of population processes.

#### 4.5.1 Survey methods

Surveys for Growling Grass Frog were undertaken in accordance with the *Significant Impact Guidelines for the Vulnerable Growling Grass Frog* (DEWHA 2009c) and the *Survey Guidelines for Australia's Threatened Frogs* (DEWHA 2010).

Targeted survey for Growling Grass Frog was undertaken on two nights, 7 November and 21 December 2014. The survey nights were selected on the basis of projected weather conditions - fine and mild conditions (i.e. day time temperatures above 15 degrees Celsius and night time temperatures above 12 degrees Celsius) with little or no wind. Weather conditions, including temperature, humidity and wind speed, were measured on site using a Kestrel Weather Meter (Model 4000). Weather data collected on site is provided in Appendix A2.8. Reference sites in Appendix A2.9.

Survey locations within the study area included two wetlands at the Mortlake Power Station (Figure 4.11), one wetland on the Down Ampney property (Figure 4.3) and three wetlands on the Walmsley property (Figure 4.8).

Survey effort included a combination of passive listening, call playback and active searching/spotlighting. Nocturnal surveys commenced with a 10 minute period of listening for any calling frogs. To illicit a response from male frogs that may be present but not calling, a Growling Grass Frog advertisement call was played for a subsequent 10 minute period followed by a further period of listening for any calling frogs. Active searching was carried out by systematically searching areas of aquatic vegetation and surrounding areas of potential habitat using a head torch and hand-held spotlight.

#### Reference sites

The most recent confirmed database record for the Growling Grass Frog occurs near the study area on the Woolsthorpe-Hexham Road and dates from 2010. Other database records occur on the Mortlake Common (2000), north of Mortlake and along the Mortlake-Ararat road near Hexham (1992). Locations near existing recent records with potential habitat were identified as reference sites to survey while undertaking surveys within the study area. Two locations along the Woolsthorpe-Hexham Road approximately 3 kilometres north of the study area were surveyed before each survey within the study area and details are provided in Appendix A2.9. Growling Grass Frogs were recorded calling at both reference sites during November. No Growling Grass Frogs were recorded during the December survey from either reference site. We consider conditions were suitable for Growling Grass Frogs to have been active during both survey nights.

#### 4.5.2 Survey results

No Growling Grass Frogs were recorded from the study area during the present survey. Growling Grass Frog was recorded from two reference locations during the November survey when up to 10 calling males were present at both locations. Other species of frog detected at the time of survey included Common Froglet *Crinia signifera*, Southern Brown Tree Frog *Litoria ewingii*, Spotted Marsh Frog *Limnodynastes tasmaniensis* and the Striped Marsh Frog *Limnodynastes peroni*. A summary of the results is outlined in Table 6.

Habitat quality varied between survey sites within the study area. Two of the three dams within the Mortlake Power Station site were considered to have highly suitable habitat for Growling Grass Frog. Although the dams at this location are not directly connected to any waterway, there is some connection to permanent/semi-permanent water bodies including the Hopkins River via a series of drains and gutters that drain to the north of the site. During wet conditions this would allow frogs to disperse between waterbodies. The condition of habitat within other parts of the study area varied in quality over the two surveys. This meant that several sites were not extensively surveyed during the December survey due to wetlands drying out and others showing poor habitat quality. Survey was discontinued at these locations, this included sites on both the Down Ampney (Figure 4.3) and Walmsley properties (Figure 4.8).

**Table 6 Summary results of Growling Grass Frog surveys at study area**

Survey date	Survey duration (hrs)	Growling Grass Frog detected	Frog species detected
07/11/2014	3	No	Common Froglet, Southern Brown Tree Frog, Striped Marsh Frog, Spotted Marsh Frog
21/12/2014	2	No	Common Froglet, Southern Brown Tree Frog, Striped Marsh Frog, Spotted Marsh Frog

#### 4.5.3 Potential impacts and recommendations

No Growling Grass Frogs were recorded from the study area and the survey effort undertaken was adequate to confirm these sites do not support an important population of the species. Therefore, development of the site as proposed by the Development Plan (Figure 3) is not expected to have a significant impact on the species. Based on the limited suitable habitat for the species within the Development Plan footprint, no further survey is recommended for Growling Grass Frog.

#### 4.6 Southern Bent-wing Bat

The Mount Fyans Wind Farm study area has been identified as supporting potential habitat for the EPBC Act listed critically endangered Southern Bent-wing Bat. The species is known to range over much of south-western Victoria and south-eastern South Australia and is known to utilise naturally occurring lava and limestone caves that provide winter roost sites and maturity sites for breeding.

The cave systems in south-western Victoria are broadly geographically divided into two zones, one of volcanic origin that lies inland away from the coast and the other that is in a belt of limestone and sedimentary rocks along the coast of south-western Victoria. Caves of volcanic origin have developed in association with volcanic vents and scoria cones. These volcanic vents and scoria cones sometimes form prominent landscape features such as Mount Hamilton to the north of the study area and Mount Napier near Penshurst. Other smaller landscape features include Mount Fyans to the north of the study area and smaller scoria cones within the study area on the Down Ampney property. Around these structures, "lava caves" and overhangs have developed and are the result of the partial collapse of lava tube systems that developed on the flanks and slopes of these features when they were volcanically active. Caves occurring near the coast have largely developed as a result of solution weathering of limestone. In some instances coastal caves have been modified as a result of wave action and this has led to the development of sea caves along exposed parts of the coast. There are a number of lava caves in south-western Victoria, some of which are known to support roosting and overwintering Southern Bent-wing Bats. Table 7 includes a list of known lava cave systems in the region (Davey & White 1986) and includes historic and current records of Southern Bent-wing Bat (Ken Grimes pers. comm.).



**Table 7 Lava caves in south-western Victoria with records of roosting bats**

Location	Bat Records
Byaduk and Mount Napier	Many bats including Southern Bent-wing Bat
Mount Eccles	No bats or guano records
Mount Fyans (Mount Fyans Wildlife reserve)	No evidence of bats
Mount Hamilton	Old guano at southern end of system
Panmure (NE of Warrnambool)	Many bats, Southern Bent-wing Bat
Parwan (SE of Bacchus Marsh)	No Records
Porndon (SSW of Pomberneit)	Formerly mined for guano, many bats including Southern Bent-wing Bat
Skipton (Mount Widderin)	Extensive guano (mined) Southern Bent-wing Bat (skeletal only, no live bats since mining at the end of the 1880's prior to which they were known to be abundant)
Smeaton (E of Clunes)	No records
Warrion Hill (NNW of Colac)	No records

#### 4.6.1 Survey methods

Caves, cave complexes and overhangs at Mount Hamilton, Mount Fyans and the scoria cone on the Down Ampney property were systematically searched by a Biosis zoologist and two experienced speleologists on 4-5 September 2013. All possible roost sites at each location were examined by going underground and looking for evidence of bats which included the recording of live bats, new or old guano, skeletal remains and any other evidence that might suggest occupation. The system at Mount Hamilton is relatively complex and includes three portals which were accessed from the surface. Owing to its complexity this cave took a full day with three experienced staff and contractors to fully examine all possible parts of the system.

#### 4.6.2 Survey results

Three locations around and within the wind farm study area were identified as possible locations that may provide potential roosting and overwintering sites for the Southern Bent-wing Bat. They are all unique in their layout and complexity and each of the sites is described in detail below.

- Mount Hamilton complex** -17 kilometres north-east of the study area. This is the most complex lava cave system near the study area and one of the largest volcanic cave systems in Victoria. The Mount Hamilton system is divided in three sections all of which are accessed by separate porthole style entrances. Plate 4 illustrates the entrance known as H-3 and is the entrance to what is known as Sausage Cave. This is the northern most of three complexes at Mount Hamilton. A schematic diagram is included in Appendix 2.10 and this shows a full layout plan of the Mount Hamilton Cave complex. The main complex consists of a series of interconnecting passages, enlarged chambers and domes. The system is gently dipping from north to south and reflects the topography of the surrounding site. Water pools in the lowest portion of the complex were present during the current survey.
  - All portions of the complex were accessible during the current survey despite several constriction points that made access more difficult. No evidence of recent bat roosting activity was observed. Historic guano was evident at several locations within the main complex. The porthole entrance at H – 30 was blocked by wire netting, making entry by bats very difficult.



**Plate 4 Porthole type entrance known as H - 3 at the Mount Hamilton lava cave complex**

- **Mount Fyans** –nine kilometres north-east of the study area. The cave complex at Mount Fyans is within the Mount Fyans Wildlife Reserve. This is the site of a former scoria stone quarry. Quarrying operations have exposed several narrow vertical tubes and pipes up to 5 metres long and an interconnecting sub-horizontal passage about 1.2 metres high and about 30 metres long in the floor of the former quarry. The passage is accessed via a small porthole style entrance in the western section of the quarry. The passage is largely free of debris and can be followed to either end before pinching out and ending. There appear to be no other surface indications that more passages or lava caves occur within the Mount Fyans Wildlife Reserve.
  - The site was fully searched during the field survey. No evidence of roosting bats was observed, and there was no evidence of guano to suggest any historical usage by bats.
- **Scoria Cone - Down Ampney property.** This site is a small scoria cone located east of Salt Creek (Figure 2). This site has several small overhangs near the summit and on the eastern flank that extended laterally for several metres. Several smaller openings as shown in Plate 5 were found on the southern flank of the scoria cone; however, these were too small to be entered and it could be clearly seen that they did not extend laterally for any distance and did not develop into a larger chamber.
  - No evidence of roosting bats was observed, and there was no evidence of guano to suggest any historical usage by bats.



**Plate 5 Small lateral entrance on southern flank of scoria cone – Down Ampney property**

#### **4.6.3 Potential impacts and recommendations**

Survey of potential roosting sites has indicated that suitable roosting habitat is not present within the study area and the surrounding locality that was investigated. However, there is potential that the species uses the broader area for foraging. To assess if Southern Bent-wing Bats fly within the study area, presence/absence surveys will be undertaken in 2017. Anabat Bat Detection devices, which record acoustic microbat calls that can be used to identify bat species, will be deployed across the study area.

### **4.7 Aquatic Fauna**

During the initial flora and fauna assessment of the study area, numerous creeks, lakes, wetlands and ephemeral waterways were identified as providing potential habitat for threatened aquatic fauna, including Dwarf Galaxias *Gallaxiella pusilla*, Yarra Pygmy Perch *Nannoperca obscura* and Hairy Burrowing Crayfish *Engaeus sericatus*.

#### **4.7.1 Survey methods**

Aquatic fauna survey was conducted under Fisheries Victoria Research Permit RP 1071, FFG Permit 10006240 and Animal Ethics Approval 14.12.

Aquatic habitat assessment (including in situ water quality measurement) and survey was undertaken at 24 sites located on Blind Creek, Salt Creek, wetlands and numerous tributaries in the vicinity and downstream of the study area (Appendix A2.11; Figure 4). Survey site selection was based on water depth/permanence, waterway connectivity, accessibility and location relative to the study area.

Aquatic field assessments were undertaken between November 2012 and February 2013 (total of 14 days). Standard fish sampling techniques were used including backpack electrofishing, fyke netting and bait trapping. Fish survey techniques utilised at each site was varied in order to maximise sampling efficacy in accordance with site characteristics such as stream conductivity (similar to salinity), depth, width, and vegetation cover.

The survey was conducted by appropriately skilled and experienced personnel in accordance with guidelines for detecting fish listed as threatened under the EPBC Act (DSEWPaC 2011d).

Ten bait traps constructed of 2 millimetre mesh with entrance funnels of 40 millimetres in diameter were set overnight at suitable sites. Bait traps were set with light sticks and were generally deployed in depths of 0.25 to 0.5 metres, typically amongst aquatic vegetation or other forms of cover.

Single wing (5 metre) fyke nets constructed of 4 millimetre knotless nylon mesh; were set overnight at suitable sites. Fyke nets were generally set adjacent to cover in water depths of 0.5 to 1.5 metres; with half of the nets facing upstream and half facing downstream. Half of the fyke nets at each site were set with a 20 x 20 millimetre mesh exclusion grill on the first internal throat to exclude large species from these nets, thereby reducing the predation and mortalities of smaller fishes that occurs when captured in the same nets and subsequently improving the representation of smaller fish species in the overall catch per site.

Data from each sampling technique was processed and recorded separately at each site. The number of nets of each type, the duration of net deployment and the number and length of electrofishing shots taken at each site was recorded.

In situ measurements of Dissolved Oxygen (DO), pH, Electrical Conductivity (EC), temperature and turbidity were made at all sites using a calibrated Horiba U52 water quality meter. All water quality measurements were taken in accordance with EPA publication IWRG701: Sampling and analysis of waters, wastewaters, soils and wastes.

#### 4.7.2 Survey results

A total of 1,429 individual fish and crayfish were collected during the aquatic fauna surveys and consisted of nine native species and three exotic species, inclusive of the native Carp Gudgeon *Hypseleotris* sp. which has been introduced to this catchment. The most abundant species was Flat-headed Gudgeon *Philypnodon grandiceps*, with 712 individuals collected, followed by Southern Pygmy Perch *Nannoperca australis* and Eastern Gambusia *Gambusia holbrooki* with 215 and 177 individuals collected respectively. Results of aquatic fauna surveys are presented in Appendix A2.12.

- **Dwarf Galaxias** (EPBC Act: vulnerable; FFG Act: threatened; DELWP Advisory List: vulnerable).

There are currently no existing historic records of Dwarf Galaxias occurring within, or in the vicinity of, the study area on the Victorian Biodiversity Atlas (VBA) fish database (DSE 2010).

A total of 21 individuals were collected within the study area during surveys. The species was collected at two sites on Salt Creek along the western perimeter of the study area (Figure 2.3 and 2.7). Dwarf Galaxias were collected at sites supporting abundant emergent and submerged aquatic vegetation. Potential suitable habitat was identified at Blind Creek and associated wetlands, although these areas present temporary habitats due to the ephemeral nature of these waterbodies.

- **Yarra Pygmy Perch** (EPBC Act: vulnerable; FFG Act: threatened; DELWP Advisory List: vulnerable).

There are historic records on the VBA fish database (DSE 2010), of Yarra Pygmy Perch occurring within the Hopkins and Merri River catchments adjacent to the study area.

No Yarra Pygmy Perch were collected during fish surveys but suitable habitat was identified within Salt Creek and Blind Creek and associated. There is a low to medium likelihood of this species occurring within the study area.

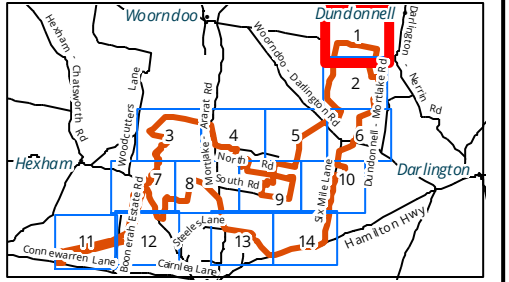
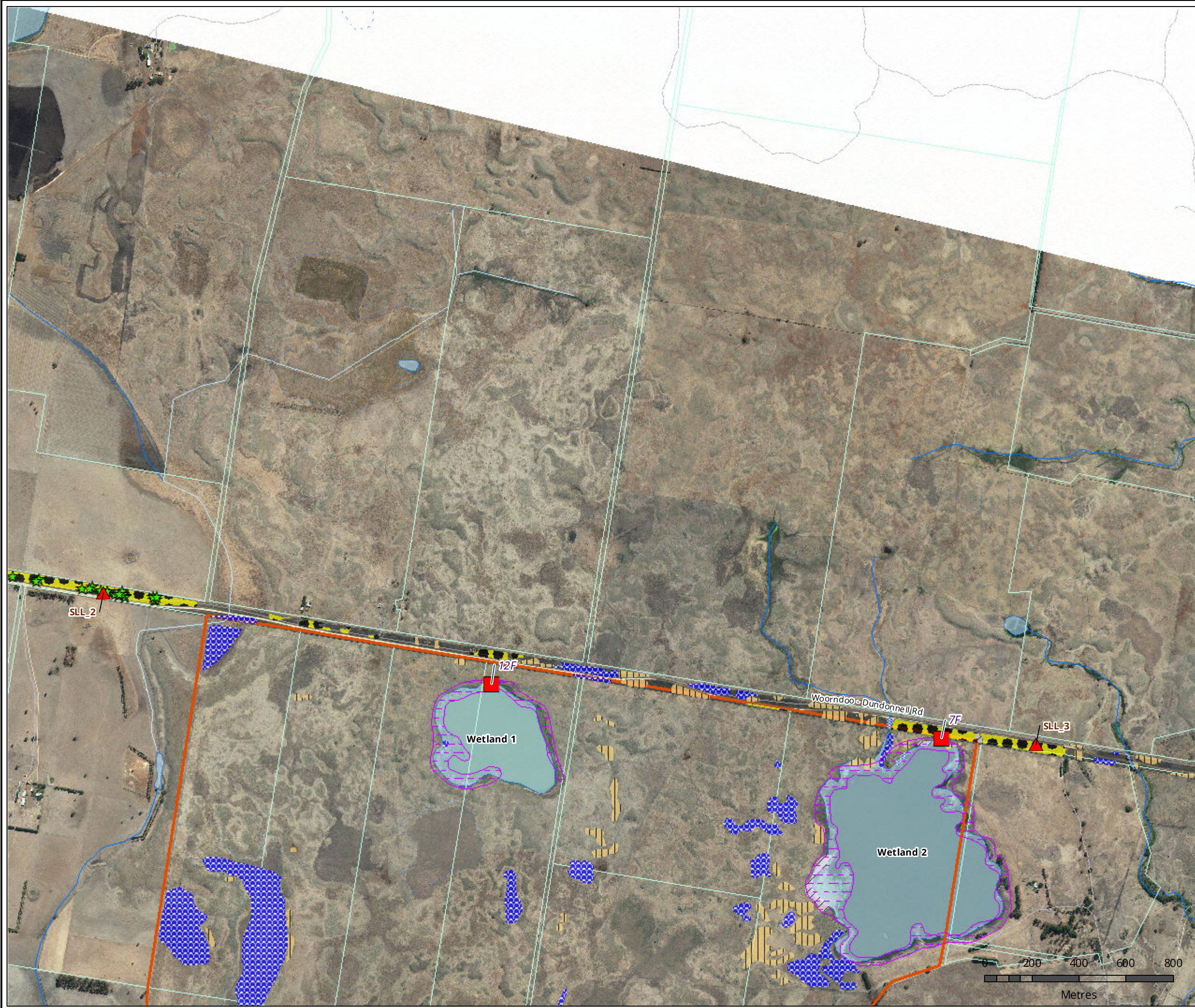
- **Hairy Burrowing Crayfish** (DELWP Advisory List: vulnerable).

There is currently one historic record of Hairy Burrowing Crayfish south of the study area at Mortlake. One specimen of Hairy Burrowing Crayfish was collected within the study area in Blind Creek at South Road (Figure 4.8). Numerous inactive burrowing crayfish burrows were located throughout the study area but only a small number of active burrows at the waterline of streams were recorded. High densities of crayfish burrows, of approximately one burrow per square metre, were identified adjacent to Blind Creek west of Mortlake-Ararat Road (Figure 4.8).

#### **4.7.3 Potential impacts and recommendations**

The targeted aquatic surveys have highlighted that Salt Creek and Blind Creek are the key aquatic habitat within the study area as they support populations of threatened aquatic species. The current Development Plan minimises direct impacts on these species through siting the wind farm footprint away from these creeks. It is recommended that further direct and indirect impacts can be avoided and minimised through ensuring no additional crossing points on, or upstream of these creeks, and implementing appropriate sediment and pollution control measures during construction.

The proponent has advised that additional surveys of the Hairy Burrowing Crayfish habitat will be undertaken along the section of Blind Creek associated with the underground cable route prior to construction commencing. If Hairy Burrowing Crayfish are likely to be present, trenchless technology will be used for the construction of underground cable routes to avoid any impact to this species.



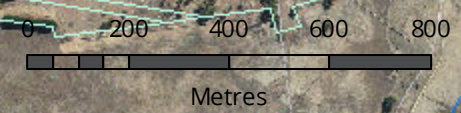
- Legend**
- Study Area
  - ★ Spiny Rice Flower location
  - Threatened Fauna Habitat**
  - Corangamite Water Skin
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland
  - 649 Stony Knoll Shrubland
  - 653 Aquatic Herbland
  - 656 Brackish Wetland
  - 821 Tall Marsh
- Targeted survey sites**
- ▲ Striped Legless Lizard tile grid
  - Aquatic fauna survey site

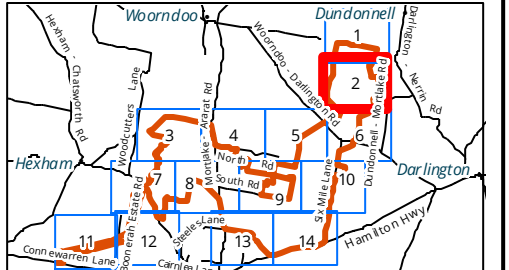
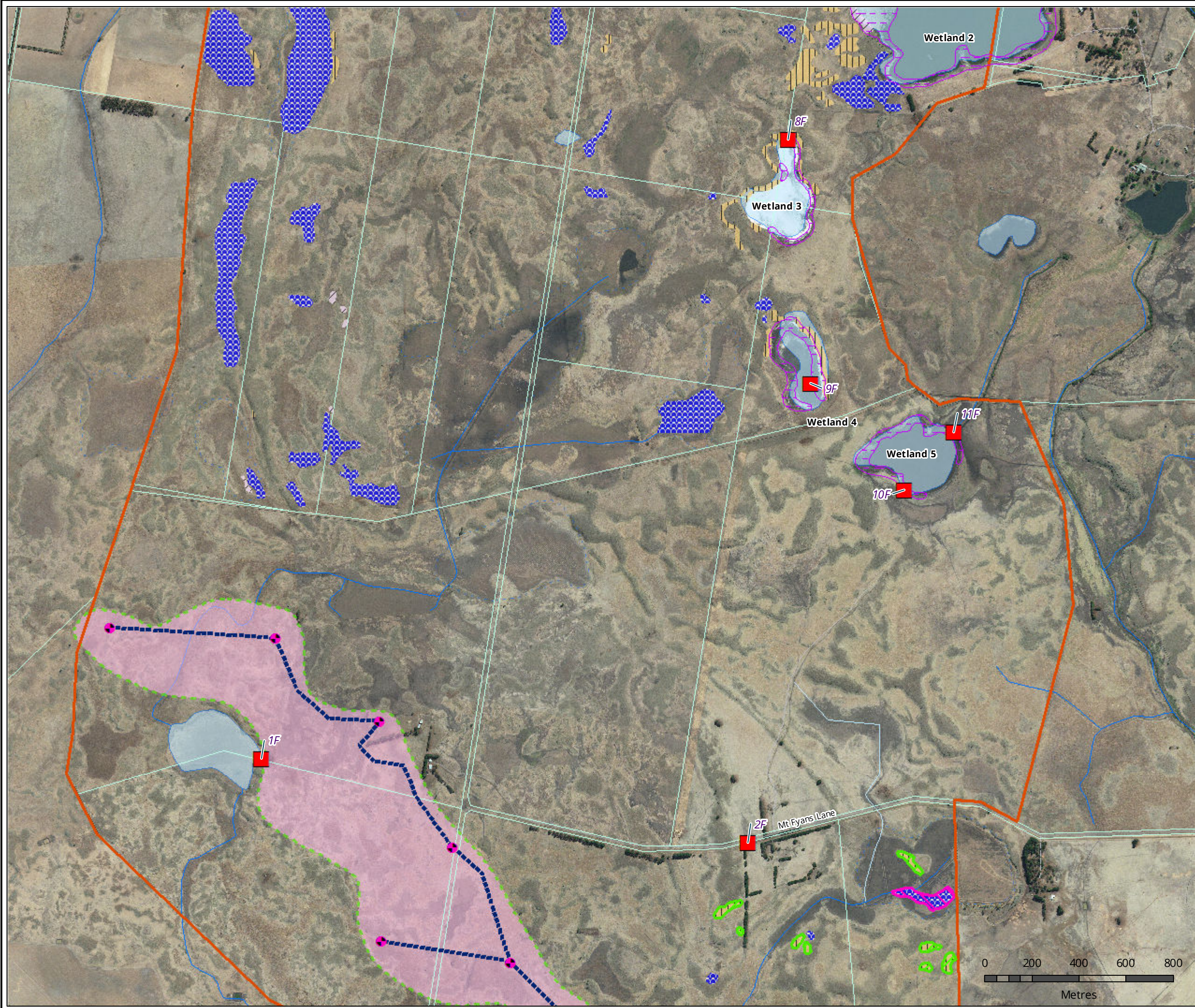
**Species Recorded**

