

# Mount Fyans Wind Farm: Flora and fauna existing conditions

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## **Biosis offices**

### AUSTRALIAN CAPITAL TERRITORY

**Canberra** Floor 1, Unit 3, 38 Essington Street Mitchell ACT 2911

Phone: (02) 6102 1200 Email: <u>canberra@biosis.com.au</u>

#### NEW SOUTH WALES

Newcastle 39 Platt Street Waratah NSW 2298

Phone: (02) 4911 4040 Email: <u>newcastle@biosis.com.au</u>

#### Sydney

Unit 14 17-27 Power Avenue Alexandria NSW 2015

Phone: (02) 9101 8700 Email: <u>sydney@biosis.com.au</u>

#### Wollongong

8 Tate Street Wollongong NSW 2500

Phone: (02) 4201 1090 Email: <u>wollongong@biosis.com.au</u>

### QUEENSLAND

#### Brisbane

Suite 4 First Floor, 72 Wickham Street Fortitude Valley QLD 4006

Phone: (07) 3014 1110 Email: <u>brisbane@biosis.com.au</u>

#### VICTORIA

Ballarat 506 Macarthur Street Ballarat VIC 3350

Phone: (03) 5304 4250 Email: <u>ballarat@biosis.com.au</u>

#### Melbourne (Head Office)

38 Bertie Street Port Melbourne VIC 3207

Phone: (03) 8686 4800 Fax: (03) 9646 9242 Email: <u>melbourne@biosis.com.au</u>

Wangaratta 16 Templeton Street Wangaratta VIC 3677

Phone: (03) 5718 6900 Email: <u>wangaratta@biosis.com.au</u>

### **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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#### Canberra

Floor 1, Unit 3, 38 Essington Street Mitchell ACT 2911

Phone: (02) 6102 1200 Email: <u>canberra@biosis.com.au</u>

#### NEW SOUTH WALES

Newcastle 39 Platt Street Waratah NSW 2298

Phone: (02) 4911 4040 Email: <u>newcastle@biosis.com.au</u>

### Sydney

Unit 14 17-27 Power Avenue Alexandria NSW 2015

Phone: (02) 9101 8700 Email: <u>sydney@biosis.com.au</u>

Wollongong 8 Tate Street Wollongong NSW 2500

Phone: (02) 4201 1090 Email: <u>wollongong@biosis.com.au</u>

#### QUEENSLAND

#### Brisbane

Suite 4 First Floor, 72 Wickham Street Fortitude Valley QLD 4006

Phone: (07) 3014 1110 Email: <u>brisbane@biosis.com.au</u>

### VICTORIA

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Phone: (03) 5304 4250 Email: <u>ballarat@biosis.com.au</u>

#### Melbourne (Head Office)

38 Bertie Street Port Melbourne VIC 3207

Phone: (03) 8686 4800 Fax: (03) 9646 9242 Email: <u>melbourne@biosis.com.au</u>

Wangaratta

16 Templeton Street Wangaratta VIC 3677

Phone: (03) 5718 6900 Email: <u>wangaratta@biosis.com.au</u> Biosis staff involved in this project were:

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# Summary

Biosis Pty Ltd was commissioned by Hydro Tasmania to undertake a flora and fauna assessment of the site of the proposed Mount Fyans Wind Farm for the purpose of describing the existing ecological conditions present. The study area is located near the township of Mortlake in western Victoria.

A preliminary flora and fauna assessment was undertaken in 2012 to document and map the extent of native vegetation and fauna habitats present. Subsequent assessments were undertaken in 2012 and 2013 to assess roadsides and additional areas.

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.

Following the general flora and fauna assessments, further detailed targeted surveys for threatened species have been undertaken across the study area. The results of these surveys, along with an assessment of potential impacts associated with development and operation of the wind farm, is provided in a separate report (Biosis 2017a) which should be read in conjunction with this report.



# 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 Mt 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 resulting information to inform the design development of the wind farm with a view to minimising impacts on biodiversity values.

A preliminary flora and fauna assessment was undertaken in March 2012 to ascertain 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 EPBC Act listed ecological communities and threatened flora/fauna habitat.

An assessment of roadside vegetation within and surrounding the study area was undertaken in June 2013. All potential habitat for threatened fauna was also mapped during this survey for the purpose of designing targeted assessments that were carried out over the spring/summer period of 2013-14.

The route of the proposed External Transmission Line was assessed in June 2013. Targeted surveys for threatened flora and fauna species were 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 are presented in this report with the purpose of documenting the existing conditions for the site. Details of the targeted surveys for threatened flora and fauna, including the implications of relevant biodiversity legislation and policy are provided in a separate report (Biosis 2017a). A detailed assessment for potential Brolga breeding and flocking habitats within and adjacent to the proposed wind farm has been undertaken and is outlined in Biosis (2016b).

## 1.2 Scope of assessment

The objectives of this investigation are to document the existing ecological conditions for the proposed wind farm site, roadsides and associated external transmission route. The objectives are achieved by:

- Describing the vascular flora (ferns, conifers, flowering plants), vertebrate fauna (birds, mammals, reptiles, frogs, fishes) and decapod crustacea (e.g. crayfish).
- Mapping native vegetation and other habitat features.
- Reviewing the Permitted clearing of native vegetation Biodiversity Assessment Guidelines as they apply to the project.



## 1.3 Study area

The study area is located near the township of Mortlake, approximately 200 kilometres west of Melbourne. 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 the 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 (Figure 2).

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 or 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, is 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 km 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 km reach upstream of Salt Creek) was assessed in the 2004 Index of Stream Condition assessment to be in moderate condition (DSE 2005b). 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 2005b).





# 2. Methods

## 2.1 Database review

In order to provide a context for the study, information about flora and fauna from within 10 kilometres of the study area (the 'local area') was obtained from relevant biodiversity databases. Aquatic fauna records were searched upstream of the confluence of Mount Emu Creek and Hopkins River, into which Blind Creek and the unnamed tributaries drain. Records from the following databases were collated and reviewed on 22/09/2016:

- Flora Information System (FIS) which includes records from the Victorian Biodiversity Atlas VBA\_FLORA25, FLORA100 & FLORA Restricted' August 2015 © The State of Victoria, Department of Environment, Land, Water and Planning (DELWP). The contribution of the Royal Botanical Gardens Melbourne to the database is acknowledged.
- Victorian Biodiversity Atlas 'VBA\_FAUNA25, FAUNA100 & FAUNA Restricted' August 2015 © The State of Victoria.
- DELWP Biodiversity Interactive Map (BIM)
- BirdLife Australia Atlas of Australian Birds (BA)
- Protected Matters Search Tool of the Australian Government Department of the Environment for matters protected by the EPBC Act.

Other sources of biodiversity information were examined including:

- 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.
- Biosis Research (2011). Penshurst Wind Farm: Targeted fauna assessment. Report for RES Australia. Authors: Venosta, M., Garvey, N. & Bloink, C. Biosis Research Pty. Ltd., Melbourne.
- Biosis Research (2012). Penshurst Wind Farm: Transmission Grid Route. Report for RES Australia. Author: Arber, S. Biosis Research Pty. Ltd.
- Biosis (2013). Penshurst 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 (2017a). Mount Fyans Wind Farm: Targeted surveys and impact assessment. 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.



## 2.2 Definitions of significance

The significance of a species or ecological community is determined by its listing status under Commonwealth or State legislation / policy (Table 1).

Table 1	Criteria for determining significance of	species & ecological communities

Significance	
National	Listed as critically endangered, endangered or vulnerable under the EPBC Act
State	Listed as critically endangered, endangered, vulnerable or rare in Victoria on a DELWP Advisory List (DSE 2013a; DEPI 2014a) Listed as threatened under the FFG Act

Lists of significant species generated from the databases are provided in Appendix 1 (flora) and Appendix 2 (fauna) and the species have been assessed to determine the likelihood of their occurrence based on the process outlined below. These species are not discussed further in this report unless they:

- Have a medium or greater likelihood of occurrence.
- Are flora species listed as threatened under the FFG Act with a medium or greater likelihood of occurrence.
- Are identified as having habitat on the site by the DELWP Habitat Importance Modelling.

