

# Phase 2 Targeted Ecological Assessments

Joel Joel Wind and Solar Farm

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**Prepared for Umwelt Australia Pty Ltd  
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## Phase 2 Targeted Ecological Assessments

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### Executive Summary

Umwelt (Australia) Pty Limited (Umwelt) have been engaged by RES Australia Pty Limited (RES) to conduct studies of key risk areas across a number of disciplines associated with the proposed Joel Joel Wind and Solar Farm Project (the project). Following recommendations arising from the completion of a Phase 1 ecological assessment, Emerge Environmental Services (Victoria) Pty Ltd (Emerge Associates) was engaged by Umwelt to undertake a Phase 2 targeted ecological assessment to build on the existing knowledge of potential flora and fauna occurrence. The flora assessments focussed on threatened flora species identified in the Phase 1 Ecological Assessment whilst the fauna assessments focussed on birds (wetland species, birds of prey and owls) and bats. The surveys targeted higher quality habitat both within and in close proximity to the project area to enable broad characterisation of regional species presence and their potential occurrence within the project area. In turn, this will help inform the requirements with regards to biodiversity related Victorian and Commonwealth policy and legislation.

#### Key ecological features

##### Conservation significant flora

Three confirmed conservation significant flora species were recorded during the Phase 1 and 2 field assessments. A further four records for the study area may represent additional significant flora. This is subject to further work to clarify species identification.

Species	Common name	EPBC Act	FFG Act	VROTS
<i>Allocasuarina luehmannii</i>	Buloke	-	Threatened	Endangered
<i>Caladenia fulva</i>	Tawny Spider-orchid	Endangered	Threatened	Endangered
<i>Convolvulus ? graminetinus</i> <sup>^</sup>	Grassland Bindweed	-	-	Vulnerable
<i>Dianella ?longifolia var. grandis</i> <sup>^</sup>	Arching Flax-lily (subject to confirmation once flowering)	-	-	Previous taxonomy: Vulnerable
<i>Diuris ?X palachila</i> <sup>^</sup>	Broad-lip Diuris	-	-	Rare
<i>Amphibromus fluitans</i> <sup>^</sup>	River Swamp Wallaby-grass	Vulnerable	Threatened	
<i>Ptilotus erubescens</i>	Hairy Tails	-	Threatened	vulnerable

<sup>^</sup> Requires further taxonomic confirmation

In total, 83 fauna species of were recorded across six sites during the survey period, one species is considered of conservation significance:

Species	Common name	EPBC Act	FFG Act	VROTS
<i>Synemon plana</i>	Golden Sun Moth	Critically Endangered	Threatened	Critically Endangered

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### **Legislation implications and permit requirements**

No additional *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) species were recorded during the Phase 2 assessment beyond those noted in Phase 1, however; a range of other EPBC listed flora and fauna species may occur within areas of native vegetation (patches and scattered trees) which is noted to have a restricted distribution within the study area.

Detailed planning and design that avoids important ecological features have the potential to circumvent the requirement of an Environmental Effects Statement under the *Environmental Effects Act 1978* (EE Act) and potentially also the EPBC Act. A complete determination on the requirement (or lack thereof) for an Environmental Effects Statement cannot be made at this point, however enough understanding of existing conditions and potential impacts now exist to begin the process. Further targeted surveys and habitat assessment will inform the need to refer the Project under the EE Act.

No further flora species listed under the *Flora and Fauna Guarantee Act 1988* (FFG Act) were recorded during the Phase 2 assessment. However, 18 further FFG listed species have a moderate-high likelihood to occur within the study area, generally restricted to areas of higher quality vegetation and habitat.

### **Key recommendations**

The following recommendations are considered as important next steps in understanding the existing conditions and assessing ecological implications of the Project:

- Complete further targeted flora surveys for conservation significant species that flower outside currently completed survey dates such as *Pterostylis*.
- Undertake additional on ground habitat assessments for conservation significant species (e.g fish and reptiles).
- Undertake targeted surveys in additional habitats and EVCs (e.g. grasslands) that have yet to be assessed for the presence of conservation significant species.
- Commence relevant state and federal referral documentation and discussions with relevant authorities.
- Complete an EPBC Act 'Self-Assessment' to better understand the projects potential to cause significant impact to MNES.

Following the completion of more detailed planning and design additional ecological surveys will be required including:

- bird and bat utilisation studies that indicate the number of flights at rotor sweep height
- detailed vegetation quality assessments where vegetation is to be removed or impacted.

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## Abbreviations and Key Terms

Table A1: Abbreviations

Acronym/term	Definition
CaLP Act	Catchment and Land Protection Act 1994
cm	Centimetres
DBH	Diameter at Breast Height
DELWP	Department of Environment, Land, Water and Planning
DEPI	Department of Sustainability and Primary Industries
DOEE	Department of the Environment and Energy
DSE	Department of Sustainability and Environment
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EES	Environmental Effects Statement
EMP	Environmental Management Plan
ESO	Environmental Significance Overlay
EVC	Ecological Vegetation Class
FFG Act	Flora and Fauna Guarantee Act 1988
Ha	Hectares
km	Kilometres
MNES	Matters of National Environmental Significance
m	Metres
NVIM	Native Vegetation Information Management
NVR report	Native Vegetation Removal report
Planning and Environment Act	Planning and Environment Act 1987
PMST	Protected Matters Search Tool
SLO	Significant Landscape Overlay
sp.	Species (singular)
spp.	Species (plural)
subsp.	Subspecies
TPZ	Tree Protection Zone
var.	Variety
VPO	Vegetation Protection Overlays
VQA	Vegetation Quality Assessment
VBA	Victorian Biodiversity Atlas

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Acronym/term	Definition
VROTS	Advisory list of Victoria Rare and Threatened Species (flora and fauna)
WONS	Weeds of National Significance
Wildlife Act	Wildlife Act 1975



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Table A2: Key terms

General terms	Explanation
Bioregion	A landscape-based approach to classifying the land surface using a range of environmental attributes such as climate, geomorphology, lithology and vegetation.
Bioregional Conservation Status (BCS)	An assessment of the conservation status of the native vegetation type (EVC) in the context of a particular bioregion, taking account of how commonly it originally occurred, the current level of depletion and the level of degradation of condition typical of remaining stands. An EVC can have a BCS of endangered, vulnerable, depleted, least concern or rare. The BCS of an EVC has no formal relationship with listed threatened ecological communities under the FFG Act or EPBC Act.
Ecological Vegetation Class (EVC)	A type of native vegetation classification that is described through a combination of its floristics, life form and ecological characteristics, and through an inferred fidelity to particular environment attributes. Each EVC includes a collection of floristic communities that occurs across a biogeographic range, and although differing in species, have similar habitat and ecological processes operating.
Exotic Vegetation	Any vegetation that is not native to Australia or its States and Territories. This can sometimes include non-indigenous vegetation.
Habitat Zone	A discrete area of native vegetation consisting of a single vegetation type (EVC) with an assumed similar averaged quality. This is the base spatial unit for conducting a habitat hectare assessment.
Indigenous Vegetation	Indigenous vegetation includes vegetation that is native to Australia as well as being native to a specific geographic region.
Native Vegetation	Native vegetation is defined in planning schemes as 'plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses.
Non-indigenous Vegetation	Vegetation that is native to Australia, but not to the geographic region to which a study area is located.
Native Vegetation Offset	A native vegetation offset is any works of other actions to make reparation for the loss of native vegetation arising from the removal of native vegetation. This may include an area of existing remnant vegetation that is protected and managed, an area that is revegetated and protected, an area that is set aside for regeneration or restoration, or any combination of these. The relative size of an offset is graded according to its conservation significance.
Patch	A patch of native vegetation is: <ul style="list-style-type: none"> <li>• an area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native, or</li> <li>• any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or</li> </ul> any mapped wetland included in the Current wetlands map, available in DELWP systems and tools.
Scattered Tree	A scattered tree is a native canopy tree that does not form part of a patch.
Tree Protection Zone	A combination of the root area and crown area of a tree requiring protection and should be between 2 m and 15 m in radius (except where crown protection is required). The TPZ delineates an area for isolation from disturbance to ensure continued viability of the tree. The TPZ = DBH x 12.

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## 1 Introduction

### 1.1 Project overview

Umwelt (Australia) Pty Limited (Umwelt) have been engaged by RES Australia Pty Limited (RES) to assist with scoping and assessment of a potential Wind and Solar Farm in Joel Joel, Victoria. Initially the work focussed on due diligence assessments (Phase 1) across a range of disciplines including ecology. During the Phase 1 Ecological assessment it was noted that a number of additional investigations were required to better understand existing conditions across the site and potential project risks. These works are considered a component of the Phase 2 studies.

Emerge Environmental Services (Victoria) Pty Ltd (Emerge Associates) was engaged by Umwelt to undertake both the Phase 1 ecological study and the Phase 2 targeted ecological assessment of the site. This work is considered complimentary to the Phase 1 assessment and has been designed to determine those species that occur or are likely to occur within the project area. This assessment aims to identify any conservation significant species and any constraints these species may impart on the project, particularly with regards to biodiversity related Victorian and Commonwealth policy and legislation.

Both the Phase 1 and Phase 2 reports will support Umwelt in developing an *Environmental Effects Act 1978* (EE Act) referral and a development application to the Department of Environment, Land Water and Planning (DELWP).

### 1.2 Site and Study area

Three types of assessment areas are referred to in this report, as defined below:

- The project area: located approximately 15 km north-east of Stawell and 5 km west of Joel Joel in Victoria. The project area covers approximately 5,596 ha, has a perimeter length of approximately 73 km (**Figure 1**).
- The study area: a surrounding radius of 10 km of the site. This definition is used to define the extent of broader ecological characteristics of the site and its surrounds and the extent of contextual desktop data extraction (this is standard practice for this type of ecological assessment).
- The survey sites: locations identified for targeted flora and fauna surveys throughout the study area (**Figure 1**).

### 1.3 Relevant state and national Legislation

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

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
- *Environmental Effects Act 1978* (EE Act) – Ministerial Guidelines for Assessment of Environmental Effects
- *Flora and Fauna Guarantee Act 1988* (FFG Act)

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- *Planning and Environment Act 1987* (Planning and Environment Act)
  - The Guidelines for the removal, destruction and lopping of native vegetation (DELWP, 2017).
- *Wildlife Act 1975* (Wildlife Act)
- *Catchment and Land Protection Act 1994* (CaLP Act)
- *Environmental Protection Act 1970 and 2017*.

In addition, the Department of Environment, Land, Water and Planning (DELWP) provide specific guidance to inform planning decisions regarding wind and solar energy facility proposals (DELWP, 2019a)(DELWP, 2018). This assessment was conducted with a particular focus on applicable significant flora and fauna species defined within these guidelines. A brief introduction to the relevant biodiversity legislation and policy, and their implications for the project is provided in **Section 4** of this report.

### 1.4 Purpose of assessment

The *Phase 1 Ecological Study: Joel Joel Wind and Solar Farm* (Emerge Associates, 2019) made a number of recommendations. Those recommendations pertinent to this report include:

- detailed survey and mapping of potential EPBC Act communities should be undertaken in spring
- detailed floristic assessments of native vegetation patches to classify them against FFG Act listed communities, of which they have broad similarity, should be undertaken during spring
- targeted flora searches should be undertaken during appropriate survey seasons to capture short-lived species with specific flowering phenology, such as orchids
- detailed fauna surveys are required to confirm the status of significant species occurring within the site and the potential for significant fauna to occupy the site (Emerge Associates, 2019).

Given this, the purpose of this assessment was to complete additional flora and fauna surveys and build on our understanding of the likelihood of presence or absence of significant flora and fauna within the project area. Furthermore, this assessment aims to characterise the fauna within the study area, particularly in relation to bird and bat species.

In summary, this report aims to:

- detail the findings of a targeted flora assessment conducted over the 2019 spring -summer season, particularly for a number of seasonally dependent orchids and wetland flora (grasses and herbs), and
- to build on our existing knowledge on potential fauna presence focussed on birds (wetland species, birds of prey and owls) and bats. This work targeted higher quality habitat both within and close to the project area to enable broad characterisation of regional species presence and their potential to occur within the project area.

It should be understood that the intent of the Phase 2 study was not to complete all flora and fauna surveys required for the project to proceed. Rather, this work enabled greater characterisation of the existing habitats, occurrence and potential occurrence of conservation significant flora, fauna and communities.

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## 2 Methods

### 2.1 Targeted Flora Surveys

The Phase 1 report found 25 significant flora species have been recorded within 10 kilometers of the study area, and many more species had the potential to occur (Emerge Associates, 2019). To better understand the likelihood of occurrence of these species, Phase 2 flora surveys were undertaken. For identification purposes, surveys occurred during the flowering period for a majority of the species. This can vary due to seasonal weather and climate conditions. To ensure the flower period was covered for a majority of species, four additional targeted surveys were conducted between mid-spring and mid-summer 2019. The selection criteria and survey timings are outlined below.

#### 2.1.1 Background information review and survey design

The mapping of native vegetation extent and potential habitat for significant flora species was undertaken during Phase 1 of the project (Emerge Associates, 2019). Features such as low-lying areas subject to inundation and areas of native vegetation with intact understory vegetation were identified as areas with high potential to support significant flora species.

The prioritisation for targeted flora survey within potential significant flora species habitat was undertaken based on the suitability of habitat to support individual significant flora species that are known to occur in the study area or are known to occur in similar habitat in the region. Elevated areas occupied by high-quality Heathy Woodland were targeted as areas of highest priority for repeat transect surveys, while lower priority Grassy Woodland and derived grassland were sampled throughout the survey period with a degree of transect repetition in some areas.

The design of the targeted flora species survey considered the timing of the flowering period and life-cycle for the species in question and the timing of annual grass die-off (which increased the visibility of target species). The survey design also considered the levels of inundation in low-lying areas and the implications for potential target species including responses to variations in inundation and moisture availability.

#### 2.1.2 Targeted flora survey timing and duration

Targeted flora surveys were undertaken on four occasions within suitable habitat between September 2019 and January 2020. The timing, duration and target species of the orchid surveys is provided in **Table 1**. All other significant flora species were targeted throughout the entire targeted survey program.

Table 1: Timing and duration of targeted flora assessments; 2019-2020

Flora survey timing	Dates	Target orchid genera with seasonal timing constraints
September (mid-spring)	27/09/19 (~4 hours only)	<i>Caladenia</i> , <i>Diuris</i> , <i>Prasophyllum</i> , certain <i>Pterostylis</i>
November (late Spring)	4/11/19 – 8/11/19	<i>Caladenia</i> , <i>Diuris</i> , <i>Prasophyllum</i> , certain <i>Pterostylis</i> , <i>Thelymitra</i>
December (early summer)	2/12/19 – 4/12/19	n/a
January (mid-summer)	20/1/19 – 22/1/19	n/a

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Targeted flora searches were generally undertaken as transects utilising five meter spacing undertaken by Mark Shepherd (Emerge Associates) and Bill Wallach (Umwelt) within roadsides or within larger areas of continuous terrestrial vegetation. Targeted searches within wetland vegetation and linear riparian woodlands were generally undertaken in a random meander fashion due to the steep topography or the physical barriers to movement within these vegetation types.