**Figure 4.1 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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Matter: 21630,  
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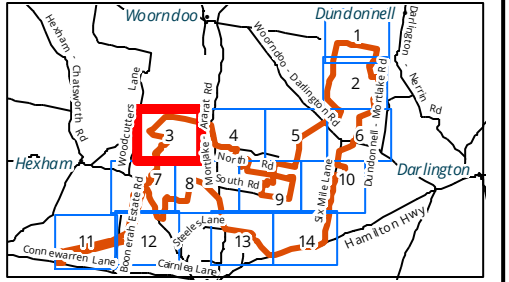
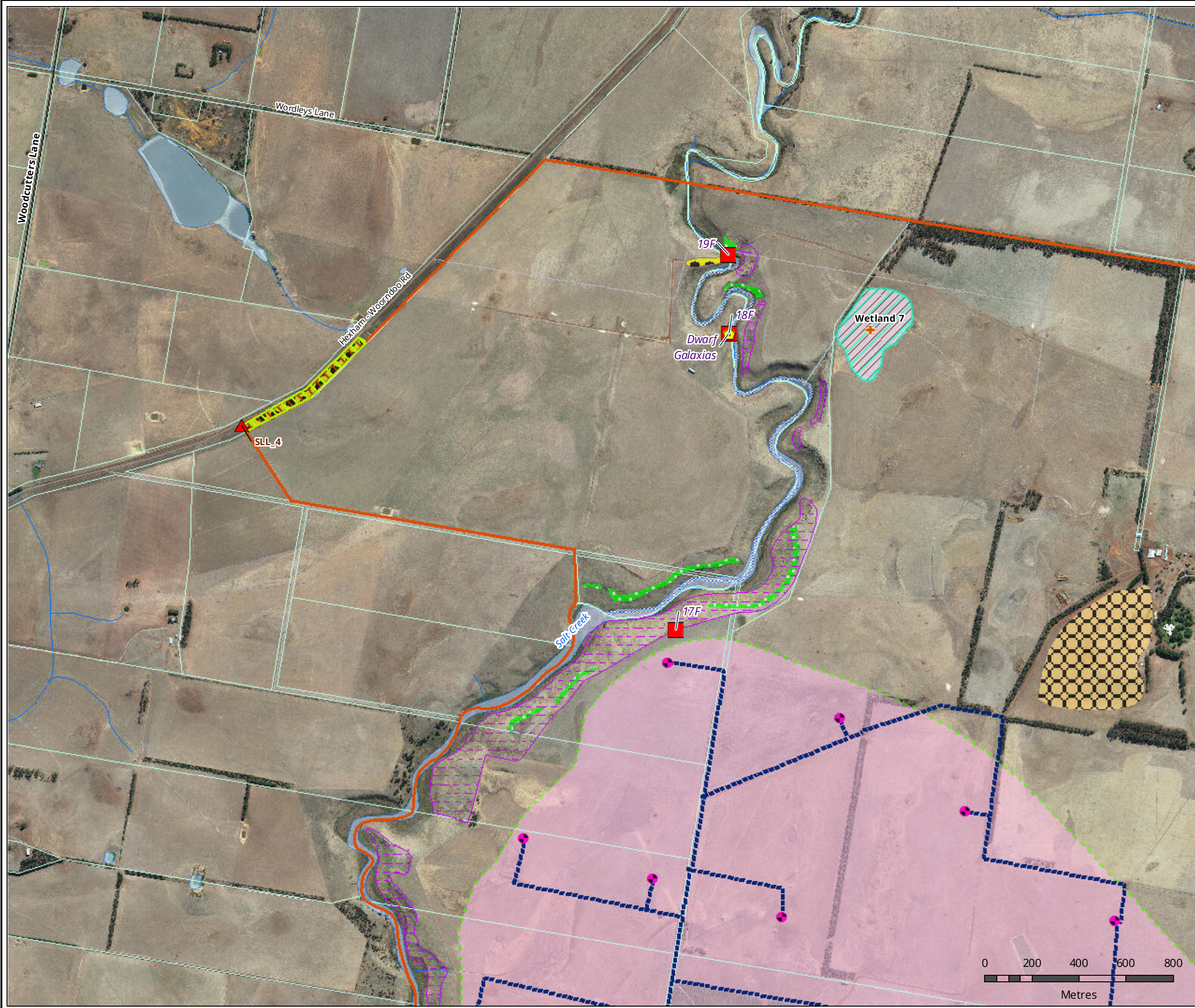
- Legend**
- Study Area
  - Proposed wind turbine
  - Proposed road layout
  - Threatened Fauna Habitat**
  - Corangamite Water Skink
  - Mt Fyans development area
  - Ecological Vegetation Class**
  - 125 Plains Grassy Wetland
  - 649 Stony Knoll Shrubland
  - 653 Aquatic Herbland
  - 656 Brackish Wetland
- Targeted survey sites**
- Aquatic fauna survey site
  - Plains Grassy Wetland
- Flora species**
- Adamson's Blown-grass
  - Curly Sedge
  - Spiny Peppergrass
- Stony Knoll Shrubland**
- 
- Flora species**
- Basalt Rustyhood
  - Clover Glycine
  - Gragrant Leek-orchid
  - Small Golden Moths
  - White Sunray
- Fauna species**
- Golden Sun Moth

**Species Recorded**

**Figure 4.2 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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**Legend**

- Study Area
- Proposed wind turbine
- Proposed road layout
- Threatened Fauna Habitat**
- Corangamite Water Skink
- Striped Legless Lizard
- Mt Fians development area
- Ecological Vegetation Class**
- 132\_61 Heavier-soils Plains Grassland
- 653 Aquatic Herbland
- 821 Tall Marsh
- 894 Scoria Cone Woodland
- 895 Escarpment Shrubland

**Targeted survey sites**

- ▲ Striped Legless Lizard tile grid
- Aquatic fauna survey site
- + Growing Grass Frog survey sites
- Aquatic Herbland

**Flora species**

- Adamson's Blown-grass
- Spiny Peppergrass

**Fauna species**

- Growing Grassfrog

**Plains Grassland**

- Basalt Rustyhood
- Clover Glycine
- Fragrant Leek-orchid
- Matted Flax-lily
- Small Golden Moths
- White Sunray

**Fauna species**

- Golden Sun Moth

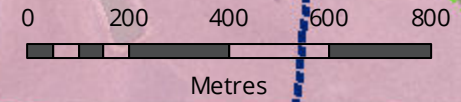
**Species Recorded**

- ◆ Dwarf Galaxias recorded

**Figure 4.3 Targeted survey locations and results with the study area**  
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 Coordinate System: GDA 1994 MGA Zone 54 N

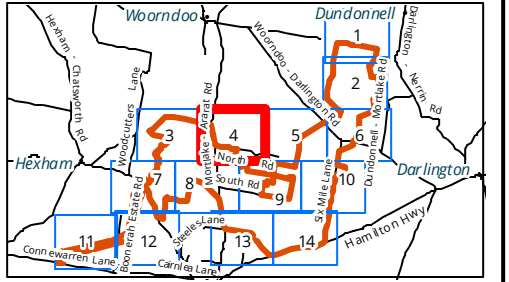


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**Legend**  
 Study Area  
 Mt Fyans development area

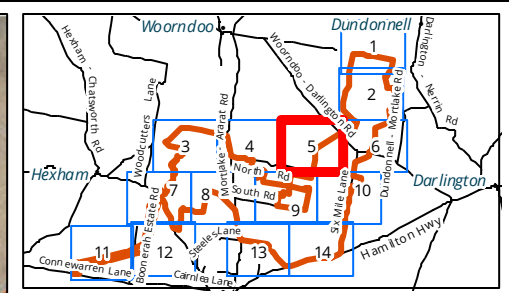
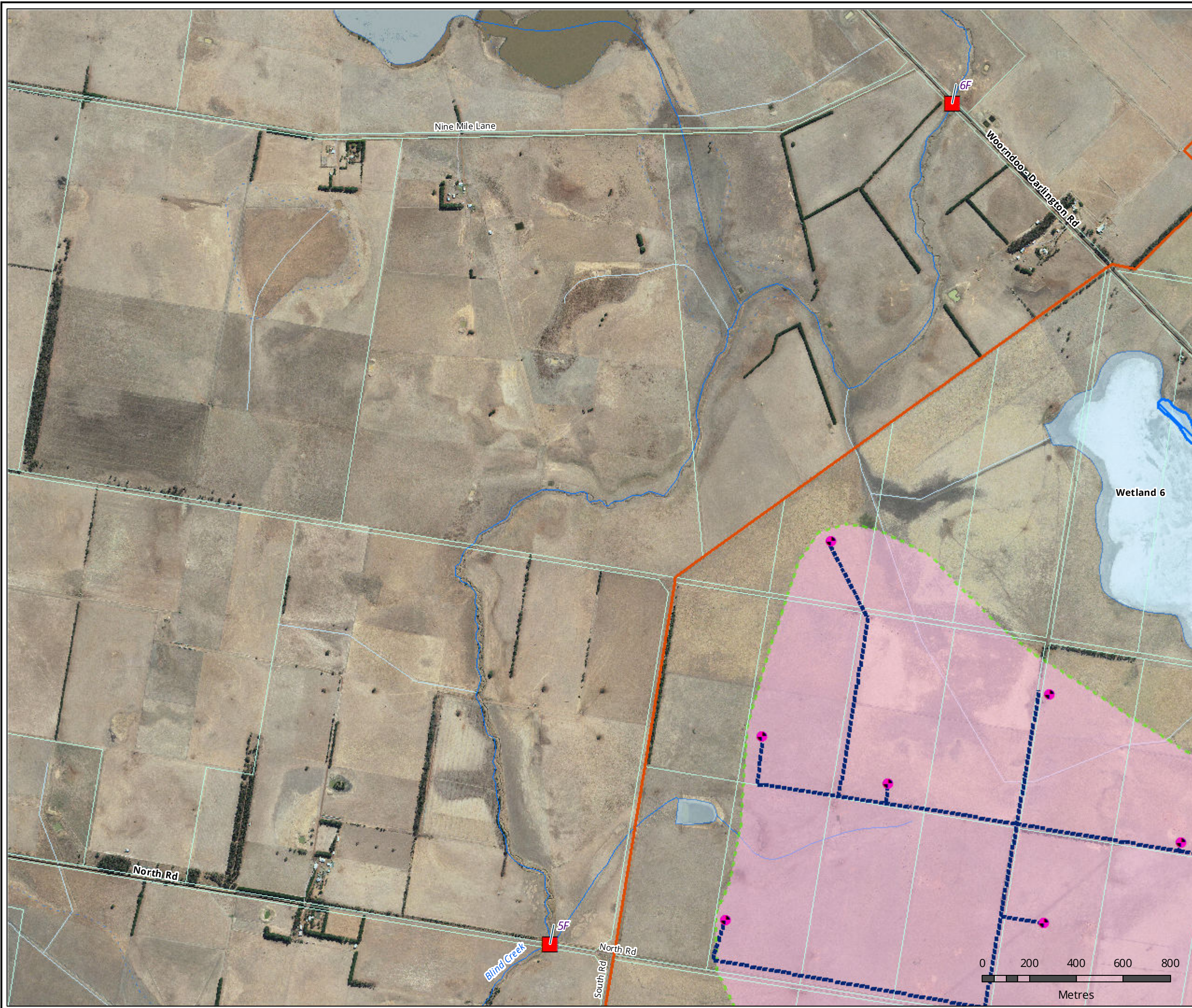
**Targeted survey sites**

**Species Recorded**

**Figure 4.4 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54



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 Date: 10 April 2017,  
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- Legend**
- Study Area
  - Proposed wind turbine
  - Proposed road layout
  - Mt Fyans development area
- Ecological Vegetation Class**
- Salt Lake

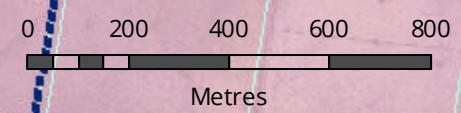
- Targeted survey sites**
- Aquatic fauna survey site
  - Target SaltLake
- Flora species**
- Salt-lake Tussock-grass

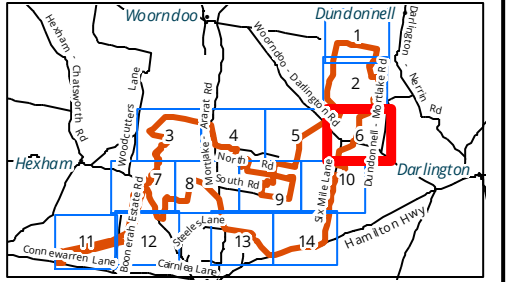
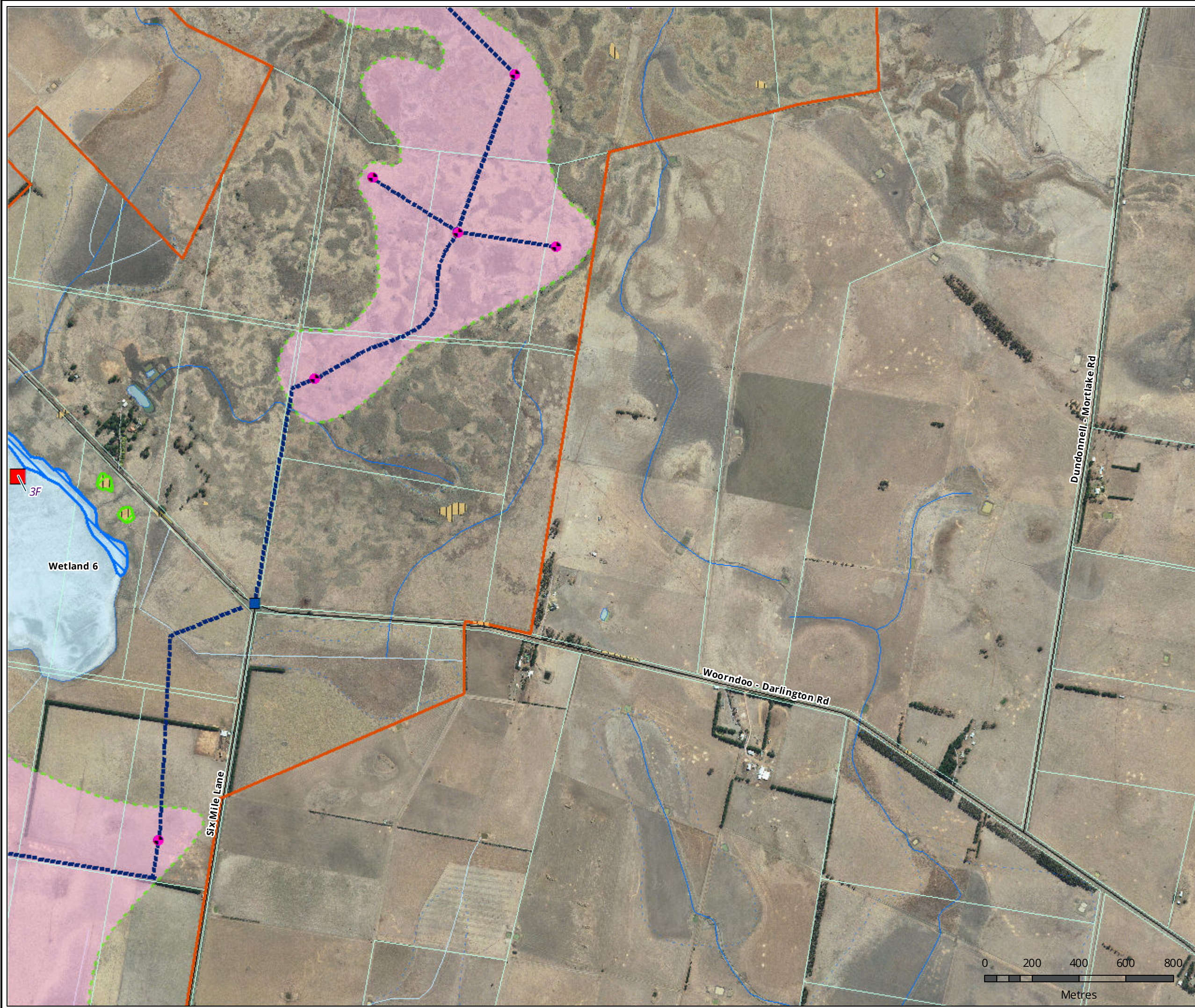
**Species Recorded**

**Figure 4.5 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54

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**Legend**

- Study Area
  - Road access point
  - Proposed wind turbine
  - Proposed road layout
  - Mt Fyans development area
- Ecological Vegetation Class**
- 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland
  - 649 Stony Knoll Shrubland
  - Salt Lake

**Targeted survey sites**

- Aquatic fauna survey site
- Target SaltLake

**Flora species**

- Salt-lake Tussock-grass
- Stony Knoll Shrubland

**Flora species**

- Basalt Rustyhood
- Clover Glycine
- Gragrant Leek-orchid
- Small Golden Moths
- White Sunray

**Fauna species**

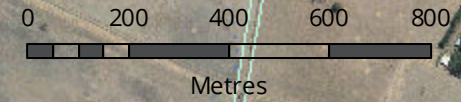
- Golden Sun Moth

**Species Recorded**

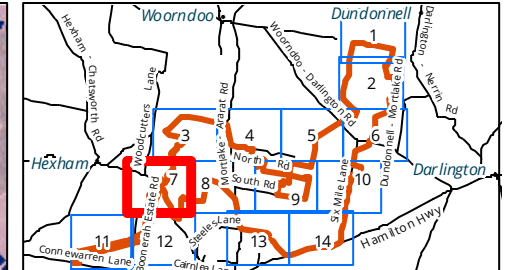
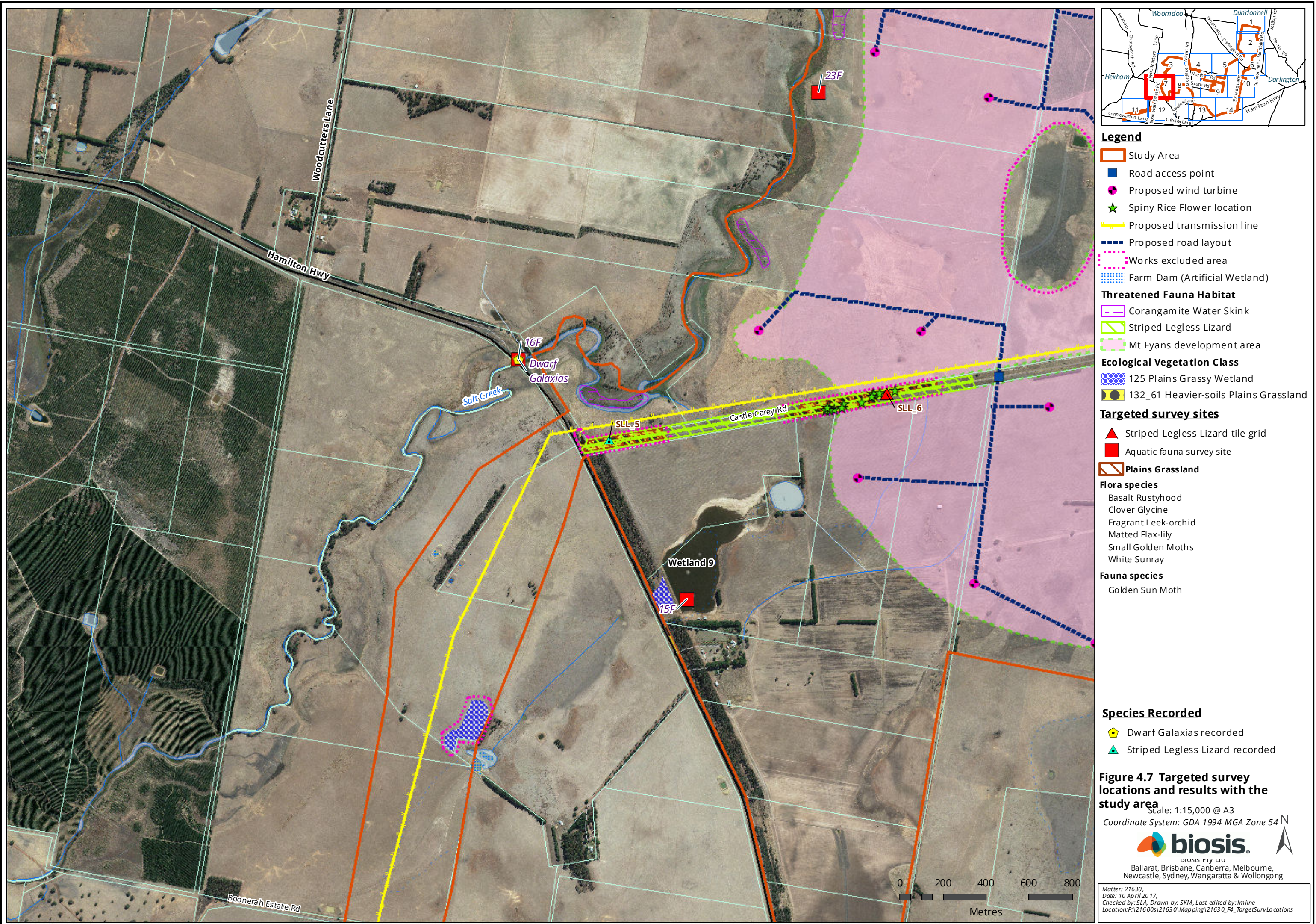
**Figure 4.6 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N



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 Date: 10 April 2017,  
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 Location: P:\21600s\21630\Mapping\21630\_F4\_TargetSurLocations



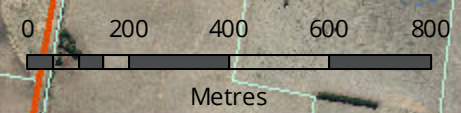
- Legend**
- Study Area
  - Road access point
  - Proposed wind turbine
  - ★ Spiny Rice Flower location
  - Proposed transmission line
  - Proposed road layout
  - Works excluded area
  - Farm Dam (Artificial Wetland)
- Threatened Fauna Habitat**
- Corangamite Water Skink
  - Striped Legless Lizard
  - Mt Fyans development area
- Ecological Vegetation Class**
- 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland
- Targeted survey sites**
- ▲ Striped Legless Lizard tile grid
  - Aquatic fauna survey site
  - Plains Grassland
- Flora species**
- Basalt Rustyhood
  - Clover Glycine
  - Fragrant Leek-orchid
  - Matted Flax-lily
  - Small Golden Moths
  - White Sunray
- Fauna species**
- Golden Sun Moth

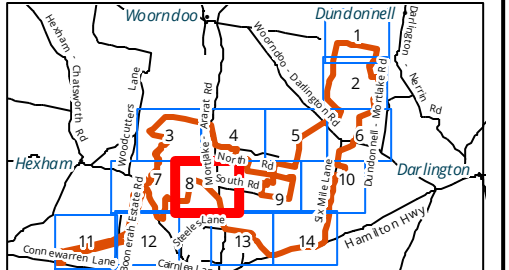
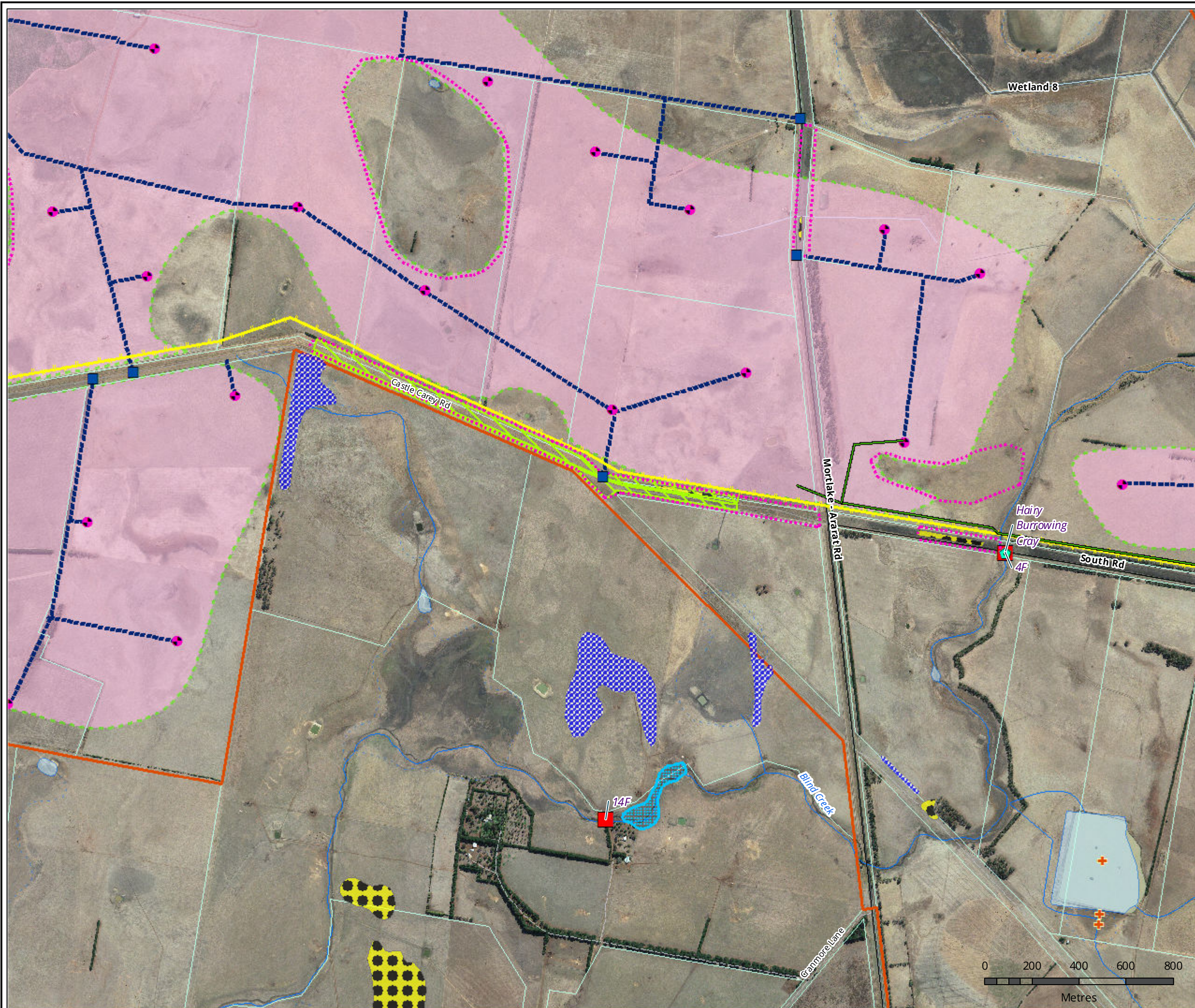
- Species Recorded**
- ◆ Dwarf Galaxias recorded
  - ▲ Striped Legless Lizard recorded

**Figure 4.7 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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 Location: P:\21600s\21630\Mapping\21630\_F4\_TargetedSurveyLocations





- Legend**
- Study Area
  - Road access point
  - Proposed wind turbine
  - Western underground cable route
  - Proposed transmission line
  - Proposed road layout
  - Works excluded area
- Threatened Fauna Habitat**
- Hairy Burrowing Crayfish
  - Striped Legless Lizard
  - Mt Fyans development area
- Ecological Vegetation Class**
- 125 Plains Grassy Wetland
  - 132\_61 Heavier-soils Plains Grassland

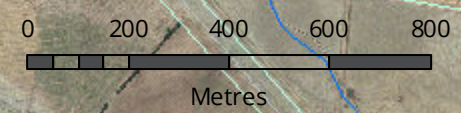
- Targeted survey sites**
- Aquatic fauna survey site
  - + Growing Grass Frog survey sites