## 2.3 Determining likelihood of occurrence of significant species

Likelihood of occurrence indicates the potential for a species or ecological community to occur regularly within the study area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low, medium, high or recorded. Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Species which have at least medium likelihood of occurrence are given further consideration in this report. The need for targeted survey for these species was considered and forms the basis of the targeted survey and impact assessment report (Biosis 2017a). Subsequently, results of the targeted surveys have also been factored into the likelihood assessment.

## 2.4 Site investigation

### 2.4.1 Flora assessment

The flora assessment has been undertaken in stages:

- A preliminary flora assessment and mapping was undertaken to assess general native vegetation values of the study area: 12-16 March 2012.
- Investigation following the removal of grazing and spring survey of identified native vegetation to confirm extent and distribution of EVCs: 15-17 October 2012 and 5-7 November 2012.
- Flora survey and mapping of the small extension to the study area ("Western Extension") near Woorndoo-Dundonnell Road: 15-17 October 2012.
- Flora survey and mapping of the western extension: 29-30 January 2013.
- Flora survey and mapping of roadsides: 3-4 June 2013.



• Flora survey and mapping of external transmission line corridor: 11-13 June 2013.

A list of flora species was collected across the entire study area (including the Wind Farm and Transmission Line): list S1444100. This list was submitted to DELWP for incorporation into the Victorian Biodiversity Atlas. The flora species list is intended to provide an overview of common indigenous and introduced species present across the site and is not an exhaustive inventory. Planted species have not been recorded unless they are naturalised.

The general condition of native vegetation was observed as well as the effects of seasonal conditions at the time of surveys. Notes were made on specific issues such as noxious weed infestations, evidence of management works, current grazing impacts and the regeneration capacity of the vegetation.

Classification of native vegetation is based on ecological vegetation classes (EVCs). An EVC contains one or more floristic (plant) communities, and represents a grouping of broadly similar environments. Definitions of EVCs and benchmarks (condition against which vegetation quality at the site can be compared) are as determined by DELWP.

Species nomenclature for flora follows the Flora Information System (FIS).

## 2.4.2 Fauna assessment

The fauna assessment has been undertaken in stages:

- The preliminary fauna assessment and mapping of fauna habitat was undertaken over five days: 12-16 March 2012.
- Fauna survey and habitat assessment of the small extension to the study area ("Western Extension") near Woorndoo-Dundonnell Road: 15-17 October 2012.
- Fauna survey and habitat assessment of the western extension: 29-30 January 2013.
- Fauna survey and habitat assessment and mapping of roadsides: 3-4 June 2013.
- Fauna survey of external transmission line corridor: 11-13 June 2013.

The fauna values were determined primarily on the basis of the types and qualities of habitat(s) present. All species of fauna observed during the assessment were noted and active searching for fauna was undertaken. This included direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls. Particular attention was given to searching for significant species and their habitats. Fauna species were recorded with a view to characterising the values of the site and the investigation was not intended to provide a comprehensive survey of all fauna that has potential to utilise the site over time.

Fauna records are submitted to DELWP for incorporation into the Victorian Biodiversity Atlas. Aquatic fauna records will also be submitted to Melbourne Water for inclusion in the Melbourne Water Fish database.

## 2.4.3 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.



## 2.5 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 assessments were conducted over multiple seasons (autumn, spring and summer) in order to gain a good understanding of the vegetation present and fauna species that use the site.

At the time of early assessments, 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 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).

## 2.6 Legislation and policy

The implications for the project were assessed in relation to the Permitted Clearing of Native Vegetation: Biodiversity Assessment Guidelines (DEPI 2013a). Other key biodiversity legislation and policy relevant to the project is covered in detail in the Targeted Surveys and Impact Assessment Report (Biosis 2017a).

## 2.7 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 ± 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. Results

The ecological features of the study area are described below and mapped in Figure 2.

Species recorded during the flora and fauna assessments of the study area are listed in Appendix 1 (flora) and Appendix 2 (fauna). The results of the targeted surveys (Biosis 2017a) have also been included in those appendices.

Species recorded or predicted to occur in the broader local area are also listed in those appendices, along with an assessment of the likelihood of them occurring within the study area.

## 3.1 Vegetation & fauna habitat

The vegetation and fauna habitat throughout the majority of the study area have been highly modified by past disturbances which have included clearing, agricultural development, pasture improvement. Most of the study area has been significantly modified and supports predominantly introduced vegetation that is of limited value for native fauna. However, some roadsides in and around the study area have potential to support significant fauna habitat.

The study area supports the presence of ten EVCs in addition to scattered trees (all River Red-gums *Eucalyptus camaldulensis* and occasional Drooping She-oak *Allocasuarina verticillata*) and an additional eight fauna habitat types. All EVCs present are classified as Endangered within the Victorian Volcanic Bioregion, with the exception of Plains Sedgy Wetland which is Vulnerable. These features are described further in Table 2 and mapped in Figure 2.

Photos are provided in Appendix 3.



Vegetation or habitat type	Description	Location	Significant values
Heavier-soils Plains Grassland EVC 132_6	The ground layer of <i>Heavier-soils</i> Plains Grassland within the study area consists of a mixture of native and introduced grasses and herbs. Common native ground species present include Wallaby-grasses <i>Rytidosperma</i> spp., Kangaroo Grass <i>Themeda triandra</i> , Small Vanilla-lily <i>Arthropodium minus</i> and Pink Bindweed <i>Convolvulus</i> <i>erubescens</i> spp. <i>agg.</i> (Plate1). The cover of introduced species varies between patches of this EVC. Native grasslands provide habitat for a range of fauna, particularly ground foraging and nesting birds such as Stubble Quail <i>Coturnix pectoralis</i> , Brown Songlark <i>Cincloramphus cruralis</i> and Australasian Pipit <i>Anthus</i> <i>novaeseelandiae</i> . Common, open country birds will also forage within and over grasslands, including Australian Magpie <i>Cracticustibicen</i> , Ravens <i>Corvus</i> spp. and a range of raptors including Brown Falcon <i>Falco berigora</i> , Nankeen Kestrel <i>Falco cenchroides</i> and Black-shouldered Kite <i>Elanus axillaris</i> .	This community has been mapped along Castle Carey Rd and on some stony rises within the study area. However, it is most commonly present along roadsides surrounding the study area which include the high quality grassland patches along Woorndoo- Dundonnell Road.	Some patches of Heavier-soils Plains Grassland EVC also meet the definition of the EPBC Act listed ecological community (Natural Temperate Grasslands of the Victorian Volcanic Plain – NTGVVP) and the state listed ecological community (Grassy Eucalypt Woodland of the Victorian Volcanic Plain). These areas provide suitable habitat for seven species of national significance (Matted Flax-lily <i>Dianella amoena</i> , Small Golden Moths <i>Diuris</i> <i>basaltica</i> , Clover Glycine <i>Glycine latrobeana</i> , Spiny Rice Flower <i>Pimelea spinescens</i> subsp. <i>spinescens</i> , White Sunray <i>Leucochrysum albicans</i> var. <i>tricolor</i> , Fragrant Leek-orchid <i>Prasophyllum suaveolens</i> , Basalt Rustyhood <i>Pterostylis basaltica</i> ) and 10 species of state significance (Wimmera Woodruff Asperula wimmerana, Arching Flax-lily <i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra), Small Milkwort <i>Comesperma</i> <i>polygaloides</i> , Golden Cowslips <i>Diuris chryseopsis</i> , Clumping Golden Moths <i>Diuris gregaria</i> , Pale-flower Crane's-bill <i>Geranium</i> sp. 3, Leprechaun Greenhood <i>Pterostylis conferta</i> , Dense Greenhood <i>Pterostylis</i> sp. aff. <i>bicolor</i> (Woorndoo), Derrinallum Billy-buttons <i>Craspedia</i> sp. 2, Basalt Sun-orchid <i>Thelymitra</i> <i>gregaria</i> ). Plains Grassland provides habitat for Tussock Skink <i>Pseudemoia pagenstecheri</i> and potentially the EPBC Act listed Striped Legless Lizard <i>Delma impar</i> . Some grassland areas also have potential to support