The location and number of individuals for each significant flora species recorded during the assessment was recorded electronically in the field. Global Position System (GPS) tracks for each assessor were recorded during the assessment.

### 2.2 Fauna Surveys

#### 2.2.1 Overview

Fauna surveys were conducted to confirm the occurrence or potential occurrence of faunal species of conservation significance on the site following the completion of the Phase 1 rapid field and desktop assessments (Emerge Associates, 2019). Surveys were undertaken by experienced faunal ecologists Rob Gration (Eco Aerial) and Mark Allen (Umwelt) in accordance with Fauna Permit No. 10009182. Four survey categories were assessed. These were:

- bird surveys
- spotlight and call playback surveys
- sound recorder surveys
- bat detector surveys

#### 2.2.2 Survey sites

Survey site selection focused on larger patches of vegetation or habitat that had previous records of fauna (particularly birds and bats) as well ensuring survey sites covered higher quality habitat within the study area (both inside and outside the project area. Six sites were selected as appropriate locations for generalised fauna surveys as presented in **Figure 1**. Generally, survey sites were determined based on:

- proximity to water/wetlands
- larger patches of forested habitat
- linear habitat connectivity and
- habitat quality or where vegetation clines were present (i.e. shifts from riparian to forest to grassland).

A description of each site and justification for their selection is outlined below.

##### 2.2.2.1 Survey site 1

Located in the south of study area, survey site 1 sits outside the project area boundary within approximately 260 ha of indigenous Box Ironbark Forest (see **Plate 1**). Due to its forested nature the location offers habitat for arboreal and volant species such as birds, bats and gliders. All survey techniques (birds, spotlighting and call playback, bat detector and song meters) were utilised within survey site 1.



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*Plate 1:* The open box ironbark forest of survey site 1.

#### 2.2.2.2 Survey site 2

Survey site 2 lies within the centre of the project area (**see Figure 1**) and is situated along Seven Mile Creek amongst Ecological Vegetation Class (EVC) Creekline Grassy Woodland. Potter Road lies to the west as presented in **Plate 1** and much of the site is surrounded by cultivated agricultural land. Birds surveying, spotlighting and call playback, bat detectors and song meters were utilised at this site. Due to the habitat connectivity provided by the trees lining each side of Potter Road, its close proximity to the creeks as a water and food source it was considered highly suitable for birds and bats and habitat for wetland species such as wetland birds and amphibians.

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*Plate 2: Survey site 2 looking North along Potter Road*

#### 2.2.2.3 Survey site 3

Survey site 3 sits north of the study area (see **Figure 1**) along the eastern banks of the Wimmera River. The site is representative of Riparian Woodland EVC near the river moving to dryer Box Ironbark Forest EVC. At either end of the site, the river winds through cultivated agriculture land as seen in **Plate 3**. The western side of the site along the Stawell - Avoca Road is one of the proposed site access points for the project. Spotlighting and callback, song meters and bat detectors were deployed along the banks of the river.



*Plate 3: The Wimmera River winding through agricultural land at survey site 3*



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### 2.2.2.4 Survey site 4

Survey site 4 lies on the eastern edge of the project area, again along the Wimmera River which contained several large water holes (see **Plate 4**) suitable for wetland species. The vegetation along the river was comprised of Riparian Woodland EVC blending to Plains Woodland EVC away from the river and cultivated agriculture land beyond the woodland. All survey techniques were deployed at this location apart from the song meters.



*Plate 4: Survey site 4 showing water holes along the Wimmera River*

### 2.2.2.5 Survey site 5

Study site 5 is located to the west of the project area. Situated to the south of Vineyard Road, it sits amongst approximately 140 ha of health woodland suitable for arboreal mammals and woodland bird species (see **Plate 5**). Spotlight and playback and bird surveys were conducted at this location.

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*Plate 5: Survey site 5 Heathy Woodland*

#### 2.2.2.6 Survey site 6

Situated 300 metres to the South of study site 2 along Vineyard Road (see **Plate 6**), the site provided good habitat connectivity between site 2 and site 5. Spotlighting transects were undertaken along Vineyard Road.



*Plate 6: Survey site 6 situated along Vineyard Road*

Deployment of each survey technique was based on the habitat suitability of the survey site for the species being targeted (e.g. forested areas for arboreal species). The deployment of survey techniques at each survey site is shown in **Table 2**.



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Table 2: Survey techniques deployed at each survey site

Survey site	Survey technique deployed			
	Bird	Spotlight & call playback	Sound recorder	Bat detector
1	X	X	X	X
2	X	X	X	X
3		X	X	X
4	X	X		X
5	X	X		

The method approaches for each category are outlined below.

### 2.2.3 Bird Surveys

The surveys were undertaken twice (19-20 November 2019 and 02-03 December 2019), once at dawn and once at dusk at survey sites 1, 2, 4, and 5 (see **Figure 1**). Using the species accumulation method which estimates the number of species in a particular area based on effort of sampling, all species observed or heard within a five-minute period were recorded. Following a one-minute break, recording continued for a further five-minute period. Only those species that had not been recorded previously were noted in the proceeding five-minute periods. This process was undertaken until there were no new species recorded in two consecutive five-minute periods.

### 2.2.4 Spotlight and Call Playback Surveys

Spotlighting and call playback transect were undertaken at survey sites 1, 2, 3 and 6 on two separate occasions; once in mid-spring (18<sup>th</sup> and 19<sup>th</sup> of November 2019) and once in late spring/early summer (2<sup>nd</sup> and 16<sup>th</sup> of December).

Prior to undertaking spotlighting, the calls of Powerful Owl *Ninox strenua*, Bush-stone Curlew *Burhinus grallarius* and Barking Owl *Ninox connivens* were played over a loudspeaker. Call playback is regarded as an effective method to either have a call response or the target species will fly into the area where spotlighting will be undertaken. Each call was played for one-minute; there was a one-minute break before playing the call for another minute. Once no further responses are recorded, no further playing of the calls were undertaken on that evening.

Following call playback, spotlighting took place along a 500 metre transect for a duration of approximately 30-minutes. After a 5-minute break, the return trip was undertaken. Binoculars (8 x 42mm or larger) were used to make a quick identification, thereby reducing the period the animal was in the spotlight.

### 2.2.5 Sound Recorder Surveys

Three Song Meter SM4 (Wildlife Acoustics™) sound recorders were deployed at survey sites 1, 2, and 3 (**Figure 1**). The SM4's recorded audible sounds from 20hz-15kHz which is the calling acoustic frequencies of birds, frogs and mammals. The recorders were deployed for 14-days between the 18<sup>th</sup> of November and the 2<sup>nd</sup> of December 2019. The units recorded for 5-minutes every hour for the duration of the 14-days.

Call identification was completed by Rob Gratton (Eco Aerial) using Kaleidoscope sound analysis software (Wildlife Acoustics™).

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### 2.2.6 Bat Detector Surveys

The current surveys were not designed to investigate potential bat and turbine interactions which generally require one detector deployed for every 3-4 turbines (pre-construction wind farm surveys). In this case, the survey was designed to understand potential bat species presence and abundance, including the potential for any threatened bats. Detectors were deployed at survey sites 1, 2, 3, and 4 where bat activity was likely to be higher (refer to **Figure 1**).

Bat detectors were deployed between the 18<sup>th</sup> of November and the 1<sup>st</sup> of December 2019 recording bat calls from dusk to dawn. Bat call analysis was undertaken by Rob Gration (Eco Aerial).

### 2.2.7 Golden Sun Moth Habitat Assessment

During the Phase 1 Ecological Study, the Golden Sun Moth *Synemon Plana* was observed in the south of the project area as seen in **Figure 3**. Potential habitat zones were mapped by Emerge Associates as part of the Phase 1 assessment. These were then assessed and rated for their potential as suitable habitat for the Golden Sun Moth by Rob Gration (Eco Aerial). The results of this assessment are presented in **Section 3.2.5**.

## 2.3 Threatened species likelihood of occurrence

Under the Phase 1 report the likelihood of occurrence of conservation significance species within the site was assessed using historical records of species and the presence of the species preferred habitat within the study area (Emerge Associates, 2019). Each species was then ranked unlikely, potential, likely or present based on above parameters. The method is presented in Emerge Associates, 2019.

Following the Phase 2 assessment, the likelihood for each conservation significant species was reassessed using the results from the survey sites and an assessment of each survey site's (and the study area in general) ability to meet preferred habitat requirements for each species. Both Phase 1 and Phase 2 likelihood of occurrence assessment results are presented **Appendix A**.

## 2.4 Nomenclature

Common and scientific names of plants and fauna (reptiles, birds, mammals, amphibians and fish) follow the VBA and are provided and maintained by DELWP (DELWP, 2019b). (DELWP, 2019b). Plant species were also compared to records presented on the VicFlora website (RBGBV, 2015). Where confident binomial identity of a plant was not possible, records were assigned a 'sp.' (species) epithet, indicating that identification could not be confirmed beyond genus level.

## 2.5 Conservation significant flora and fauna

For the purpose of this report, flora and fauna of conservation significance (or significance) includes:

- species listed as vulnerable, endangered or critically endangered under the Commonwealth EPBC Act 1999
- migratory species listed as 'JAMBA', 'CAMBA', 'ROKAMBA' or 'BONN' under the Commonwealth EPBC Act

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- species in Victoria defined by the Department of Sustainability and Environment (2009), or Department of Environment and Primary Industries (2014) as rare, vulnerable, endangered or critically endangered
- species listed under the FFG Act.

A number of species were eliminated from the VBA search results based on their listing status, a review of relevant literature and an understanding of their preferred habitats. These species are not considered further in this report and include:

- records older than 30 years (pre-1990)
- fauna species considered 'near threatened', 'conservation dependent' or 'data deficient' in the advisory list of threatened vertebrate fauna in Victoria (Victorian Rare or Threatened Species [VROTS]) list unless they are also listed under the EPBC Act and/or FFG Act.
- flora listed as 'poorly known' in the advisory list of rare or threatened plants in Victoria (VROTS) list, as the current knowledge of their distribution and abundance is not sufficient to determine whether these species should be considered as rare, vulnerable, endangered or critically endangered in Victoria.
- flora listed as 'Nominated' under the FFG Act
- some threatened flora species which are outside their natural range but are commonly used for landscaping and amenity, including *Corymbia maculata* (Spotted Gum) and *Melaleuca armillaris* (Giant Honey-myrtle)
- fauna reliant on marine environments was not considered because the project boundary is not within or near a Commonwealth Marine Area, and impacts on a Commonwealth Marine Area are highly unlikely.

Throughout this report the conservation status and origin of species is regularly referred to. Where codes/abbreviations are presented, the following should be referred to **Table 3**.

Table 3. Abbreviations of conservation significant species under the EPBC Act, FFG Act and VROT lists.

EPBC Act	FFG Act	VROTS
CR – Critically Endangered	L – Listed	c – Critically Endangered
EN – Endangered	N – Nominated for listing	e – Endangered
VU – Vulnerable	D – Delisted	v – Vulnerable
Ma - Marine		r – Rare
Mi - Migratory		
*denotes an exotic species		

## 2.6 Limitations and assumptions

The findings of this report are subject to the following assumptions and limitations:

- Observations of significant species is not considered to be conclusive, as survey limitations (effort and timing) may have resulted in some species remaining undetected.
- The location of significant flora species recorded during the assessment was recorded using hand-held GPS, which has a positional accuracy of between approximately 2-10 metres.
- Certain orchid species were not targeted in the ideal flowering period (October 2019), due to project constraints and the short flowering period of some species. Furthermore, certain

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significant *Pterostylis* (Greenhood) species typically flower in Winter, which has not yet been surveyed as part of the Project.

- Pressed specimens of certain significant flora species collected at the study area were sent to the National Herbarium of Victoria for confirmation of the species identification (the results of which have not yet been received). The results of the significant flora species presented in this report assumes that species suspected of being significant are treated as such.
- Limited targeted flora survey was undertaken within the “offset site” due to the nomination of this site by the proponent as being unlikely to be impacted by the proposed works.

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### 3 Results

#### 3.1 Flora

In total 249 flora species were recorded during Phase 1 and Phase 2 assessments. Of the 247 species recorded, 173 species were indigenous, while the remaining 76 species were exotic species or native species occurring outside of their natural range.

A list of flora species observed during the current assessment is provided in **Appendix B**.

##### 3.1.1 Significant flora

Up to seven significant flora species were opportunistically recorded in Phase 1 survey in late September 2019 or were recorded during a targeted flora assessment in during Phase 2 between November 2019 and January 2020 (**Table 4**).

A number of native orchid species were recorded during the Phase 1 survey in late September 2019, which comprised approximately four hours of rapid targeted survey within the majority of orchid habitat at the site. This rapid survey was undertaken during the flowering period of the majority of *Caladenia* and *Diuris* species that have the potential to occur at the site. A targeted flora survey was undertaken as a subsequent phase of work (Phase 2) after the majority of the remainder of orchids (that were not flowering in late September) had finished flowering. Furthermore, certain *Pterostylis* species are winter emerging and flowering species, for which no targeted survey has taken place to date. Further survey at the appropriate time of the year is therefore recommended to address the potential occurrence of significant orchids, particularly within heathy woodland vegetation on Vineyard Road at the project area.

The locations of significant flora recorded during the field assessment are illustrated on **Figure 3a – Figure 3e**.

Table 4: Conservation significant flora recorded during the field assessment and their classification status.

Species	Common name	EPBC Act	FFG Act	VROTS
<i>Allocasuarina luehmannii</i>	Buloke	-	Threatened	Endangered
<i>Caladenia fulva</i>	Tawny Spider-orchid	Endangered	Threatened	Endangered
<i>Convolvulus ? graminetinus</i>	Grassland Bindweed	-	-	Vulnerable
<i>Dianella ?longifolia</i> var. <i>grandis</i> <sup>^</sup>	Arching Flax-lily (subject to confirmation once flowering)	-	-	Previous taxonomy: Vulnerable
<i>Diuris ?X palachila</i> <sup>^</sup>	Broad-lip Diuris	-	-	Rare
<i>Amphibromus fluitans</i> <sup>^</sup>	River Swamp Wallaby-grass	Vulnerable	Threatened	
<i>Ptilotus erubescens</i>	Hairy Tails	-	Threatened	vulnerable

<sup>^</sup> Requires further taxonomic confirmation

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Further information on each of these species is provided below.

### 3.1.1.1 Buloke

*Allocasuarina luehmannii* Buloke is a tree to 15 m tall and was recorded throughout the project area. A total of at least 101 individuals were recorded, the majority of which were scattered trees occurring within farm paddocks at the project area.