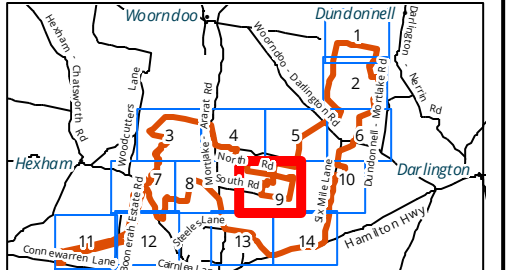
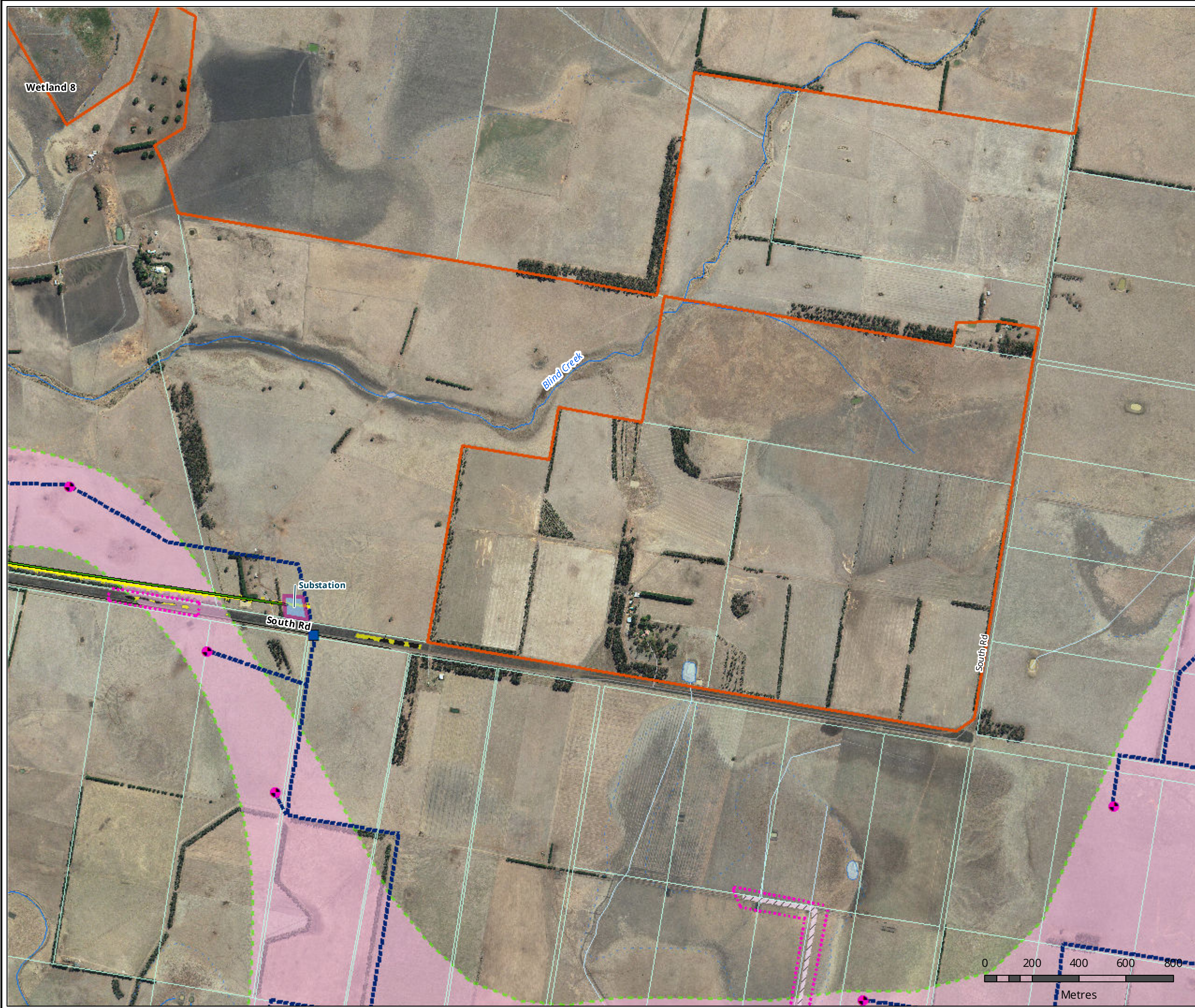
- Species Recorded**
- ◆ Hairy Burrowing Crayfish recorded

**Figure 4.8 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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 Location: P:\21600s\21630\Mapping\21630\_F4\_TargetSurLocations





- Legend**
- Study Area
  - Road access point
  - Proposed wind turbine
  - Western underground cable route
  - Proposed transmission line
  - Proposed road layout
  - Substation
  - Works excluded area
  - Mt Fyans development area
- Ecological Vegetation Class**
- 132\_61 Heavier-soils Plains Grassland
  - 653 Aquatic Herbland

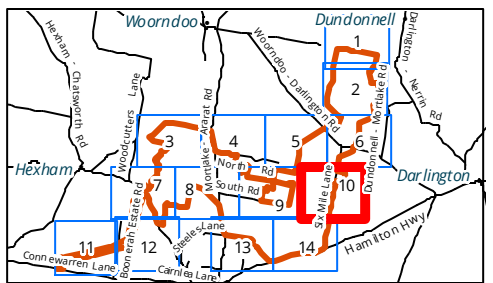
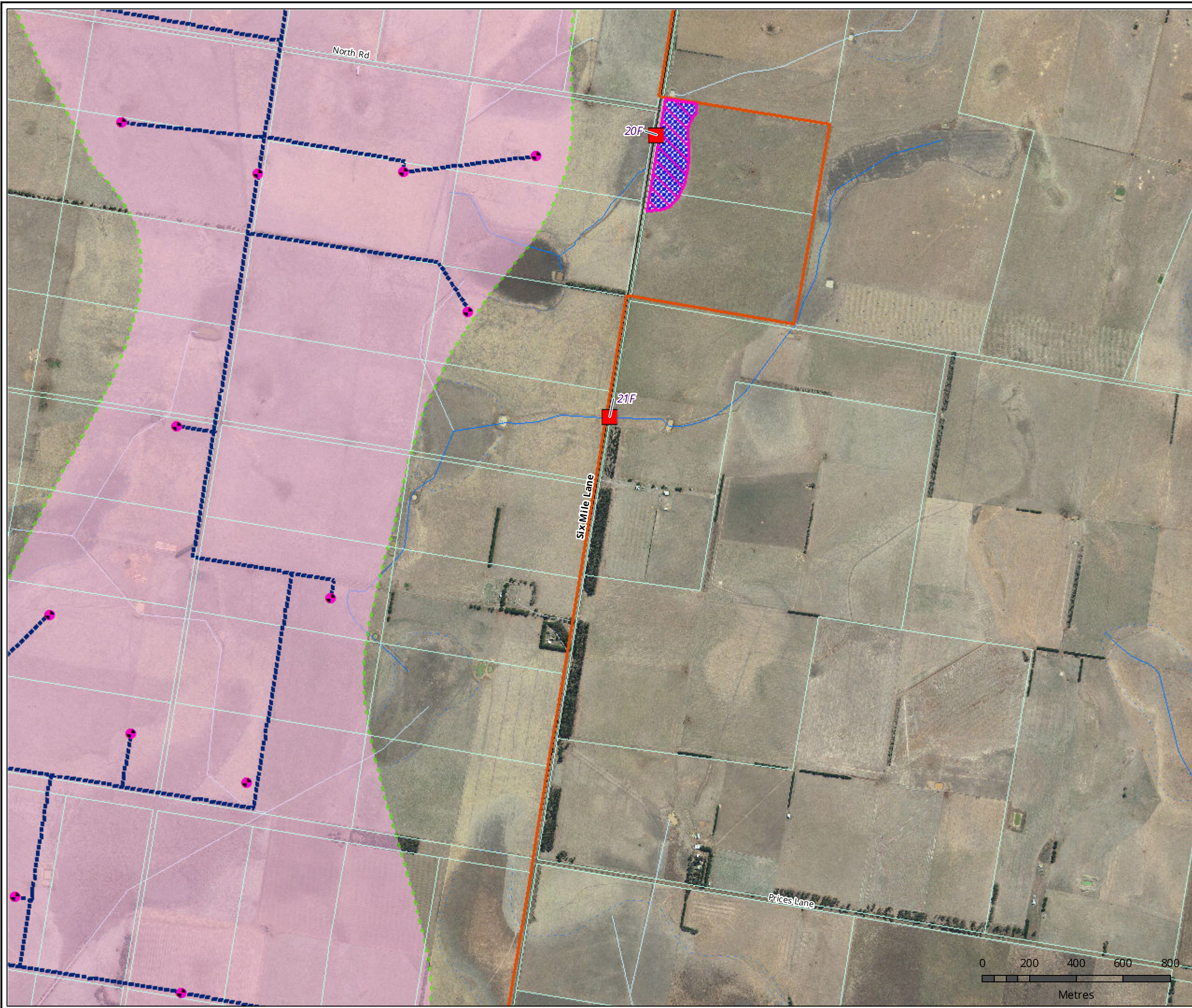
**Targeted survey sites**

**Species Recorded**

**Figure 4.9 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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 Location: P:\21600s\21630\Mapping\21630\_F4\_TargetSurvLocations



- Legend**
- Study Area
  - Proposed wind turbine
  - Proposed road layout
  - Mt Fyans development area
- Ecological Vegetation Class**
- 125 Plains Grassy Wetland

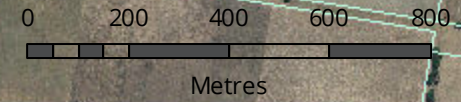
- Targeted survey sites**
- Aquatic fauna survey site
  - Plains Grassy Wetland
- Flora species**
- Adamson's Blown-grass
  - Curly Sedge
  - Spiny Peppergrass

**Species Recorded**

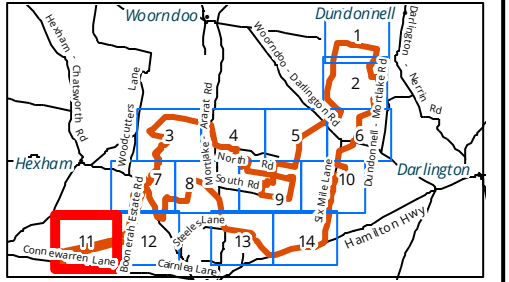
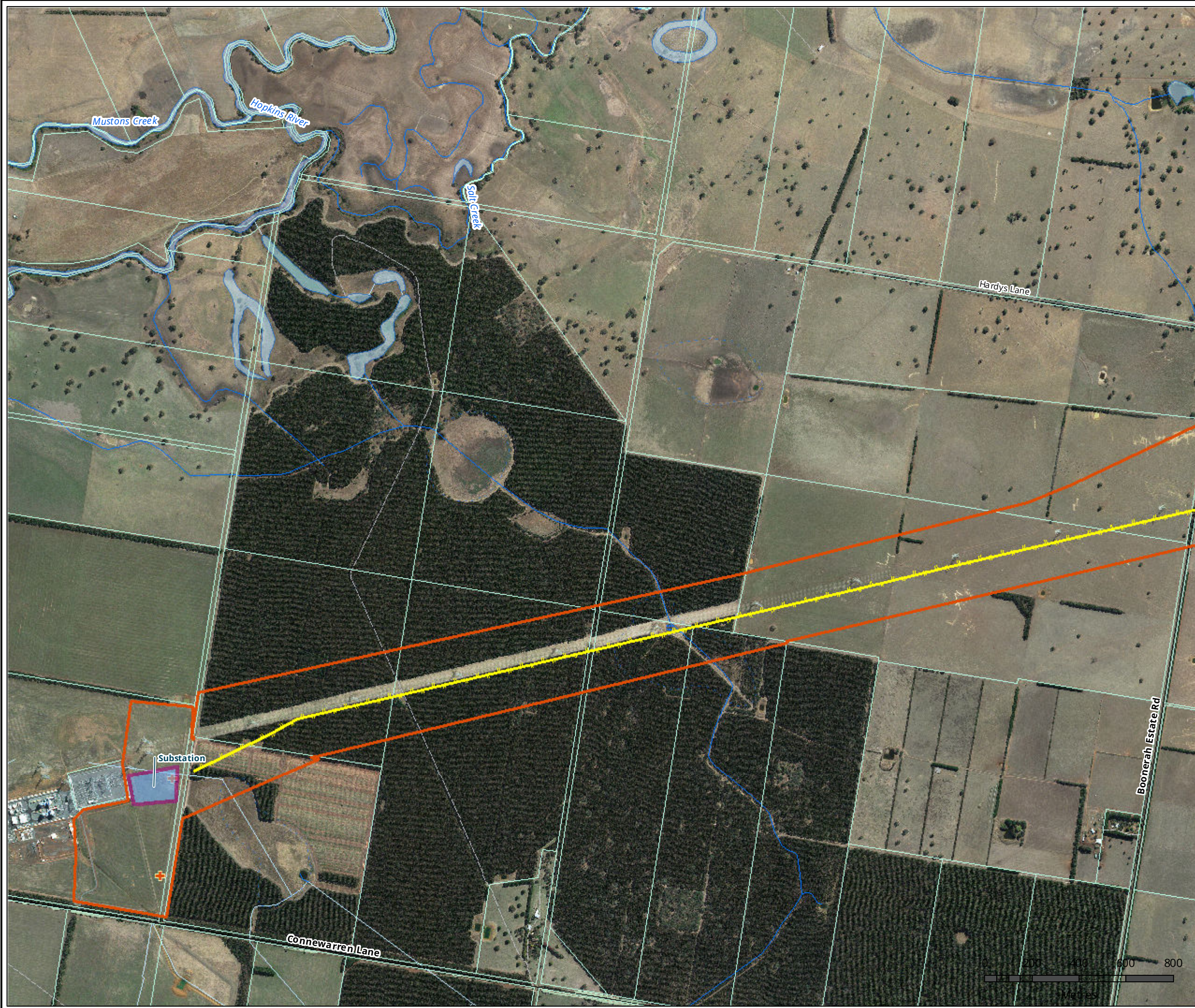
**Figure 4.10 Targeted survey locations and results with the study area**

Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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 Location: P:\21600s\21630\Mapping\21630\_F4\_TargetSurvLocations



- Legend**
- Study Area
  - Proposed transmission line
  - Substation
  - Farm Dam (Artificial Wetland)
- Ecological Vegetation Class**
- 55\_61 Plains Grassy Woodland

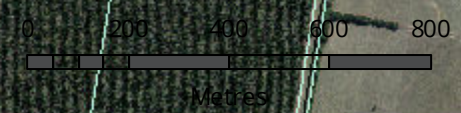
- Targeted survey sites**
- + Growing Grass Frog survey sites

**Species Recorded**

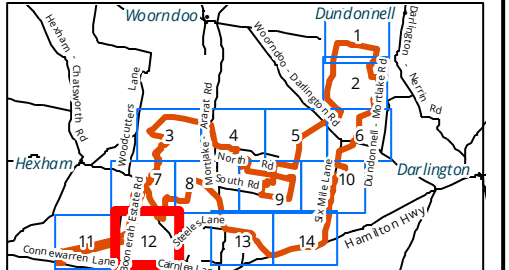
**Figure 4.11 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 <sup>N</sup>

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 Location: P:\21600s\21630\Mapping\21630\_F4\_TargetSurvLocations







- Legend**
- Study Area
  - Proposed transmission line
  - Works excluded area
  - Farm Dam (Artificial Wetland)
  - Threatened Fauna Habitat**
  - Toad let
  - Ecological Vegetation Class**
  - 55\_61 Plains Grassy Woodland

- Targeted survey sites**
- Aquatic fauna survey site

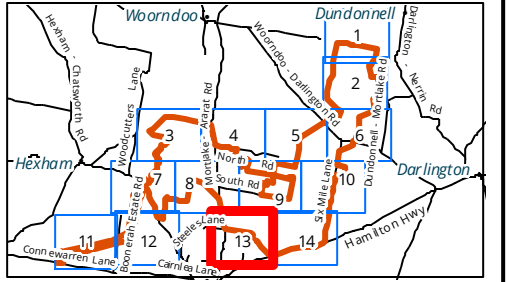
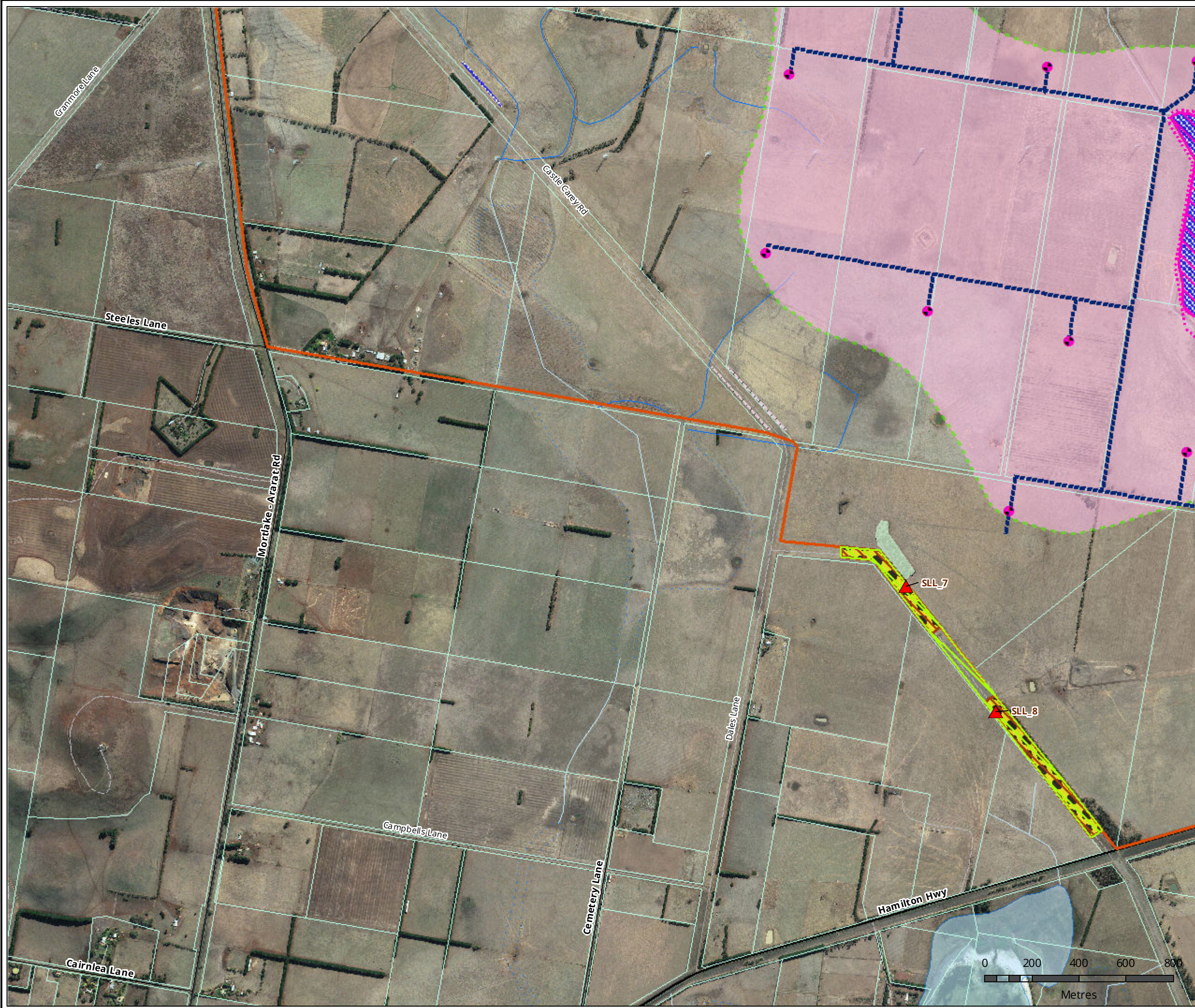
**Species Recorded**

**Figure 4.12 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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**Legend**

- Study Area
- Proposed wind turbine
- Proposed road layout
- Works excluded area
- Threatened Fauna Habitat**
- Striped Legless Lizard
- Mt Fyans development area
- Ecological Vegetation Class**
- 125 Plains Grassy Wetland
- 132\_61 Heavier-soils Plains Grassland
- 55\_61 Plains Grassy Woodland
- 653 Aquatic Herbland

**Targeted survey sites**

- ▲ Striped Legless Lizard tile grid
- Plains Grassland

**Flora species**

- Basalt Rustyhood
- Clover Glycine
- Fragrant Leek-orchid
- Matted Flax-lily
- Small Golden Moths
- White Sunray

**Fauna species**

- Golden Sun Moth

**Plains Grassy Wetland**

**Flora species**

- Adamson's Blown-grass
- Curly Sedge
- Spiny Peppergrass

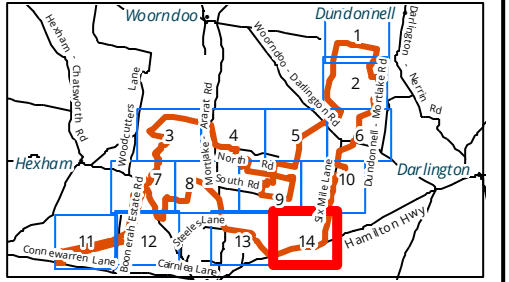
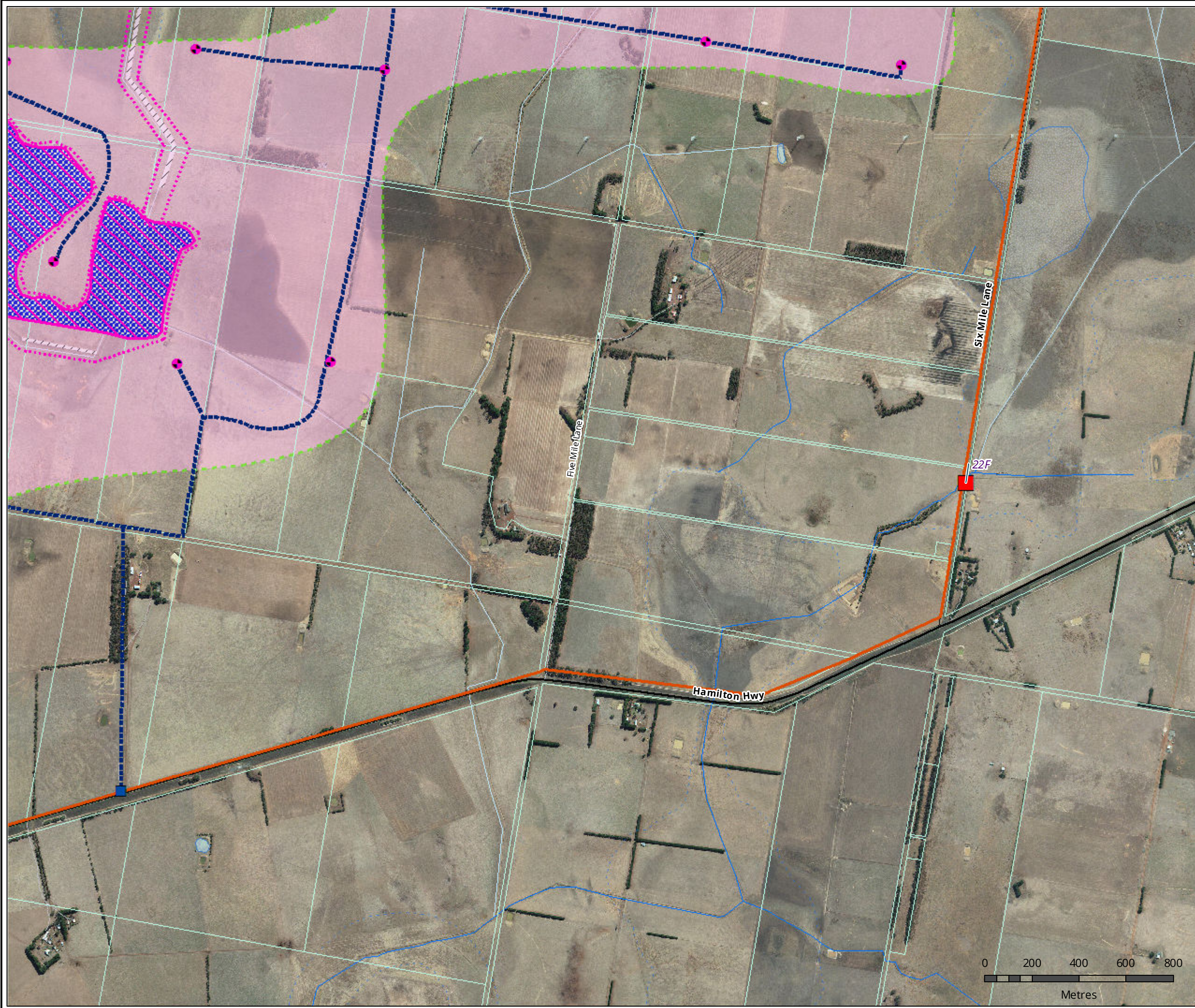
**Species Recorded**

**Figure 4.13 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

**biosis** ▲

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- Legend**
- Study Area
  - Road access point
  - Proposed wind turbine
  - Proposed road layout
  - Works excluded area
  - Mt Fyans development area
- Ecological Vegetation Class**
- 125 Plains Grassy Wetland
  - 653 Aquatic Herbland

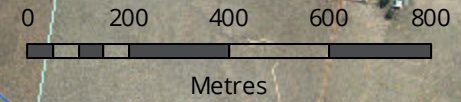
- Targeted survey sites**
- Aquatic fauna survey site
  - Plains Grassy Wetland
- Flora species**
- Adamson's Blown-grass
  - Curly Sedge
  - Spiny Peppergrass

**Species Recorded**

**Figure 4.14 Targeted survey locations and results with the study area**  
 Scale: 1:15,000 @ A3  
 Coordinate System: GDA 1994 MGA Zone 54 N

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 Location: P:\21600s\21630\Mapping\21630\_F4\_TargetSurLocations



## 5. Biodiversity legislation and government policy

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This section provides an assessment of the project in relation to key biodiversity legislation and government policy. This section does not describe the legislation and policy in detail. Where available, links to further information are provided.

### 5.1 Commonwealth

#### 5.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (NES) protected under the Act.

Link for further information including a guide to the referral process is available at:  
<http://www.environment.gov.au/epbc/index.html>.

Matters of NES relevant to the project are summarised in Table 8. It includes an assessment against the EPBC Act policy statements published by the Australian Government which provide guidance on the practical application of EPBC Act.