## Table 2Summary of vegetation and habitat types within the study area

populations of the EPBC Act listed Golden Sun Moth



Vegetation or habitat type	Description	Location	Significant values
			<i>Synemon plana</i> . Areas with extensive surface rock may provide habitat for Fat-tailed Dunnart <i>Sminthopsis crassicaudata</i> .
Plains Grassy Wetland EVC 125	Plains Grassy Wetland within the study area occurs in low-lying areas and its presence is characterised by either a high cover of Common Tussock-grass <i>Poa labillardierei</i> and little else or alternatively a mixture of species including Australian Sweet-grass <i>Glyceria australis</i> , Slender Knotweed <i>Persicaria decipiens</i> , Buttercup <i>Ranunculus</i> spp. and Grey Willow-herb <i>Epilobium</i> <i>billardierianum</i> subsp. <i>cinereum</i> (Plate 2). All areas of Plains Grassy Wetland have a long history of grazing and, as a consequence, lack the native species diversity that would have once been present, especially in patches dominated by Common Tussock-grass. Introduced plants are common, especially on the margins of the wetlands, and include Common Water-starwort <i>Callitriche stagnalis</i> , Sweet Vernal-grass <i>Anthoxanthum</i> <i>odoratum</i> , Fox-tail <i>Alopecurus</i> spp., Water Buttons <i>Cotula</i> <i>coronopifolia</i> and White Clover <i>Trifolium repens</i> var. <i>repens</i> .	The majority of patches of Plains Grassy Wetland present within the study area are north of Woorndoo-Darlington Road.	Plains Grassy Wetland EVC potentially includes the presence of one nationally and one state listed ecological community. This EVC also provides suitable habitat for five nationally significant species (River Swamp Wallaby- grass <i>Amphibromus fluitans</i> , Curly Sedge <i>Carex</i> <i>tasmanica</i> , Adamson's Blown-grass <i>Lachnagrostis</i> <i>adamsonii</i> , Spiny Peppercress <i>Lepidium aschersonii</i> , Swamp Fireweed <i>Senecio psilocarpus</i> ) and nine state significant species (Wavy Swamp Wallaby-grass <i>Amphibromus sinuatus</i> , Pale Swamp Everlasting (recorded) <i>Coronidium scorpioides</i> 'rutidolepis' variant, Derrinallum Billy-buttons, two subspecies of Purple Blown-grass <i>Lachnagrostis punicea</i> subsp. <i>punicea</i> and subsp. <i>filifolia</i> , Plains Yam-daisy <i>Microseris scapigera</i> , Yawning Leek-orchid <i>Prasophyllum chasmogamum</i> , Brackish Plains Buttercup <i>Ranunculus diminutus</i> , Spreading Panic- grass <i>Paspalidium distans</i> ).
Stony Knoll Shrubland EVC 649	Stony Knoll within the study area is generally dominated by grasses and other ground-storey flora species with scattered occurrences of Tree Violet <i>Melicytus dentatus</i> and Sweet Bursaria <i>Bursaria spinosa</i> to 2 m in height (Plate 3). Other indigenous plants present include Austral Bracken <i>Pteridium esculentum</i> , Wallaby-grass <i>Rytidosperma</i> spp., Weeping Grass <i>Microlaena stipoides</i> var. <i>stipoides</i> , Small Vanilla-lily <i>Arthropodium minus</i> ,	Stony Knoll Shrubland occurs in isolated patches of low quality throughout the study area, particularly north and immediately south of Woorndoo- Chatsworth Road.	Many patches of Stony Knoll Shrubland include a sufficient cover of perennial native grasses and low cover of woody vegetation to meet the definition of the EPBC Act listed community Natural Temperate Grasslands of the Victorian Volcanic Plain (DEWHA 2003). This EVC provides suitable habitat for five nationally listed species (Small Golden Moths, Clover Glycine,



Vegetation or habitat type	Description	Location	Significant values
	Kidney-weed <i>Dichondra repens</i> , Australian Sheep's Burr <i>Acaena ovina</i> and Crassula <i>Crassula</i> spp. Introduced plants are common within this EVC and include Onion Grass <i>Romulea rosea</i> , Capeweed <i>Arctotheca</i> <i>calendula</i> , Sheep Sorrel <i>Acetosella vulgaris</i> and Sweet Vernal-grass.		White Sunray, Fragrant Leek-orchid, Basalt Rustyhood) and seven state listed species (Wimmera Woodruff, Derrinallum Billy-buttons, Clumping Golden Moths, Pale-flower Crane's-bill, Leprechaun Greenhood, Dense Greenhood, Basalt Sun-orchid). Stony rises provides potential habitat for Fat-tailed Dunnart and a range of common reptile species. Surface rock close to water also provide habitat for a range of common frog species and the EPBC listed Corangamite Water Skink <i>Eulamprus tympanum</i> <i>marieae</i> .
Plains Grassy Woodland EVC 55_61	Plains Grassy Woodland EVC within the study area supports an overstorey of River Red-gum with an understorey dominated by the introduced Toowoomba Canary-grass <i>Phalaris aquatica</i> (Plate 4). Small woodland remnants within a largely cleared landscape provide important nesting habitat for common woodland birds, and potentially roosting and foraging habitat for microbats.	This EVC is present in one patch adjoining Castle Carey Road, along the proposed transmission line route and along some roadsides.	The Plains Grassy Woodland EVC corresponds with the FFG Act listed community Western Basalt Plains (River Red Gum) Grassy Woodland.
Aquatic Herbland EVC 653	These areas are dominated by grass and herb species such as Australian Sweet-grass, Common Swamp Wallaby-grass <i>Amphibromus nervosus</i> , Water Milfoil <i>Myriophyllum</i> spp and Buttercup <i>Ranunculus</i> spp. The cover of introduced species is low except on the drier margins of the herbland, where they dominate the ground layer. They include Clustered Dock <i>Rumex</i> <i>conglomeratus</i> , Onion Grass and Sweet Vernal-grass (Plate 5).	Patches of Aquatic Herbland EVC are scattered throughout the study area.	Aquatic Herbland EVC potentially includes the presence of a nationally significant ecological community. It provides suitable habitat for three flora species of national significance (Adamson's Blown-grass, Swamp Everlasting, River Swamp Wallaby-grass) and six of state significance (Brackish Plains Buttercup, Spreading Panic-grass, two subspecies of Purple Blown-grass, Pale Swamp Everlasting, Wavy Swamp Wallaby-grass).