The presence of Buloke indicates potential for the occurrence of EPBC Act listed *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* (**Section 4.1.1**).

### 3.1.1.2 Tawny Spider-orchid

*Caladenia fulva* Tawny Spider-orchid is included in the VBA database as recorded within the Watta Wella Bushland Reserve, within close proximity to the site (Tawny Spider-orchid was not recorded within the project area itself). The location of the VBA record was inspected and approximately 18 Tawny Spider-orchid plants were observed flowering during the current assessment.

### 3.1.1.3 Arching Flax-lily

*Dianella longifolia* subsp. *grandis* Arching Flax-lily is a small lily that was recorded within riparian vegetation immediately north of Watta Wella Road. The plant was not flowering at the time of the assessment and needs flowers for species identification confirmation.

Arching Flax-lily has recently been subject to taxonomic revision and was previously classified as *Dianella* sp. aff. *longifolia* (Benambra), which currently holds a *Vulnerable* conservation status on the Advisory List. However, the Royal Botanic Gardens of Victoria does not currently classify *D. longifolia* subsp. *grandis* as a rare or threatened species.

Arching Flax-lily is only a VROT listed species and as such should not be considered as significant as EPBC Act or FFG Act listed species.

### 3.1.1.4 Broad-lip Diuris

*Diuris X palachila* Broad-lip Diuris is a naturally occurring hybrid between *Diuris behrii* and *Diuris pardina*. A plant resembling Broad-lip Diuris was recorded within roadside vegetation opposite the Watta Wella Reserve. Hybrids between *D. behrii*, *D. pardina* and *Diuris cryseopsis* are possible and are difficult to distinguish based on morphology. Given that *D. pardina* and *D. cryseopsis* were recorded in close proximity, it is likely that the subject plant was a hybrid between *D. pardina* and *D. cryseopsis* (which is not listed as a significant species). However, Broad-lip Diuris cannot be ruled out due to the difficulties associated with identification.

Broad-lip Diuris is only a VROT listed species and as such should not be considered as significant as EPBC Act or FFG Act listed species.



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### 3.1.1.5 River Swamp Wallaby-grass

*Amphibromus fluitans* (River Swamp Wallaby-grass) is a rhizomatous and stoloniferous aquatic or semi-aquatic perennial grass that was recorded in farm dams from November 2019 – January 2020. Strongly stoloniferous plants resembling *Amphibromus fluitans* were observed coexisting with *Amphibromus nervosus* (Common Swamp Wallaby-grass) at the site (the latter of which is a taller and more upright plant that is rarely stoloniferous). However, some plants shared the characteristics of both plants. Several plant samples were collected and pressed during the current assessment and were sent to the herbarium for confirmation of the species identification. However, it is assumed that *Amphibromus fluitans* has the potential to occur anywhere *Amphibromus nervosus* was recorded.

### 3.1.1.6 Hairy Tails

*Ptilotus erubescens* (Hairy Tails) is an upright herb to 30cm tall and was recorded at 19 locations on Vineyard Road within high quality grassy woodland vegetation on Vineyard Road and Potter Road. A total of 101 individuals were recorded.

### 3.1.1.7 Grassland Bindweed

A plant resembling *Convolvulus graminetinus* Grassland Bindweed was recorded at the project area. Grassland Bindweed is a perennial herb with trailing or twining stems and was recorded at up to 11 locations within the project area, primarily within Grassy Woodland on Potters Road and Vineyard Road. Grassland Bindweed specimens are currently with the National Herbarium of Victoria for confirmation of species identification, due to the challenges associated with the identification of this genera.

## 3.2 Fauna

As presented in **Table 5**, a total of 14,568 individual recordings accounting for 83 unique species of fauna were recorded across the six sites during the survey period. Only the critically endangered Golden Sun Moth *Synemon plana* was observed during the survey period with no other conservation significant species recorded. The introduced Red Fox *Vulpes vulpes* was observed which is listed as a threatening process under the Victorian FFG Act. Site 5 had the most bird species while site 3 along the Wimmera River recorded the most bat calls (9429) and species (10). The number of species for spotlight and playback, and sound detection were similar across all locations.

The results of each targeted survey are presented in the following sections.

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Table 5: Number of individual recordings/sightings and number of species per site.

Site	Survey type	Individual recordings	Total recordings per site	Number of species	Total species per site
1	Birds	17	318	10	29
	Spotlighting	5		2	
	Bat detection <sup>#</sup>	279		6	
	Sound	17		11	
2	Birds	16	1629	7	17
	Spotlighting	6		2	
	Bat detection	1,607		8	
	Sound	16		7	
3	Birds	9	9429	9	20
	Spotlighting	2		1	
	Bat detection	9,418		10	
	Sound	9		9	
4	Spotlighting	6	3101	4	10
	Bat detection	3,095		6	
5	Birds	56	63	40	42
	Spotlighting	7		2	
6	Spotlighting	3	3	1	1

## 3.2.1 Bird Survey Results

A total of 159 individual bird sightings covering 56 different species were recorded across the 4 sites. As observed in **Table 6: Bird species recorded during targeted surveys.**, the Australian Magpie *Cracticus tibicen*, Brown tree Creeper *Climacteris picumnus*, the Galah *Eolophus roseicapilla*, Grey Shrike-thrush *Colluricincla harmonica*, Red-rumped Parrot *Psephotus haematonotus* and Sulphur-crested Cockatoo *Cacatua galerita* are common across all sites. No conservation significant species were observed during the survey period.

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Table 6: Bird species recorded during targeted surveys.

Common name	Scientific name	Site	19/11	20/11	02/12	03/12	Total sightings
Australian Magpie	<i>Cracticus tibicen</i>	1,2,4,5	+	+	+	+	8
Australian Raven	<i>Corvus coronoides</i>	1,2,4,5	+	+		+	4
Australian Reed-Warbler	<i>Acrocephalus australis</i>	4				+	1
Black-faced Cuckoo-shrike	<i>Coracina novaehollandiae</i>	2,4,5	+	+	+	+	4
Brown Goshawk	<i>Accipiter fasciatus</i>	4		+		+	2
Brown Treecreeper	<i>Climacteris picumnus</i>	1,2,4,5	+	+	+	+	8
Brown-headed Honeyeater	<i>Melithreptus brevirostris</i>	1,2	+	+			3
Buff-rumped Thornbill	<i>Acanthiza reguloides</i>	1,5	+		+		3
Collared Sparrowhawk	<i>Accipiter cirrocephalus</i>	5			+		1
Common Bronzewing	<i>Phaps chalcoptera</i>	1,2,5	+	+	+	+	4
Common Starling*	<i>Sturnus vulgaris</i>	2,5	+	+			2
Crested Shrike-tit	<i>Falcunculus frontatus</i>	1			+		1
Crimson Rosella	<i>Platycercus elegans</i>	1,2,4,5	+	+	+	+	6
Dusky Woodswallow	<i>Artamus cyanopterus</i>	1,2,4,5	+	+	+	+	5
Eastern Rosella	<i>Platycercus eximius</i>	1,2,4,5	+	+	+	+	6
Eastern Yellow Robin	<i>opsaltria australis</i>	1,5		+	+		3
Fairy Martin	<i>Petrochelidon ariel</i>	2	+				1
Fuscous Honeyeater	<i>Lichenostomus fuscus</i>	1,5	+	+	+		4
Galah	<i>Eolophus roseicapilla</i>	1,2,4,5	+	+	+	+	8
Grey Currawong	<i>Strepera versicolor</i>	1	+				1
Grey Fantail	<i>Rhipidura albiscapa</i>	1,2	+		+	+	3
Grey Shrike-thrush	<i>Colluricincla harmonica</i>	1,2,4,5	+	+	+	+	7
Horsfield's Bronze-Cuckoo	<i>Chrysococcyx basalis</i>	1,5	+	+			2
House Sparrow	<i>Passer domesticus</i>	5		+			1
Jacky Winter	<i>Microeca fascinans</i>	5		+			1
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	4		+			1
Little Raven	<i>Corvus mellori</i>	2,4	+	+		+	3
Long-billed Corella	<i>Cacatua tenuirostris</i>	1,4,5	+	+		+	3
Magpie-lark	<i>Grallina cyanoleuca</i>	2,4,5	+	+		+	3
Mistletoe bird	<i>Dicaeum hirundinaceum</i>	5		+	+		2
Musk Lorikeet	<i>Glossopsitta concinna</i>	1,2,4,5	+	+		+	5
Noisy Miner	<i>Manorina melanocephala</i>	4		+			1

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Common name	Scientific name	Site	19/11	20/11	02/12	03/12	Total sightings
Pacific Black Duck	<i>Anas superciliosa</i>	4		+			1
Red Wattlebird	<i>Anthochaera carunculata</i>	1,2,5	+	+		+	5
Red-capped Robin	<i>Petroica goodenovii</i>	1	+				1
Red-rumped Parrot	<i>Psephotus haematonotus</i>	1,2,4,5	+	+	+	+	7
Restless Flycatcher	<i>Myiagra inquieta</i>	4				+	1
Rufous Songlark	<i>Cincloramphus mathewsi</i>	4		+			1
Rufous Whistler	<i>Pachycephala rufiventris</i>	1,5	+	+	+		3
Sacred Kingfisher	<i>Todiramphus sanctus</i>	4		+		+	2
Spotted Pardalote	<i>Pardalotus punctatus</i>	1,2,5	+	+		+	3
Striated Pardalote	<i>Pardalotus striatus</i>	4,5		+	+	+	4
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	1,2,4,5	+	+	+	+	7
Superb Fairy-wren	<i>Malurus cyaneus</i>	1,4,5	+	+	+	+	6
Tree Martin	<i>Petrochelidon nigricans</i>	1,2,4,5	+	+	+	+	6
Wedge-tailed Eagle	<i>Aquila audax</i>	1,5			+		2
Weebill	<i>Smicrornis brevirostris</i>	1,2,5	+	+		+	4
Welcome Swallow	<i>Hirundo neoxena</i>	2,4,5	+	+		+	5
White-browed Woodswallow	<i>Artamus superciliosus</i>	1,4,5	+	+	+	+	5
White-faced Heron	<i>Egretta novaehollandiae</i>	2	+				1
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	1,2,4,5	+	+		+	6
White-throated Treecreeper	<i>Cormobates leucophaea</i>	1	+		+		2
White-winged Chough	<i>Corcorax melanorhamphos</i>	1,2,5	+	+	+		5
White-winged Triller	<i>Lalage tricolor</i>	1,4	+	+		+	3
Willie Wagtail	<i>Rhipidura leucophrys</i>	2,4,5		+	+	+	5
Yellow-rumped Thornbill	<i>Acanthiza chrysorrhoa</i>	5		+			1
Yellow-tufted Honeyeater	<i>Lichenostomus melanops</i>	5			+		1

\*denotes an introduced species

Most species observed are relatively common generalists which are adaptable to a variety of habitats. Only two wetland/riverine species were recorded (sacred kingfisher and white-faced heron) suggesting the project area is not high-quality habitat for these species. Woodland species are well represented across many of the sites, particularly study sites 1 and 5 which are well buffered by open forest.

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### 3.2.2 Spotlight and call playback surveys results

In total 29 individuals from eight different species were observed across the six spotlight sites as presented in **Table 7**. Both possum species were the most common fauna observed during the survey period. No conservation significant species were recorded, however as previously noted, the red fox (*Vulpes Vulpes*) was observed at site 4 and is listed as a potentially threatening process under the FFG Act due to its predation of native wildlife.

Table 7: Fauna species recorded during spotlighting and call playback surveys

Common name	Scientific Name	Site	18/11	19/11	02/12	16/12	Total Sightings
Common Brushtail Possum	<i>Richosurus vulpecula</i>	4,5		+	+		6
Common Froglet	<i>Crinia signifera</i>	4		+			1
Common Ringtail Possum	<i>Pseudocheirus peregrinus</i>	1,2,3,5,6	+	+	+	+	15
Owlet night-jar	<i>Aegotheles cristatus</i>	1	+				1
Perons Tree frog	<i>Litoria peronii</i>	4		+			1
Red Fox*	<i>Vulpes vulpes</i>	4		+			1
Tawny Frogmouth	<i>Podargus strigoides</i>	5			+		3
Boobook Owl	<i>Ninox boobook</i>	2		+			1

\*denotes an introduced species

The strong representation of arboreal mammals and predatory birds suggests the habitat surveyed may provide suitable conditions to support conservation significant species such the Squirrel Glider *Petaurus norfolcensis* and the Powerful Owl.

### 3.2.3 Bat survey results

Bat surveys recorded 14399 calls during the survey period. **Table 8** shows 10 species were identified from the recorded material. Survey site 3 which sits outside the project area and survey site 2 recorded the greatest number of species with the remaining two sites recording similar numbers. No conservation significant species were recorded during the survey period.

Table 8 Bat survey results at each survey site

Species	Scientific name	Site 1	Site 2	Site 3	Site 4	Total species observations
Broad-nosed species	<i>Scotorepens sp.</i>	0	1	1	0	2
Chocolate Wattled bat	<i>Chalinolobus morio</i>	1	1	1	1	4
Eastern Falsistrelus	<i>Falsistrellus tasmaniensis</i>	0	1	1	1	3
Forest Bat species	<i>Vespadelus sp.</i>	1	1	1	1	4
Gould's Wattled bat	<i>Chalinolobus gouldii</i>	1	1	1	1	4
Large Forest Bat	<i>Vespadelus darlingtoni</i>	0	1	1	1	3
Little Forest Bat	<i>Vespadelus vulturnus</i>	1	1	1	0	3

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Species	Scientific name	Site 1	Site 2	Site 3	Site 4	Total species observations
Long-eared bat species	<i>Nyctophilus sp</i>	0	0	1	0	1
Southern Freetail Bat	<i>Mormopterus planiceps</i>	1	1	1	1	4
White-striped Freetail Bat	<i>Austronomus australis</i>	1	1	1	1	4
<b>Site Totals</b>		<b>6</b>	<b>9</b>	<b>10</b>	<b>7</b>	<b>-</b>

The survey results suggest a moderate-high diversity of insectivorous bat taxa across the four locations and therefore there may be potential for bats species to interact with turbines located nearby. However further research is required to understand how significant, if any these impacts may be. Variables such as flight height, territorial range and turbine design may affect these interactions.

### 3.2.4 Sound recorder results

Sound recorder results reveal 22 species and at least 40 individuals as present during the survey period. **Table 9** shows white-plumed honeyeaters *Lichenostomus penicillatus* were the most common along with rufous whistlers *Achycephala rufiventris* and ravens *Corvus sp.*. Again, no conservation significant species were recorded during the survey period.