**Table 8 Assessment of project in relation to the EPBC Act**

Matter of NES	Project specifics	Assessment against significant impact guidelines
<b>Listed threatened species</b>		
<b>Spiny Rice-flower</b> (Vulnerable)	Spiny Rice-flower recorded within roadside reserves surrounding the proposed wind farm development site during the current assessment.	All recorded populations are outside of the proposed development area. The project will not result in a significant impact to this species.
<b>Corangamite Water Skink</b> (Endangered)	Corangamite Water Skink was recorded from three wetlands within the study area. All three wetlands are located in the north of the study area which is outside the footprint of the Development Plan.	Impacts to identified habitat areas have been avoided through the location of the Development Plan. Therefore, the proposed action will not directly or indirectly impact on the population, occupancy or habitat for Corangamite Water Skink and is unlikely to result in a significant impact on this species.
<b>Striped Legless Lizard</b> (Vulnerable)	Targeted survey detected Striped Legless Lizard within the road reserve of Castle Carey Road.	Development Plan avoids impacts to known and potential habitat. Minor impacts associated with access tracks not likely to result in a significant impact.
<b>Golden Sun Moth</b> (Critically Endangered)	Targeted survey undertaken in accordance with survey guidelines in potential habitat. Species not recorded within the study area.	Golden Sun Moth considered to be absent from the study area, therefore the proposed actions is not likely to result in a significant impact on this species.
<b>Growling Grass Frog</b> (Vulnerable)	Targeted survey undertaken in accordance with survey guidelines in potential habitat. Species not recorded within the study area.	Growling Grass Frog considered to be absent from the study area, therefore the proposed actions is not likely to result in a significant impact on this species.
<b>Southern Bent-wing Bat</b> (Critically Endangered)	Southern Bent-wing Bat has potential to forage or move through the study area. A survey of caves within the vicinity of the study area did not detect any recent bat activity. Further (targeted) survey is being undertaken to determine the presence/absence and distribution of Southern Bent-wing Bat across the study area.	Preliminary findings based on habitat assessment to date indicates the proposed development would be unlikely to have a significant impact on this species. Additional survey required to make final determination against the significant impact criteria.
<b>Dwarf Galaxias</b> (Vulnerable)	Dwarf Galaxias have been recorded in Salt Creek (which runs along the western boundary of the study area).	The Development Plan for the proposed wind farm is not expected to impact on habitat for Dwarf Galaxias in Salt Creek. An assessment against the significant impact guidelines for a vulnerable species shows

Matter of NES	Project specifics	Assessment against significant impact guidelines
		that the proposed action is not likely to result in a significant impact on this species.
<b>Listed threatened ecological communities</b>		
<b>Natural Temperate Grassland of the Victorian Volcanic Plain</b> (Critically Endangered)	Identified as present within the study area and adjoining roadside reserves.	The Development Plan will identify these areas as works exclusion zones, in which no construction activity will be undertaken. Therefore, works are not likely to result in a significant impact.
<b>Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains</b> (Critically Endangered)	Identified as present within the study area including adjoining roadside reserves.	The Development Plan will identify these areas as works exclusion zones, in which no construction activity will be undertaken. Therefore, works are not likely to result in a significant impact.
<b>Listed migratory species</b>		
<b>Migratory species</b>	Nineteen migratory species have been recorded or predicted to occur in the project search area. Four migratory species (Sharp-tailed Sandpiper, Latham's Snipe, Red-necked Stint and Common Sandpiper) were recorded from the study area during targeted surveys.	The number of species and individuals overserved across the study area, along with pre-existing database records, indicate that no sites within the study area or it's vicinity can be considered "important habitat", as outlined in the significant impact guidelines (DEWHA 2009a; DoE 2013). The Development Plan has been designed to avoid direct impacts on wetland habitat suitable for migratory species. Therefore, the proposed action is not likely to have a significant impact on a listed migratory species.
<b>Wetlands of international importance (Ramsar sites)</b>		
<b>Western District Lakes Ramsar wetland</b>	The Western District Lakes Ramsar wetland is located to the east of the study area.	The study area does not have any direct hydrological connection with the majority of the wetlands that comprise this Ramsar site. The study area appears to lack a direct hydrological connection with Lake Bookar, or Lake Colongaluc the closest wetlands of this Ramsar site occur in the neighbouring river basin. Development of the study area is unlikely to result in a significant impact to this Ramsar site.

On the basis of criteria outlined in the relevant Significant Impact Guidelines, the proposed development is unlikely to have a significant impact on any matter of national environmental significance, as detailed in Table 8 above.

## 5.2 State

### 5.2.1 Environment Effects Act 1978

The *Environment Effects Act 1978* establishes a process to assess the environmental impacts of a project. If applicable, the Act requires that an Environment Effects Statement (EES) be prepared by the proponent. The EES is submitted to the Minister for Planning and enables them to assess the potential environmental effects of the proposed development.

The general objective of the assessment process is to *provide for the transparent, integrated and timely assessment of the environmental effects of projects capable of having a significant effect on the environment* (DSE 2006).

The 'Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978' (DSE 2006) provide a range of criteria that can be used to determine whether an EES may be required for a project. These criteria relate to individual potential environmental effects and a combination of (two or more) potential environmental effects.

An assessment of the project against the individual, and combination of, potential effects criteria has been undertaken based on the information for the project outlined in this report. Table 9 outlines the EES referral criteria and the relevance for the project based on the current Development Plan (Figure 3). Several assessment criterion are outside the scope of this biodiversity assessment.

Note that the guidelines are not binding, and the decision as to whether an EES is required is ultimately at the discretion of the Minister for Planning.

**Table 9 Assessment of project in relation to the EES Referral criteria**

Referral criteria	Yes/No	Notes/details
<b>Individual environmental effects to warrant referral of the project</b>		
Potential clearing of 10 ha or more of native vegetation.	No	The project will impact on less than 10 hectares of native vegetation.
Potential long-term loss of a significant proportion of known remaining habitat or population of a threatened species within Victoria.	No	The project has been designed to minimise impacts to native vegetation and habitat for threatened species.
Potential long-term change to the ecological character of a wetlands listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'.	No	Impacts to wetland habitat avoided through position of the infrastructure outlined in the Development Plan.
Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term.	No	The project will not result in long term changes to overland flows, stream flows or groundwater.
Potential extensive or major effects on the health, safety or well-being of a human community, due to emissions to air or water or chemical hazards or displacement of residences.	-	Assessment of health or safety of a human community is outside the scope of this assessment.
Potential greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility.	-	Assessment of greenhouse gas emissions is outside the scope of this assessment.
<b>Combination of two or more environmental effects to warrant referral of the project</b>		
Potential clearing of 10 ha or more of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan.	No	Under the current design, the project will impact upon less than 10 hectares of native vegetation.
Matters listed under the FFG Act: <ul style="list-style-type: none"> <li>– Potential loss of a significant area of a listed ecological community; or</li> <li>– Potential loss of a genetically important population of an endangered or threatened species, including as a result of loss or fragmentation of habitats; or</li> <li>– Potential loss of critical habitat; or</li> <li>– Potential significant effects on habitat values of a wetland supporting migratory bird species.</li> </ul>	No	FFG Act listed species recorded within the study area including Corangamite Water Skink, Dwarf Galaxias, Gull-billed Tern, Brolga, Eastern Great Egret and Spiny Rice-flower. However, area of impact on these species and their habitat is not considered to be significant, based on the current Development Plan.
Potential extensive or major effects on landscape values of regional importance, especially where recognised by a planning scheme overlay or within or adjoin land reserved under the National Parks Act 1975.	-	Assessment of effects on landscape values is outside the scope of this study.



Referral criteria	Yes/No	Notes/details
Potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short or long term.	-	Assessment of effects on land stability, acid sulphate soils or erodible soils is outside the scope of this assessment.
Potential extensive or major effects on beneficial uses of waterbodies over the long term due to changes in water quality, stream flows or regional groundwater levels.	No	The project will not result in long term changes to stream flows or groundwater.
Potential extensive or major effects on social or economic well-being due to direct or indirect displacement of non-residential land use activities.	-	Assessment of effects on social or economic parameters is outside the scope of this assessment.
Potential for extensive displacement of residences or severance of residential access to community resources due to infrastructure development.	-	Assessment of residential impacts is outside the scope of this assessment.
Potential significant effects on the amenity of a substantial number of residents, due to extensive or major, long-term changes in visual, noise and traffic conditions.	-	Assessment of residential amenity is outside the scope of this assessment.
Potential exposure of a human community to severe or chronic health or safety hazards over the short or long term, due to emissions to air or water or noise or chemical hazards or associated transport.	-	Assessment of human health and safety hazards is outside the scope of this assessment.
Potential extensive or major effects on Aboriginal cultural heritage.	-	Assessment of effects on Aboriginal cultural heritage values is outside the scope of this study. Refer to Preliminary Cultural Heritage Assessment (Biosis 2016).
Potential extensive or major effects on cultural heritage places listed on the Heritage Register or the Archaeological Inventory under the Heritage Act 1995.	-	Assessment of effects on cultural heritage places values is outside the scope of this study. Refer to Preliminary Cultural Heritage Assessment (Biosis 2016).

### 5.2.2 Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Under the FFG Act a permit is required from DELWP to 'take' protected flora species from public land. A permit is generally not required for removal of protected flora from private land. Authorisation under the FFG Act is required to collect, kill, injure or disturb listed fish.

Link for further information: <http://www.depi.vic.gov.au/environment-and-wildlife/threatened-species-and-communities/flora-and-fauna-guarantee-act-1988>

All areas of *Heavier-soils* Plains Grassland within the site are consistent with the listed Western (Basalt) Plains Grassland community (Figure 2, Section 3.1). The Plains Grassy Woodland within the study area may represent the listed *Western Basalt Plains (River Red Gum) Grassy Woodland* community however clarification on the definition of this community is needed from DELWP.

The majority of the land is privately owned, however, sections also occur within public land (i.e. road reserves). Protected flora species and communities are present, and a protected flora permit from DELWP would be required if any of these species will be affected by the proposal.

### 5.2.3 Catchment and Land Protection Act 1994 (CaLP Act)

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species.

Declared noxious weeds identified in the study area are listed in Appendix 1 and established pest animals are listed in Appendix 2.

The proponent/land owner must take all reasonable steps to eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds, and prevent the spread of and as far as possible eradicate established pest animals. The State is responsible for eradicating State prohibited weeds from all land in Victoria.

Link for further information: <http://www.depi.vic.gov.au/agriculture-and-food/pests-diseases-and-weeds/protecting-victoria-from-pest-animals-and-weeds/legislation-policy-and-permits/legislation>.

### 5.2.4 Planning and Environment Act 1987 (incl. Planning Schemes)

The *Planning and Environment Act 1987* controls the planning and development of land in Victoria, and provides for the development of planning schemes for all municipalities.

Reforms to the native vegetation permitted clearing regulations were gazetted on 20 December 2013 through planning scheme amendment VC105. The reforms made changes to the Victoria Planning Provisions including the State Planning Policy Framework (SPPF), Clause 52.16 and 52.17 of all planning scheme within Victoria and introduced the Permitted clearing of native vegetation: Biodiversity Assessment Guidelines (DEPI 2013a).

Of particular relevance to the development proposed are controls over the removal of native vegetation contained within the Moyne Shire Planning Scheme, including permit requirements. The Scheme (Clause 72) defines 'native vegetation' as 'Plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. It is an objective of Clause 12.01-2 of the SPPF (Native Vegetation Management) that permitted clearing of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity. For more information on these reforms refer to <http://www.depi.vic.gov.au/environment-and-wildlife/biodiversity/native-vegetation>.

Clause 52.17 requires a planning permit to remove, destroy or lop native vegetation including dead native vegetation. Decision guidelines are contained in Clause 52.17-5.

Clause 65.02 requires consideration of native vegetation retention in a subdivision application and siting of open space areas.

Under Clause 66.02 a permit application to remove, destroy or lop native vegetation is required to be referred to DELWP as a recommending referral authority if any of the following apply:

- the area of native vegetation to be removed is greater than 0.5 hectares
- the class of application is on the high risk-based pathway
- a property vegetation precinct plan applies to the site or
- the native vegetation is on Crown land occupied or managed by the Responsible Authority.

At this stage of planning, an assessment of the proposed project against vegetation removal thresholds in Clause 66.02 cannot be made.

The study area is not covered by any overlays relevant to biodiversity under the Moyne Shire Planning.

### **Victoria's Biodiversity Assessment Guidelines**

The Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria (DEPI 2013a). The Guidelines replace Victoria's Native Vegetation Management – A Framework for Action.

The purpose of the Guidelines is to guide how impacts to biodiversity should be considered when assessing a permit application to remove, destroy or lop native vegetation. The objective for permitted clearing of native vegetation in Victoria is 'No net loss in the contribution made by native vegetation to Victoria's biodiversity'.

A detailed assessment for the project under the Guidelines is provided in Section 6.

#### **5.2.5 Fisheries Act 1995**

The Fisheries Act 1995 provides a legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats.

A person must not take, injure, damage, destroy or release any protected aquatic biota. Protected aquatic biota includes all species of the family Syngnathidae (seahorses, sea dragons and pipefish), and any fish or aquatic invertebrate or community that is listed under the FFG Act.

Protected aquatic biota that may be impacted upon by the development include:

- Hairy Burrowing Crayfish
- Dwarf Galaxias
- Yarra Pygmy Perch

Providing mitigation measures outlined in this report are adhered to, the potential for protected aquatic biota, as listed above, to be injured, damaged or destroyed is considered to be negligible. However, it is recommended that advice be sought from the DELWP if areas where Hairy Burrowing Crayfish occur are to be disturbed.

#### **5.2.6 Water Act 1989**

The primary purpose of the *Water Act 1989* is to provide a framework for the allocation and management of surface water and groundwater throughout Victoria. It provides a principal mechanism for maintenance of ecosystem functions including those of aquatic ecosystems. Under By-Laws created by the relevant Authority under the Act, the authorities regulate the works within and in the vicinity of waterways.

The proposed wind farm development will involve construction of access tracks that may affect beds and banks of waterways, riparian vegetation and quality of water in Salt and Blind Creek as well as number of unnamed tributaries of Stony Creek.

Development within the study area will require a Works on Waterways Permit from the Glenelg-Hopkins Catchment Management Authority.

### **5.2.7 Environment Protection Act 1970: State Environmental Protection Policy (Waters of Victoria) 2003**

The Environment Protection Act underpins the State Environmental Protection Policy (SEPP) - Waters of Victoria which provides a legal framework for the protection and rehabilitation of Victoria's surface water environments.

The project may directly and/or indirectly impact upon Blind Creek and unnamed tributaries of Stony Creek and Mount Emu Creek and their aquatic ecosystems. The SEPP requires that aquatic ecosystem values be protected. Environmental quality objectives and indicators are defined to protect beneficial uses and an attainment program provides guidance on protection of the beneficial uses (the uses and values of the water environment).

Impacts to surface water quality must not result in changes that exceed water quality objectives specified in the SEPP to protect the values of the water environment. Hydro Tasmania needs to ensure that direct and indirect impacts to surface water quality do not exceed the water quality objectives

Link to further information: <http://www.epa.vic.gov.au/water/epa/wov.asp>.

### **5.2.8 Regional Catchment Strategy and River Health Strategy**

State Planning Policy Framework Clause 14.02-1 (Catchment planning and management) states that planning must consider as relevant, Regional Catchment Strategies (RCS) and any associated implementation plan or strategy including any regional river health and wetland strategies.

Strategies of relevance to the study area are the:

- Glenelg-Hopkins CMA Regional Catchment Strategy (GHCMA 2012)
- Glenelg-Hopkins CMA Regional River Health Strategy (GHCMA 2004-2009)

These documents provide recommendations on the protection of existing high-value rivers and creeks that are in good condition and strategic improvement of other rivers and creeks.

## 6. Victoria's biodiversity assessment guidelines

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The Guidelines were introduced in December 2013, and they describe the following objective for permitted clearing of native vegetation in Victoria:

*"No net loss in the contribution made by native vegetation to Victoria's biodiversity"*

This objective is to be achieved through Victoria's planning system using a risk-based approach that relies on strategic planning and the permit and offset system. The key strategies for achieving no net loss at the permit level are:

- avoiding the removal of native vegetation that makes a significant contribution to Victoria's biodiversity
- minimising impacts to Victoria's biodiversity from the removal of native vegetation
- where native vegetation is permitted to be removed, ensuring it is offset in a manner that makes a contribution to Victoria's biodiversity that is equivalent to the contribution made by the native vegetation to be removed.

The steps that have been taken during the design of the development to ensure that impacts on biodiversity from the removal of native vegetation have been minimised include:

- Avoidance of large areas of the study area containing ecological constraints
- Siting of infrastructure, including turbines, roads, powerlines and access points, to minimise impacts on native vegetation and habitats where possible.

DELWP has provided biodiversity information tools to assist with determining the risk associated with permitted clearing and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

All planning permit applications to remove native vegetation are assigned to a risk-based pathway determined by the extent and location of proposed clearing. The risk-based pathway will dictate the information to be provided in a planning permit application and the decision guidelines the responsible authority (e.g. Council) and/or DELWP as a referral authority will use to assess the permit application.

The biodiversity information tools have two components:

- Site-based information is observable at a particular site. Biosis has collected the requisite site-based information for the assessment against the Guidelines.
- Landscape scale information requires consideration of information beyond the site. This information is managed by DELWP and can be accessed via the NVIM. Biosis has submitted the site-based data and location information to DELWP and a Biodiversity Information and Offset Requirements (BIOR) report has been prepared to accompany the planning application.

The following section summarises the results of the site-based assessment and the outputs generated by the BIOR report. The BIOR report identifies the risk-based pathway on which the planning application will be assessed. The full BIOR report can be viewed in Appendix 3.

## 6.1 Proposed removal of native vegetation

To provide a preliminary assessment of the impact of the proposed project on native vegetation, mapped native vegetation (including patches of vegetation and scattered trees) was overlain on the Development Plan area. Areas intersecting the Development Plan area are treated as lost (Figure 5). As a detailed vegetation quality assessment has not yet been conducted, vegetation quality scores have been derived from the state-wide vegetation condition layer (NV2005\_QUAL layer).

### 6.1.1 Extent of native vegetation removal

According to this preliminary assessment, the Development Plan area contains 0.422 hectares (0.084 habitat hectares) of vegetation. This includes 6 scattered trees.

### 6.1.2 Modelled habitat for rare or threatened species

The development area contains modelled habitat for 23 species (Table 10). Under the clearing scenario assessed, specific offsets are not required for any of these species.

**Table 10 Rare or threatened species with modelled habitat within the development area**

Scientific name	Common name	Conservation status		
		EPBC	VIC	FFG
<b>Fauna</b>				
<i>Anas rhynchotis</i>	Australasian Shoveler		vu	
<i>Ardea intermedia</i>	Intermediate Egret		en	L
<i>Ardea modesta</i>	Eastern Great Egret		vu	L
<i>Aythya australis</i>	Hardhead		vu	
<i>Biziura lobata</i>	Musk Duck		vu	
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	en	L
<i>Delma impar</i>	Striped Legless Lizard	VU	en	L
<i>Falco subniger</i>	Black Falcon		vu	
<i>Gelochelidon nilotica macrotarsa</i>	Gull-billed Tern		en	L
<i>Antigone rubicunda</i>	Brolga		vu	L
<i>Litoria raniformis</i>	Growling Grass Frog	VU	en	L
<i>Oxyura australis</i>	Blue-billed Duck		en	L
<i>Porzana pusilla palustris</i>	Baillon's Crake		vu	L
<i>Rostratula benghalensis australis</i>	Australian Painted Snipe	EN	cr	L
<i>Stictonetta naevosa</i>	Freckled Duck		en	L
<i>Synemon plana</i>	Golden Sun Moth	CR	cr	L
<i>Tringa glareola</i>	Wood Sandpiper		vu	
<b>Flora</b>				
<i>Casuarina obesa</i>	Swamp Sheoak		e	L
<i>Comesperma polygaloides</i>	Small Milkwort		v	L
<i>Coronidium scorpioides</i> 'aff. <i>rutidolepis</i> (Lowland Swamp)' variant	Pale Swamp Everlasting		v	
<i>Glycine latrobeana</i>	Clover Glycine	VU	v	L
<i>Lachnagrostis adamsonii</i>	Adamson's Blown-grass	EN	v	L
<i>Lachnagrostis punicea</i> subsp. <i>punicea</i>	Purple Blown-grass		r	
<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	CR	e	L

## 6.2 Determining the risk-based pathway

To determine the risk based pathway for the permit application, two factors are considered: **location risk** and **extent risk**.

Location risk has been pre-determined by DELWP for all locations in Victoria. The location of a particular site is determined using the *Native vegetation location risk map* available in the Native Vegetation Information Management (NVIM) system (<http://nvim.depi.vic.gov.au>).

The extent risk is based on the extent of native vegetation proposed to be removed. Extent risk is determined with reference to the

- area of any remnant patches of native vegetation proposed to be removed
- number of any scattered trees proposed to be removed.

For applications that propose to remove both remnant patch vegetation and scattered trees, the extent of scattered trees is calculated using the standard extent multiplier and added to the extent of remnant patch vegetation, to determine the overall extent to be considered when determining the risk-based pathway.

It is proposed to remove less than one hectare of native vegetation from within location A, therefore the application for removal of this native vegetation must meet the requirements of, and be assessed in, the low risk-based pathway. These requirements are provided in Appendix 3.

## 6.3 Offset requirements

In order to ensure a gain to Victoria's biodiversity that is equivalent to the loss resulting from permitted clearing of native vegetation, compensatory offsets are required. Losses and gains are measured in biodiversity equivalence scores or units.

For a moderate and high risk-based pathway application, the specific-general offset test will determine if a general offset, specific offset or combination of both is required.

The results of the specific-general offset test are provided in Appendix 3 and summarized in Table 11.

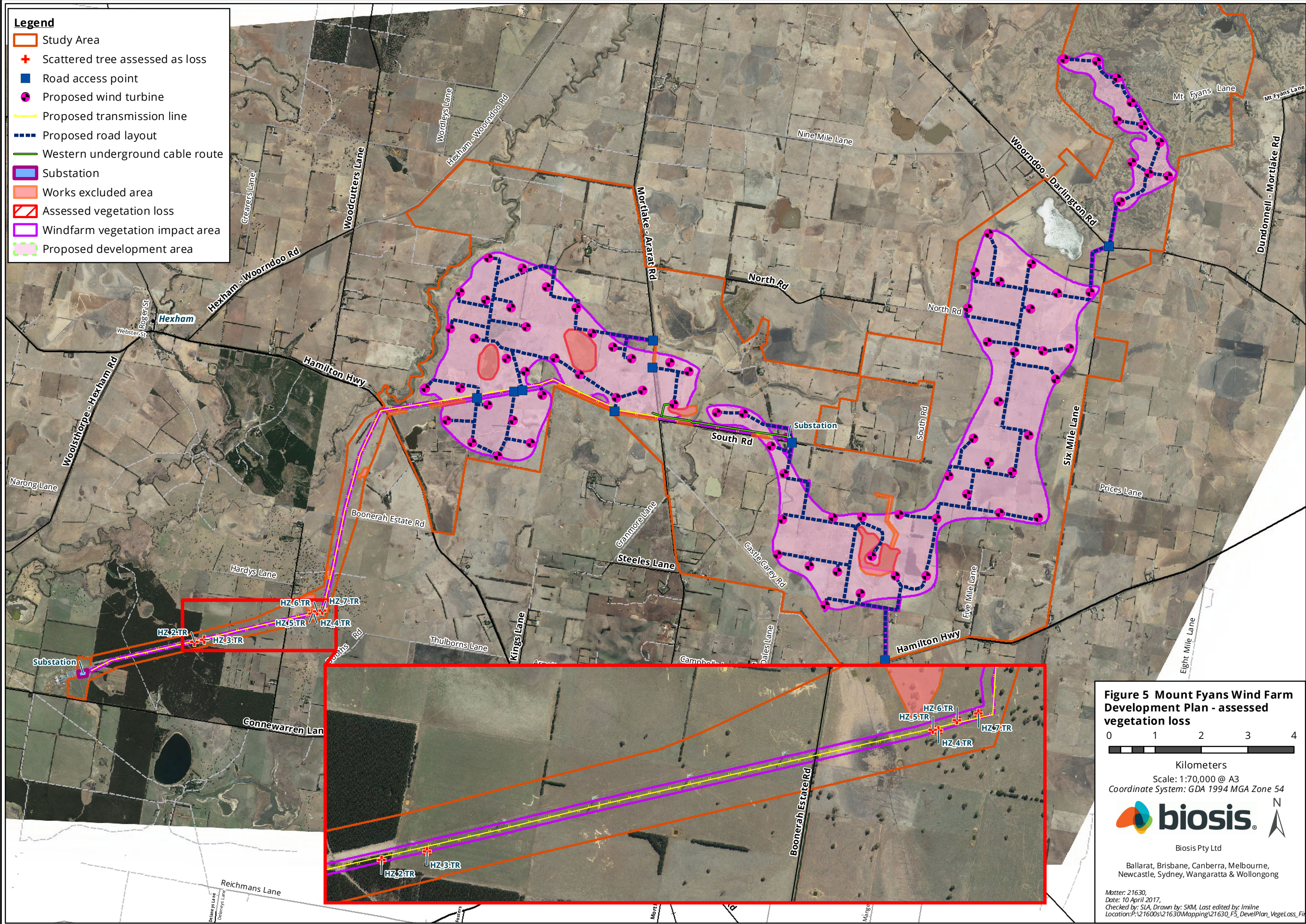
**Table 11 Summary of DELWP Biodiversity Impacts and Offset Requirements report**

Attribute	Outcome
Location risk	A
Native vegetation removal extent	0.422
Risk-based pathway	Low
Habitat hectares to be removed	0.084
Strategic Biodiversity Score	0.177
Specific-general offset test result	General offset only
General Biodiversity Equivalence Scores	0.015 GBES
Offset type	General
Offset risk factor	1.5
Offset Vicinity	Glenelg Hopkins CMA or Moyne Shire Council
Offset minimum Strategic Biodiversity Score	0.142

In summary, clearance of all vegetation within the infrastructure area would require the provision of 0.048 general biodiversity equivalence units, which must be located within the Glenelg Hopkins Catchment Management Area or the Moyne Shire Council local government area. The offset site would require a strategic biodiversity score of equal to or greater than 0.142.



- Legend**
- Study Area
  - + Scattered tree assessed as loss
  - Road access point
  - Proposed wind turbine
  - Proposed transmission line
  - Proposed road layout
  - Western underground cable route
  - Substation
  - Works excluded area
  - Assessed vegetation loss
  - Windfarm vegetation impact area
  - Proposed development area



**Figure 5 Mount Fyans Wind Farm Development Plan - assessed vegetation loss**

0 1 2 3 4  
Kilometers

Scale: 1:70,000 @ A3  
Coordinate System: GDA 1994 MGA Zone 54

**biosis**

Biosis Pty Ltd

Ballarat, Brisbane, Canberra, Melbourne, Newcastle, Sydney, Wangaratta & Wollongong

Matter: 21630,  
Date: 10 April 2017,  
Checked by: SIA, Drawn by: SKM, Last edited by: Iniline  
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## 7. Key ecological values and recommendations

The section summarises the key ecological values identified within the study area and provides recommendations to minimise risks associated with development of the site.

The current Development Plan has been prepared and designed in response to the results of the general and targeted surveys to avoid key areas of habitat for threatened species. Priority has been given to the highest value areas and in retaining as much of the mapped native vegetation and habitat as possible. All areas of vegetation and habitat nominated in the Development Plan as 'retained' are to be treated as no-go zones and are not to be encroached upon as development progresses.

Table 12 provides a summary of recommendations to avoid and minimise risks on key ecological features as the planning approval phase progresses and the project moves into detailed design.

The final design phase is the time during which future requirements for infrastructure and services will be known, within the scope of planning and environmental permits, and allowance made for all construction works, such as road batters, drainage and services.