Vegetation or habitat type	Description	Location	Significant values
Tall Marsh EVC 821	Tall Marsh EVC is characterised by the high cover of Common Reed <i>Phragmites australis</i> and/or Narrow-leaf Cumbungi <i>Typha domingensis</i> . Introduced species, such as Toowoomba Canary-grass, are uncommon except on the margins of the marsh.	This EVC is typically present in and along creeklines and, within the study area, is common within Salt Creek.	Tall Marsh EVC does not include any significant ecological communities.
Brackish Wetland EVC 656	Brackish Wetland EVC is dominated by sedges and herbs including Clammy Goosefoot <i>Dysphania pumilio</i> , Sharp Club-sedge <i>Schoenoplectus pungens</i> , Flat Sedge <i>Cyperus</i> spp. and Club-sedge <i>Isolepis</i> sp. The cover of introduced species varies but is predominantly low. There is little organic matter present but there are relatively large areas of rock or bare ground.	This EVC is present on the shoreline of saline lakes within the most northern portion of the study area.	Provides suitable habitat for four flora species of national significance (Curly Sedge, Adamson's Blown-grass, Spiny Peppercress, Salt-lake Tussock- grass <i>Poa sallacustris</i> ) and an additional three species of state significance (Creeping Rush <i>Juncus</i> <i>revolutus</i> and two subspecies of Purple Blown-grass).
Scoria Cone Woodland EVC 894	This area is lacking an indigenous overstorey however there are some scattered planted shrubs and trees. The ground-layer is dominated by Wallaby-grasses and Austral Bracken. The cover of introduced species is high.	There is one occurrence of Scoria Cone Woodland in the western extension of the proposed wind farm.	No significant ecological communities are present within this EVC.
Escarpment Shrubland EVC 895	Escarpment Shrubland EVC within the study area supports indigenous shrubs including Sweet Bursaria and Tree Violet as well as other species including Austral Bracken, Wallaby Grass, Spear Grass <i>Austrostipa</i> spp. and Weeping Grass. Common opportunistic forbs such as Kidney-weed and Pink Bindweed were also recorded. Introduced species are abundant and there is a relatively high cover of bryophytes and lichens on the embedded and loose surface rock. Stony rises within this EVC provide habitat for a similar assemblage of species to native grasslands, however the added structural complexity of the habitat also provides habitat for shrub dependent species. such as Striated	This EVC is present along the Salt Creek rocky escarpment.	No significant ecological communities are present within this EVC. Provides potential habitat for Fat- tailed Dunnart and surface rock close to water also provides habitat for the EPBC listed Corangamite Water Skink.



Vegetation or habitat type	Description	Location	Significant values
	Fieldwren <i>Calamanthus fuliginosus</i> , and species requiring surface rock including Fat-tailed Dunnart and a range of common reptile species. Surface rock close to water also provide habitat for a range of common frog species.		
Plains Sedgy Wetland EVC 647	Plains Sedgy Wetland EVC within the study area is highly degraded and supports one or few indigenous species including <i>Juncus subsecundus</i> and Gold Rush <i>Juncus</i> <i>flavidus</i> . Introduced plants are abundant and include Toowoomba Canary-grass, Onion Grass, and Capeweed.	This EVC occurs throughout the study area but patches are predominantly low quality and are potentially referrable to Degraded/Modified Treeless Vegetation.	Plains Sedgy Wetland is vulnerable within the Victorian Volcanic Plain Bioregion. There are no significant communities within this EVC.
Scattered remnant trees	Scattered remnant trees within the study area include only River Red-gums (Plate 6) and provide habitat for a range of common woodland birds, including Yellow- rumped Thornbill <i>Acanthiza chrysorrhoa</i> , Grey Shrike- thrush <i>Colluricincla harmonica</i> , White-plumed Honeyeater <i>Lichenostomus penicillatus</i> , Restless Flycatcher <i>Myiagra</i> <i>inquieta</i> , Striated Pardalote <i>Pardalotus striatus</i> , Tree Martin <i>Petrochelidon nigricans</i> , Eastern Rosella <i>Platycercus</i> <i>eximius</i> and Red-rumped Parrot <i>Psephotus haematonotus</i> . Scattered trees and small woodland remnants within a largely cleared landscape provide important nesting habitat for common woodland birds, and potentially roosting and foraging habitat for microbats.	Present on roadsides and within private land, particularly along the proposed transmission line route.	



Vegetation or habitat type	Description	Location	Significant values
Planted vegetation	Cypress <i>Cupressus</i> spp., Sugar Gum <i>Eucalyptus cladocalyx</i> and Pines <i>Pinus</i> spp. occurs within the wind farm study area as wind breaks and amenity plantings around old house sites	Present throughout study area.	
Modified Treeless Vegetation	Modified Treeless Vegetation is defined by DELWP as "vegetation that has more than 25% understorey cover that is native, but is not dominated by species that are unlikely to have originally dominated the site" These areas are now dominated by introduced species and a single or few native species such as <i>Juncus subsecundus</i> , and Gold Rush. These areas are largely mapped as Plains Grassland EVC and Plains Grassy Wetland EVC by the DELWP pre-1750 vegetation modelling although there is one area mapped as Plains Sedgy Wetland. While they consist of an understorey supporting greater than 25% cover of native species, they support a significantly lower diversity of indigenous species than would be expected to occur within the EVCs within the region. As a result, these areas should be considered as Modified Treeless Vegetation.	Modified Treeless Vegetation occurs in a number of areas within the study site that are highly degraded and have been significantly modified by a long history of grazing and cropping. These areas were not mapped during the initial vegetation mapping, as they were not considered to constitute native vegetation (as defined by the Net Gain Framework) at the time of the assessment.	Under the Biodiversity Assessment Guidelines, which were introduced in December 2013, some areas of modified treeless vegetation are likely to meet the definition of remnant patch vegetation, and will therefore require consideration of impacts and offsets. Mapping of these areas is required within the project impact area.
Exotic Grassland	Remaining areas which do not meet the definition of a 'patch' of native vegetation are classified as exotic grassland. These areas consist of predominantly introduced vegetation, typically dominated by pasture grasses, with occasional planted introduced trees. Introduced species commonly present include Yorkshire Fog <i>Holcus lanatus</i> , Flatweed <i>Hypochaeris radicata</i> , Onion- grass, Rye Grasses <i>Lolium</i> spp. and Sheep Sorrel <i>Acetosella vulgaris</i> . Few opportunistic indigenous flora	Widespread throughout the study area within disturbed roadsides and farmland areas with a long history of grazing and/or cropping.	Exotic grasslands are less likely to provide habitat for the Striped Legless Lizard or Golden Sun Moth. Areas of exotic grassland located near native grasslands may provide habitat for Striped Legless Lizards, particularly on roadsides with a mosaic of native/exotic vegetation.



Vegetation or habitat type	Description	Location	Significant values
	species are present such as Wallaby Grasses, Small Loosestrife <i>Lythrum hyssopifolia</i> and Common Blown-grass <i>Lachnagrostis filiformis</i> .		
	Exotic grasslands support a range of open country generalist fauna species, similar to those potentially inhabiting native grasslands.		
Waterbodies and waterways	A number of waterbodies and waterways exist within the study area including ephemeral creeks and drainage lines and associated low lying areas that are subject to flooding. Other waterbodies within the study area include Lake Myrngong and farm dams. Many waterways/waterbodies within the northern portion of the study area were dry at the time of assessment.	Present throughout study area.	Ephemeral habitats and floodplains may provide permanent habitat for crayfish <i>Engaeus sericatus</i> and when inundated can provide important breeding and foraging habitat for fish, including EPBC Act listed Dwarf Galaxias <i>Galaxiella pusilla</i> , which may reside in permanent pools within or downstream of the study area.
Salt Creek and Blind Creek	The verge and bank vegetation of Salt Creek is dominated by Common Reed with Tassel <i>Ruppia</i> spp. contributing to the instream submerged vegetation. Blind Creek and its tributaries are ephemeral waterways that were predominantly dry at the time of survey, with some isolated pools remaining.	Salt Creek adjoins the western perimeter of the study area and varies in form beginning with deeper spring fed pools in the northern extent shifting to an ephemeral stream for 3 km and returning to a series of disconnected pools before flowing under the Hamilton Highway. Blind Creek and its tributaries flow from the northern extent of the study area to the Hamilton Highway to	These creeks also provide a diverse range of habitats for wetland dependent birds and frogs, including reed beds, flooded grass, shallow well- vegetated water and open pools. The Corangamite Water Skink potentially inhabits rocky banks and escarpments close to these creeks. Seasonally inundated floodplains adjacent to Blind Creek presented favourable habitat for Hairy Burrowing Crayfish with numerous burrows observed and one individual successfully collected. The highest abundance of Crayfish burrows occurred adjacent to Blind Creek west of Mortlake- Ararat Road.