Table 9 Sound recorder results at each site according to date

Common Name	Scientific name	Date	Site/count			Total recordings
			1	2	3	
Boobook Owl	<i>Ninox boobook</i>	30/11/19			1	1
Brown treecreeper	<i>Climacteris picumnus</i>	22/11/19			1	2
		26/11/19	1			
Common Brushtail Possum	<i>Trichosurus vulpecula</i>	2/12/19	1			1
Corella	<i>Cacatua sanguinea</i>	18/11/19			1	1
Crimson rosella	<i>Platycercus elegans</i>	22/11/19		1		1
Galah	<i>Eolophus roseicapilla</i>	27/11/19			1	1
Grey Fantail	<i>Rhipidura albiscapa</i>	27/11/19	1			2
		29/11/19	1			
Grey Shirke-thrush	<i>Colluricincla harmonica</i>	23/11/19	1			1
Horsfields Bronze-cuckoo	<i>Chrysococcyx basalis</i>	24/11/19	1			2
		27/11/19	1			
Koala	<i>Phascolarctos cinereus</i>	27/11/19	1			1
Magpie	<i>Gymnorhina tibicen</i>	20/11/19		1		3
		26/11/19	1			
		28/11/19		1		

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Musk Lorikeet	<i>Glossopsitta concinna</i>	2/12/19			1	1
Raven	<i>Corvus sp.</i>	20/11/19			1	5
		25/11/19		2		
		28/11/19		1		
		30/11/19		1		
Red Wattlebird	<i>Anthochaera carunculata</i>	25/11/19		1		1
Rufous whistler	<i>Achycephala rufiventris</i>	19/11/19	1			5
		22/11/19	1			
		24/11/19	2			
		26/11/19	1			
Striated pardalote	<i>Pardalotus striatus</i>	25/11/19			1	1
Sulphur-crested Cockatoo	<i>Cacatua galerita</i>	23/11/19	1	1		2
Supurb Fairy-wren	<i>Malurus cyaneus</i>	28/11/19	1			1
Weebill	<i>Smicrornis brevirostris</i>	27/11/19	1			1
White-plumed Honeyeater	<i>Lichenostomus penicillatus</i>	18/11/19			1	7
		20/11/19		1		
		23/11/19		2		
		25/11/19		1		
		27/11/19		2		
White-throated Treecreeper	<i>Cormobates leucophaea</i>	1/12/19			1	1
White-winged Chough	<i>Corcorax melanorhamphos</i>	1/12/19		1		1
<b>Total</b>			<b>17</b>	<b>16</b>	<b>9</b>	<b>42</b>

Results confirm much of the data collected during bird surveys suggesting generalist and woodlands specialists are the main volant taxa of the project area.

### 3.2.5 Golden Sun Moth

Golden Sun Moth is listed as Critically Endangered under the EPBC Act, is listed as threatened under the FFG Act and is listed as critically endangered on DELWP's Advisory Listings (DSE, 2007).

Golden Sun Moth was recorded at eight discrete locations within the study area during Phase 1. These observations occurred on elevated stony rises occupied by colonising native grasses in the southern end of the study area, within a total area of approximately 1,200m x 200m (< 25hectares) (refer to **Figure 3**). The Golden Sun Moth records comprised 8 male moths and one female moth.

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### Golden Sun Moth habitat within the study area

Confirmed Golden Sun Moth habitat was identified in a single parcel of land to the south of the site (**Figure 3**) where moths were recorded at eight separate locations. Habitat within this area consisted of stony rises that have presumably been excluded from historical ploughing and have not been cropped (due to the relatively steep gradients and rock). Golden Sun Moth habitat in this area was dominated by exotic pasture grasses, with a component (<30% cover) of native *Austrostipa* (Spear-grass) and *Rytidosperma* (Wallaby-grass) (**Figure 3**).

Following the observations, a Golden Sun Moth broader habitat assessment was conducted to assess the likelihood of occurrence across the study site. The results are presented in **Table 10**. As presented in **Figure 3**, four locations in the south of the study area (zones 2, 5, 7 and 8) were identified as having Golden Sun Moth present with a further 2 locations (zones 3 and 6) adjacent to existing habitat were identified as having a high likelihood of Golden Sun Moth occurring within the zones. Zone 17 located to the east of known Golden Sun Moth habitat was considered to have a medium likelihood of occurrence whilst the remaining zones were considered unlikely to support Golden Sun Moth due to heavy soil compaction from cultivation.

Table 10 Golden Sun Moth habitat assessment

Location ID	comment	EVC	Category	Area	Golden Sun Moth likelihood
1	Derived grassland. Grassy Woodland	Grassy Woodland	Patch	0.15	Low; high degree of soil compaction and cultivation
2	Degraded derived grassland on rocky hilltop	Grassy Woodland	Patch	1.24	Very high-GSM present
4	Derived grassland. Grassy Woodland	Grassy Woodland	Patch	1.68	Low; high degree of soil compaction and cultivation
6	Borderline 25% indigenous - check in another season.		Derived grassland (borderline 25% cover)	1.43	High-adjacent to where GSM seen
5	Borderline 25% indigenous - check in another season.		Patch	3.94	Very high-GSM present
7	Borderline 25% indigenous - check in another season.		Derived grassland (borderline 25% cover)	6.30	Very High-GSM present
3	Borderline 25% indigenous - check in another season.		Derived grassland (borderline 25% cover)	3.10	High-GSM seen adjacent
8	HDF (treeless)	Heathy Dry Forest	Patch	4.93	Very high-GSM present
9	Fenced area. native grasses, planted indig. species, significant erosion				Low; high degree of soil compaction and cultivation
10	This section fenced from stock				Low; high degree of soil compaction and cultivation
11	20191203				Low; high degree of soil compaction and cultivation
12	20191203_141536				Low; high degree of soil compaction and cultivation
13	20191203				Low; high degree of soil compaction and cultivation
14	20191203_174031				Didn't access, nearest turbine won't impact



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Location ID	comment	EVC	Category	Area	Golden Sun Moth likelihood
15	20191203_180744				Didn't access, nearest turbine won't impact
16	Rytidosperma dominated. no other species		derived grassland borderline.		Didn't access, nearest turbine won't impact
17	20191204. Wallaby grass. evidence of ploughing, so unlikely gsm				Med; high degree of soil compaction and cultivation
18	Areas of disturbance with areas of assumed non-disturbance				Didn't access, nearest turbine won't impact
19	Rytidosperma and Stipa grassland	?heathy woodland			Didn't access, nearest turbine won't impact

### Initial advice on buffers and habitat avoidance

Given the considerations outlined above, a conservative buffer between Golden Sun Moth habitat and physical infrastructure of 200-400m is considered appropriate. Where a minimum buffer of 200m is considered unachievable, further consideration of the potential for significant impact on the Golden Sun Moth will be required, potentially triggering an EPBC referral. Furthermore, the layout of lineal infrastructure such as internal access roads and high voltage cabling would need to consider the potential for impacts to Golden Sun Moth habitat. It is recommended that further investigations of Golden Sun Moth buffers and consultation with DoEE is completed to fully consider the implications of the Project on the species and the potential for significant impact.

### 3.3 Likelihood of Occurrence - Adjusted determinations

Following the flora and fauna survey and survey site assessments for conservation significant species, the likelihood of occurrence for each species identified assessed in Phase 1 was re-examined. As presented in **Table 11** and **Table 12**, a total of 28 species (10 floral and 18 faunal) likelihood of occurrence was modified. These modifications were due to either observance during Phases 1 and 2 surveys, or assessment of habitat site suitability for each species (i.e. most wetland habitat did not have protective habitat along its fringes). Of the 28 modifications, five were due to confirmation of their presence within the study area, 15 were reduced from likely to potential (three flora and 12 fauna), and the remaining eight were reduced from potential to unlikely.

Table 11: Flora likelihood of occurrence table modifications following Phase 2

Scientific Name	Common Name	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	Potential	Present
<i>Convolvulus ? graminetinus</i>	Grassland Bindweed	Not considered	Present
<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra)	Arching Flax-lily	Potential	Present
<i>Dianella</i> sp. aff. <i>longifolia</i> (Riverina)	Pale Flax-lily	Likely	Potential
<i>Diuris palustris</i>	Swamp Diuris	Potential	Present

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Scientific Name	Common Name	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
<i>Geranium</i> sp. 3	Pale-flower Crane's-bill	Likely	Potential
<i>Leucopogon virgatus</i> var. <i>brevifolius</i>	Common Beard-heath	Potential	Unlikely
<i>Ptilotus erubescens</i>	Hairy Tails	Potential	Present
<i>Schoenus nanus</i>	Tiny Bog-sedge	Likely	Potential
<i>Senecio macrocarpus</i>	Large-headed Fireweed	Potential	Unlikely

Table 12: Fauna likelihood of occurrence table modifications following Phase 2

Scientific Name	Common Name	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
<i>Anas rhynchotis</i>	Australasian Shoveler	Likely	Potential
<i>Ardea modesta</i>	Eastern Great Egret	Likely	Potential
<i>Aythya australis</i>	Hardhead	Likely	Potential
<i>Biziura lobata</i>	Musk Duck	Likely	Potential
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Potential	Unlikely
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper	Potential	Unlikely
<i>Calidris melanotos</i>	Pectoral Sandpiper	Potential	Unlikely
<i>Grus rubicunda</i>	Brolga	Likely	Potential
<i>Hirundapus caudacutus</i>	White-throated Needletail	Likely	Potential
<i>Lathamus discolor</i>	Swift Parrot	Likely	Potential
<i>Numenius madagascariensis</i>	Eastern Curlew	Potential	Unlikely
<i>Oxyura australis</i>	Blue-billed Duck	Likely	Unlikely
<i>Petaurus norfolcensis</i>	Squirrel Glider	Likely	Potential
<i>Pseudophryne bibronii</i>	Brown Toadlet	Likely	Potential
<i>Rhipidura rufifrons</i>	Rufous Fantail	Potential	Unlikely
<i>Rostratula australis</i>	Australian Painted Snipe	Likely	Potential
<i>Tringa nebularia</i>	Common Greenshank	Potential	Unlikely

The full likelihood of occurrence assessment for both Phase 1 and 2 is presented in **Appendices A1** and **A2**

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# 4 Legislative and policy implications of the proposed development

The following sections addresses some of the key environmental legislation that must be considered in relation to the proposed development. It should be noted that this section is not intended to re-hash sections from the Phase 1 report (Emerge Associates, 2019).

## 4.1 Commonwealth

### 4.1.1 Environment Protection and Biodiversity Conservation Act 1999

#### 4.1.1.1 Threatened flora

One EPBC Act listed threatened flora species; River Swamp Wallaby-grass, was recorded within wetlands at the site (subject to species confirmation). A further EPBC Act species; Tawny Spider-orchid, was recorded outside of the site during the assessment.

Despite modification of likelihood of occurrence assessment following the surveys, **17 EPBC Act listed flora species** are still considered to have a likelihood of either potential or likely.

#### 4.1.1.2 Threatened fauna

One EPBC Act listed threatened fauna species; Golden Sun Moth was recorded during the Phase 1 assessment (Emerge Associates, 2019). The implications for the project are detailed in Section 3.2.5.

Following the reassessment of the likelihood of occurrence, **12 EPBC Act listed fauna species** (reduced from 16) are considered potential or likely to occur within the site.

#### 4.1.1.3 Marine and Migratory species

One Marine species listed under the EPBC Act; Rainbow Bee-eater *Merops ornatus* was recorded during the Phase 1 assessment. Rainbow Bee-eater is not listed as a threatened species under the EPBC Act. Under the EPBC Act, marine species require a permit to kill, take, trade, keep, or move a listed species in a Commonwealth area, unless you have a permit. As such, the observation of Rainbow Bee-eater should not be considered a significant project constraint.

It would be pertinent to consider the completion of an EPBC Act 'Self-Assessment' to better understand the projects potential to cause significant impact to a Matters of National Environmental Significance (MNES).

## 4.2 State

### 4.2.1 Environment Effects Act 1978

As discussed in the Phase 1 report (Emerge Associates, 2019), if more than 10 ha of native vegetation is cleared as part of the project there would be an increased likelihood of an EES under the EE Act. However, during the design phase of the Project, considered planning has the potential to

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significantly lower the environmental impact and avoid and minimise the clearance of native vegetation.

As a complete understanding of all aspects of the site such (e.g. linear infrastructure) is not available at this time, a complete determination on the requirement (or lack thereof) for an EES cannot be made. However, the data gathered to this point should allow for the commencement of scoping components of an EES referral and discussions with relevant state agencies to determine additional requirements to be considered.

### 4.2.2 *Planning and Environment Act 1987*

No further implications were identified beyond the environmental significance overlay identified in the Phase 1 report (Emerge Associates, 2019).

#### 4.2.2.1 *Native vegetation removal guidelines*

Approximately 490 ha of native vegetation patches, and 1,260 scattered trees were recorded during the Phase 1 assessment. As the final footprint and impacts of the project are not well understood at this time, the impact on these ecological features has not been determined. No additional recommendations beyond the proposed detailed assessments (vegetation quality assessments) presented in Phase 1 (Emerge Associates, 2019) are proposed at this time.

### 4.2.3 *Flora and Fauna Guarantee Act 1988*

Following the Phase 1 report three floral and one faunal species listed as threatened under the FFG Act were recorded as present. An additional flora species *Diuris palustris* Swamp Diuris was recorded as present in Phase 2. The full list is presented below:

- *Allocasuarina luehmannii* Buloke
- *Ptilotus erubescens* Hairy Tails
- *Caladenia fulva* Tawny Spider-orchid
- *Diuris palustris* Swamp Diuris
- Golden Sun Moth *Synemon plana*

The Red Fox *Vulpes vulpes* is listed as a potentially threatening process due to predation of native wildlife under the FFG Act. This species was observed during the spotlight surveys, however no action against threatening processes is required under the FFG Act

Additionally, 15 flora species and 18 fauna species were listed under the FFG Act considered to have a likelihood rating of either 'potential' or 'likely' following the reassessment of the likelihood of occurrence. Once an understanding of all the Project's impacts has been completed, the requirement (or lack thereof) for a FFG Act permit to 'take' protected flora should be reviewed.

#### 4.2.3.1 *FFG Act Amendment Bill 2019*

In 2019 the Victorian Government passed legislation to modernise and strengthen the FFG Act. The *Flora and Fauna Guarantee Amendment Bill 2019* amends the FFG Act with a strengthened framework for the protection of Victoria's biodiversity. The amendments take effect on 1 June 2020

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Importantly, all current VROT species are being reviewed and are likely to be listed under the new act.

### 4.2.4 Wildlife Act 1975

No significant fauna were recorded during Phase 2 assessment, however further detailed fauna assessment may be required, especially for those species considered to have the potential or are likely to occur within the site but their preferred habitat has not yet been explored (ie open grasslands). In accordance with the *Wildlife Act 1975*, if protected species are located within land proposed for clearing, the salvage and translocation of such wildlife may be needed. This requires authorisation from DELWP.