**Table 12 Summary of key ecological values, potential implications of developing the study area and recommendations to minimise ecological impacts.**

Ecological feature	Potential implications of development	Recommendations
<b>Native vegetation</b>	There are 10 EVCs within the study area.	Minimise impacts to native vegetation and fauna habitat. In particular, <i>Heavier-soils</i> Plains Grassland, Stony Knoll Shrubland, Plains Grassy Wetland and Aquatic Herbland EVCs should be avoided as these areas support the presence of EPBC Act and FFG Act listed ecological communities.
<b>Other habitat features</b>	Removal of known/potential habitat for significant flora and fauna species.	Keep development footprint to a minimum and avoid construction of infrastructure (e.g. underground services) outside of road reserves containing native vegetation and/or potential habitat for threatened species such as Striped Legless Lizard, Southern Toadlet and Brown Toadlet.
<b>Instream/aquatic habitat</b>	Loss of, or alterations to, riparian and in-stream habitat within and in the vicinity of the study area via direct removal, notable hydrological changes, deterioration in water quality and sedimentation.	Protect waterways by inclusion of appropriate buffers. Road batters and all services should be excluded from waterways and their buffers. Avoid or minimise removal of habitat by careful design of instream works. Design the infrastructure works in accordance with relevant guidelines from the Glenelg-Hopkins CMA and in accordance with guidelines for fish friendly waterway crossings (Witheridge 2002). Where instream works may be necessary, guidelines should be followed to ensure the approach and instream sediment control measures appropriately mitigate the downstream transfer of sediment from the construction site. See Appendix E of Fish Passage Requirements for Waterway Crossings (Witheridge 2002) for guidance on the planning, selection and

Ecological feature	Potential implications of development	Recommendations
		<p>usage of these methods.</p> <p>Incorporate relevant Water Sensitive Road Design (Wong et al. 2000) elements wherever practical/appropriate.</p> <p>Minimise the removal of native vegetation within or adjacent to waterbodies and watercourses.</p> <p>Ensure effective sediment controls are implemented and regularly inspected.</p> <p>Time works appropriately with regard to waterway crossings, Blind Creek water levels and anticipated flow events - aim for low or zero flow conditions and low water levels.</p> <p>Protect key values (including waterways) by retaining features and including appropriate buffers into design.</p>
<b>Habitat connectivity</b>	<p>Removal of vegetation / habitat that forms part of a notable habitat linkage.</p> <p>Aquatic linkage (instream – refer above).</p>	<p>Retain fauna habitat linkages within the development and the local area.</p>

### Construction and post-construction management

Specific detail relating to preventing impacts to retained native vegetation and aquatic and terrestrial habitat should be addressed in a site-specific Construction Environmental Management Plan. This will include issues relating to contractors such as environmental inductions, installation of temporary fencing/signage, drainage and sediment control.

## References

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- Bamford, M, Watkins, D., Bancroft W., Tischler, G. & Wahl, J. 2008. Migratory Shorebirds of the East Asian – Australasian Flyway: Population estimates and internationally important sites. Wetlands International.
- Biosis Research 2012. Peshurst Wind Farm: Transmission Grid Route. Report for RES Australia. Author: Arber, S. Biosis Research Pty. Ltd.
- Biosis 2013. Peshurst Wind Farm: Flora, Fauna, Net Gain and Targeted Flora Surveys. Report for RES Australia. Authors: Dell, M., Arber S. & Gibson, M. Biosis Pty Ltd.
- Biosis 2014. Mount Fyans Wind Farm. Report for Hydro Tasmania. Authors: Sofo, K. & Venosta, M. Biosis Pty Ltd.
- Biosis 2016. Mount Fyans Wind Farm, Mortlake, Victoria: Preliminary Cultural Heritage Assessment. Report for Hydro Tasmania. Authors: Wood, A. & Thomson, M. Biosis Pty Ltd.
- Biosis 2017a. Mount Fyans Wind Farm: Flora and fauna existing conditions. Report for Hydro Tasmania. Authors: Gibson, M., Arber, A., Thomas, G., Steelcable, A., Byrne, A., Venosta, M. & Sofo, K. Biosis Pty Ltd.
- Biosis 2017b. Mount Fyans Wind Farm: Brolga assessment. Report for Hydro Tasmania. Authors: Sofo, K. & Venosta, M. Biosis Pty Ltd.
- Biosis Research 2009. Mt Fyans Wind Farm Due Diligence Ecological Assessment. Report for Roaring 40s Renewable Energy. Authors: Sofo, K., Wong, N. & Mossop, D. Biosis Research Pty. Ltd., Melbourne.
- Biosis Research 2012. Peshurst Wind Farm: Transmission Grid Route. Report for RES Australia. Author: Arber, S. Biosis Research Pty. Ltd.
- Braby, M and Dunforn, M 2006. Field observations on the ecology of the Golden Sun Moth *Synemon plana* Walker (Lepidoptera: Castniidae). The Australian Entomologist 33: 103-110
- Carter, O. & Sutter, G. 2010. National Recovery Plan for Clover Glycine *Glycine latrobeana*. Department of Sustainability and Environment, Melbourne.
- Carter, O. & Walsh, N. 2006. National Recovery Plan for the Salt-lake Tussockgrass *Poa sallacustris*. Department of Sustainability and Environment, Melbourne.
- Clarke G M and O'Dwyer C 2000. Genetic variability and population structure of the endangered Golden Sun Moth *Synemon plana*. Biological Conservation 92: 371-381
- Coates, F. 2003a. Action Statement No. 147. Fragrant Leek-orchid *Prasophyllum* sp. aff. *suaveolens* (Western Basalt Plains). Department of Sustainability & Environment, Melbourne.
- Coates, F. 2003b. Action Statement No. 156, Metallic Sun-orchid, *Thelymitra epipactoides*. Department of Sustainability and Environment, Melbourne.
- Cogger, H. 2014. *Reptiles and Amphibians of Australia*. CSIRO Publishing, Collingwood.
- Davey, A. G., & White, S. 1986. Victorian Caves and Karst-Strategies for Management and Catalogue. A Report to the Department of Conservation, Forests and Lands.
- DEH 2006. White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands. Nationally threatened species and ecological communities. EPBC Policy Statement. Department of the Environment & Heritage. Australian Government, Canberra.

- DEPI 2013a. *Permitted clearing of native vegetation - Biodiversity assessment guidelines*. Victorian Government Department of Environment and Primary Industries, Melbourne (September 2013).
- DEPI 2013b. *Native vegetation gain scoring manual, version 1*. Victorian Government Department of Environment and Primary Industries, Melbourne (May 2013).
- DEPI 2014a. *Advisory List of Rare or Threatened Plants in Victoria – 2014*. Victorian Government Department of Environment & Primary Industries, East Melbourne.
- DEPI 2014b. *Permitted clearing of native vegetation – Biodiversity assessment handbook*. Version 0.2. Victorian Government Department of Environment and Primary Industries, Melbourne (January 2014).
- DEWHA 2009a. Significant impact guidelines for 36 migratory shorebird species: Migratory species. Draft EPBC Act policy statement 3.21. Department of the Environment, Water, Heritage & the Arts. Australian Government, Canberra.
- DEWHA 2009b. Significant impact guidelines for the critically endangered golden sun moth (*Synemon plana*). Nationally threatened species and ecological communities EPBC policy statement 3.12. Department of the Environment, Water, Heritage & the Arts. Australian Government, Canberra.
- DEWHA 2009c. Significant impact guidelines for the vulnerable Growling Grass Frog (*Litoria raniformis*). Nationally threatened species and ecological communities EPBC policy statement 3.14. Department of the Environment, Water, Heritage & the Arts. Australian Government, Canberra.
- DEWHA 2009d. Significant impact guidelines for the critically endangered Spiny Rice-flower (*Pimelea spinescens* subsp. *spinescens*). Nationally threatened species and ecological communities EPBC policy statement 3.11. Department of the Environment, Water, Heritage & the Arts. Australian Government, Canberra.
- DEWHA 2010. Survey guidelines for Australia's threatened frogs. Guidelines for detecting frogs listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Department of the Environment, Water, Heritage & the Arts. Australian Government, Canberra.
- DNRE 2002. *Victoria's Native Vegetation Management: A Framework for Action*. Victorian Government Department of Natural Resources & Environment, East Melbourne.
- DoE 2013. Matters of National Environmental Significance. Significant impact guidelines 1.1. Environment Protection and Biodiversity Conservation Act 1999. Department of the Environment. Australian Government, Canberra.
- DSE 2004. *Native Vegetation: Sustaining a living landscape. Vegetation Quality Assessment Manual – Guidelines for applying the Habitat hectares scoring method. Version 1.3*. Victorian Government Department of Sustainability & Environment, Melbourne.
- DSE 2005a. Index of Stream Condition: The Second Benchmark of Victorian River Condition. Department of Sustainability & Environment, East Melbourne.
- DSE 2005b. Advisory List of Rare or Threatened Plants in Victoria - 2005, Victorian Department of Sustainability & Environment, East Melbourne, Victoria.
- DSE 2006. *Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978*. Victorian Government Department of Sustainability and Environment, Melbourne.
- DSE 2010a. Victorian Biodiversity Atlas 'VBA\_FAUNA25, FAUNA100 & FAUNA Restricted, FLORA25, FLORA100 & FLORA Restricted' August 2015 © The State of Victoria, Department of Sustainability & Environment.
- DSE 2010b. Biodiversity Precinct Structure Planning Kit. Department of Sustainability and Environment, Melbourne.

DSE 2012. Interim Guidelines for the Assessment, Avoidance, Mitigation and Offsetting of Potential Wind Farm Impacts on the Victorian Brolga Population. Department of Sustainability & Environment, East Melbourne, Victoria.

DSE 2013. Advisory List of the Threatened Vertebrate Fauna in Victoria - 2013, Department of Sustainability & Environment, East Melbourne, Victoria.

DSEWPaC 1999. Survey guidelines for Australia's threatened reptiles: Guidelines for detecting reptiles listed as threatened under the EPBC Act. Department of Sustainability, Environment, Water, Population & Communities. Australian Government, Canberra.

DSEWPaC 2011b. Environment Protection and Biodiversity Conservation Act 1999 draft referral guidelines for the endangered southern brown bandicoot (eastern), *Isoodon obesulus obesulus*. Department of Sustainability, Environment, Water, Population & Communities. Australian Government, Canberra.

DSEWPaC 2011c. Nationally Threatened Ecological Communities of the Victorian Volcanic Plain: Natural Temperate Grassland & Grassy Eucalypt Woodland A guide to the identification, assessment and management of nationally threatened ecological communities. Department of Sustainability, Environment, Water, Population & Communities. Australian Government, Canberra.

DSEWPaC 2011d. Survey guidelines for Australia's threatened fish: Guidelines for detecting fish listed as threatened under the Environment Protection and Biodiversity Conservation Act 1999. Department of Sustainability, Environment, Water, Population & Communities. Australian Government, Canberra.

DSEWPaC 2012. Commonwealth Listing Advice on Seasonal Herbaceous Wetlands (Freshwater) of the temperate Lowland Plains. Department of Sustainability, Environment, Water, Population & Communities. Australian Government, Canberra.

Edwards, T. 1993. Golden Sun Moth. Australian Natural History. 24 (6): 16-17.

Fairfull, S., & Witheridge, G. 2003. Why Do Fish Need to Cross the Road: Fish Passage Requirements for Waterway Crossings. NSW Fisheries.

Gibson L. 2006. Surveys of the Golden Sun Moth (*Synemon plana* Walker) population and ant assemblage at the Craigieburn Grassland Reserve. (Unpublished Bsc Hons Thesis, La Trobe University, Bundoora.

GHCMA 2012. Regional Catchment Strategy 2014-2022. Glenelg Hopkins Catchment Management Authority. Victorian Government.

GHCMA 2003. Regional River Health Strategy 2004-2009. Glenelg Hopkins Catchment Management Authority. Victorian Government.

Gilmore, D., Koehler, S. O'Dwyer, C. and Moore, W. 2008. Golden Sun Moth *Synemon plana* (Lepidoptera: Castniidae): results of a broad survey of populations around Melbourne. The Victorian Naturalist. 125 (2): 230-37.

Heard, G.W., Scroggie, M.P., and Clemann, N. 2010. *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes*. Arthur Rylah Institute for Environmental Research Technical Series Report No. 208. Department of Sustainability and Environment, Heidelberg, Victoria.

Hero, J.M., Littlejohn, M. & Marantelli, G. 1990. *Frogwatch Field Guide to Victorian Frogs*. Department of Conservation and Environment, East Melbourne.

Hurley, V. G. 2015. Monitoring of Peregrine Falcon (*Falco peregrinus macropus*) breeding at Mt Fyans, 1976-2014. Unpublished report to by the Victorian Peregrine Project, Melbourne.

- 
- O'Dwyer, C. and Attiwill, P.M. 1999. A comparative study of habitats of the Golden Sun Moth *Synemon plana* Walker (Lepidoptera: Castniidae): implications for restoration. *Biological Conservation* 89: 131-141.
- Murphy, A. 2010. National Recovery Plan for Adamson's Blown-grass *Lachnagrostis adamsonii*. Department of Sustainability and Environment, Melbourne.
- Robertson, P., Heard, G.W. & Scroggie, M. 2002. *The Ecology and Conservation Status of the Growling Grass Frog Litoria raniformis within the Merri Creek Corridor. Interim Report: Distribution, Abundance and Habitat Requirements*. Wildlife Profiles Pty Ltd Report for the Department of Natural Resources and Environment. Tyler, M.J. 1997. *The Action Plan for Australian Frogs*. Environment Australia, Canberra.
- Wetheridge, G. 2002. Fish passage requirements for waterway crossings-Engineering guidelines.

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## Appendices

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## Appendix 1 Flora

Notes to tables:

<p><b>EPBC Act:</b>            CR - Critically Endangered            EN - Endangered            VU - Vulnerable</p> <p>PMST – Protected Matters Search Tool</p>	<p><b>DEPI 2014a:</b>            e - endangered            v - vulnerable            r - rare</p>
<p><b>FFG Act:</b>            L - listed as threatened under FFG Act            P - protected under the FFG Act (public land only)</p>	<p><b>Noxious weed status:</b>            SP - State prohibited species            RP- Regionally prohibited species            RC - Regionally controlled species            RR- Regionally restricted species</p>
<p># - Native species outside natural range</p>	

## A1.1 Flora species recorded from the study area

Status	Scientific Name	Common Name	Biosis	Other
<b>Indigenous species</b>				
	<i>Acacia dealbata</i>	Silver Wattle	+	
	<i>Acacia implexa</i>	Lightwood	+	
P	<i>Acacia mearnsii</i>	Black Wattle	+	
	<i>Acacia melanoxylon</i>	Blackwood	+	
	<i>Acacia paradoxa</i>	Hedge Wattle	+	+
P	<i>Acacia pycnantha</i>	Golden Wattle	+	
	<i>Acaena echinata</i>	Sheep's Burr	+	+
	<i>Acaena ovina</i>	Australian Sheep's Burr	+	
	<i>Arthropodium minus</i>	Small Vanilla-lily	+	+
	<i>Asperula conferta</i>	Common Woodruff	+	
	<i>Austrostipa scabra</i>	Rough Spear-grass		+
	<i>Austrostipa</i> spp.	Spear Grass	+	
P	<i>Azolla</i> spp.	Azolla	+	
	<i>Brachychiton</i> spp.	Kurrajong	+	
	<i>Bursaria spinosa</i>	Sweet Bursaria	+	+
	<i>Bursaria spinosa</i> subsp. <i>spinosa</i>	Sweet Bursaria	+	
P	<i>Calocephalus citreus</i>	Lemon Beauty-heads	+	
	<i>Carex tereticaulis</i>	Poong'ort	+	
P	<i>Chrysocephalum apiculatum</i> s.s.	Common Everlasting		+
	<i>Convolvulus erubescens</i> spp. <i>agg.</i>	Pink Bindweed	+	
v, P	<i>Coronidium scorpioides</i> 'aff. <i>rutidolepis</i> (Lowland Swamp)	Pale Swamp Everlasting	+	
P	<i>Craspedia</i> spp.	Billy Buttons	+	
	<i>Crassula decumbens</i> var. <i>decumbens</i>	Spreading Crassula	+	
	<i>Crassula helmsii</i>	Swamp Crassula	+	
	<i>Crassula sieberiana</i> s.s.	Sieber Crassula	+	
	<i>Cyperus</i> spp.	Flat Sedge	+	
	<i>Dichelachne</i> spp.	Plume Grass	+	
	<i>Dichondra repens</i>	Kidney-weed	+	+
	<i>Drosera peltata</i> s.s.	Pale Sundew	+	
	<i>Dysphania pumilio</i>	Clammy Goosefoot	+	
	<i>Eleocharis acuta</i>	Common Spike-sedge	+	
	<i>Epilobium hirtigerum</i>	Hairy Willow-herb	+	
	<i>Epilobium</i> spp.	Willow Herb	+	
	<i>Eryngium ovinum</i>	Blue Devil	+	
	<i>Eryngium vesiculosum</i>	Prickfoot	+	
	<i>Eucalyptus camaldulensis</i>	River Red-gum	+	
#	<i>Eucalyptus globulus</i>	Southern Blue-gum	+	

Status	Scientific Name	Common Name	Biosis	Other
	<i>Geranium</i> spp.	Crane's Bill	+	+
	<i>Glyceria australis</i>	Australian Sweet-grass	+	
	<i>Glycine</i> spp.	Glycine		+
	<i>Haloragis</i> spp.	Raspwort	+	
P	<i>Helichrysum luteoalbum</i>	Jersey Cudweed	+	
	<i>Hypericum gramineum</i> spp. agg.	Small St John's Wort	+	
	<i>Juncus bufonius</i>	Toad Rush	+	
	<i>Juncus holoschoenus</i>	Joint-leaf Rush	+	
	<i>Juncus pallidus</i>	Pale Rush	+	
	<i>Juncus</i> spp.	Rush	+	
	<i>Juncus subsecundus</i>	Finger Rush	+	
	<i>Lachnagrostis filiformis</i> s.s.	Common Blown-grass	+	
P	<i>Leptorhynchos squamatus</i>	Scaly Buttons	+	
	<i>Lobelia</i> spp.	Lobelia	+	
	<i>Lythrum hyssopifolia</i>	Small Loosestrife	+	
	<i>Melicytus dentatus</i> s.s.	Tree Violet	+	+
	<i>Mentha</i> spp.	Mint	+	
	<i>Montia australasica</i>	White Purslane	+	
	<i>Myriophyllum</i> spp.	Water Milfoil	+	
	<i>Oxalis corniculata</i> s.l.	Yellow Wood-sorrel	+	
	<i>Oxalis perennans</i>	Grassland Wood-sorrel		+
	<i>Persicaria decipiens</i>	Slender Knotweed	+	
	<i>Phragmites australis</i>	Common Reed	+	
	<i>Plantago</i> spp.	Plantain	+	
	<i>Poa labillardierei</i>	Common Tussock-grass	+	+
	<i>Ranunculus</i> spp.	Buttercup	+	
	<i>Rumex brownii</i>	Slender Dock	+	
	<i>Rumex dumosus</i>	Wiry Dock	+	
	<i>Rytidosperma caespitosum</i>	Common Wallaby-grass		+
	<i>Rytidosperma</i> spp.	Wallaby Grass	+	
	<i>Schoenoplectus pungens</i>	Sharp Club-sedge	+	
	<i>Schoenus apogon</i>	Common Bog-sedge	+	
P	<i>Senecio glomeratus</i>	Annual Fireweed	+	
P	<i>Senecio</i> spp.	Groundsel	+	
	<i>Solanum laciniatum</i>	Large Kangaroo Apple	+	
P	<i>Solenogyne</i> spp.	Solenogyne	+	
	<i>Stellaria caespitosa</i>	Matted Starwort	+	
P	<i>Thelymitra</i> spp.	Sun Orchid	+	
	<i>Themeda triandra</i>	Kangaroo Grass	+	+

Status	Scientific Name	Common Name	Biosis	Other
	<i>Triglochin striata</i>	Streaked Arrowgrass	+	
	<i>Typha</i> spp.	Bulrush	+	
	<i>Urtica</i> spp.	Nettle	+	
	<i>Wurmbea dioica</i>	Common Early Nancy	+	
Introduced species				
	<i>Acetosella vulgaris</i>	Sheep Sorrel	+	+
	<i>Agrostis capillaris</i>	Brown-top Bent	+	
	<i>Alopecurus geniculatus</i>	Marsh Fox-tail	+	
	<i>Alopecurus pratensis</i>	Meadow Fox-tail	+	
	<i>Arctotheca calendula</i>	Cape Weed	+	+
	<i>Aster subulatus</i>	Aster-weed	+	
	<i>Avena fatua</i>	Wild Oat	+	
	<i>Bromus diandrus</i>	Great Brome	+	
	<i>Callitriche stagnalis</i>	Common Water-starwort	+	
RR	<i>Carduus tenuiflorus</i>	Winged Slender-thistle	+	
RR	<i>Carthamus lanatus</i>	Saffron Thistle	+	
	<i>Cerastium glomeratum</i> s.s.	Sticky Mouse-ear Chickweed	+	
	<i>Chamaecytisus palmensis</i>	Tree Lucerne	+	
	<i>Cicendia</i> spp.	Cicendia	+	
RR	<i>Cirsium vulgare</i>	Spear Thistle	+	
	<i>Conyza bonariensis</i>	Flaxleaf Fleabane	+	
	<i>Cotula coronopifolia</i>	Water Buttons	+	
	<i>Cynosurus echinatus</i>	Rough Dog's-tail	+	+
	<i>Cyperus eragrostis</i>	Drain Flat-sedge	+	
RR	<i>Cytisus scoparius</i>	English Broom	+	
	<i>Dactylis glomerata</i>	Cocksfoot	+	
	<i>Erodium botrys</i>	Big Heron's-bill	+	+
	<i>Erodium cicutarium</i>	Common Heron's-bill	+	
	<i>Eucalyptus cladocalyx</i>	Sugar Gum	+	
	<i>Helminthotheca echioides</i>	Ox-tongue	+	
	<i>Holcus lanatus</i>	Yorkshire Fog	+	+
	<i>Hordeum</i> spp.	Barley Grass	+	
	<i>Hypochaeris glabra</i>	Smooth Cat's-ear		+
	<i>Hypochaeris radicata</i>	Flatweed	+	+
	<i>Isolepis levynsiana</i>	Tiny Flat-sedge	+	
	<i>Lactuca saligna</i>	Willow-leaf Lettuce	+	
	<i>Lepidium africanum</i>	Common Peppergrass	+	
	<i>Lolium</i> spp.	Rye Grass	+	

Status	Scientific Name	Common Name	Biosis	Other
RC	<i>Lycium ferocissimum</i>	African Box-thorn	+	
	<i>Malus pumila</i>	Apple	+	
	<i>Malva nicaeensis</i>	Mallow of Nice	+	
RC	<i>Marrubium vulgare</i>	Horehound	+	
	<i>Medicago polymorpha</i>	Burr Medic		+
	<i>Parentucellia latifolia</i>	Red Bartsia	+	
	<i>Paspalum dilatatum</i>	Paspalum	+	
	<i>Phalaris aquatica</i>	Toowoomba Canary-grass	+	
	<i>Plantago lanceolata</i>	Ribwort	+	
	<i>Polycarpon tetraphyllum</i>	Four-leaved Allseed	+	
	<i>Polypogon monspeliensis</i>	Annual Beard-grass	+	
	<i>Romulea rosea</i>	Onion Grass	+	
	<i>Rumex crispus</i>	Curled Dock	+	
	<i>Salvia verbenaca</i>	Wild Sage	+	
	<i>Schinus molle</i>	Pepper Tree	+	
RR	<i>Silybum marianum</i>	Variegated Thistle	+	+
	<i>Sisymbrium</i> spp.	Mustard	+	
	<i>Sonchus asper</i> s.s.	Rough Sow-thistle	+	
	<i>Sonchus oleraceus</i>	Common Sow-thistle	+	
	<i>Trifolium repens</i> var. <i>repens</i>	White Clover	+	
	<i>Urtica urens</i>	Small Nettle	+	

## A1.2 Listed flora species recorded/predicted to occur within 10 km of the study area

The following table includes the listed flora species that have potential to occur within the study area. The list of species is sourced from the Victorian Flora Information System and the Protected Matters Search Tool (DEE; accessed on 22.09.2016).

**Table A1.2. Listed flora species recorded / predicted to occur within 10 km of the study area.**

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<b>National significance</b>								
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	VU				PMST	Swampy areas, mainly along the Murray River between Wodonga and Echuca with scattered records from southern Victoria.	<b>Medium</b> Aquatic Herbland.
<i>Carex tasmanica</i>	Curly Sedge	VU	v	L		PMST	Seasonally wet areas, such as around drainage lines and freshwater swamps, on fertile, clay soils derived from basalt.	<b>Medium</b> Brackish Wetland; Plains Grassy Wetland.
<i>Dianella amoena</i>	Matted Flax-lily	EN	e	L	2002		Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays.	<b>Medium</b> Plains Grassland (roadsides).

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Diuris basaltica</i>	Small Golden Moths	EN	e	L	1991		Plains Grassland dominated by tussock-forming perennial grasses (including Kangaroo Grass); often with embedded surface basalt.	<b>High</b> Stony Knoll Shrubland/Plains Grassland.
<i>Dodonaea procumbens</i>	Trailing Hop-bush	VU	v			PMST	Sandy or clay soils in low-lying, winter-wet areas in grasslands, woodlands, and low-open forest.	<b>Low</b> Plains Grassy Woodland.
<i>Glycine latrobeana</i>	Clover Glycine	VU	v	L	2010		Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	<b>High</b> Plains Grassland; Stony Knoll Shrubland.
<i>Lachnagrostis adamsonii</i>	Adamson's Blown-grass	EN	v	L		PMST	Low-lying, seasonally wet or swampy areas of plains communities, often in slightly saline conditions.	<b>Medium</b> Brackish Wetland; Plains Grassy Wetland; Aquatic Herbland.
<i>Lepidium aschersonii</i>	Spiny Peppercross	VU	e	L	1983		Heavy clay soils near salt lakes on the volcanic plains; disjunct records near Lake Omeo.	<b>Medium</b> Brackish Wetland; Aquatic Herbland; Plains Grassy Wetland.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Leucochrysum albicans</i> var. <i>tricolor</i>	White Sunray	EN	e	L	2008		Grasslands of the Victorian Volcanic Plains, primarily on acidic clay soils derived from basalt, with occasional occurrences on adjacent sedimentary, sandy-clay soils.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland.
<i>Pimelea spinescens</i> subsp. <i>spinescens</i>	Spiny Rice-flower	CR	e	L	1989		Primarily grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although also recorded in grassland dominated by introduced perennial grasses.	<b>Recorded</b> Stony Knoll Shrubland; Plains Grassland.
<i>Poa sallacustris</i>	Salt-lake Tussock-grass	VU	v	L	2012		Grasslands and herblands on the sloping verges of saline lakes.	<b>Medium</b> Brackish Wetland.
<i>Prasophyllum frenchii</i>	Maroon Leek-orchid	EN	e	L		PMST	Grassland and grassy woodland environments on sandy or black clay loam soils, that are generally damp but well drained.	<b>Low</b> Sandy soils habitat.



Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Prasophyllum suaveolens</i>	Fragrant Leek-orchid	EN	e	L	2010		Open, species rich grasslands dominated by Kangaroo Grass on poorly draining red-brown soils in western Victoria.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland.
<i>Pterostylis basaltica</i>	Basalt Rustyhood	EN	e	L	2010		Native grasslands among basalt rocks in stony rises of south west Victoria; known from only one location.	<b>High</b> Stony Knoll Shrubland; Plains Grassland.
<i>Senecio psilocarpus</i>	Swamp Fireweed	VU	v			Biosis	Seasonally-inundated herb-rich swamps, growing on peaty soils or volcanic clays.	<b>Medium</b> Plains Grassy Wetland.
<i>Taraxacum cygnorum</i>	Coast Dandelion	VU	e	L		PMST	Confined to woodlands and scrub on calcareous soils.	<b>Negligible</b> Calcareous soils not present within the study area.
<i>Thelymitra epipactoides</i>	Metallic Sun-orchid	EN	e	L		PMST	Moist or dry sandy loams or loamy sands, primarily in coastal heaths, grasslands and woodlands, but also in similar communities at drier inland sites.	<b>Low</b> Usually near coast.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	VU	v	L		PMST	Typically on well-drained soils on slightly elevated sites, but also on coastal sandy flats. Often in open situations following disturbance.	<b>Low</b> Usually near coast.
<i>Xerochrysum palustre</i>	Swamp Everlasting	VU	v	L		Biosis	Sedge-swamps and shallow freshwater marshes and swamps in lowlands, on black cracking clay soils.	<b>Medium</b> Aquatic Herbland.
<b>State significance</b>								
<i>Amphibromus sinuatus</i>	Wavy Swamp Wallaby-grass		v		1990		Confined to permanent swamps in cool sites.	<b>High</b> Plains Grassy Wetland; Aquatic Herbland.
<i>Comesperma polygaloides</i>	Small Milkwort		v	L	1901		Grasslands on the western basalt plains; less commonly in grassy woodlands between Bendigo and the Wimmera.	<b>Medium</b> Plains Grassland.
<i>Coronidium gunnianum</i>	Pale Swamp Everlasting		v		2012		Widespread and sometimes locally common, particularly in high-rainfall areas of Victoria; often in moist sites in open forests and woodlands.	<b>Recorded</b> Plains Grassy Wetland; Aquatic Herbland.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Craspedia</i> sp. 2	Derrinallum Billy-buttons		e		1990		Drier grasslands of the volcanic plains.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland Plains Grassy Wetland.
<i>Dianella</i> sp. aff. <i>longifolia</i> ( <i>Benambra</i> )	Arching Flax-lily		v		2007		The habitat requirements of this species are poorly known.	<b>Medium</b> Plains Grassland (roadsides).
<i>Diuris behrii</i>	Golden Cowslips		v		2010		Grasslands, open grassy woodlands and Box Ironbark Forests.	<b>Medium</b> Plains Grassland.
<i>Diuris gregaria</i>	Clumping Golden Moths		e	L	2010		Herb-rich grasslands dominated by Kangaroo Grass on heavy basalt soils.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland.
<i>Geranium</i> sp. 3	Pale-flower Crane's-bill		r		2012		Grasslands and dry woodlands.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland.
<i>Juncus revolutus</i>	Creeping Rush		r		2012		Saltmarshes and other similarly saline inland habitats.	<b>Medium</b> Brackish Wetland.
<i>Lachnagrostis punicea</i> subsp. <i>filifolia</i>	Purple Blown-grass		r	L	1995		Wet marshes and slightly saline swamps and depressions, on heavy soils away from the coast.	<b>Medium</b> Brackish Wetland; Plains Grassy Wetland; Aquatic Herbland.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Lachnagrostis punicea</i> subsp. <i>punicea</i>	Purple Blown-grass		r		1997		Wet marshes and slightly saline swamps and depressions in plains communities.	<b>Medium</b> Brackish Wetland; Plains Grassy Wetland; Aquatic Herbland.
<i>Microseris scapigera</i> s.s.	Plains Yam-daisy		v		2012		Damp depressions in grasslands, woodlands, stream banks, alpine herb fields and around the margins of saline lakes and flats.	<b>High</b> Plains Grassy Wetland.
<i>Paspalidium distans</i>	Spreading Panic-grass		e		2011		Woodlands and scrub on poor soils.	<b>Medium</b> Aquatic Herbland; Plains Grassy Wetland; See record within 10km (SCC).
<i>Prasophyllum chasmogamum</i>	Yawning Leek-orchid		e		1992		Seasonally wet sites on heavy clay soils of plains grassland; may be limited to the Sale plains in south-eastern Victoria.	<b>Medium</b> Plains Grassy Wetland.
<i>Poa physoclina</i>	Wind-blown Tussock-grass		e	L	2007		Occurs in heavy textured soils on the margins of salt lakes, although not in highly saline environments; also in basalt outcrops on the edges of seasonal swamps.	<b>Medium</b> Recorded near Lake Barnie Bolac to the east of the study area. Has potential to occur near salt lakes in the north of the study area, but unlikely to be impacted by the project.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Prasophyllum viretrum</i>	Basalt Leek-orchid		e	L	2013		Remnant native grassland on heavy basalt soils.	<b>Medium</b> Recorded in Mortlake Common Flora Reserve in 2013. No records within the study area.
<i>Pterostylis baptistii</i>	King Greenhood		v	L	2010		Near coastal heathy forests.	<b>Low</b> Typically confined to coastal far east Gippsland and further north into NSW. One questionable record near Worndoo-Dundonnell road in 2010.
<i>Pterostylis conferta</i>	Leprechaun Greenhood		e	L	2010		Kangaroo Grass dominated grasslands on shallow, heavy clay soils on stony rises.	<b>High</b> Stony Knoll Shrubland; Plains Grassland.
<i>Pterostylis</i> sp. aff. <i>bicolor</i> (Woorndoo)	Dense Greenhood		e	L	2010		Western (Basalt) Plains Grassland dominated by Kangaroo Grass in shallow soils on stony rises.	<b>Medium</b> Plains Grassland.
<i>Ptilotus erubescens</i>	Hairy Tails		v	L	2004		Grasslands and woodlands on relatively fertile soils.	<b>Medium</b> Stony Knoll Shrubland; Plains Grassland.
<i>Ranunculus diminutus</i>	Brackish Plains Buttercup		r		2007		Seasonally wet clay soils on the fringes of lakes.	<b>High</b> Plains Grassland; Plains Grassy Wetland.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in Study Area / potential habitat areas
		EPBC	VIC	FFG				
<i>Thelymitra bracteata</i>	Lofty Sun-orchid		e		2000		Grasslands and grassy woodlands. Currently known from only three sites in western Victoria.	<b>Low</b> Plains Grassy Wetland; Aquatic Herbland.
<i>Thelymitra gregaria</i>	Basalt Sun-orchid		e	L	2010		Open, species-rich grassland dominated by Kangaroo Grass on poorly draining soils of the volcanic plains.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland.

## Appendix 2 Fauna

Notes to tables:

<p><b>EPBC Act:</b></p> <p>EX - Extinct            CR - Critically Endangered            EN - Endangered            VU - Vulnerable            CD - Conservation dependent</p>	<p><b>DSE 2009, DSE 2013:</b></p> <p>ex - extinct            cr - critically endangered            en - endangered            vu - vulnerable            nt - near threatened            dd - data deficient            rx - regionally extinct</p>
<p><b>FFG Act:</b></p> <p>L - listed as threatened under FFG Act            N - nominated for listing as threatened            I - determined ineligible for listing</p>	<p><b>CaLP Act:</b></p> <p>PS - pest species listed under the CaLP Act</p>
<p>* - introduced species</p>	
<p>Most recent database records are from the Victorian Biodiversity Atlas unless otherwise specified as follows</p> <p># – Protected Matters Search Tool</p> <p>BA – Birds Australia</p>	

## A2.1 Fauna species recorded from the study area

Table A1.1. Fauna species recorded from the study area.

Status	Scientific name	Common name	Wind farm	Transmission line	Road reserves	Wader surveys
<b>Mammals</b>						
**	<i>Vulpes vulpes</i>	Red Fox		✓		
	<i>Macropus giganteus</i>	Eastern Grey Kangaroo		✓		
<b>Birds</b>						
	<i>Acanthiza chrysorrhoa</i>	Yellow-rumped Thornbill		✓		✓
	<i>Acrocephalus australis</i>	Australian Reed-Warbler		✓		✓
vu	<i>Actitis hypoleucos</i>	Common Sandpiper				✓
*	<i>Alauda arvensis</i>	European Skylark	✓			✓
	<i>Anas castanea</i>	Chestnut Teal			✓	✓
	<i>Anas gracilis</i>	Grey Teal			✓	✓
vu	<i>Anas rhynchotis</i>	Australasian Shoveler				✓
	<i>Anas superciliosa</i>	Pacific Black Duck	✓	✓	✓	✓
	<i>Anthus novaeseelandiae</i>	Australasian Pipit	✓	✓	✓	✓
	<i>Aquila audax</i>	Wedge-tailed Eagle	✓			
vu, L	<i>Ardea modesta</i>	Eastern Great Egret	✓		✓	
	<i>Ardea pacifica</i>	White-necked Heron		✓	✓	✓
vu	<i>Aythya australis</i>	Hardhead				✓
	<i>Bubulcus ibis</i>	Cattle Egret			✓	
	<i>Cacatua tenuirostris</i>	Long-billed Corella	✓	✓	✓	
	<i>Calamanthus fuliginosus</i>	Striated Fieldwren			✓	✓
	<i>Calidris acuminata</i>	Sharp-tailed Sandpiper				✓
	<i>Calidris ruficollis</i>	Red-necked Stint				✓
*	<i>Carduelis carduelis</i>	European Goldfinch	✓	✓		✓
	<i>Charadrius ruficapillus</i>	Red-capped Plover				✓
	<i>Chenonetta jubata</i>	Australian Wood Duck	✓	✓		✓
	<i>Chroicocephalus novaehollandiae</i>	Silver Gull	✓			
	<i>Cincloramphus cruralis</i>	Brown Songlark	✓			
	<i>Circus approximans</i>	Swamp Harrier			✓	✓
nt	<i>Circus assimilis</i>	Spotted Harrier	✓		✓	
	<i>Cisticola exilis</i>	Golden-headed Cisticola	✓		✓	✓
	<i>Colluricincla harmonica</i>	Grey Shrike-thrush		✓		
	<i>Corvus coronoides</i>	Australian Raven	✓	✓		
	<i>Corvus mellori</i>	Little Raven	✓		✓	✓



Status	Scientific name	Common name	Wind farm	Transmission line	Road reserves	Wader surveys
	<i>Coturnix pectoralis</i>	Stubble Quail	✓		✓	✓
	<i>Cracticus tibicen</i>	Australian Magpie	✓	✓	✓	✓
	<i>Cygnus atratus</i>	Black Swan	✓		✓	✓
	<i>Dendrocygna eytoni</i>	Plumed Whistling-Duck	✓			
nt	<i>Dromaius novaehollandiae</i>	Emu		✓		
	<i>Egretta novaehollandiae</i>	White-faced Heron	✓	✓	✓	✓
	<i>Elanus axillaris</i>	Black-shouldered Kite	✓	✓		✓
	<i>Euseyornis melanops</i>	Black-fronted Dotterel	✓	✓		✓
	<i>Eolophus roseicapillus</i>	Galah	✓	✓	✓	
	<i>Epthianura albifrons</i>	White-fronted Chat	✓	✓		✓
	<i>Erythrogonyx cinctus</i>	Red-kneed Dotterel	✓			✓
	<i>Falco berigora</i>	Brown Falcon	✓			✓
	<i>Falco cenchroides</i>	Nankeen Kestrel	✓		✓	✓
	<i>Falco longipennis</i>	Australian Hobby	✓		✓	
vu	<i>Falco subniger</i>	Black Falcon	✓			✓
	<i>Fulica atra</i>	Eurasian Coot	✓		✓	✓
nt	<i>Gallinago hardwickii</i>	Latham's Snipe				✓
	<i>Gallinula tenebrosa</i>	Dusky Moorhen			✓	
en, L	<i>Gelochelidon nilotica</i>	Gull-billed Tern	✓		✓	
	<i>Grallina cyanoleuca</i>	Magpie-lark	✓	✓	✓	✓
vu, L	<i>Antigone rubicunda</i>	Brolga	✓		✓	
	<i>Haliastur sphenurus</i>	Whistling Kite		✓		✓
	<i>Himantopus himantopus</i>	Black-winged Stilt	✓		✓	✓
	<i>Hirundo neoxena</i>	Welcome Swallow	✓	✓		✓
	<i>Lichenostomus leucotis</i>	White-eared Honeyeater				✓
	<i>Lichenostomus penicillatus</i>	White-plumed Honeyeater		✓		
	<i>Malacorhynchus membranaceus</i>	Pink-eared Duck	✓		✓	✓
	<i>Manorina melanocephala</i>	Noisy Miner	✓	✓		✓
	<i>Myiagra inquieta</i>	Restless Flycatcher		✓		
	<i>Neophema chrysostoma</i>	Blue-winged Parrot	✓			✓
	<i>Ocyphaps lophotes</i>	Crested Pigeon	✓	✓		
	<i>Pardalotus striatus</i>	Striated Pardalote		✓		
*	<i>Passer domesticus</i>	House Sparrow	✓		✓	✓
	<i>Petrochelidon nigricans</i>	Tree Martin	✓			
	<i>Phalacrocorax carbo</i>	Great Cormorant				✓
	<i>Phylidonyris novaehollandiae</i>	New Holland Honeyeater		✓		

Status	Scientific name	Common name	Wind farm	Transmission line	Road reserves	Wader surveys
	<i>Platalea flavipes</i>	Yellow-billed Spoonbill	✓			
nt	<i>Platalea regia</i>	Royal Spoonbill	✓			
	<i>Platycercus elegans</i>	Crimson Rosella	✓			
	<i>Platycercus eximius</i>	Eastern Rosella	✓	✓		
	<i>Poliocephalus poliocephalus</i>	Hoary-headed Grebe	✓			✓
L, v	<i>Porzana pusilla</i>	Baillion's Crake	✓	✓	✓	✓
	<i>Porzana tabuensis</i>	Spotless Crake	✓	✓	✓	✓
	<i>Porphyrio porphyrio</i>	Purple Swamphen	✓	✓	✓	✓
	<i>Psephotus haematonotus</i>	Red-rumped Parrot	✓	✓	✓	✓
	<i>Rhipidura leucophrys</i>	Willie Wagtail	✓	✓	✓	✓
en, L	<i>Stictonetta naevosa</i>	Freckled Duck				✓
*	<i>Sturnus vulgaris</i>	Common Starling	✓	✓		✓
	<i>Tachybaptus novaehollandiae</i>	Australasian Grebe				✓
	<i>Tadorna tadornoides</i>	Australian Shelduck	✓	✓	✓	✓
	<i>Threskiornis molucca</i>	Australian White Ibis			✓	
	<i>Threskiornis spinicollis</i>	Straw-necked Ibis			✓	
	<i>Vanellus miles</i>	Masked Lapwing	✓	✓	✓	✓
	<i>Vanellus tricolor</i>	Banded Lapwing				✓
<b>Reptiles</b>						
EN, cr, L.	<i>Eulamprus tympanum marnieae</i>	Corangamite Water Skink	✓			
	<i>Ctenotus robustus</i>	Large Striped Skink				
	<i>Pseudonaja textilis</i>	Eastern Brown Snake	✓			
	<i>Chelodina longicollis</i>	Eastern Long-neck Turtle	✓			
	<i>Pseudemoia pagenstecheri</i>	Tussock Skink	✓			
<b>Frogs</b>						
	<i>Crinia signifera</i>	Common Froglet		✓		
	<i>Litoria ewingii</i>	Southern Brown Tree Frog		✓		
	<i>Limnodynastes peroni</i>	Striped Marsh Frog		✓		
	<i>Limnodynastes tasmaniensis</i>	Spotted Marsh Frog		✓		
<b>Fishes</b>						
	<i>Anguilla australis</i>	Southern Short-finned Eel	✓			
	<i>Galaxias oliros</i>	Obscure Galaxias	✓			
	<i>Galaxias maculatus</i>	Common Galaxias	✓			
VU, L	<i>Galaxiella pusilla</i>	Dwarf Galaxias	✓			

Status	Scientific name	Common name	Wind farm	Transmission line	Road reserves	Wader surveys
*	<i>Gambusia holbrooki</i>	Eastern Gambusia	✓			
	<i>Hypseleotris</i> spp.	Carp Gudgeon Complex	✓			
	<i>Nannoperca australis</i>	Southern Pygmy Perch	✓			
	<i>Philypnodon grandiceps</i>	Flat-headed Gudgeon	✓			
	<i>Retropinna Semoni</i>	Australian Smelt	✓			
*	<i>Tinca tinca</i>	Tench	✓			
<b>Decapod Crustacea</b>						
	<i>Cherax destructor</i>	Common Yabby	✓			
	<i>Amarinus lacustris</i>	Freshwater Crab	✓			
vu	<i>Engaeus sericatus</i>	Hairy Burrowing Crayfish	✓			
	<i>Paratya australiensis</i>	Freshwater Shrimp	✓			

## A2.2 Listed fauna species recorded, or predicted to occur, within 10 km of the study area

The following table includes a list of the listed fauna species that have potential to occur within the study area. The list of species is sourced from the Victorian Biodiversity Atlas and the Protected Matters Search Tool (DEE; accessed on 22.09.2016).

**Table A2.2. Listed fauna species recorded, or predicted to occur, within 10 km of the study area.**

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<b>National significance</b>								
<i>Pedionomus torquatus</i>	Plains-wanderer	CR	cr	L		PMST	Native grassland with a sparse, open structure.	<b>Low</b> Limited patches of sparse native grassland suitable for this species.
<i>Numenius madagascariensis</i>	Eastern Curlew	CR	vu			PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	<b>High</b> Suitable wetland habitat present.
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR	en		2011		Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	<b>High</b> Suitable wetland habitat present.
<i>Rostratula australis</i>	Australian Painted Snipe	EN	cr	L		PMST	Shallows of well-vegetated freshwater wetlands.	<b>Low</b> Limited and marginal habitat present.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	en	L		PMST	Shallow freshwater and brackish wetlands with abundant emergent aquatic vegetation.	<b>Low</b> Limited vegetated wetland habitat available.
<i>Lathamus discolor</i>	Swift Parrot	CR	en	L		PMST	A range of forests and woodlands, especially those supporting nectar-producing tree species. Also well-treed urban areas.	<b>Negligible</b> No suitable habitat.
<i>Grantiella picta</i>	Painted Honeyeater	VU	vu	L		PMST	Dry open woodlands and forests. Typically forages for fruit and nectar in mistletoes and in tree canopies.	<b>Negligible</b> No suitable woodland habitat.
<i>Dasyurus viverrinus</i>	Eastern Quoll	EN	rx	L	1980		Once occupied a broad range of forest, woodland and grassland habitats in Victoria. The species is now restricted to Tasmania and is considered to be extinct from mainland Australia.	<b>Negligible</b> No suitable habitat.
<i>Antechinus minimus maritimus</i>	Swamp Antechinus	VU	nt	L		PMST	Dense wet heath and heathy woodland, sedgeland and dense tussock grassland.	<b>Negligible</b> Limited habitat and outside recorded range for the species.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Isodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	EN	nt	L		PMST	Heathland, shrubland, sedgeland, heathy open forest and woodland; also exotic vegetation, such as blackberry thickets and rank grasses where native vegetation has been removed.	<b>Negligible</b> No suitable habitat.
<i>Perameles gunnii</i> unnamed subsp.	Eastern Barred Bandicoot (mainland form)	EN	cr	L	1997		Natural temperate grasslands and grassy woodlands.	<b>Negligible</b> Low quality habitat available, however, no known free-ranging populations on mainland.
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	VU	en	L		PMST	Forest, heathy woodlands and heathlands.	<b>Negligible</b> No suitable habitat.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	vu	L		PMST	Rainforest, wet and dry sclerophyll forest, woodland and urban areas.	<b>Low</b> Limited suitable habitat available.
<i>Miniopterus orianae bassanii</i>	Southern Bent-wing Bat	CR	cr	L	2010		Woodlands, grasslands, pasture especially near wetlands. Roosts in caves, crevices in cliff faces and in mines.	<b>Medium</b> Suitable foraging habitat present.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Delma impar</i>	Striped Legless Lizard	VU	en	L	2009		Natural temperate grassland, grassy woodland and exotic grassland.	<b>Recorded</b> Suitable grassland habitat present. Species recorded with Castle Carey Road reserve.
<i>Eulamprus tympanum marnieae</i>	Corangamite Water Skink	EN	cr	L	2012		Basalt rock outcrops and stone walls associated with remnant vegetation and adjacent to permanent or ephemeral wetlands.	<b>Recorded</b> Targeted survey recorded the species within Wetland 1, 3, and 4 in the north of the study area.
<i>Litoria raniformis</i>	Growling Grass Frog	VU	en	L	2011		Still or slow-flowing waterbodies and surrounding terrestrial vegetation.	<b>Low</b> Suitable habitat identified, however, targeted survey did not record the species.
<i>Prototroctes maraena</i>	Australian Grayling	VU	vu	L		PMST	Adults inhabit cool, clear, freshwater streams.	<b>Negligible</b> Diadromous species unable to move upstream of Hopkins River Falls.
<i>Galaxiella pusilla</i>	Dwarf Galaxias	VU	en	L		PMST	Slow-flowing or still freshwater wetlands such as swamps, drains and backwaters of streams.	<b>Recorded</b> Recorded from two locations within Salt Creek.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Macquaria australasica</i>	Macquarie Perch	EN	en	L	1920		Streams with clear water and deep, rocky holes with abundant cover.	<b>Low</b> Non-indigenous. Result of translocation. Old records (1920). Marginal habitat on site for this species.
<i>Nannoperca obscura</i>	Yarra Pygmy Perch	VU	vu	L	-	-	Yarra Pygmy Perch is a small bodied fish typically associated with slow flowing streams or floodplain wetlands with abundant aquatic vegetation.	<b>Low-Medium</b> Suitable habitat in certain areas. Recorded from the catchment.
<i>Synemon plana</i>	Golden Sun Moth	CR	cr	L	2012		Natural temperate grassland, grassy woodland and pasture supporting spear grasses and wallaby grasses and exotic grassland dominated by Chilean Needle-grass.	<b>Low</b> Suitable habitat in some areas. Not recorded during GSM flight season surveys.
<b>State significance</b>								
<i>Dromaius novaehollandiae</i>	Emu		nt		2000		Most environments from semi-arid grasslands to dense forests and alpine areas, moving in response to seasonal conditions.	<b>Recorded</b> Suitable habitat for this species.



Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Phalacrocorax varius</i>	Pied Cormorant		nt		1991		Marine environments and coastal waters including beaches, coastal lagoons, estuaries and rock platforms.	<b>High</b> Suitable habitat present.
<i>Chlidonias hybrida</i>	Whiskered Tern		nt		2009		Wetlands, lakes, swamps, rivers, and other water bodies with submerged and emergent vegetation such as grasses, sedges, reeds and rushes.	<b>Medium</b> Limited suitable habitat present.
<i>Gelochelidon nilotica</i>	Gull-billed Tern		en	L	2012		Floodplains, saltmarsh, claypans and flooded pasture.	<b>Recorded</b> Suitable wetland habitat present.
<i>Tringa nebularia</i>	Common Greenshank		vu			PMST	A variety of ephemeral and permanent inland wetlands and sheltered coastal wetlands.	<b>Medium</b> Suitable habitat present.
<i>Tringa stagnatilis</i>	Marsh Sandpiper		vu		1993		Permanent or ephemeral wetlands, mudflats and saltmarshes in coastal and inland environments.	<b>High</b> Suitable habitat present.
<i>Gallinago hardwickii</i>	Latham's Snipe		nt	N	2015		Prefers open freshwater wetlands with nearby cover, but also recorded on the edges of creeks and rivers, river-pools and floodplains.	<b>Recorded</b> Suitable wetland habitat present. Recorded from Wetland 2.
<i>Siltia isabella</i>	Australian Pratincole		nt		1983		Open plains, sparsely wooded plains and tussock grasslands in arid and semi-arid environments.	<b>Negligible</b> Outside the generally expected range for the species.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Ardeotis australis</i>	Australian Bustard		cr	L	1876		Grassland, open dry woodlands of mallee and mulga, arid heathland saltbush and bluebush.	<b>Negligible</b> Outside the excepted range of the species.
<i>Antigone rubicunda</i>	Brolga		vu	L	2013		Shallow freshwater and brackish wetlands, crops, grassland and pasture.	<b>Recorded</b> Refer to Biosis (2017b).
<i>Plegadis falcinellus</i>	Glossy Ibis		nt		2008		Freshwater wetlands especially permanent or ephemeral water bodies on floodplains, including wet pasture environments.	<b>Low</b> Some habitat present but generally outside the excepted range for this species.
<i>Platalea regia</i>	Royal Spoonbill		nt		2011		Permanent and ephemeral wetlands and wet grassland areas, particularly large expanses of water such as lakes, swamps or lagoons.	<b>High</b> Suitable wetland habitat present.
<i>Egretta garzetta</i>	Little Egret		en	L	2009		Swamps, billabongs, floodplain pools, mudflats, mangroves and channels; breeds in trees standing in water.	<b>Medium</b> Suitable wetland habitat present.
<i>Ardea modesta</i>	Eastern Great Egret		vu	L	2011		Flooded crops, pasture, swamps, lagoons, saltmarsh, sewage ponds, estuaries, dams, roadside ditches. Breeds in trees standing in water.	<b>Recorded</b> Suitable wetland habitat for this species.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Anseranas semipalmata</i>	Magpie Goose		nt	L	1911		Swamps, lakes, sewage ponds, flooded pasture, dams.	<b>Low</b> Marginal habitat for this species.
<i>Anas rhynchos</i>	Australasian Shoveler		vu		2011		Large, permanent lakes and swamps with deep water, stable conditions and abundant aquatic vegetation.	<b>Recorded</b> Suitable wetland habitat present. Recorded from Wetland 2.
<i>Aythya australis</i>	Hardhead		vu		2011		Large, deep freshwater environments with abundant aquatic vegetation, including slow moving areas of rivers.	<b>Recorded</b> Suitable wetland habitat for this species.
<i>Nycticorax caledonicus hillii</i>	Nankeen Night Heron		nt		2011		Estuarine and terrestrial wetlands, including wet pastures, urban wetlands and ponds.	<b>High</b> Suitable wetland habitat present.
<i>Oxyura australis</i>	Blue-billed Duck		en	L	2011		Open or densely vegetated wetlands.	<b>Medium</b> Limited suitable wetland habitat present.
<i>Biziura lobata</i>	Musk Duck		vu		2011		Large, permanent lakes and swamps with deep water, stable conditions and abundant aquatic vegetation.	<b>High</b> Suitable wetland habitat present.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Circus assimilis</i>	Spotted Harrier		nt		1977		Open and wooded country of inland and sub-inland Australia, where they hunt over flat or undulating country with low vegetation cover.	<b>Recorded</b> Suitable habitat for this species.
<i>Accipiter novaehollandiae</i>	Grey Goshawk		vu	L	1993		Rainforest, gallery forest, tall wet forest and woodland. Also partially cleared agricultural land.	<b>Low</b> Habitat generally unsuitable for this species.
<i>Falco subniger</i>	Black Falcon		vu		2007		Woodlands, open country and around terrestrial wetlands areas, including rivers and creeks.	<b>Medium</b> Suitable foraging habitat present.
<i>Hirundapus caudacutus</i>	White-throated Needle-tail		vu		2009		An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas.	<b>High</b> Suitable summer habitat for this species.
<i>Sminthopsis crassicaudata</i>	Fat-tailed Dunnart		nt		2008		Inhabits sparse grasslands and open shrubland habitats, usually where there is a significant component of bare ground and suitable refuge sites.	<b>Recorded</b> Suitable grassland habitat present. Species recorded during tiling survey.
<i>Pseudemoia pagenstecheri</i>	Tussock Skink		vu		2008		Range of grasslands or sparse grassy woodlands from alps to coast.	<b>Recorded</b> High quality habitat along Salt Creek.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area
		EPBC	VIC	FFG				
<i>Pseudophryne bibronii</i>	Brown Toadlet		en	L	1979		A wide variety of woodland, forest and grassland habitats.	<b>Medium</b> Suitable habitat in some areas.
<i>Pseudophryne semimarmorata</i>	Southern Toadlet		vu		1979		Open forests, lowland woodlands and heathlands where adults shelter beneath leaf litter and other debris in moist soaks and depressions.	<b>Medium</b> Suitable habitat in some areas.
<i>Engaeus sericatus</i>	Hairy Burrowing Crayfish		vu		1903		Burrows are connected to the water-table, typically adjacent to creeks or on floodplains.	<b>Recorded</b> Burrows observed and one specimen recorded from Blind Creek.
<i>Cherax destructor albidus</i>	Common Yabby		dd		1904		Burrowing freshwater crayfish that occur in and around lakes, swamps, watercourses and artificial dams, ponds and drains.	<b>Recorded</b> Recorded at several survey sites.