Vegetation or habitat type	Description	Location	Significant values
		the south.	
Lakes and wetlands	Lakes and wetlands are represented in the study area by several EVCs including Plains Grassy Wetland EVC 125, Aquatic Herbland EVC 653, Brackish Wetland EVC 565, Plains Sedgy Wetland EVC 647 and Tall Marsh EVC 821. The lake systems in the north of the study area are almost permanently isolated, terminal waterbodies and are highly saline. During periods of high rainfall lakes and wetlands will be connected to Blind and Salt Creeks.	Numerous small unnamed wetlands occur throughout the study area. Larger wetlands include the salt lakes in the northern section of the study area (labelled as Wetlands 1-5 on Figure 2), Lake Sheepwash and Wetlands 6-9 in the western section of the study area.	Plains Grassy Wetlands and Plains Sedgy Wetlands provide foraging and nesting habitat for a range of fauna species when inundated, including Eastern Great Egret Ardea modesta, White-necked Heron Ardea pacifica, Cattle Egret Bubulcus ibis, Black Swan Cygnus atratus, White-faced Heron Egretta novaehollandiae, Brolga Antigonerubicunda, Yellow- billed Spoonbill Platalea flavipes, Royal Spoonbill Platalea regia, Australian White Ibis Threskiornis molucca and Straw-necked Ibis Threskiornis spinicollis. Flooded grass around wetland margins also provides habitat for Latham's Snipe Gallinago hardwickii, which is protected as a migratory species under the EPBC Act. Areas of open water within these larger lakes provide habitat for a diverse range of ducks, grebes, cormorants and other waterfowl. The bare, muddy shorelines of the saline lakes are utilised by a range of wader species, including Common Sandpiper Actitis hypoleucos, Sharp-tailed Sandpiper Calidris acuminata, Red-capped Plover Charadrius ruficapillus, Red-kneed Dotterel Erythrogonys cinctus, Black-winged Stilt Himantopus himantopus and Masked Lapwing Vanellus miles. Wetlands are also likely to provide important foraging habitat for Whiskered Tern Chlidonias hybrid, Gull-billed Tern Sterna nilotica macrotarsa and Swamp Harrier Circus approximans.



Vegetation or habitat type	Description	Location	Significant values
Rock walls	Historically extensive lengths of dry stone walls have been constructed throughout the study area from surrounding surface rocks.	Present throughout the study area, particularly in the northern section.	These walls potentially provide shelter sites for reptiles and frogs, and perching sites for birds in an otherwise low-relief landscape. Where the walls are located close to permanent water, they potentially provide shelter habitat for Corangamite Water Skink.













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## 3.2 Significant species and ecological communities

## 3.2.1 EPBC Act and FFG Act listed species

Lists of EPBC Act and FFG Act listed species recorded or predicted to occur within 10 kilometres of the study area or from the relevant catchment (aquatic species) are provided in Appendix 1 (flora) and Appendix 2 (fauna). Locations of database records are provided in Figure 3 (flora) and Figure 4 (fauna). An assessment of the likelihood of these species occurring in the study area and an indication of where within the site (i.e. which habitats or features of relevance to the species) is included. A summary of the species recorded or with a medium or higher likelihood of occurring in the study area is provided in Table 3.

Species name	Listing status	Area of value within the study area
Spiny Rice-flower	Vulnerable under EPBC Act Listed under FFG Act	Recorded within road reserves supporting Plains Grassland EVC (Figure 4).
Southern Bent-wing Bat	Critically Endangered under EPBC Act Listed under FFG Act	May forage and fly through open habitat within the study area. Prefers to forage within woodland and requires caves for roosting (as well as some manmade structures such as mine shafts and adits).
Striped Legless Lizard	Vulnerable under EPBC Act Listed under FFG Act	Native grasslands and exotic grasslands close to native grasslands. Recorded with western extent of Castle-Carey Road reserve.
Growling Grass Frog	Vulnerable under EPBC Act Listed under FFG Act	Potential to occur in wetlands, however, targeted surveys did not detect this species (Biosis 2017a).
Curlew Sandpiper	Critically Endangered under EPBC Act	Suitable wetland habitat present, particularly in north of study area.
Golden Sun Moth	Critically Endangered under EPBC Act Listed under FFG Act	Heavier Soils Plains Grassland. Most potential habitat is located on roadsides, but there is potential for this species to be present in patches of native grassland associated with Stony Rises.
Dwarf Galaxias	Vulnerable under EPBC Act Listed under FFG Act	Recorded from two locations within Salt Creek on western boundary of the study area.
Corangamite Water Skink	Endangered under EPBC Act Listed under FFG Act	Recorded within the northern section of the study area in rocky habitats associated with wetlands.
Freckled Duck	Listed under FFG Act	Recorded within wetlands.
Gull-billed Tern	Listed under FFG Act	Recorded within wetlands.
Eastern Great Egret	Listed under FFG Act	Recorded within wetlands.
Brolga	Listed under FFG Act	Recorded within wetlands and pasture
Blue-billed Duck	Listed under FFG Act	Suitable wetland habitat present, particularly larger permanent wetlands.
Little Egret	Listed under FFG Act	Potential

## Table 3 Summary of EPBC and FFG Act listed species most likely to occur in the study area



Species name	Listing status	Area of value within the study area	
Brown Toadlet	Listed under FFG Act Potential habitat identified along Boone		
		Road in the western extension of the study area.	

### 3.2.2 Significant ecological communities

The following listed threatened ecological communities are present within the study area.

# Natural Temperate Grassland of the Victorian Volcanic Plain (Critically Endangered under EPBC Act)

The EPBC Act Protected Matters Search Tool (PMST) predicts that Natural Temperate Grassland of the Victorian Volcanic Plain (NTG VVP) is likely to occur within the area. The field assessment confirms that this community is present within sections of *Heavier-soils* Plains Grassland EVC; Plains Grassy Wetland and Stony Knoll Shrubland within the wind farm study area and along roadsides.

Advice from the DoEE indicates that Plains Grassy Wetland dominated by Common Tussock-grass was not intended to be included within the EPBC Act listed NTG VVP. However where the cover of Common Tussock-grass accounts for at least 50% of the perennial tussock cover, the community meets the definition of the NTGVVP provided in the policy statement for this community (DEWHA 2008). Therefore, we consider the community present where it meets the policy definition until formal written advice can be provided.

# Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (Critically Endangered under EPBC Act)

The EPBC Act PMST predicts that this community occurs within the study area.

Areas of Aquatic Herbland and Plains Grassy Wetland EVCs correspond with the definition of this critically endangered community (DSEWPaC 2012).

### Western (Basalt) Plains Grassland (Listed under FFG Act)

Vegetation within all patches of *Heavier-soils* Plains Grassland EVC and some patches of Stony Knoll Shrubland and Plains Grassy Wetland EVCs are considered to belong to this listed community. However, as the vast majority of the study area is private land, a Protected Flora Permit under the FFG Act will not be required. A permit would be required for any impacts to this community on public land (roadside reserves). The extent of impacts to this community on private and public land will be considered in the EES referral.









## State significant flora

- Arching Flax-lily v ٠
- Basalt Sun-orchid L,e ٠
- ٠ Brackish Plains Buttercup - r
- Clumping Golden Moths L, e ٠
- Creeping Rush r
- Dense Greenhood L, e
- Derrinallum Billy-buttons e
- Golden Cowslips v
- King Greenhood L, v ۲
- Leprechaun Greenhood L, e
- Pale Swamp Everlasting v ۲
- Pale-flower Crane's-bill r
- Plains Yam-daisy v
- Purple Blown-grass L, r ٠
- Wavy Swamp Wallaby-grass v ٠
- ٠ Wind-blown Tussock-grass - L,e

FFG Act List L - listed

- DSE Advisory List e - endangered v - vulnerable
- r rare



## Nationally significant flora

- ▲ Basalt Rustyhood EN, L, e
- ▲ Clover Glycine VU, L, v
- Fragrant Leek-orchid EN, L, e
- △ Salt-lake Tussock-grass -VU, L, v
  - Small Golden Moths EN, L, e
- ▲ Spiny Rice-flower CR, L, e

















## State

- $\triangle$ Australasian Shoveler - vu
- Blue-billed Duck L, en  $\diamond$
- Brolga L, vu  $\diamond$
- Brown Toadlet L, en  $\diamond$
- Eastern Great Egret L, vu  $\diamond$
- Emu nt ☆
- Glossy Ibis nt ☆
- ★ Gull-billed Tern L, en
- ☆ Hardhead - vu
- Latham's Snipe N, nt ☆
- Marsh Sandpiper - vu
- Musk Duck vu
- Pied Cormorant nt
- Royal Spoonbill nt
- Little Egret L, en
- Tussock Skink vu
- Whiskered Tern nt













## 3.4 Victorian strategic biodiversity values

As part of the Permitted clearing of native vegetation – Biodiversity Assessment Guidelines (DEPI 2013a), DELWP provide a series of state-wide information tools. These tools are modelled GIS map layers, derived from existing site-based flora and fauna data and expert opinion. A summary of the composition of these layers within the study area is provided below.