### 4.2.5 DELWP Victorian Advisory Lists

The presence, or likely presence, of a species listed on the DELWP Victorian Advisory Lists is used to determine whether species-specific habitat is required to be offset, rather than statutory lists of species for which conservation management is recommended.

As presented in **Table 13**, two species classified as ‘endangered’ in the Victorian Advisory List were recorded, a further four species classified as ‘vulnerable’ whilst one (Golden Sun Moth) was classified as ‘critically endangered’.

Table 13 VROT listed species recorded within the study area

Scientific Name	Common Name	VROTS
<i>Allocasuarina luehmannii</i>	Buloke	endangered
<i>Caladenia fulva</i>	Tawny Spider-orchid	endangered
<i>Convolvulus ? graminetinus</i>	Grassland Bindweed	vulnerable
<i>Dianella sp. aff. longifolia (Benambra)</i>	Arching Flax-lily	vulnerable
<i>Diuris palustris</i>	Swamp Diuris	vulnerable
<i>Ptilotus erubescens</i>	Hairy Tails	vulnerable
<i>Synemon plana</i>	Golden Sun Moth	critically endangered

The likelihood of occurrence assessment indicates 30 flora and 23 fauna taxa listed as VROTS have a rating of either ‘potential’ or ‘likely’ following the Phase 2 likelihood of occurrence.

### 4.2.6 Policy and Planning Guidelines – Development of Wind Energy Facilities in Victoria (DELWP, 2019a)

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

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

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To understand potential impacts on volant species such as birds and bats it is recommended bird and flight utilisation study at rotor height should be undertaken once turbine locations are confirmed. The information gathered will help inform a bat and avifauna management plan (DELWP, 2019a) required as part of an environmental management plan for the project.

## Phase 2 Targeted Ecological Assessments

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# 5 Conclusions and Recommendations

Seven flora and one fauna species considered conservation significant were recorded within the study area. In addition, a further 166 indigenous flora species and 73 fauna species have been recorded over the 2 assessment phases. The project area, therefore, appears to represent good habitat for many common native flora and fauna species with the possibility to include a further 59 conservation significant species that are considered to have a potential of occurring or are likely to occur on site. Despite this, while not definitive, the results suggest that much of the habitat is not suitable for many of the conservation significant species presented in the likelihood of occurrence assessment. Nevertheless, as previously stated in Phase 1, it should be recognised that all areas are subject to an assessment of impact that must consider the turbine layout and associated lineal infrastructure design (including internal access roads and transmission lines). Impacts to native vegetation and habitats at this stage appear to be confined primarily to site entry locations, which are relatively small in the context of the project and are therefore not expected to represent a significant approvals risk.

The data collected to date does allow components of a state EES referral and discussions with relevant state authorities to commence. Federally, the EPBC Act referral may still be triggered based on the presence of EPBC species and communities, however this cannot be determined until a more complete understanding of project design has been finalised and the likely impact this design may have on these species and communities is explored.

## 5.1 Legislative and policy implications of the works

A summary of the key environmental legislation and policy that must be considered in relation to the proposed development includes:

- No additional EPBC listed species were identified beyond those already identified in Phase 1
- One additional FFG species was recorded Swamp Diuris which is also listed as VROTS.

## 5.2 Next Steps

### 5.2.1 Additional assessments required

The implementation of the following actions is recommended to further develop an understanding of the ecological impacts by the project:

- Complete further targeted flora surveys for conservation significant species that flower outside currently completed survey dates such as *Pterostylis*.
- Undertake targeted surveys in additional habitats and EVCs (e.g. grasslands) that have yet to be targeted for several conservation significant species, particularly reptiles.
- Undertake additional on ground habitat assessments for conservation significant species that have the potential to be impacted (e.g. fish).
- Undertake bird and bat utilisation studies that indicate the number of flights at rotor swept height\*.

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- Undertake detailed vegetation quality assessments where vegetation is to be removed or impacted. \*
- Complete an EPBC Act 'Self-Assessment' to better understand the projects potential to cause significant impact to MNES.

\*To be completed once final project design is finalised



## Phase 2 Targeted Ecological Assessments

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## 6 References

DELWP (2017) *Guidelines for the removal, destruction or lopping of native vegetation*. Department of Environment, Land, Water and Planning. Government of Victoria.

DELWP (2018) *DRAFT - Solar Energy Facilities Design and Development Guidelines*.

Available at:

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DELWP (2019a) *Development of Wind Energy Facilities in Victoria: Policy and Planning Guidelines*. Available at:

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DSE (2007) *Advisory list of threatened vertebrate fauna in Victoria - 2007, Environmental Research*.

Emerge Associates (2019) *Phase 1 Ecological Study Joel Joel Wind and Solar Farm*.

RBGBV (2015) *VICFLORA Flora of Victoria*. Available at: <https://vicflora.rbg.vic.gov.au/> (Accessed: 10 September 2019).

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# Figures



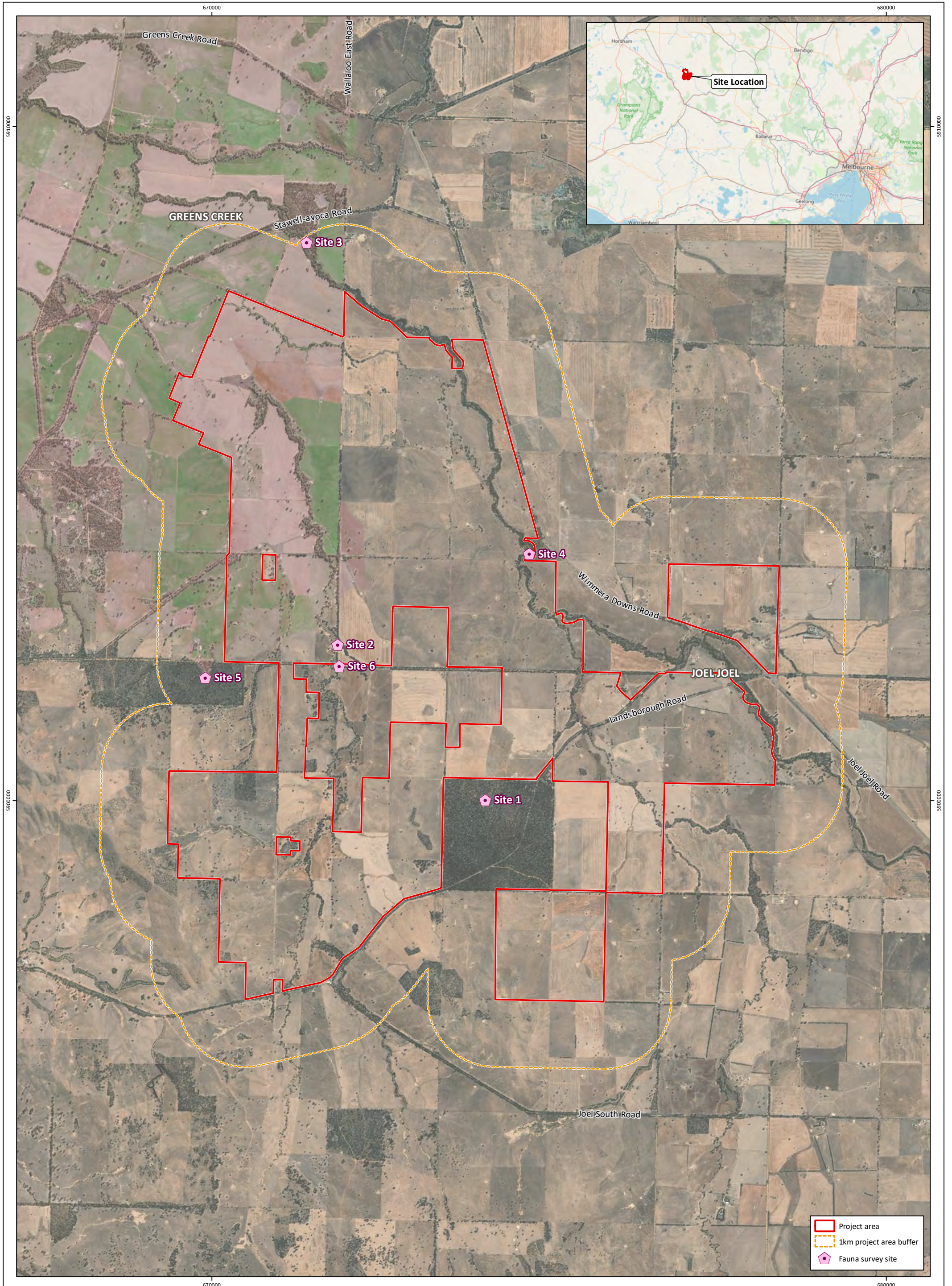
*Figure 1: Study Area Location*

*Figure 2: Significant Flora Observations*

*Figure 3: Golden Sun Moth observations and potential habitat zones*



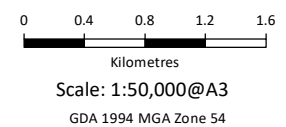




**Figure 1: Study Area Location**

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**Client:** RES Australia

**Plan Number:** VEP19-014(02)-F17  
**Drawn:** GAR  
**Date:** 12/02/2020  
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**Approved:** DRAFT  
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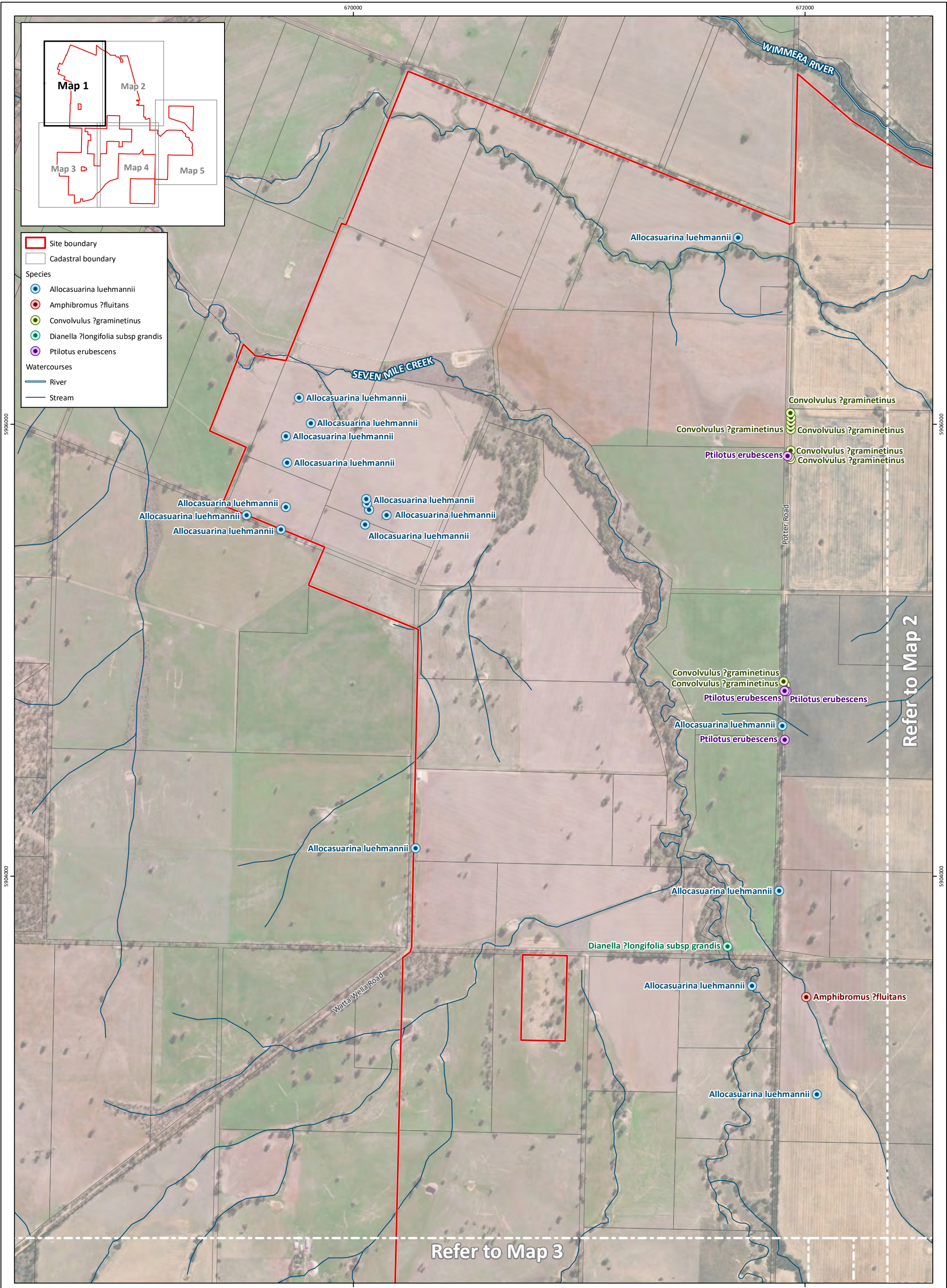
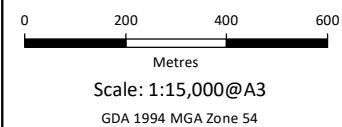