## A2.3 Migratory fauna species (EPBC Act listed) recorded or predicted to occur within 10 km of the study area

**Table A2.3. Migratory fauna species recorded or predicted to occur within 10 km of the study area.**

Scientific name	Common name	Most recent record	Recorded on site (targeted surveys)
<i>Acrocephalus stentoreus</i>	Clamorous Reed Warbler	1992	
<i>Actitis hypoleucos</i>	Common Sandpiper	2013	Yes
<i>Apus pacificus</i>	Fork-tailed Swift	2009	
<i>Ardea ibis</i>	Cattle Egret	2008	
<i>Ardea modesta</i>	Eastern Great Egret	2011	
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	2012	Yes
<i>Calidris ferruginea</i>	Curlew Sandpiper	2011	
<i>Calidris minuta</i>	Little Stint	1988	
<i>Calidris ruficollis</i>	Red-necked Stint	2015	Yes
<i>Charadrius bicinctus</i>	Double-banded Plover	2011	
<i>Gallinago hardwickii</i>	Latham's Snipe	2015	Yes
<i>Gelochelidon nilotica</i>	Gull-billed Tern	2012	
<i>Hirundapus caudacutus</i>	White-throated Needletail	2009	
<i>Motacilla flava</i>	Yellow Wagtail	PMST	
<i>Myiagra cyanoleuca</i>	Satin Flycatcher	PMST	
<i>Numenius madagascariensis</i>	Eastern Curlew	PMST	
<i>Pandion haliaetus</i>	Eastern Osprey	PMST	
<i>Plegadis falcinellus</i>	Glossy Ibis	2008	
<i>Rhipidura rufifrons</i>	Rufous Fantail	PMST	
<i>Tringa nebularia</i>	Common Greenshank	1992	
<i>Tringa stagnatilis</i>	Marsh Sandpiper	1993	

## A2.4 Migratory bird survey results – Wetlands 1 – 6 (individuals recorded during each survey)

Note that the table includes all birds recorded during surveys (including non-migratory species).

Species	Wetland 1				Wetland 2				Wetland 3				Wetland 4				Wetland 5				Wetland 6			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Australasian Shoveler					1	4	10																	
Australian Shelduck					50	4	65	30																
Australian Wood Duck							10																	
Banded Lapwing																						21		
Black-fronted Dotterel																								
Black Swan					7	1	8	4																
Black-winged Stilt						12																		
Chestnut Teal						10	15	13																
Common Sandpiper					2																			
Eurasian Coot					11	75	50	60																
Freckled Duck							6																	
Great Cormorant					5																			
Grey Teal					230	50	150	50																
Hardhead					10		10	2																
Hoary-headed Grebe						35	30	40																
Latham's Snipe					1																			
Pacific Black Duck							30	30																
Pink-eared Duck					500	750	500	3500																
Red-capped Plover		3			8	7	10	11	2				6				1		1					
Red-kneed Dotterel					3	12	10	15																
Red-necked Stint					26	35	52	21																
Sharp-tailed Sandpiper					6	8																		

## A2.5 Migratory bird survey results – Wetlands 7, 9 and Salt Creek (individuals recorded each survey)

Species	Wetland 7					Wetland 9					Salt Creek				
	W	1	2	3	4	W	1	2	3	4	W	1	2	3	4
<b>Australasian Shoveler</b>															
<b>Australian Shelduck</b>	2							5		2					
<b>Australian Wood Duck</b>									2						
<b>Banded Lapwing</b>															
<b>Black-fronted Dotterel</b>						2		2	2	1					
<b>Black Swan</b>															
<b>Black-winged Stilt</b>															
<b>Chestnut Teal</b>															
<b>Common Sandpiper</b>															
<b>Eurasian Coot</b>		4										3			
<b>Freckled Duck</b>															
<b>Great Cormorant</b>															
<b>Grey Teal</b>		7				40		16	21	5	2		7		12
<b>Hardhead</b>															
<b>Hoary-headed Grebe</b>															
<b>Latham's Snipe</b>															
<b>Pacific Black Duck</b>						8			17			2	9		
<b>Pink-eared Duck</b>															
<b>Red-capped Plover</b>		6					1		1						
<b>Red-kneed Dotterel</b>		3				4									
<b>Red-necked Stint</b>		2						1							
<b>Sharp-tailed Sandpiper</b>															

Note: W = winter; 1 = survey 1; 2 = survey 2; 3 = survey 3; 4 = survey 4.



## A2.6 Corangamite Water Skink targeted survey results

Wetland	Survey date	Start time	Survey duration	No. of animals observed	Observation and habitat notes	Weather conditions
<b>Survey 1</b>						
1	8/01/2013	13:00	1 hour	0	Excellent CWS habitat	Fine, mostly cloudy (cloud 7/8); Temp 28.5; RH 24.5%; Wind max 14km/h WSW
2	8/01/2013	15:00	3 hours	0	Excellent CWS habitat	Fine, mostly cloudy (cloud 6/8); Temp 23.0; RH 64.5%; Wind max 16km/h WSW
3	9/01/2013	10:45	45 mins	0	Good CWS habitat, particularly around eastern margin	Fine, mostly cloudy (cloud 6/8); Temp 16; RH 58.2%; Wind max 15km/h SW
4	9/01/2013	11:40	1 hour	0	Good CWS habitat	Fine, mostly cloudy (cloud 7/8); Temp 15; RH 58.0%; Wind max 16km/h SW
5	9/01/2013	12:55	1 hour	0	Small area of CWS habitat	Fine, mostly cloudy (cloud 7/8); Temp 16.5; RH 60.0%; Wind max 16km/h SW
6	9/01/2013	9:30	1 hour	0	Small areas of low quality habitat	Fine, mostly cloudy (cloud 7/8); Temp 14.1; RH 59.6%; Wind max 17.9km/h SW
<b>Survey 2</b>						
1	22/01/2013	13:05	1 hour	0	Excellent CWS habitat	Fine, clear (cloud 0/8); Temp 24; RH 38.5; Wind max 11.7km/h SW
2	22/01/2013	14:40	3 hours	0	Excellent CWS habitat	Fine, clear (cloud 0/8); Temp 23.7; Wind max 9.6km/h SSW
3	22/01/2013	12:32	45 mins	0	Good CWS habitat, particularly around eastern margin	Fine, clear (cloud 0/8); Temp 22.5; Wind max 14.2km/h SE
4	23/01/2013	11:15	1 hour	0	Good CWS habitat	Fine, clear (cloud 0/8); Temp 22.1; Wind max 14.2km/h SE

Wetland	Survey date	Start time	Survey duration	No. of animals observed	Observation and habitat notes	Weather conditions
5	23/01/2013	10:05	1 hour	0	Small area of CWS habitat	Fine, clear (cloud 0/8); Temp 21.1; Wind max 14.0km/h SE
6	23/01/2013	8:40	1 hour	0	Small areas of low quality of habitat	Fine, clear (cloud 0/8); Temp 17.2; Wind max 19.4km/h SE
<b>Survey 3</b>						
1	05/02/2013	12:15	1 hour	19	19 CWS from north-eastern corner of the wetland	Fine, clear (cloud 0/8); Temp 28.6; RH 27.6%; Wind max 4.6 km/h NE
2	05/02/2013	2:10	3 hours	0		Fine, clear (cloud 0/8); Temp 30.8; RH 17.2%; Wind max 12.1km/h NE/NW
3	06/02/2013	10:55	45 mins	1	1 CWS on western side of dry wetland.	Fine, partly cloudy (1/8); Temp 32.6; RH 14.7%; Wind max 27.6km/h NNW
4	06/02/2013	10:02	1 hour	4	4 CWS at various points around dry wetland	Fine, partly cloudy (1/8); Temp 30.20; RH 19.7%; Wind max 19.1 km/h NW
5	06/02/2013	9:15	1 hour	0		Fine, partly cloudy (1/8); Temp 27.8; RH 27.9%; Wind max 16km/h NW
6	06/02/2013	12:20	1 hour	0	Limited habitat on site	Fine, partly cloudy (2/8); Temp 34.5; RH 11.4%; Wind max 33.9 km/h NW
<b>Survey 4</b>						
1	27/02/2013	1:00	1 hour	0	Excellent CWS habitat	Light rain; Temp 19.0; RH 100%; Wind max 13.1 km/h WSW
2	27/02/2013	12:00	3 hours	0	Excellent CWS habitat	Moderate rain; Temp 18; RH 100%; Wind max 10 km/h SSW
3	28/02/2013	14:05	45 mins	2	Good CWS habitat, particularly around eastern margin	Fine, cloudy (cloud 6/8); Temp 17; RH 42.3%; Wind max 16.8km/h SSE

Wetland	Survey date	Start time	Survey duration	No. of animals observed	Observation and habitat notes	Weather conditions
4	28/02/2013	12:50	1 hour	0	Good CWS habitat	Fine, cloudy (cloud 4/8); Temp 15; RH 41%; Wind max 17km/h SSE
5	28/02/2013	11:40	1 hour	0	Small area of CWS habitat	Fine, cloudy (cloud 4/8); Temp 15; RH 52%; Wind max 17km/h SSE
6	28/02/2013	9:45	1 hour	0	Small areas of low quality of habitat	Fine, partly cloudy (cloud 4/8); Temp 12; RH 51%; Wind max 14km/h SSW
<b>Survey 1</b>						
7	20/01/2014	2:26	1 hour	0	Small areas of low quality of habitat	Fine, Cloud 0/8, Temp 25, RH 37. Wind max 15 km/h SW
9	20/01/2014	3:50	1 hour	0	Small areas of low quality of habitat	Fine. Temp 25, RH 37. Wind max 15 km/h SW
<b>Salt Creek</b>	21/01/2014	8:40	6 hours	0	Large areas of CWS habitat in rocky escarpments and talus areas associated with Salt Creek	Fine, Cloud 2/8, Temp 19, RH 43, Wind max 12 km/h SW
<b>Survey 2</b>						
7	06/02/2014	3:07	1 hour	0	Small areas of low quality of habitat	Fine, Cloud 0/8, Temp 33, RH 52, Wind max 10 km/h NNE
9	06/02/2014	4:44	1 hour	0	Small areas of low quality of habitat	Fine, Cloud 0/8, Temp 33, RH 52, Wind max 10 km/h NNE
<b>Salt Creek</b>	07/02/2014	9:20	6 hours	0	Large areas of CWS habitat in rocky escarpments and talus areas associated with Salt Creek	Fine, Cloud 0/8, Temp 23 RH 46 Wind max 3 km/h N
<b>Survey 3</b>						
7	18/02/2014	1:46	1 hour	0	Small areas of low quality of habitat	Fine, Cloud 2/8, Temp 30, RH 30.8 Wind max 20.1 km/h WSW

Wetland	Survey date	Start time	Survey duration	No. of animals observed	Observation and habitat notes	Weather conditions
9	18/02/2014	4:07	1 hour	0	Small areas of low quality of habitat	Fine, Cloud 2/8, Temp 28, RH 30.8 Wind max 17 km/h SW
Salt Creek	19/02/2014	9:15	6 hours	0	Large areas of CWS habitat in rocky escarpments and talus areas associated with Salt Creek	Fine, Cloud 2/8, Temp 28, RH 30.8 Wind max 17 km/h SW
Survey 4						
7	28/02/2014	3:35	1 hour	0	Small areas of low quality of habitat	Fine, Cloud 2/8, Temp 26, RH 30.8 Wind max 13 km/h SW
9	28/02/2014	5:20	1 hour	0	Small areas of low quality of habitat	Fine, Cloud 2/8, Temp 23, RH 30.8 Wind max 13 km/h SW
Salt Creek	28/02/2014	10:07	5 hours	0	Large areas of CWS habitat in rocky escarpments and talus areas associated with Salt Creek	Fine, Cloud 1/8, Temp 28, RH 32.3 Wind max 18 km/h SE

## A2.7 Golden Sun Moth reference sites with sightings of flying males 2014-15

Date	Site
12/12/2014	Wandobah – via Dunkeld, Sunbury, Epping, Craigieburn
22/12/2014	Epping, Merrimu
02/01/2015	Merrimu, Lethbridge, Craigieburn
06/01/2015	Epping, Merrimu

## A2.8 Growling Grass Frog targeted survey results

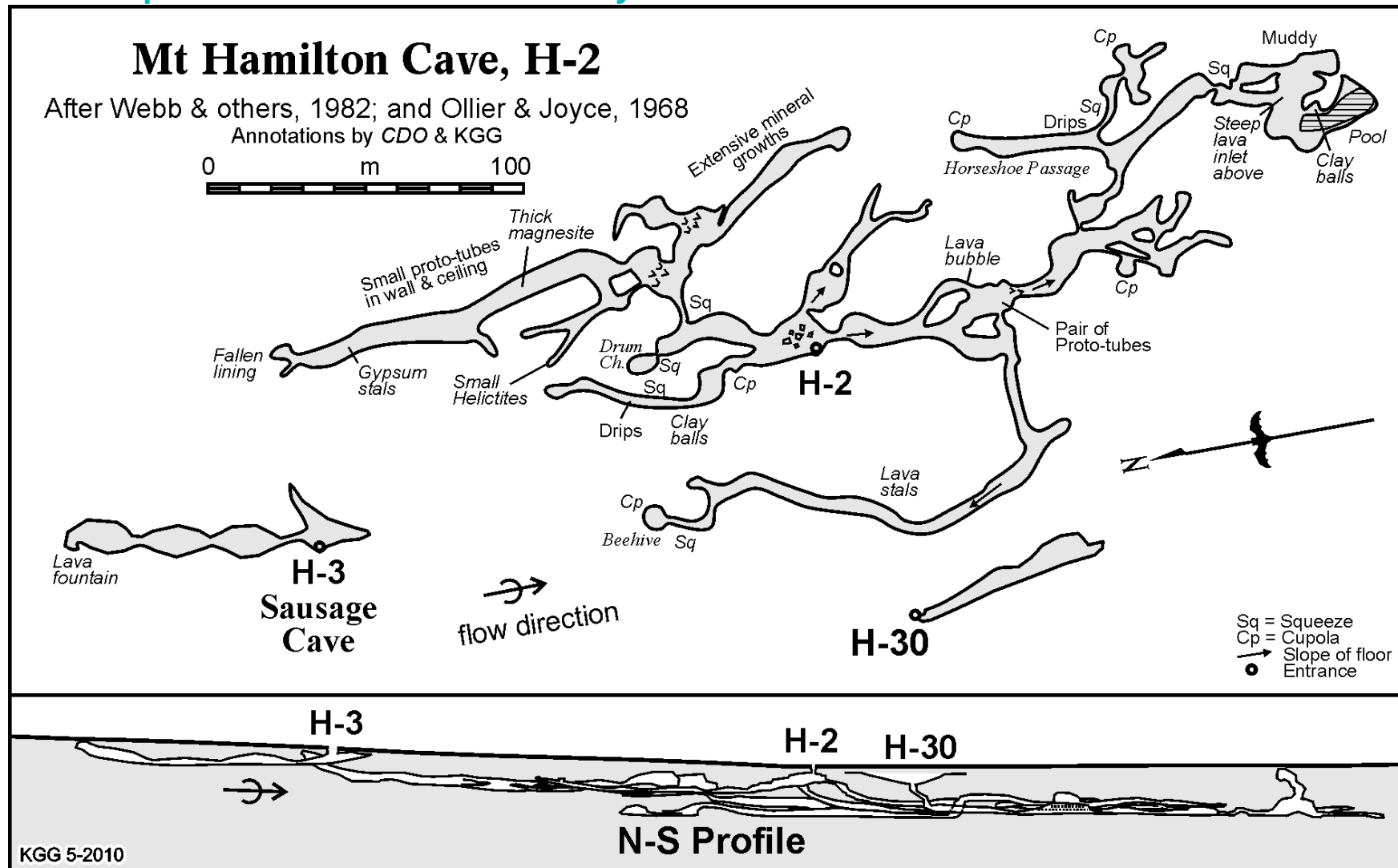
Date	Location	Survey time	Observer initials	Growling Grass Frog observed	Air temp. (°C)	Wind dir.	Avg. wind speed (km/hr)	Cloud cover (%)	Frog species recorded
07/11/2014	Mortlake Power station	9:24-10:37	CPM SLA	N	26	N	12	30	<i>Limnodynastes tasmaniensis</i> <i>Crinia signifera</i> <i>Limnodynastes peroni</i> <i>Litoria ewingii</i>
	Down Ampney	11:30-12:00	CPM SLA	N	15	N	12	80	<i>Litoria ewingii</i> <i>Limnodynastes tasmaniensis</i>
	Walmsley dams	12:20-12:40	CPM SLA	N	15	N	12	80	-
21/12/2014	Mortlake Power station	9:45-11:40	CPM SLA	N	14	-	-	20	<i>Litoria ewingii</i> <i>Limnodynastes tasmaniensis</i>
	*Down Ampney	-	-	-	-	-	-	-	-
	*Walmsley dams	-	-	-	-	-	-	-	-

\* A second survey was not completed at these sites due to lack of appropriate habitat conditions during the survey period.

## A2.9 Growling Grass Frog reference sites

Survey date	Survey location	Growling Grass Frog detected Y/N	Site co-ordinates (Lat, long - WGS84)
17/11/2014	Hopkins River – Woolsthorpe-Hexham- Road	Y	-38.041479, 142.644374
17/11/2014	Mustons Creek bridge – Woolsthorpe-Hexham-Road	Y	-38.034641, 142.661063
21/12/2014	Hopkins River – Woolsthorpe-Hexham- Road	N	-38.041479, 142.644374
21/12/2014	Mustons Creek bridge – Woolsthorpe-Hexham-Road	N	-38.034641, 142.661063

## A2.10 Map of the Mount Hamilton Cave System





## A2.11 Aquatic survey and habitat assessment sites, including methods used

Site Name	Waterbody	Co-ordinates			Survey Method
		Zone	Easting	Northing	
1F	Unnamed Lake	54	668627	5798676	HA
2F	Unnamed Stream	54	670692	5798323	HA
3F	Unnamed Lake	54	667944	5795739	HA
4F	Blind Creek	54	659973	5791309	HA, FN x 1, BT x 10, excavation
5F	Blind Creek	54	665156	5793754	Excavation and HA
6F	Blind Creek	54	666867	5797331	HA
7F	Unnamed Lake	54	671705	5802492	HA
8F	Unnamed Lake	54	670863	5801306	HA
9F	Unnamed Lake	54	670959	5800272	HA
10F	Unnamed Lake	54	671354	5799818	HA, BT x 10
11F	Unnamed tributary of 12F	54	671566	5800064	HA, excavation
12F	Unnamed Lake	54	669794	5802724	HA, BT x 10
13F	Blind Creek	54	655998	5786193	HA, FN x 4, BT x 10
14F	Blind Creek	54	658278	5790177	HA
15F	Private Dam	54	653846	5790873	HA, BT x 10
16F	Salt Creek	54	653061	5791988	Ha, BT x 10, DN (30 min)
17F	Salt Creek	54	655577	5795087	HA
18F	Salt Creek	54	655803	5796346	HA, FN x 2, BT x 10
19F	Blind Creek	54	655800	5796680	HA, FN x 4, BT x 10
20F	Salt Creek	54	668607	5793078	HA
21F	Unnamed Wetland	54	668409	5791880	HA
22F	Drainage line	54	667690	5787557	HA
23F	Drainage Line	54	654458	5793227	HA
24F	Hopkins River	54	646179	5780638	HA, FN x 4, BT x 10

Table notes: FN - Fyke Net, LFN – Larval Fyke Net, FN (D) – Fyke Net (dual wing), BT - Bait Trap, DN – Dip Net, SN – Seine Net, HA – Habitat Assessment. Datum: UTM GDA9

## A2.12 Aquatic fauna species recorded within and in the vicinity of the study area

Status	Scientific name	Common name	Notes	4F	10F	12F	13F	14F	15F	16F	18F	19F	24F
<b>Fish</b>													
	<i>Anguilla australis</i>	Southern Short-finned Eel											4
	<i>Galaxias</i> sp.1	Obscure Galaxias			N					1			
	<i>Galaxias maculatus</i>	Common Galaxias			O				16	1			
	<i>Galaxiella pusilla</i>	Dwarf Galaxias	‡‡							19	2		
*	<i>Gambusia holbrooki</i>	Eastern Gambusia	N		F		10			23	133	1	
	<i>Hypseleotris</i> spp.	Carp Gudgeon Complex	‡‡		I				58				
	<i>Nannoperca australis</i>	Southern Pygmy Perch			S					48	99	68	
	<i>Philypnodon grandiceps</i>	Flat-headed Gudgeon			H					2	64	398	247
	<i>Retropinna Semoni</i>	Australian Smelt		1									1
*	<i>Tinca tinca</i>	Tench											1
<b>Decapod Crustacea</b>													
	<i>Cherax destructor</i>	Common Yabby		10		1	87		2				
	<i>Amarinus lacustris</i>	False Spider Crab									2		
	<i>Engaeus sericatus</i>	Hairy Burrowing Crayfish		1				P					
	<i>Paratya australiensis</i>	Freshwater Shrimp									105		50
<b>Reptiles</b>													
	<i>Chelodina longicollis</i>	Eastern Long-neck Turtle											13

‡‡ - New records of species, N - Declared noxious species under the *Fisheries Act 1995*, P - Present – abundance not recorded (e.g. burrow observations)

Aquatic survey sites are listed in Appendix A2.11 and shown in Figure 4.

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## Appendix 3 Biodiversity Impact and Offset Requirements report

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# Testing Clearing proposal

This report provides offset requirements for proposed clearing. It **DOES NOT represent a Biodiversity Impact and Offset Requirements report** required to support applications for permits to remove native vegetation under clause 52.16 or 52.17 of planning schemes in Victoria. It can be used for internal testing of different clearing proposals. Final clearing shapefiles must be submitted to DELWP for processing.

Date of issue: 03/04/2017  
Time of issue: 1:54 pm

Ref: Scenario Testing

Project ID	21630_VegClearing_GDA94VICGRID
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## Summary of marked native vegetation

Risk-based pathway	Low
Total extent	0.422 ha
Remnant patches	0.000 ha
Scattered trees	6 trees
Location risk	A

Strategic biodiversity score of all marked native vegetation	0.177
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## Offset requirements if a permit is granted

If the marked vegetation was cleared the following offsets would be applicable.

Offset type	General offset
General offset amount (general biodiversity equivalence units)	0.022 general units
General offset attributes	
Vicinity	Glenelg Hopkins Catchment Management Authority (CMA) or Moyne Shire Council
Minimum strategic biodiversity score	0.142 <sup>1</sup>

NB: values presented in tables throughout this document may not add to totals due to rounding

<sup>1</sup> Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

# Testing Clearing proposal

## Next steps

This proposal to remove native vegetation must meet the application requirements of the low risk-based pathway and it will be assessed under the low risk-based pathway.

If you wish to remove the marked native vegetation you must submit the related shapefiles to the Department of Environment, Land, Water and Planning (DELWP) for processing, by email to [nativevegetation.support@delwp.vic.gov.au](mailto:nativevegetation.support@delwp.vic.gov.au). DELWP will provide a Biodiversity impact and offset requirements report that is required to meet the permit application requirements.

## Biodiversity impact of removal of native vegetation

### Habitat hectares

Habitat hectares are calculated for each habitat zone within your proposal using the extent and condition scores in the GIS data you provided.

Habitat zone	Site assessed condition score	Extent (ha)	Habitat hectares
1-2-TR	0.200	0.070	0.014
2-3-TR	0.200	0.070	0.014
3-4-TR	0.200	0.070	0.014
4-5-TR	0.200	0.070	0.014
5-6-TR	0.200	0.070	0.014
6-7-TR	0.200	0.070	0.014
<b>TOTAL</b>			<b>0.084</b>

### Clearing site biodiversity equivalence score(s)

The general biodiversity equivalence score for the habitat zone(s) is calculated by multiplying the habitat hectares by the strategic biodiversity score.

Habitat zone	Habitat hectares	Strategic biodiversity score	General biodiversity equivalence score (GBES)
1-2-TR	0.014	0.180	0.003
2-3-TR	0.014	0.120	0.002
3-4-TR	0.014	0.101	0.001
4-5-TR	0.014	0.206	0.003
5-6-TR	0.014	0.245	0.003
6-7-TR	0.014	0.212	0.003

# Testing Clearing proposal

## Offset requirements

If a permit is granted to remove the marked native vegetation the permit condition will include the requirement to obtain a native vegetation offset.

To calculate the required offset amount required the biodiversity equivalence scores are aggregated to the proposal level and multiplied by the relevant risk multiplier.