## 3.4.1 Native vegetation location risk

Throughout Victoria location risk is mapped in three categories: A, B and C (NVR2013\_LOCRISK\_V2 GIS layer). In conjunction with the extent of native vegetation removal, location risk can modify the risk-based pathway for applications to remove native vegetation under Clause 52.17 of local planning schemes.

The study area contains areas of all three location risk categories (Figure 5). Most of the study area, particularly to the south of Woorndoo-Darlington Road, is mapped as location A (the lowest risk category). To the north of Woorndoo-Darlington Road, the study area contains extensive areas of location B and to a lesser extent location C (the highest risk category).

## 3.4.2 Native vegetation site condition

Native vegetation site condition (NVR2013\_COND\_V2 GIS layer) has also been modelled throughout the entire State of Victoria. Site condition represents the predicted Habitat Hectare score (ranging from 0.0 to 1.0), and has been modelled where native vegetation is predicted to occur within the Native Vegetation Extent layer (NV2010\_EXTENT\_V2 GIS layer).

Within the study area, site condition ranges from 0 (non-native vegetation) to over 0.8 (Figure 6). Where native vegetation is predicted to be present, most areas are assigned condition scores of between 0.4 and 0.8. Small areas of higher quality vegetation are predicted to occur along high value roadsides, particularly Woorndoo-Dundonnell Road towards the northern boundary of the study area.

## 3.4.3 Strategic biodiversity score

Strategic biodiversity score (NVR2013\_SBS\_V3 GIS layer) has been modelled for the entire State of Victoria. The layer represents a strategic assessment of the value of land for the conservation of Victoria's biodiversity. Scores range between 0.0 and 1.0. Clearance of native vegetation from high value areas will result in greater offset requirements, compared with clearance of native vegetation from lower value areas. The strategic biodiversity score model for the study area is shown in Figure 7. As with native vegetation site condition, areas to the north of Woorndoo-Darlington road are generally predicted to be of higher strategic importance than areas to the south.

## 3.5 Other ecological values

The nearby Mt Fyans quarry site is a significant site for Peregrine Falcon *Falco peregrinus* in Victoria's volcanic plains bioregion having had almost continuous breeding occupation for at least 38 years (Hurley 2015). This species has no conservation status in Victoria.









## Key ecological values

Although much of the study area has been highly modified and degraded, the preliminary flora and fauna assessments undertaken within the broader study area for the proposed Mount Fyans Wind Farm identified patches of native vegetation and habitat for threatened species. A summary of these key ecological values includes:

- 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.

To complete a more detailed assessment of the presence of threatened species and investigate the potential for impacts, additional targeted surveys were recommended and subsequently undertaken within the study area. The results of these targeted surveys and an assessment of potential impacts associated with the proposed development plan and relevant government legislation is provided in the *Mount Fyans Wind Farm: Targeted Surveys and Impact Assessment* report (Biosis 2017a).



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# Appendices



# Appendix 1: Flora

Notes to tables:

<b>DEPI 2014a:</b> e - endangered v - vulnerable r - rare
<ul> <li>DELWP NVIM habitat model:</li> <li>H<t -="" below="" habitat="" impact="" li="" mapped="" offset="" on="" site,="" specific="" the="" threshold<=""> <li>H&gt;T - habitat mapped on site, impact exceeds the specific offset threshold</li> </t></li></ul>
# - Native species outside natural range



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

Table A **Error! Reference source not found.**1. Flora species recorded from the study area.

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



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



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



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



## **Appendix 1.2 Listed flora species**

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 (DoE; accessed on 22.09.2016).

	Common name	Conservation status			Most recent	Othor		Likely occurrence in
Scientific name		EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
National significance								
Amphibromus fluitans	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.
Carex tasmanica	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.
Dianella amoena	Matted Flax-lily	EN	е	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).



		Conservation status			Most recent	Othor		Likely occurrence in
Scientific name	Common name	EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
Diuris basaltica	Small Golden Moths	EN	е	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.
Dodonaea procumbens	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.
Glycine latrobeana	Clover Glycine	VU	V	L	2010		Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	<b>High</b> Plains Grassland; Stony Knoll Shrubland.
Lachnagrostis adamsonii	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.
Lepidium aschersonii	Spiny Peppercress	VU	е	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.



		Conservation status			Most recent	Othor		Likely occurrence in
Scientific name	Common name	EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
<i>Leucochrysum albicans</i> var. tricolor	White Sunray	EN	е	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.
Pimelea spinescens subsp. spinescens	Spiny Rice-flower	CR	е	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.
Poa sallacustris	Salt-lake Tussock- grass	VU	V	L	2012		Grasslands and herblands on the sloping verges of saline lakes.	<b>Medium</b> Brackish Wetland.
Prasophyllum frenchii	Maroon Leek-orchid	EN	е	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.



		Conservation status			Most recent	Other		Likely occurrence in
Scientific name	Common name	EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
Prasophyllum suaveolens	Fragrant Leek-orchid	EN	е	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.
Pterostylis basaltica	Basalt Rustyhood	EN	е	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.
Senecio psilocarpus	Swamp Fireweed	VU	V			Biosis	Seasonally-inundated herb-rich swamps, growing on peaty soils or volcanic clays.	<b>Medium</b> Plains Grassy Wetland.
Taraxacum cygnorum	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.
Thelymitra epipactoides	Metallic Sun-orchid	EN	е	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	Othor		Likely occurrence in
		EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
Thelymitra matthewsii	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.
Xerochrysum palustre	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.
State significance								
Amphibromus sinuatus	Wavy Swamp Wallaby- grass		V		1990		Confined to permanent swamps in cool sites.	<b>High</b> Plains Grassy Wetland; Aquatic Herbland.
Comesperma polygaloides	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.
Coronidium gunnianum	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	Othor		Likely occurrence in
		EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
Craspedia sp. 2	Derrinallum Billy- buttons		e		1990		Drier grasslands of the volcanic plains.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland Plains Grassy Wetland.
Dianella sp. aff. Iongifolia (Benambra)	Arching Flax-lily		V		2007		The habitat requirements of this species are poorly known.	<b>Medium</b> Plains Grassland (roadsides).
Diuris behrii	Golden Cowslips		V		2010		Grasslands, open grassy woodlands and Box Ironbark Forests.	<b>Medium</b> Plains Grassland.
Diuris gregaria	Clumping Golden Moths		е	L	2010		Herb-rich grasslands dominated by Kangaroo Grass <i>Themeda triandra</i> on heavy basalt soils.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland.
Geranium sp. 3	Pale-flower Crane's-bill		r		2012		Grasslands and dry woodlands.	<b>Medium</b> Plains Grassland; Stony Knoll Shrubland.
Juncus revolutus	Creeping Rush		r		2012		Saltmarshes and other similarly saline inland habitats.	<b>Medium</b> Brackish Wetland.
Lachnagrostis punicea subsp. filifolia	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.