Figure 2a: Significant Flora Records - Map 1 of 5

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**Plan Number:** VEP19-014(02)-F18  
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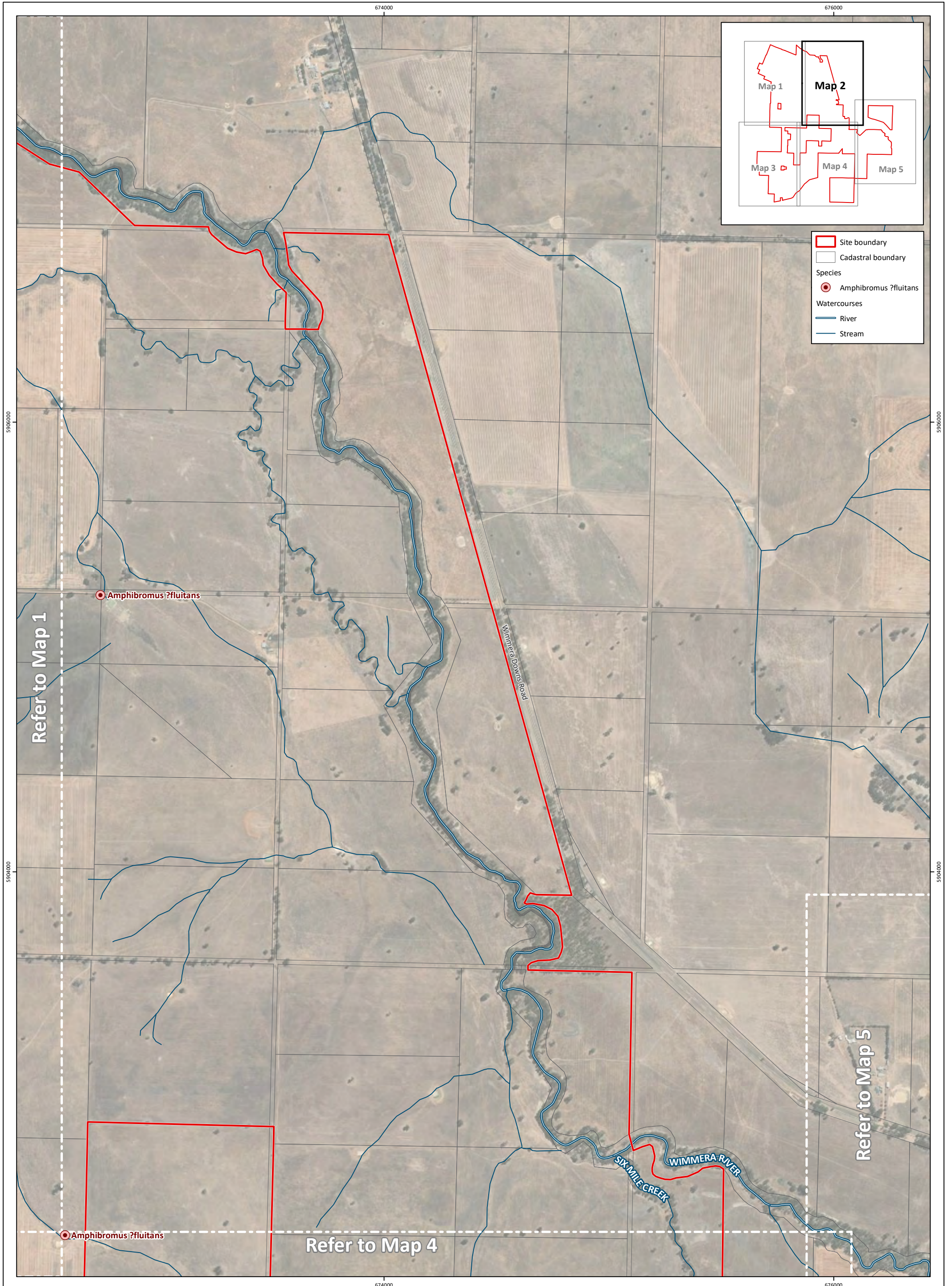


Figure 2b: Significant Flora Records - Map 2 of 5

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GDA 1994 MGA Zone 54



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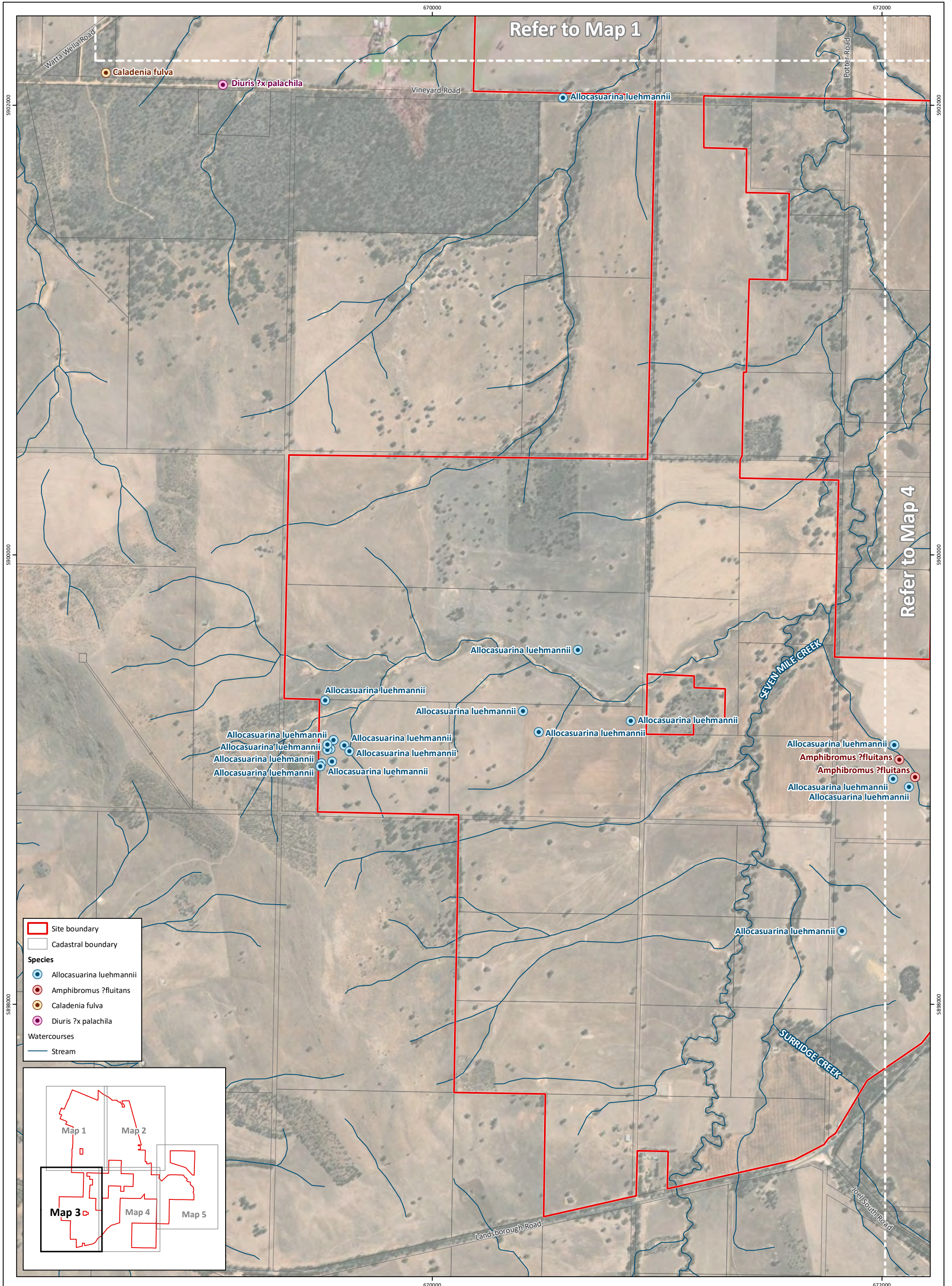


Figure 2c: Significant Flora Records - Map 3 of 5

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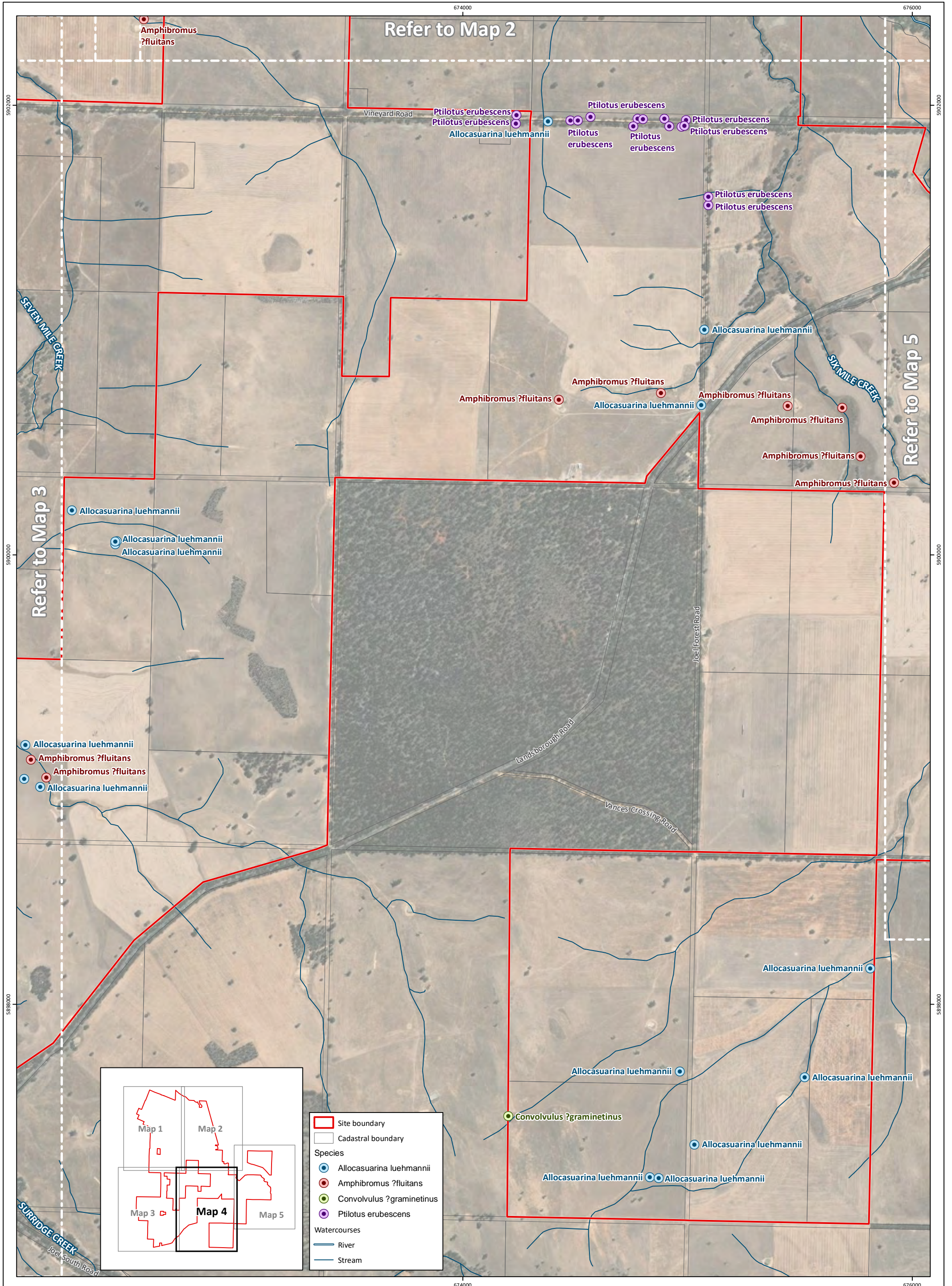
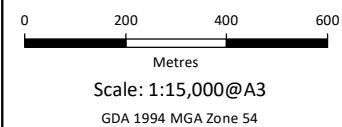


Figure 2d: Significant Flora Records - Map 4 of 5

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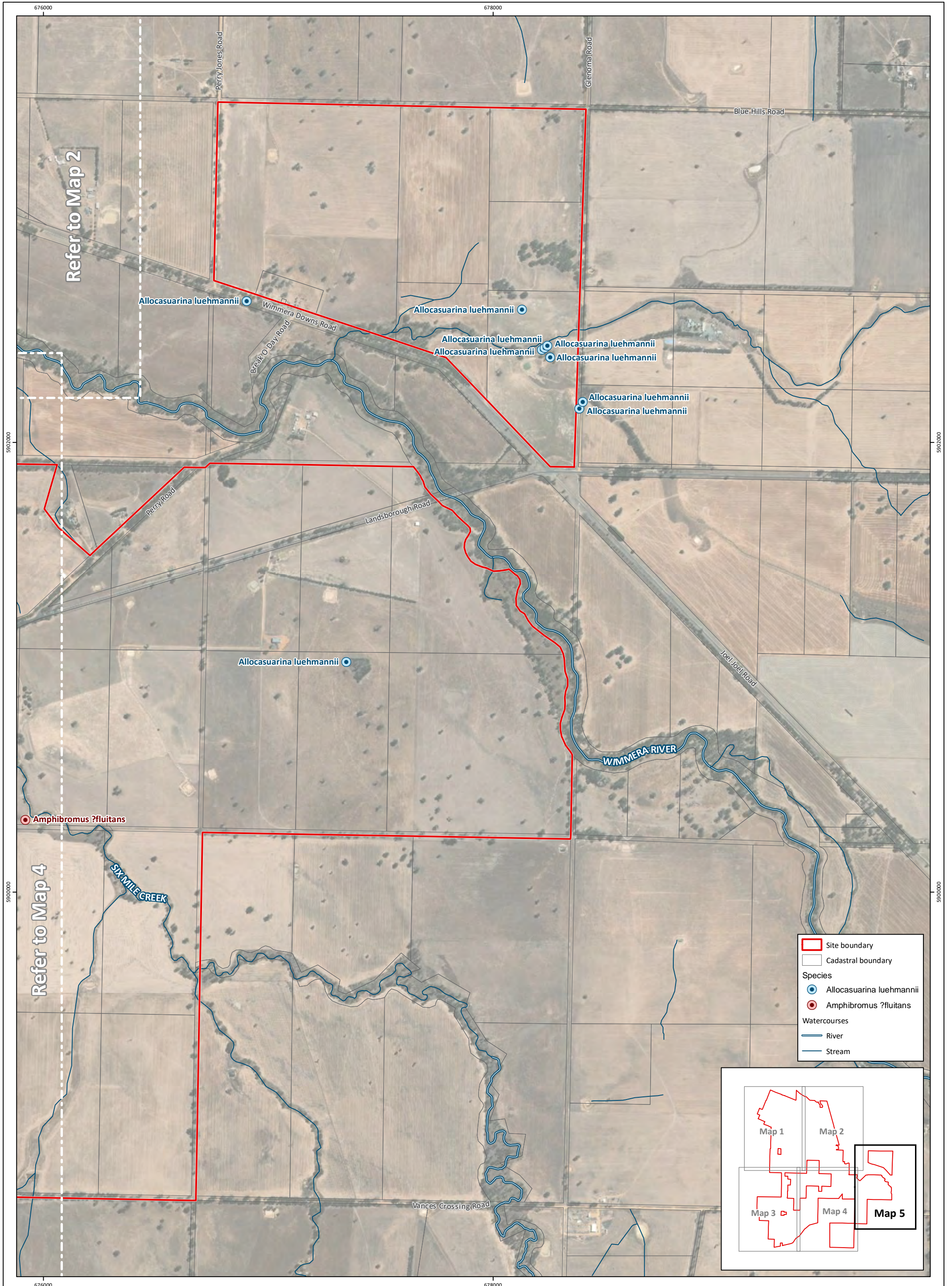
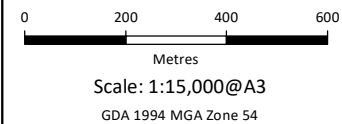