Offsets also have required attributes:

- General offsets must be located in the same Catchment Management Authority (CMA) boundary or Local Municipal District (local council) as the clearing and must have a minimum strategic biodiversity score of 80 per cent of the clearing.<sup>2</sup>

The offset requirements for your proposal are as follows:

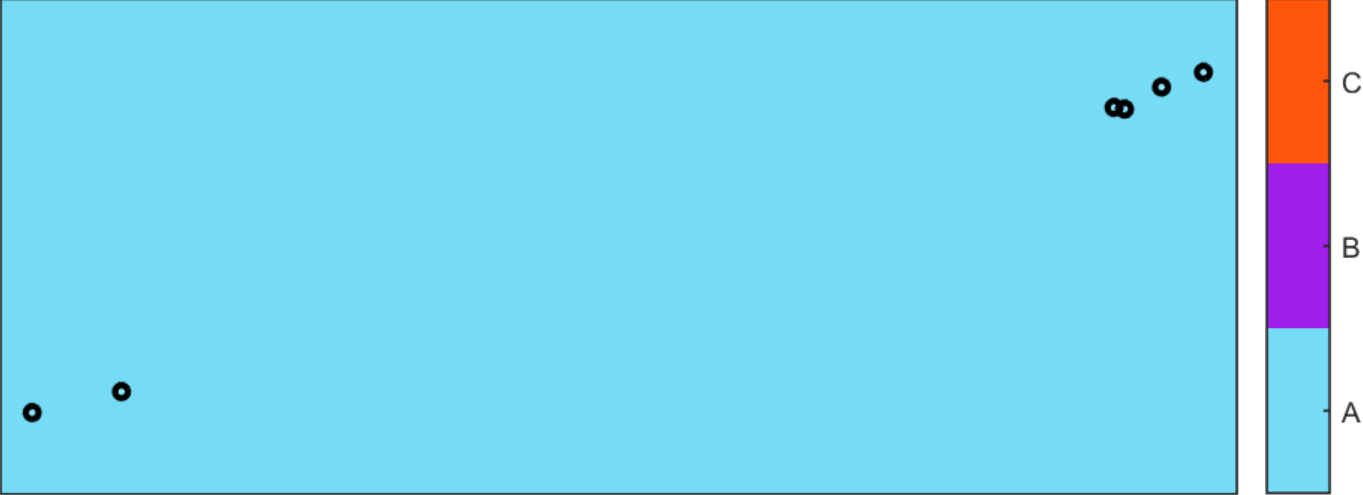
Offset type	Clearing site biodiversity equivalence score	Risk multiplier	Offset requirements	
			Offset amount (biodiversity equivalence units)	Offset attributes
General	0.015 GBES	1.5	0.022 general units	Offset must be within Glenelg Hopkins CMA or Moyne Shire Council Offset must have a minimum strategic biodiversity score of 0.142

<sup>2</sup> Strategic biodiversity score is a weighted average across habitat zones where a general offset is required

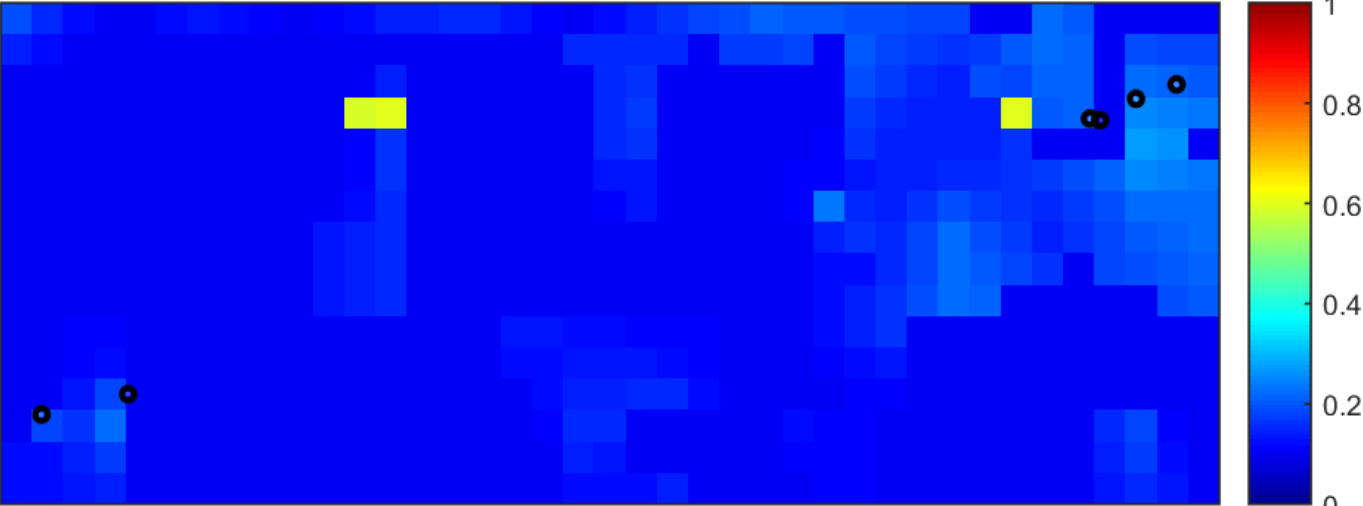
# Testing Clearing proposal

Images of marked native vegetation

1. Native vegetation location risk map



2. Strategic biodiversity score map



# Testing Clearing proposal

## Glossary

**Condition score** This is the site-assessed condition score for the native vegetation. Each habitat zone in the clearing proposal is assigned a condition score according to the habitat hectare assessment method. This information has been provided by or on behalf of the applicant in the GIS file.

**Dispersed habitat** A dispersed species habitat is a habitat for a rare or threatened species whose habitat is spread over a relatively broad geographic area greater than 2,000 hectares.

**General biodiversity equivalence score** The general biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to Victoria's biodiversity. The general biodiversity equivalence score is calculated as follows:

$$\text{General biodiversity equivalence score} = \text{habitat hectares} \times \text{strategic biodiversity score}$$

**General offset amount** This is calculated by multiplying the general biodiversity equivalence score of the native vegetation to be removed by the risk factor for general offsets. This number is expressed in general biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.

$$\text{Risk adjusted general biodiversity equivalence score} = \text{general biodiversity equivalence score clearing} \times 1.5$$

**General offset attributes** General offset must be located in the same Catchment Management Authority boundary or Municipal District (local council) as the clearing site. They must also have a strategic biodiversity score that is at least 80 per cent of the score of the clearing site.

**Habitat hectares** Habitat hectares is a site-based measure that combines extent and condition of native vegetation. The habitat hectares of native vegetation is equal to the current condition of the vegetation (condition score) multiplied by the extent of native vegetation. Habitat hectares can be calculated for a remnant patch or for scattered trees or a combination of these two vegetation types. This value is calculated for each habitat zone using the following formula:

$$\text{Habitat hectares} = \text{total extent (hectares)} \times \text{condition score}$$

**Habitat importance score** The habitat importance score is a measure of the importance of the habitat located on a site for a particular rare or threatened species. The habitat importance score for a species is a weighted average value calculated from the habitat importance map for that species. The habitat importance score is calculated for each habitat zone where the habitat importance map indicates that species habitat occurs.

**Habitat zone** Habitat zone is a discrete contiguous area of native vegetation that:

- is of a single Ecological Vegetation Class
- has the same measured condition.



# Testing Clearing proposal

<b>Highly localised habitat</b>	<p>A highly localised habitat is habitat for a rare or threatened species that is spread across a very restricted area (less than 2,000 hectares). This can also be applied to a similarly limited sub-habitat that is disproportionately important for a wide-ranging rare or threatened species. Highly localised habitats have the highest habitat importance score (1) for all locations where they are present.</p>
<b>Minimum strategic biodiversity score</b>	<p>The minimum strategic biodiversity score is an attribute for a general offset.</p> <p>The strategic biodiversity score of the offset site must be at least 80 per cent of the strategic biodiversity score of the native vegetation to be removed. This is to ensure offsets are located in areas with a strategic value that is comparable to, or better than, the native vegetation to be removed. Where a specific and general offset is required, the minimum strategic biodiversity score relates only to the habitat zones that require the general offset.</p>
<b>Offset risk factor</b>	<p>There is a risk that the gain from undertaking the offset will not adequately compensate for the loss from the removal of native vegetation. If this were to occur, despite obtaining an offset, the overall impact from removing native vegetation would result in a loss in the contribution that native vegetation makes to Victoria's biodiversity.</p> <p>To address the risk of offsets failing, an offset risk factor is applied to the calculated loss to biodiversity value from removing native vegetation.</p> <p style="text-align: center;"><b><i>Risk factor for general offsets = 1.5</i></b></p> <p style="text-align: center;"><b><i>Risk factor for specific offset = 2</i></b></p>
<b>Offset type</b>	<p>The specific-general offset test determines the offset type required.</p> <p>When the specific-general offset test determines that the native vegetation removal will have an impact on one or more rare or threatened species habitat above the set threshold of 0.005 per cent, a specific offset is required. This test is done at the permit application level.</p> <p>A general offset is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have an impact on any habitat for any rare or threatened species above the set threshold of 0.005 per cent. All habitat zones that do not require a specific offset will require a general offset.</p>
<b>Proportional impact on species</b>	<p>This is the outcome of the specific-general offset test. The specific-general offset test is calculated across the entire proposal for each species on the native vegetation permitted clearing species list. If the proportional impact on a species is above the set threshold of 0.005 per cent then a specific offset is required for that species.</p>
<b>Specific offset amount</b>	<p>The specific offset amount is calculated by multiplying the specific biodiversity equivalence score of the native vegetation to be removed by the risk factor for specific offsets. This number is expressed in specific biodiversity equivalence units and is the amount of offset that is required to be provided should the application be approved. This offset requirement will be a condition to the permit for the removal of native vegetation.</p>

$$\begin{aligned} & \text{Risk adjusted specific biodiversity equivalence score} \\ & = \text{specific biodiversity equivalence score clearing} \times 2 \end{aligned}$$

# Testing Clearing proposal

**Specific offset attributes** Specific offsets must be located in the modelled habitat for the species that has triggered the specific offset requirement.

**Specific biodiversity equivalence score** The specific biodiversity equivalence score quantifies the relative overall contribution that the native vegetation to be removed makes to the habitat of the relevant rare or threatened species. It is calculated for each habitat zone where one or more species habitats require a specific offset as a result of the specific-general offset test as follows:

$$\text{Specific biodiversity equivalence score} = \text{habitat hectares} \times \text{habitat importance score}$$

**Strategic biodiversity score** This is the weighted average strategic biodiversity score of the marked native vegetation. The strategic biodiversity score has been calculated from the *Strategic biodiversity map* for each habitat zone.

The strategic biodiversity score of native vegetation is a measure of the native vegetation's importance for Victoria's biodiversity, relative to other locations across the landscape. The *Strategic biodiversity map* is a modelled layer that prioritises locations on the basis of rarity and level of depletion of the types of vegetation, species habitats, and condition and connectivity of native vegetation.

**Total extent (hectares) for calculating habitat hectares** This is the total area of the marked native vegetation in hectares. The total extent of native vegetation is an input to calculating the habitat hectares of a site and in calculating the general biodiversity equivalence score. Where the marked native vegetation includes scattered trees, each tree is converted to hectares using a standard area calculation of 0.071 hectares per tree. This information has been provided by or on behalf of the applicant in the GIS file.

**Vicinity** The vicinity is an attribute for a general offset. The offset site must be located within the same Catchment Management Authority boundary or Local Municipal District as the native vegetation to be removed.

## Appendix 4 Glossary – Biodiversity Assessment Guidelines

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Items marked with 'A' are cited from DEPI (2013a) ; items marked with 'B' are cited from DSE (2007b) and items marked with a 'C' are cited from DEPI (2014b).

### **Avoid**<sup>A</sup>

Avoiding removing any native vegetation when undertaking a use or development. This can be either by not permitting or not going ahead with the use or development, or locating it elsewhere so that removing native vegetation is not required.

### **Benchmark**<sup>B</sup>

A standard vegetation –quality reference point, dependent on vegetation type, which is applied in Habitat hectare assessments. Represents the average characteristics of a mature and apparently long undisturbed state of the same vegetation type.

### **Biodiversity**<sup>A</sup>

The variety of all life forms, the different plants, animals and microorganisms, the genes they contain, and the ecosystems of which they form a part.

### **Biodiversity Interactive Map (BIM)**

Web based interactive map available on the DSE website that provides information on the biodiversity of Victoria and displays flora and fauna data from the Victorian Biodiversity Atlas.

### **Bioregion**<sup>B</sup>

Biogeographic areas that capture the patterns of ecological characteristics in the landscape or seascape, providing a natural framework for recognising and responding to biodiversity values. A landscape based approach to classifying the land surface using a range of environmental attributes such as climate, geomorphology, lithology and vegetation.

### **BushBroker**<sup>A</sup>

A program coordinated by DELWP to match parties that require native vegetation offsets with third party suppliers of native vegetation offsets.

### **Canopy Tree**<sup>C</sup>

Is a mature tree greater than 3 m in height and is normally found in the upper layer of a vegetation type. Immature trees that are not yet able to flower and are less than three metres in height are considered part of the understorey (see definition of understorey).

### **Condition score**

The score assigned to a habitat zone that indicates the quality of the vegetation relative to the ecological vegetation class benchmark, usually expressed as a percentage or on a scale of 0 to 1.

### **Degraded treeless vegetation**<sup>B</sup>

Vegetation that is neither a wetland, a remnant patch nor scattered tree(s).

### **DBH (Diameter at Breast Height)**<sup>B</sup>

The diameter of the main trunk of a tree measured 1.3 m above ground level.

### **Dispersed habitat**<sup>A</sup>

Habitat for a rare or threatened species whose habitat is spread over a relatively broad geographic area.

### **Ecological vegetation class (EVC)**<sup>A</sup>

A native vegetation type classified on the basis of a combination of its floristic, life form, environmental and ecological characteristics.

### **EVC (see Ecological vegetation class)**<sup>B</sup>

### **Extent risk**<sup>A</sup>

The level of risk to biodiversity from the removal of native vegetation based on the area and/or number of scattered trees to be removed.

### **Forb**

A herbaceous flowering plant that is not a graminoid (grass, sedge or rush).

**Gain <sup>A</sup>**

Predicted improvement in the contribution to Victoria's biodiversity achieved from an offset, calculated by combining site gain with the strategic biodiversity score or habitat importance score of the site. Gain is measured with biodiversity equivalence scores or units.

**Gain Target <sup>B</sup>**

The amount of gain that needs to be achieved to offset a loss measured in Habitat hectares.

**General biodiversity equivalence score / units <sup>A</sup>**

Score or units used to quantify the relative overall contribution of a site to Victoria's biodiversity.

**General offset <sup>A</sup>**

An offset that is required when a proposal to remove native vegetation is not deemed, by application of the specific-general offset test, to have a significant impact on habitat for any rare or threatened species.

**General provisions <sup>A</sup>**

Operational requirements in planning schemes which are consistent across the state, relating to matters such as administrative provisions, ancillary activities and referral of applications.

**Habitat hectares <sup>A</sup>**

Combined measure of condition and extent of native vegetation. This measure is obtained by multiplying the site's condition score (measured between 0 and 1) with the area of the site (in hectares).

**Habitat hectares benchmark <sup>A</sup>**

A reference point for each vegetation type that represents the average condition of mature stands that are likely to reflect pre-settlement circumstances.

**Habitat hectares site assessment <sup>A</sup>**

A site-based measure of the condition of native vegetation with reference to the benchmark for the same type of native vegetation. The assessment generates a condition score of between 0 and 1.

**Habitat importance map <sup>A</sup>**

A map that indicates the importance of locations as habitat for a particular rare or threatened species. This map is based on modelled data.

**Habitat importance score <sup>A</sup>**

Measure of the importance of the habitat located on a site for a particular rare or threatened species.

**Habitat zone <sup>B</sup>**

A discrete area of native vegetation consisting of a single vegetation type (EVC) within an assumed similar quality. This is the base spatial unit for conducting a Habitat hectare assessment. Separate *Vegetation Quality Assessments* (or Habitat hectare assessments) are conducted for each habitat zone within the designated assessment area.

**Highly localised habitat <sup>A</sup>**

Habitat for rare or threatened species whose habitat is spread over a very restricted area (i.e. less than 2,000 ha). This can also be applied to a similarly limited sub-habitat that is disproportionately important for a wide-ranging rare or threatened species.

**Improvement gain <sup>B</sup>**

This is gain resulting from management commitments beyond existing obligations under legislation to improve the current vegetation quality. Achieving improvement gain is predicated on maintenance commitments being already in place. For example, control of any threats such as grazing that could otherwise damage the native vegetation must already be agreed. Typical actions leading to an improvement gain include reducing or eliminating environmental weeds, enhancement planting or revegetation over a 10-year management period. If the vegetation is to be used as an offset, a commitment to maintain the improvement gain (i.e. no subsequent decline in quality) will be required in perpetuity.

**Incorporated document <sup>A</sup>**

A document that is included in the list of incorporated documents in a planning scheme. These documents affect the operation of the planning scheme.

**Indigenous vegetation<sup>B</sup>**

The type of native vegetation that would have normally been expected to occur on the site prior to European settlement.

**Landholder<sup>A</sup>**

An owner, occupier, proprietor or holder of land.

**Landowner<sup>A</sup>**

Owner of land.

**Landscape scale information<sup>A</sup>**

Mapped or modelled information based on data collected across the landscape rather than just on a particular site.

**Large Old Tree (LOT)<sup>B</sup>**

A tree with a DBH equal to or greater than the large tree diameter as specified in the relevant EVC benchmark.

**Listed species**

A flora or fauna species listed under the Commonwealth *Environment Protection and Biodiversity Act 1999* or listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988*.

**Local Planning Policy Framework<sup>A</sup>**

Framework outlining a Municipal Strategic Statement and the Local Planning Policies that apply to the local government area.

**Location risk<sup>A</sup>**

The risk that removing native vegetation in a particular location will have an impact on the persistence of a rare or threatened species.

**Loss<sup>A</sup>**

Loss in the contribution to Victoria's biodiversity when native vegetation is fully or partially removed, as measured in biodiversity equivalence scores or units.

**Maintenance Gain<sup>B</sup>**

This is gain from commitments that contribute to the maintenance of the current vegetation quality over time (i.e. avoiding any decline). Includes foregoing certain entitled activities that could otherwise damage or remove native vegetation, such as grazing or firewood collection. Also typically requires a commitment to ensure no further spread of environmental weeds that may otherwise result in the loss of vegetation quality over time. If the vegetation is to be used as an offset, a commitment to maintain the vegetation quality will be required in perpetuity.

**Minimise<sup>A</sup>**

Locating, designing or managing a use or development to reduce the impacts on biodiversity from the removal of native vegetation.

**Native (indigenous) vegetation<sup>B</sup>**

Native vegetation is plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses (as defined in Clause 72 of the planning scheme).

**Native vegetation credit<sup>A</sup>**

Gains in the contribution that native vegetation makes to Victoria's biodiversity that are registered on the native vegetation credit register. Native vegetation credits are offered for sale to parties who are required to offset the removal of native vegetation.

**Native vegetation credit register<sup>A</sup>**

A statewide register of native vegetation credits that meet minimum standards for security and management of sites. The register is administered by the Department of Environment and Primary Industries, and records the creation, trade and allocation of credits to meet specific offset requirements.

**Native vegetation extent<sup>A</sup>**

Area of land covered by native vegetation or the number of scattered trees.

### **Native Vegetation Information Management (NVIM) system <sup>A</sup>**

An online tool used to access information about Victoria's native vegetation.

### **Native vegetation particular provision <sup>A</sup>**

Clause 52.17 in the Victoria Planning Provisions that relates to the removing, destroying or lopping of native vegetation.

### **No net loss <sup>A</sup>**

An outcome where a particular gain in the contribution to Victoria's biodiversity is equivalent to an associated loss in the contribution to Victoria's biodiversity from permitted clearing.

### **Offset <sup>A</sup>**

Protection and management (including revegetation) of native vegetation at a site to generate a gain in the contribution that native vegetation makes to Victoria's biodiversity. An offset is used to compensate for the loss to Victoria's biodiversity from the removal of native vegetation.

### **Offset Management Plan (OMP)**

A document which sets out the requirements for establishment, protection and management of an offset site.

### **Offset market <sup>A</sup>**

A system which facilitates trade of native vegetation credits between parties requiring offsets and third party suppliers of offsets.

### **Old tree <sup>B</sup>**

A tree with a DBH equal to or greater than 0.75 of the large tree diameter as specified in the relevant EVC benchmark. Includes medium old trees and large old trees (see separate definitions). Some Regional Native Vegetation Plans additionally define very large old trees (1.5 times large tree diameter).

### **On-site offset <sup>B</sup>**

An offset located on the same property as the clearing.

### **Particular Provisions <sup>A</sup>**

Provisions in the Victoria Planning Provisions that relate to specific activities (for example, native vegetation is a Particular Provision).

### **Patch (see Remnant Patch)**

### **Permit<sup>A</sup>**

A legal document that gives permission for a use or development on a particular piece of land.

### **Perennial <sup>A</sup>**

A plant that lives for more than two years. Perennials include species that are always visible e.g. shrubs and trees, but also include species that are not always visible above ground.

### **Permitted clearing <sup>A</sup>**

Removal of native vegetation for which a planning permit has been granted to remove native vegetation.

### **Permitted clearing regulations <sup>A</sup>**

The rules in the planning system that regulate permits for the removal of native vegetation.

Planning provisions – See Victoria Planning Provisions.

### **Prior management gain**

This gain acknowledges actions to manage vegetation since State-wide planning permit controls for native vegetation removal were introduced in 1989.

### **Planning scheme <sup>A</sup>**

Policies and provisions for the use, development and protection of land in a local government area.

### **Planning system <sup>A</sup>**

Victoria's land-use planning system that includes the Victoria Planning Provisions and each local government's planning scheme.

### **Property Vegetation Plan <sup>B</sup>**

A plan which relates to the management of native vegetation within a property, and which is contained within an agreement made pursuant to section 69 of the Conservation, Forests and Lands Act 1987.

### **Protected species**

A flora species protected under the *Victorian Flora and Fauna Guarantee Act 1988*.

### **Protection (of a tree) <sup>B</sup>**

An area with twice the canopy diameter of the tree(s) fenced and protected from adverse impacts: grazing, burning and soil disturbance not permitted, fallen timber retained, weeds controlled, and other intervention and/or management if necessary to ensure adequate natural regeneration or planting can occur.

### **Rare or threatened species <sup>A</sup>**

A species that is listed in:

- DELWP's Advisory List of Rare or Threatened Plants in Victoria as 'endangered', 'vulnerable', or 'rare', but does not include the 'poorly known' category
- DELWP's Advisory List of Threatened Vertebrate Fauna in Victoria as 'critically endangered', 'endangered' or 'vulnerable', but does not include 'near threatened' or 'data deficient' categories
- DELWP's Advisory List of Threatened Invertebrate Fauna in Victoria as 'critically endangered', 'endangered' or 'vulnerable', but does not include 'near threatened' or 'data deficient' categories.

### **Recruitment <sup>B</sup>**

The production of new generations of plants, either by allowing natural ecological processes to occur (regeneration etc), by facilitating such processes such as regeneration to occur, or by actively revegetating (replanting, reseeding). See Revegetation.

### **Referral authority <sup>A</sup>**

An authority that a permit application is referred to for decision under Section 55 of the Planning and Environment Act 1987. All referral requirements are specified in Clause 66 of planning schemes.

### **Remnant patch of native vegetation <sup>A</sup>**

Either:

- an area of native vegetation, with or without trees, where at least 25 per cent of the total perennial understorey plant cover is native plants
- an area with three or more indigenous canopy trees where the tree canopy cover is at least 20 per cent.

### **Remnant vegetation <sup>B</sup>**

Native vegetation that is established or has regenerated on a largely natural landform. The species present are those normally expected in that vegetation community. Largely natural landforms may have been subject to some past surface disturbance such as some clearing or cultivation (or even the activities of the nineteenth century gold rushes) but do not include man-made structures such as dam walls and quarry floors.

### **Responsible authority <sup>A</sup>**

The authority charged with the responsibility for administering and enforcing particular aspects of a planning scheme.

### **Revegetation <sup>B</sup>**

Establishment of native vegetation to a minimum standard in formerly cleared areas, outside of a remnant patch.

### **Scattered tree <sup>C</sup>**

An indigenous canopy tree that does not form part of a remnant patch of native vegetation (see definition of remnant patch of native vegetation).

### **Section 173 agreements <sup>B</sup>**

A management agreement primarily between a landowner and the responsible authority according to section 173 of the Planning and Environment Act 1987.

**Security Gain**

This is gain from actions to enhance security of the on-going management and protection of native vegetation at the offset site, either by entering into an on-title agreement (for example under Section 173 of the *Planning and Environment Act 1987*), or by locating the offset on land that has greater security than the clearing site, or by transferring private land to a secure public conservation reserve.

**Site<sup>A</sup>**

An area of land that contains contiguous patches of native vegetation or scattered trees, within the same ownership.

**Site-based information<sup>A</sup>**

Information that is collected at a site.

**Site gain<sup>A</sup>**

Predicted improvement in the condition, or the condition and extent, of native vegetation at a site (measured in Habitat hectares) generated by the landowner committing to active management and increased security.

**Site loss<sup>A</sup>**

Loss in the condition, or condition and extent, of native vegetation when native vegetation is fully or partially removed, measured in Habitat hectares.

**sp.**

Species (one species).

**spp.**

Species (more than one species).

**Species persistence<sup>A</sup>**

The continued existence of a species into the future.

**Specific biodiversity equivalence score / units<sup>A</sup>**

With reference to a specific species, a score or units used to quantify the relative contribution of a site to Victoria's biodiversity.

**Specific-general offset test<sup>A</sup>**

A test used to determine whether a general or specific offset is required based on the impact of native vegetation removal on the habitat for rare or threatened species.

**Specific offset<sup>A</sup>**

An offset that is targeted to a particular species (or multiple species) impacted by the removal of native vegetation.

**State Planning Policy Framework<sup>A</sup>**

A collection of clauses in the Victoria Planning Provisions that inform planning authorities and responsible authorities of those aspects of state planning policy which they are to take into account and give effect to in planning and administering their respective areas.

**Strategic biodiversity map<sup>A</sup>**

A map that shows the relative value of a location in the landscape with regard to its condition, extent, connectivity and the support function it plays for species. The map is based on modelled data.

**Strategic biodiversity score<sup>A</sup>**

A score that quantifies the relative value of a location in the landscape with regard to its condition, extent, connectivity and the support function it plays for species.

**Strategic planning<sup>A</sup>**

A coordinated approach to planning where areas for conservation and areas which can be cleared are strategically identified.

**Supplementary planting**

Establishment of overstorey and/or understorey plants within a remnant patch. Typically includes the planting or direct-seeding of understorey life forms.

**Taxon (plural taxa)**

A term used to describe any taxonomic unit. This term is typically used when referring broadly to any scientifically recognised species, subspecies or variety.



**Third-party offset <sup>B</sup>**

An offset located on a property owned by a person other than the landowner who incurs the native vegetation loss being offset.

**Understorey**

Understorey is all vegetation other than mature canopy trees – includes immature trees, shrubs, grasses, herbs, mosses, lichens and soil crust. It does not include dead plant material that is not attached to a living plant. More information on understorey life forms is set out in the Vegetation Quality Assessment Manual (DSE 2004).

**Vegetation Quality Assessment**

The standard DELWP method for assessing remnant patches of vegetation. Details of the method are outlined in the Vegetation Quality Assessment Method (DSE 2004). The results of the assessment are expressed in Habitat hectares. Also referred to as a 'Habitat hectare assessment'

**Victoria Planning Provisions <sup>A</sup>**

A list of planning provisions that provides a standard template for individual planning schemes.

**Zone <sup>A</sup>**

A zone in the Victoria Planning Provisions is a set of permitted uses of land which are defined spatially.