	Common name	Conservation status			Most recent	Other		Likely occurrence in
Scientific name		EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
<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.
Microseris scapigera 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.
Paspalidium distans	Spreading Panic-grass		е		2011		Woodlands and scrub on poor soils.	<b>Medium</b> Aquatic Herbland; Plains Grassy Wetland; See record within 10km (SCC).
Prasophyllum chasmogamum	Yawning Leek-orchid		е		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.
Poa physoclina	Wind-blown Tussock- grass		е	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.
Prasophyllum viretrum	Basalt Leek-orchid		е	L	2013		Remnant native grassland on heavy	<b>Medium</b> Recorded in Mortlake

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Scientific name	Common name	Conservation status			Most recent	Other		Likely occurrence in
		EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
							basalt soils.	Common Flora Reserve in 2013. No records within the study area.
Pterostylis baptistii	King Greenhood		V	L	2010		Near coastal heathy forests.	Low Typically confined to coastal far east Gippsland and further north into NSW. One questionable record near Worndoo-Dundonnel Road in 2010.
Pterostylis conferta	Leprechaun Greenhood		е	L	2010		Kangaroo Grass <i>Themeda triandra</i> dominated grasslands on shallow, heavy clay soils on stony rises.	<b>High</b> Stony Knoll Shrubland; Plains Grassland.
Pterostylis sp. aff. bicolor (Woorndoo)	Dense Greenhood		е	L	2010		Western (Basalt) Plains Grassland dominated by Kangaroo Grass <i>Themeda triandra</i> in shallow soils on stony rises.	<b>Medium</b> Plains Grassland.
Ptilotus erubescens	Hairy Tails		V	L	2004		Grasslands and woodlands on relatively fertile soils.	<b>Medium</b> Stony Knoll Shrubland; Plains Grassland.
Ranunculus diminutus	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	Othor		Likely occurrence in
		EPBC	VIC	FFG	database record	records	Habitat description	Study Area / potential habitat areas
Thelymitra bracteata	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.
Thelymitra gregaria	Basalt Sun-orchid		е	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:

EPBC Act:	DSE 2013:								
EX - Extinct CR - Critically Endangered EN - Endangered VU - Vulnerable CD - Conservation dependent	ex - extinct cr - critically endangered en - endangered vu - vulnerable nt - near threatened dd - data deficient rx - regionally extinct								
FFG Act:									
L - listed as threatened under FFG Act									
N - nominated for listing as threatened									
I - determined ineligible for listing									
PS - pest species listed under the CaLP Act	* - introduced species								
Most recent database records are from the Victorian Bi	Most recent database records are from the Victorian Biodiversity Atlas unless otherwise specified as follows								

# - Protected Matters Search Tool

BA – Birds Australia

Fauna species in these tables are listed in alphabetical order within their taxonomic group.



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

Table A2.1. Fauna species recorded from the study area.	una species recorded from the study area.
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Status	Scientific name	Common name	Wind farm	Transmission line	Road reserves	Target surveys
Mamma	als					
**	Vulpes vulpes	Red Fox		$\checkmark$		
	Macropus giganteus	Eastern Grey Kangaroo		$\checkmark$		
Birds						
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill		$\checkmark$		$\checkmark$
	Acrocephalus australis	Australian Reed- Warbler		$\checkmark$		$\checkmark$
vu	Actitis hypoleucos	Common Sandpiper				$\checkmark$
*	Alauda arvensis	European Skylark	$\checkmark$			$\checkmark$
	Anas castanea	Chestnut Teal			$\checkmark$	$\checkmark$
	Anas gracilis	Grey Teal			$\checkmark$	$\checkmark$
vu	Anas rhynchotis	Australasian Shoveler				$\checkmark$
	Anas superciliosa	Pacific Black Duck	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Anthus novaeseelandiae	Australasian Pipit	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Aquila audax	Wedge-tailed Eagle	$\checkmark$			
vu, L	Ardea modesta	Eastern Great Egret	$\checkmark$		$\checkmark$	
	Ardea pacifica	White-necked Heron		$\checkmark$	$\checkmark$	$\checkmark$
vu	Aythya australis	Hardhead				$\checkmark$
	Bubulcus ibis	Cattle Egret			$\checkmark$	
	Cacatua tenuirostris	Long-billed Corella	$\checkmark$	$\checkmark$	$\checkmark$	
	Calamanthus fuliginosus	Striated Fieldwren			$\checkmark$	$\checkmark$
	Calidris acuminata	Sharp-tailed Sandpiper				$\checkmark$
	Calidris ruficollis	Red-necked Stint				$\checkmark$
*	Carduelis carduelis	European Goldfinch	$\checkmark$	$\checkmark$		$\checkmark$
	Charadrius ruficapillus	Red-capped Plover				$\checkmark$
	Chenonetta jubata	Australian Wood Duck	$\checkmark$	$\checkmark$		$\checkmark$
	Chroicocephalus novaehollandiae	Silver Gull	$\checkmark$			
	Cincloramphus cruralis	Brown Songlark	$\checkmark$			
	Circus approximans	Swamp Harrier			$\checkmark$	$\checkmark$
nt	Circus assimilis	Spotted Harrier	$\checkmark$		$\checkmark$	
	Cisticola exilis	Golden-headed Cisticola	$\checkmark$		$\checkmark$	$\checkmark$
	Colluricincla harmonica	Grey Shrike-thrush		$\checkmark$		
	Corvus coronoides	Australian Raven	$\checkmark$	$\checkmark$		
	Corvus mellori	Little Raven	$\checkmark$		$\checkmark$	$\checkmark$
	Coturnix pectoralis	Stubble Quail	$\checkmark$		$\checkmark$	$\checkmark$



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



Status	Scientific name	Common name	Wind farm	Transmission line	Road reserves	Target surveys
nt	Platalea regia	Royal Spoonbill	$\checkmark$			
	Platycercus elegans	Crimson Rosella	$\checkmark$			
	Platycercus eximius	Eastern Rosella	$\checkmark$	$\checkmark$		
	Poliocephalus poliocephalus	Hoary-headed Grebe	$\checkmark$			$\checkmark$
L, v	Porzana pusilla	Baillion's Crake	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Porzana tabuensis	Spotless Crake	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Porphyrio porphyrio	Purple Swamphen	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Psephotus haematonotus	Red-rumped Parrot	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Rhipidura leucophrys	Willie Wagtail	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
en, L	Stictonetta naevosa	Freckled Duck				$\checkmark$
*	Sturnus vulgaris	Common Starling	$\checkmark$	$\checkmark$		$\checkmark$
	Tachybaptus novaehollandiae	Australasian Grebe				$\checkmark$
	Tadorna tadornoides	Australian Shelduck	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Threskiornis molucca	Australian White Ibis			$\checkmark$	
	Threskiornis spinicollis	Straw-necked Ibis			$\checkmark$	
	Vanellus miles	Masked Lapwing	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$
	Vanellus tricolor	Banded Lapwing				$\checkmark$
Reptiles	5					
EN, cr, L.	Eulamprus tympanum marnieae	Corangamite Water Skink	$\checkmark$			
	Ctenotus robustus	Large Striped Skink				
	Pseudonaja textilis	Eastern Brown Snake	$\checkmark$			
	Chelodina longicollis	Eastern Long-neck Turtle	$\checkmark$			
	Pseudemoia pagenstecheri	Tussock Skink	$\checkmark$			
Frogs						
	Crinia signifera	Common Froglet		$\checkmark$		
	Litoria ewingii	Southern Brown Tree Frog		$\checkmark$		
	Limnodynastes peroni	Striped Marsh Frog		$\checkmark$		
	Limnodynastes tasmaniensis	Spotted Marsh Frog		$\checkmark$		
Fishes						
	Anguilla australis	Southern Short-finned Eel	$\checkmark$			
	Galaxias oliros	Obscure Galaxias	$\checkmark$			
	Galaxias maculatus	Common Galaxias	$\checkmark$			
VU, L	Galaxiella pusilla	Dwarf Galaxias	$\checkmark$			
*	Gambusia holbrooki	Eastern Gambusia	$\checkmark$			
	Hypseleotris spp.	Carp Gudgeon Complex	$\checkmark$			



Status	Scientific name	Common name	Wind farm	Transmission line	Road reserves	Target surveys
	Nannoperca australis	Southern Pygmy Perch	$\checkmark$			
	Philypnodon grandiceps	Flat-headed Gudgeon	$\checkmark$			
	Retropinna Semoni	Australian Smelt	$\checkmark$			
*	Tinca tinca	Tench	$\checkmark$			
Decapo	d Crustacea					
	Cherax destructor	Common Yabby	$\checkmark$			
	Amarinus lacustris	False Spider Crab	$\checkmark$			
vu	Engaeus sericatus	Hairy Burrowing Crayfish	$\checkmark$			
	Paratya australiensis	Freshwater Shrimp	$\checkmark$			



### A2.2 Listed fauna species

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).