Figure 2e: Significant Flora Records - Map 5 of 5

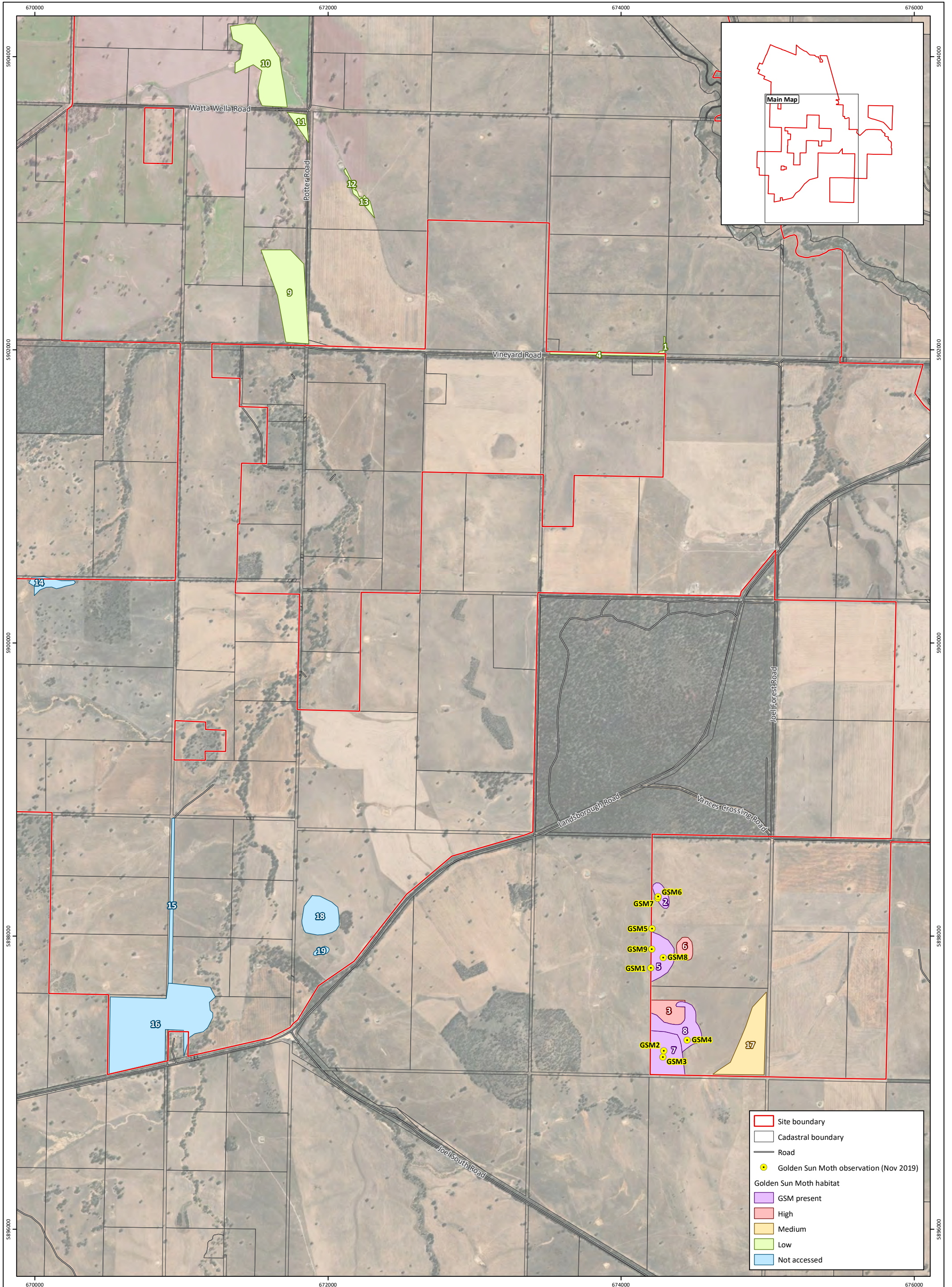
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**Client:** RES Australia

**Plan Number:** VEP19-014(02)-F22  
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**Date:**



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**Figure 3: Golden Sun Moth Observations and Potential Habitat Zones**

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# Appendix A

Likelihood of Occurrence Assessment



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Appendix A1: Significant flora likelihood of occurrence assessment.

Scientific Name	Common Name	Conservation Status			Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS					
<i>Allocasuarina luehmannii</i>	Buloke		L	e	8 (2013)	VBA	Usually found growing in woodland with Grey Box on a range of on non-calcareous soils types, mainly sandy loams. It is usually found on lower parts of the landscape mainly north and west of the Great Dividing Range and within the Murray-Darling Basin.	Present	Present
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass	VU				PMST	Inhabits both natural and man-made water-bodies, including swamps, lagoons, billabongs and dams.	Potential	Present
<i>Caladenia audasii</i>	Mclvor Spider-orchid	EN	L	e		PMST	Endemic to Victoria where known only from the west and central goldfields in woodland on shallow stony soils.	Potential	Potential
<i>Caladenia fulva</i>	Tawny Spider-orchid	EN	L	e	6 (2010)	PMST & VBA	Known only from open ironbark/yellow gum forests on shallow clay loams in the Stawell area.	Present-adjacent to the site	Present
<i>Caladenia ornata</i>	Ornate Pink-fingers	VU	L	v		PMST	In Victoria known only from the south-west in heathy forest on seasonally moist sandy loam.	Potential	Potential
<i>Caladenia reticulata s.s.</i>	Veined Spider-orchid			v	2 (1991)	VBA	In Victoria, known only from scattered localities in the Stawell, Ararat, Horsham and Dunolly areas. Usually in open <i>Eucalyptus leucoxylon</i> woodland on poorly structured clay loams.	Potential	Potential
<i>Caladenia tensa</i>	Rigid Spider-orchid	EN		v		PMST	Plains areas of western Victoria, in Cypress-pine/Yellow Gum Woodland, Heathy Woodland and Mallee on sands and sandy loams derived from aeolian sand deposits	Potential	Potential
<i>Caladenia versicolor</i>	Candy Spider-orchid	VU	L	e		PMST	Restricted to the western part of the Midlands region in the vicinity of Stawell, in woodland on winter-wet sandy loam.	Potential	Potential
<i>Comesperma polygaloides</i>	Small Milkwort		L	v	3 (1998)	VBA	Remnant native grasslands on the Western (Basalt) Plains where it is restricted to small localised stands on roadsides and railway reserves (Scarlett 1981). These	Potential	Potential



Scientific Name	Common Name	Conservation Status			Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS					
							grasslands are dominated by Kangaroo Grass, Silver Tussock and Wallaby Grasses. It is less commonly a component of the grassy woodlands of the Wimmera extending east to the Bendigo area. These woodlands are generally dominated by Grey Box, Yellow Gum or in mallee communities on relatively fertile soils.		
<i>Convolvulus ? graminetinus</i>	Grassland Bindweed			v			Occurs mainly on clay soils on alluvial plains with Eucalyptus coolabah and E. tereticornis and on rolling downs, often derived from basalt, dominate by Dichanthium sericeum. In north-eastern NSW it is found in Eucalyptus albens woodlands on clay to clay loam soils and in Acacia harpophylla – Casuarina cristata woodlands. In drier areas it occurs on clay soil downs with chenopods.	Not considered	Present
<i>Daviesia genistifolia</i> s.s.	Broom Bitter-pea			r	1 (2012)	VBA	Scattered across northern Victoria from the South Australian border to near Wangaratta (e.g. Dimboola, Wedderburn, Nagambie and Chiltern areas) but rare. Found in dry sclerophyll forests.	Potential	Potential
<i>Dianella</i> sp. aff. <i>longifolia</i> (Benambra)	Arching Flax-lily			v	2 (2012)	VBA	Occurs in lowland plains grassland and grassy woodlands (e.g. Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes than the var. <i>longifolia</i> .	Possible	Present
<i>Dianella</i> sp. aff. <i>longifolia</i> (Riverina)	Pale Flax-lily			v	1 (2012)	VBA	Occurs in lowland plains grassland and grassy woodlands (e.g. Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes than the var. <i>longifolia</i> (e.g. between Swifts Creek and Omeo, Benambra-Corryong district, Don River near Launching Place). Rather rare in the State.	Likely	Potential
<i>Digitaria divaricatissima</i> var. <i>divaricatissima</i>	Umbrella Grass			v	1 (1998)	VBA	Rare in Victoria and collected in recent times only from Dimboola, Mildura, Charlton, Tocumwal, Mitiamo and Springhurst areas, and Mt Arapiles. Mostly on heavier soils prone to occasional flooding.	Potential	Potential

Scientific Name	Common Name	Conservation Status			Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS					
<i>Diuris behrii</i>	Golden Cowslips			v	1 (2013)	VBA	Locally common in grassland and open woodland around Derrinallum, Stawell and the Grampians.	Likely	Likely
<i>Diuris palustris</i>	Swamp Diuris		L	v	2 (1998)	VBA	Swampy depressions within grassland or open woodland communities. Distributed around Melbourne and western Victoria, however probably now extinct in all or most sites around Melbourne.	Potential	Potential
<i>Dodonaea procumbens</i>	Trailing Hop-bush	VU		v		PMST	Low-lying and wet areas in woodland, low open forests, heathland and grasslands, on sands and clays.	Potential	Potential
<i>Eucalyptus froggattii</i>	Kamarooka Mallee		L	r	1 (1998)	VBA	Endemic to Victoria. Disjunctly distributed in mallee scrubs and woodlands north-west of Nhill, south-west of Horsham, near Charlton and north of Bendigo.	Potential	Potential
<i>Euphrasia collina subsp. muelleri</i>	Purple Eyebright	EN	L	e	3 (1998)	VBA	Formerly widespread in lowland to montane central and western Victoria, now very rare due to habitat destruction, surviving in heathland and heathy woodland on the Mornington Peninsula and near Jamieson.	Potential	Potential
<i>Geranium sp. 3</i>	Pale-flower Crane's-bill			r	1 (2005)	VBA	Open grassy areas of dry woodland to forest.	Likely	Likely
<i>Glycine latrobeana</i>	Clover Glycine	VU	L	v	1 (1992)	VBA	Endemic in Victoria and sporadically dispersed. Grows mainly in grasslands and grassy woodlands. Native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer.	Potential	Potential
<i>Goodenia benthamiana</i>	Small-leaf Goodenia			r	1 (2013)	VBA	Scattered across western Victoria in an area bounded by the Big Desert in the north, Mt Arapiles in the south and the Whipstick Scrub near Bendigo in the east. Found in open-forest, woodland and mallee scrub.	Potential	Potential
<i>Goodenia lineata</i>	Grampians Goodenia			r	1 (1996)	VBA	Known only from the Grampians, Mt Clay and the lower Glenelg River area, usually in heathland on sandy soils.	Potential	Potential

Scientific Name	Common Name	Conservation Status			Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS					
<i>Grevillea dryophylla</i>	Goldfields Grevillea			r	1 (1992)	VBA	Fairly common in the Western Goldfields in the Bendigo-St Arnaud-Maryborough-Castlemaine district. Grows in dry eucalypt forest (box-ironbark-stringybark associations) in poor stony or gravelly soil.	Potential	Potential
<i>Hibbertia humifusa subsp. humifusa</i>	Rising Star Guinea-flower			r	6 (2000)	VBA	Confined to dry woodlands of the northern Grampians, Deep Lead near Stawell, with a disjunct occurrence at Mt Ida near Heathcote.	Potential	Potential
<i>Lachnagrostis adamsonii</i>	Adamson's Blown-grass	EN	L	v		PMST	Slightly saline, seasonally wet areas.	Potential	Potential
<i>Leucochrysum albicans var. tricolor</i>	White Sunray	EN	L	e		PMST	Cool regions with moist non-sandy soils.	Unlikely	Unlikely
<i>Leucopogon virgatus var. brevifolius</i>	Common Beard-heath			r	2 (2005)	VBA	Rather uncommon in heathland and heathy woodlands on deep sands from the Douglas-Edenhope area in the south-west to the northern fringe of the Little Desert, near Nhill.	Potential	Unlikely
<i>Pimelea spinescens subsp. spinescens</i>	Spiny Rice-flower	CR	L	e		PMST	Grows in grassland, open shrubland and occasionally woodland, often on basalt-derived soils. Mostly west and north of Melbourne.	Potential	Potential
<i>Prasophyllum maccannii</i>	Inland Leek-orchid		L	v	2 (2009)	VBA	Occurs in open forests, particularly those dominated by <i>Eucalyptus baxteri</i> and <i>Callitris rhomboidea</i> , on well-drained gravelly or sandy loams. Apparently confined to the Stawell, Deep Lead and northern Grampians area of western Victoria.	Potential	Potential
<i>Prasophyllum subbisectum</i>	Pomonal Leek-orchid	EN	L	e		PMST	A poorly known species apparently confined to woodlands in the Ararat/Pomonal/Deep Lead area of western Victoria.	Potential	Potential
<i>Prasophyllum validum</i>	Sturdy Leek-orchid	VU				PMST	Scattered across northern and western open forest and woodland communities on stony and sandy soils.	Potential	Potential

Scientific Name	Common Name	Conservation Status			Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS					
<i>Pterostylis cheraphila</i>	Floodplain Rustyhood	VU	L	v		PMST	Endemic to Victoria and known only from the Little Desert area and near Murtoa in riverine <i>Eucalyptus largiflorens</i> woodland, growing amongst ephemerals on sandy loam or cracking silty soils.	Unlikely	Unlikely
<i>Pterostylis chlorogramma</i>	Green-striped Greenhood	VU	L	v		PMST	Grows in moist areas of heathy and shrubby forest, on well-drained soils.	Potential	Potential
<i>Pterostylis diminuta</i>	Crowded Greenhood			k	2 (1992)	VBA	Apparently endemic to Victoria where known only from between Ballarat and the Grampians in woodland and open forest with a tussocky or sparse shrubby understorey, on well-drained gravelly or stony soil.	Potential	Potential
<i>Ptilotus erubescens</i>	Hairy Tails		L	v	1 (1995)	VBA	Occasional on relatively fertile soils supporting grassland and woodland communities in northern and western Victoria, but not in mallee areas.	Potential	Present
<i>Rutidosia leptorrhynchoides</i>	Button Wrinklewort	EN	L	e	1 (1994)	PMST & VBA	Confined to basaltic grasslands. In Victoria known distribution is between Rokewood and Melbourne.	Potential	Potential
<i>Schoenus nanus</i>	Tiny Bog-sedge			r	1 (2005)	VBA	In seasonally wet habitats.	Likely	Potential
<i>Senecio macrocarpus</i>	Large-headed Fireweed	VU	L	e		PMST	Largely confined to remnant Kangaroo-grass grasslands on loamy grey soils derived from Basalt. Also known from auriferous ground near Stawell	Potential	Unlikely
<i>Thelymitra matthewsii</i>	Spiral Sun-orchid	VU	L	v		PMST	Common and widespread in various habitats, from watercourses to scrubby woodlands, in sand, gravel and clay soils.	Potential	Potential
<i>Thelymitra X macmillanii</i>	Crimson Sun-orchid			v	1 (1995)	VBA	Presumed hybrid between <i>T. antennifera</i> and either <i>T. carnea</i> , <i>T. rubra</i> or <i>T. nuda-pauciflora</i> . Occurs sporadically where parent species grow.	Potential	Potential
<i>Xerochrysum palustre</i>	Swamp Everlasting	VU	L	v		PMST	Sedge-rich lowland swamps and wetlands, usually on black cracking clay soils.	Potential	Potential



Appendix A2: Significant fauna likelihood of occurrence assessment.