Scientific name	Common name	Conserv	ation st	atus	Most	Other	Habitat description	Likely occurrence			
		EPBC	VIC	FFG	recent database record	records		in study area			
National significance											
Pedionomus torquatus	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.			
Numenius madagascariensis	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.			
Calidris ferruginea	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.			
Rostratula australis	Australian Painted Snipe	EN	cr	L		PMST	Shallows of well-vegetated freshwater wetlands.	<b>Low</b> Limited and marginal habitat present.			
Botaurus poiciloptilus	Australasian Bittern	EN	en	L		PMST	Shallow freshwater and brackish wetlands with abundant emergent aquatic vegetation.	<b>Low</b> Limited vegetated wetland habitat available.			

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



Scientific name	Common name	Conserv	vation st	atus	Most	Other	Habitat description	Likely occurrence	
		EPBC	VIC	FFG	recent database record	records		in study area	
Lathamus discolor	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.	
Grantiella picta	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.	
Dasyurus viverrinus	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.	
Antechinus minimus maritimus	Swamp Antechinus	VU	nt	L		PMST	Dense wet heath and heathy woodland, sedgeland and dense tussock grassland.	<b>Negligible</b> Limited habitat and area is outside recorded range for the species.	
lsoodon obesulus obesulus	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.	



Scientific name	Common name	Conservation status			Most	Other	Habitat description	Likely occurrence	
		EPBC	VIC	FFG	recent database record	records		in study area	
<i>Perameles gunnii</i> unnamed subsp.	Eastern Barred Bandicoot (mainland form)	EN	cr	L	1997		Natural temperate grasslands and grassy woodlands.	Negligible Low quality habitat available, however, no known free- ranging populations on mainland.	
Potorous tridactylus tridactylus	Long-nosed Potoroo	VU	en	L		PMST	Forest, heathy woodlands and heathlands.	<b>Negligible</b> No suitable habitat.	
Pteropus poliocephalus	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.	
Miniopterus orianae bassannii	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.	
Delma impar	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.	
Eulamprus tympanum marnieae	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.	



Scientific name	Common name	Conserv	ation st	atus	Most	Other records	Habitat description	Likely occurrence	
		EPBC	VIC	FFG	recent database record			in study area	
Litoria raniformis	Growling Grass Frog	VU	en	L	2011		Still or slow-flowing waterbodies and surrounding terrestrial vegetation.	Low Suitable habitat identified, however, targeted survey did not record the species.	
Prototroctes maraena	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.	
Galaxiella pusilla	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.	
Macquaria australasica	Macquarie Perch	EN	en	L	1920		Streams with clear water and deep, rocky holes with abundant cover.	Low Not locally indigenous. Records from area are the result of translocation. Old records (1920). Marginal habitat on site for this species.	



Scientific name	Common name	Conservation status			Most	Other	Habitat description	Likely occurrence	
		EPBC	VIC	FFG	recent database record	records		in study area	
Nannoperca obscura	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.	Low-Medium Suitable habitat in certain areas. Recorded from the catchment. Con- generic Southern Pygmy Perch recorded during aquatic survey.	
Synemon plana	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.	
State significance									
Dromaius novaehollandiae	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.	
Phalacrocorax varius	Pied Cormorant		nt		1991		Marine environments and coastal waters including beaches, coastal lagoons, estuaries and rock platforms.	<b>High</b> Suitable habitat present.	
Chlidonias hybrida	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.	



Scientific name	Common name	Conserv	vation st	tatus	Most	Other	Habitat description	Likely occurrence	
		EPBC	VIC	FFG	recent database record	records		in study area	
Gelochelidon nilotica	Gull-billed Tern		en	L	2012		Floodplains, saltmarsh, claypans and flooded pasture.	<b>Recorded</b> Suitable wetland habitat present.	
Tringa nebularia	Common Greenshank		vu			PMST	A variety of ephemeral and permanent inland wetlands and sheltered coastal wetlands.	<b>Medium</b> Suitable habitat present.	
Tringa stagnatilis	Marsh Sandpiper		vu		1993		Permanent or ephemeral wetlands, mudflats and saltmarshes in coastal and inland environments.	<b>High</b> Suitable habitat present.	
Gallinago hardwickii	Latham's Snipe		nt	Ν	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.	
Stiltia isabella	Australian Pratincole		nt		1983		Open plains, sparsely wooded plains and tussock grasslands in arid and semi-arid environments.	<b>Negligible</b> Outside the generally excepted range for the species.	
Ardeotis australis	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.	
Antigone rubicunda	Brolga		vu	L	2013		Shallow freshwater and brackish wetlands, crops, grassland and pasture.	<b>Recorded</b> Refer to Biosis (2017b).	



Scientific name	Common name	Conservation status			Most	Other	Habitat description	Likely occurrence	
		EPBC	VIC	FFG	recent database record	records		in study area	
Plegadis falcinellus	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.	
Platalea regia	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.	
Egretta garzetta	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.	
Ardea modesta	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.	
Anseranas semipalmata	Magpie Goose		nt	L	1911		Swamps, lakes, sewage ponds, flooded pasture, dams.	<b>Low</b> Marginal habitat for this species.	
Anas rhynchotis	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.	



Scientific name	Common name	Conservation status			Most	Other	Habitat description	Likely occurrence
		EPBC	VIC	FFG	recent database record	records		in study area
Aythya australis	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.
Nycticorgx caledonicus hillii	Nankeen Night Heron		nt		2011		Estuarine and terrestrial wetlands, including wet pastures, urban wetlands and ponds.	<b>High</b> Suitable wetland habitat present.
Oxyura australis	Blue-billed Duck		en	L	2011		Open or densely vegetated wetlands.	<b>Medium</b> Limited suitable wetland habitat present.
Biziura lobata	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.
Circus assimilis	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.
Accipiter novaehollandiae	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.



Scientific name	Common name	Conservation status			Most	Other	Habitat description	Likely occurrence
		EPBC	VIC	FFG	recent database record	records		in study area
Falco subniger	Black Falcon		vu		2007		Woodlands, open country and around terrestrial wetlands areas, including rivers and creeks.	<b>Medium</b> Suitable foraging habitat present.
Hirundapus caudacutus	White-throated Needletail		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.
Sminthopsis crassicaudata	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.
Pseudemoia pagenstecheri	Tussock Skink		vu		2008		Range of grasslands or sparse grassy woodlands from alps to coast.	<b>Recorded</b> High quality habitat along Salt Creek.
Pseudophryne bibronii	Brown Toadlet		en	L	1979		A wide variety of woodland, forest and grassland habitats.	<b>Medium</b> Suitable habitat in some areas.
Pseudophryne semimarmorata	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.



Scientific name	Common name	Conservation status			Most	Other	Habitat description	Likely occurrence
		EPBC	VIC	FFG	recent database record	records		in study area
Engaeus sericatus	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.
Cherax destructor albidus	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 species (EPBC Act listed)

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

## Appendix 3: Photos of the study area



Plate 1 Heavier soils Plains Grassland



Plate 2 Plains Grassy Wetland



Plate 3 Stony Knoll Shrubland



Plate 4 Plains Grassy Woodland



Plate 5 Aquatic Herbland EVC



Plate 6 Scattered River Red-gum on private property