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Acrocephalus stentoreus</i>	Clamorous Reed Warbler				Mi	17 (2006)	VBA	Large reed beds.	Likely	Potential
<i>Actitis hypoleucos</i>	Common Sandpiper				Mi		PMST	Edges of saltwater to fresh waterbodies and wetlands, e.g. estuaries, lakes, drainage lines, tidal watercourses and mudflats; occasionally beaches and rocky headlands; mainly spring-summer non-breeding migrant.	Unlikely	Unlikely
<i>Anas rhynchotis</i>	Australasian Shoveler				vu	18 (2001)	VBA	Inhabits various wetlands, preferring large, well-vegetated freshwater swamps and wetlands. Also, estuaries, coastal inlets and artificial waterbodies (e.g. dams, sewage ponds).	Likely	Potential
<i>Anthochaera phrygia</i>	Regent Honeyeater	CR	L		cr		PMST	Widespread but with an extremely patchy distribution. In Victoria, most sightings originate from a few sites in north-east Victoria and includes breeding habitat (Chiltern-Albury).	Unlikely	Unlikely
<i>Aprasia parapulchella</i>	Pink-tailed Worm-Lizard	VU	L		en		PMST	Inhabits sloping, open woodland areas with predominantly grassy groundlayers and rocky outcrops, particularly those dominated by Kangaroo Grass. Victorian distribution restricted to isolated population near Bendigo.	Potential	Potential

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Apus pacificus</i>	Fork-tailed Swift				Mi		PMST	Aerial over a wide range of habitats, from inland to coast; spring-summer non-breeding migrant.	Potential	Potential
<i>Ardea modesta</i>	Eastern Great Egret		L	vu		2 (1999)	VBA	Freshwater and brackish wetlands and watercourses, intertidal mudflats, inland lakes, swamps and rivers; also farm dams, irrigation drainages and artificial wetlands.	Likely	Potential
<i>Aythya australis</i>	Hardhead			vu		10 (2001)	VBA	Deep, permanent open freshwater wetlands and waterbodies with dense fringing vegetation. Sometimes artificial wetlands (dams, sewage ponds), especially during dry periods inland.	Likely	Potential
<i>Biziura lobata</i>	Musk Duck			vu		11 (2001)	VBA	Permanent freshwater and brackish swamps and wetlands with dense vegetation, more open waters in non-breeding season; occasionally coastal areas and estuaries.	Likely	Potential
<i>Botaurus poiciloptilus</i>	Australasian Bittern	EN	L	en			PMST	Occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.	Potential	Unlikely
<i>Calidris acuminata</i>	Sharp-tailed Sandpiper				Mi		PMST	Margins of brackish waterbodies with emergent sedges grassland, saltmarsh or similar vegetation.	Potential	Unlikely



Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Calidris ferruginea</i>	Curlew Sandpiper	CR		en	Mi		PMST	Coastal estuaries, bays and shallow wetlands, tidal mudflats and sandflats; mainly spring-summer non-breeding migrant.	Unlikely	Unlikely
<i>Calidris melanotos</i>	Pectoral Sandpiper			nt	Mi		PMST	Shallow freshwater or brackish wetlands, including swamps, flooded grasslands, sewage ponds, occasionally tidal flats and saltmarshes.	Potential	Unlikely
<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	EN	L	en			PMST	Coastal heath and scrub, dry and wet sclerophyll forest, rainforest. Generally a forest dependent species requiring large intact areas of vegetation.	Unlikely	Unlikely
<i>Delma impar</i>	Striped Legless Lizard	VU	L	en			PMST	Native grasslands and grassy woodland, within grass tussocks, cracks in the ground or under rocks. Has been Present in exotic pasture.	Potential	Potential
<i>Gallinago hardwickii</i>	Latham's Snipe		N	nt	Mi		PMST	Wet grasslands and pastures, open and wooded swamps; spring-summer non-breeding migrant.	Potential	Potential
<i>Grantiella picta</i>	Painted Honeyeater	VU	L	vu			PMST	Open box-ironbark forests, eucalypt and casuarina woodlands and well vegetated watercourses, particularly where trees are infested with mistletoe; mainly spring-summer migrant to south-eastern Australia.	Potential	Potential

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Grus rubicunda</i>	Brolga		L	vu		4 (2008)	VBA	Largely associated with ephemeral freshwater and brackish wetlands, grasslands, floodplains, irrigated pastures and saltmarsh.	Likely	Potential
<i>Hirundapus caudacutus</i>	White-throated Needletail			vu		5 (2014)	PMST & VBA	Aerial, mainly eastern Australia often associated with coastal and mountain regions; spring-summer non-breeding migrant.	Likely	Potential
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot (eastern)	EN	L	nt			PMST	Heathy forest, heath and coastal scrub.	Unlikely	Unlikely
<i>Lathamus discolor</i>	Swift Parrot	CR	L	en		7 (2013)	PMST & VBA	Breeds in Tasmania, late spring-summer; occurs as non-breeding migrant to mainland south-eastern Australia mainly autumn-early spring. Generally prefers Box-Ironbark forests and woodlands inland of the Great Dividing Range; sometimes also other forests and woodlands in coastal and sub-coastal areas.	Likely	Potential
<i>Leipoa ocellata</i>	Malleefowl	VU	L	en			PMST	Mallee woodlands, scrubland and heathlands, often with sandy substrate. Breeds in areas with good leaf litter layer. Occasional forage in open areas, including farmland and clearing amongst mallee.	Unlikely	Unlikely

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Litoria raniformis</i>	Growling Grass Frog	VU	L	en			PMST	Permanent lakes, swamps, dams and lagoons or very wet areas in woodland and shrubland; often in waterbodies with dense standing and floating vegetation.	Potential	Potential
<i>Maccullochella peelii peelii</i>	Murray Cod	VU	L	en			PMST	Small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow flowing, silty rivers of the Murray Darling Basin.	Potential	Potential
<i>Melanodryas cucullata cucullata</i>	Hooded Robin		L	nt		9 (2003)	VBA	Lowlands and foothills. Inhabits a range of vegetation, particularly with fallen timber and logs, including open eucalypt forest and box-ironbark woodland, mallee and mulga woodland, cypress pine woodlands, mallee heath. with scattered trees, often clearings adjacent to woodland and forest.	Potential	Potential
<i>Merops ornatus</i>	Rainbow Bee-eater	Treaty				17 (2013)	PMST & VBA	Spring-summer migrants to Victoria where they occur in many wooded habitats with an annual rainfall of less than 800 mm, especially north of the Great Divide; often along vegetated watercourses and cuttings or banks along watercourses.	Present	Present

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Motacilla flava</i>	Yellow Wagtail				Mi		PMST	Habitat includes artificial/aquatic - wastewater treatment areas, pastureland, grassland, temperate shrublands and inland wetlands.	Potential	Potential
<i>Myiagra cyanoleuca</i>	Satin Flycatcher				Mi		PMST	Mainly in wet forests and dense woodlands, particularly with tall canopy of eucalypts with an understorey of tea-trees and wattles along streams. Seasonal visitor (mainly spring) to drier inland woodlands, coastal areas and occasionally gardens and parklands.	Potential	Potential
<i>Ninox strenua</i>	Powerful Owl		L	vu		2 (1999)	VBA	Foothill and coastal forests where they favour gullies with Peppermint and Manna Gum forests; some dispersal to lowland areas, including parks and gardens with large trees in autumn-winter.	Potential	Potential
<i>Numenius madagascariensis</i>	Eastern Curlew	CR		vu	Mi		PMST	Coastal lakes, estuaries, tidal mudflats and sandflats, mangroves and saltmarshes; occasionally fresh or brackish lakes near coast; mainly spring-summer non-breeding migrant.	Potential	Unlikely
<i>Oxyura australis</i>	Blue-billed Duck		L	en		18 (2001)	VBA	Well vegetated freshwater swamps, large dams, lakes. Typically on more open waters in winter.	Likely	Unlikely

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Pedionomus torquatus</i>	Plains-wanderer	CR	L	cr			PMST	Low, open native grasslands, typically with sward less than 1 m high, with extensive inter-tussock spaces and high diversity of small herbs; sometimes in unimproved pastures or crops.	Potential	Potential
<i>Petaurus norfolcensis</i>	Squirrel Glider		L	en	2 (1985)		VBA	Inhabits mature of old grown Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with health understorey in coastal areas. Prefers mixed species stands with a shrub or <i>Acacia</i> understorey, and requires abundant tree hollows for nest sites.	Likely	Potential
<i>Pogona barbata</i>	Bearded Dragon			vu	3 (2013)		VBA	Occurs in a range of habitats ranging from woodlands, grasslands and heathlands.	Likely	Likely
<i>Potorous tridactylus tridactylus</i>	Long-nosed Potoroo	VU	L	en			PMST	Coastal Victoria, in coastal heathy woodland, rainforest, adjacent to wet sclerophyll forest. Requires dense cover.	Unlikely	Unlikely
<i>Pseudomys fumeus</i>	Smoky Mouse	EN	L	cr			PMST	A variety of vegetation communities, ranging from coastal heath to dry ridgeline forest, sub-alpine heath and, occasionally, wetter gullies (Menkhorst and Seebeck 1981). Except for the wetter sites, a consistent feature of Smoky	Potential	Potential

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
								Mouse habitats is the diversity of heath and bush-pea species present, combined with potential shelter sites in the form of woody debris or rocks. The vegetation at capture sites varies widely in age post-fire.		
<i>Pseudophryne bibronii</i>	Brown Toadlet		L	en	3 (1983)	VBA	Forests, woodlands, shrublands, grassland and heaths, sheltering under moist leaf litter and other debris in boggy soaks and depressions.	Likely	Potential	
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	L	vu		PMST	Roost sites commonly occur in gullies, in vegetation with dense canopy cover and close to water. Rarely more than 200 km inland.	Potential	Potential	
<i>Rhipidura rufifrons</i>	Rufous Fantail					PMST	Typically a fantail of dense forests such as rainforests, wet sclerophyll forests, monsoon forests, mangroves and riparian vegetation (Morcombe 2000) with a common preference for a shrubby understory (Higgins et al. 2006). Inhabits and breeds in wet eucalypt forests and rainforests, particularly gullies and in dense undergrowth. Seasonal (mainly autumn-winter) dispersal to more open habitat (e.g. woodlands, parklands with areas of dense undergrowth, box ironbark forests).	Potential	Unlikely	

Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
<i>Rostratula australis</i>	Australian Painted Snipe	EN	L	cr			PMST	Has been recorded from wetlands in all Australian states, however is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter. Inhabits shallow, well vegetated, temporary or infrequently filled wetlands, which may have associated trees, shrubs or samphire. Occasionally inhabits brackish wetlands, saltmarsh or claypans. Typical sites include those with rank emergent tussocks of grass, sedges, rushes, reeds or samphire, often with clumps of <i>Muehlenbeckia</i> or sometimes <i>Melaleuca</i> . Feeds on seeds and invertebrates from the water's edge.	Likely	Potential
<i>Stagonopleura guttata</i>	Diamond Firetail		L	nt	13 (2014)		VBA	Open grassy eucalypt or cypress pine woodlands, acacia shrublands and edges of farmland or grassland close to wooded or lightly timbered areas. Often in wooded areas close to watercourses.	Likely	Likely
<i>Synemon plana</i>	Golden Sun Moth	CR	L	cr			PMST	Native grasslands and grassy woodlands, particularly where	Present	Present



Scientific Name	Common Name	Conservation Status				Records (Year)	Source	Habitat Preferences	Likelihood of Occurrence (Phase 1)	Likelihood of Occurrence (Phase 2)
		EPBC Act	FFG Act	VROTS	Migratory					
								Wallaby-grasses dominant. Now recognised to occur also in exotic grasslands dominated by Chilean Needle Grass.		
<i>Tringa nebularia</i>	Common Greenshank				Mi		PMST	Margins of freshwater and brackish wetlands, sewage ponds, saltmarshes, dams and sometimes tidal flats and estuaries.	Potential	Unlikely
<i>Varanus varius</i>	Lace Goanna					1 (2000)	VBA	Occurs in well-timbered areas from dry woodlands to cool temperate forests.	Potential	Potential

# Appendix B

Observed flora records



Scientific Name	Common Name	Origin	EPBC Act Conservation Status	VROT / FFG Act Conservation Status
<i>Acacia acinacea s.l.</i>	Gold-dust Wattle			
<i>Acacia acinacea s.s.</i>	Gold-dust Wattle			
<i>Acacia dealbata</i>	Silver Wattle			
<i>Acacia genistifolia</i>	Spreading Wattle			
<i>Acacia gunnii</i>	Ploughshare Wattle			
<i>Acacia mearnsii</i>	Black Wattle			
<i>Acacia melanoxylon</i>	Blackwood			
<i>Acacia paradoxa</i>	Hedge Wattle			
<i>Acacia pycnantha</i>	Golden Wattle			
<i>Acacia ulicifolia</i>	Juniper Wattle			
<i>Acaena spp.</i>	Sheep's Burr			
<i>Acetosella vulgaris</i>	Sheep Sorrel	*		
<i>Acrotriche serrulata</i>	Honey-pots			
<i>Aira elegantissima</i>	Delicate Hair-grass	*		
<i>Allium triquetrum</i>	Three-corner Garlic	*		
<i>Allocasuarina luehmannii</i>	Buloke			En, L
<i>Allocasuarina muelleriana subsp. muelleriana</i>	Slaty Sheoak			
<i>Allocasuarina verticillata</i>	Drooping Sheoak			
<i>Alternanthera spp.</i>	Joyweed			
<i>Amphibromus fluitans</i>	River Swamp Wallaby-grass		VU	
<i>Amphibromus nervosus</i>	Common Swamp Wallaby-grass			
<i>Amphibromus spp.</i>	Swamp Wallaby-grass			
<i>Amyema miquelii</i>	Box Mistletoe			
<i>Anthosachne scabra s.s.</i>	Common Wheat-grass			
<i>Arctotheca calendula</i>	Cape weed	*		
<i>Aristida behriana</i>	Brush Wire-grass			
<i>Arthropodium spp.</i>	Vanilla Lily			
<i>Asparagus asparagoides</i>	Bridal Creeper	*		
<i>Astroloma humifusum</i>	Cranberry Heath			
<i>Austrostipa bigeniculata</i>	Kneed Spear-grass			
<i>Austrostipa densiflora</i>	Dense Spear-grass			
<i>Austrostipa elegantissima</i>	Feather Spear-grass			
<i>Austrostipa mollis</i>	Supple Spear-grass			
<i>Austrostipa scabra subsp. falcata</i>	Rough Spear-grass			
<i>Austrostipa spp.</i>	Spear Grass			
<i>Avena fatua</i>	Wild Oat	*		
<i>Avena sativa</i>	Oat	*		
<i>Bellardia latifolia</i>	Bellardia	*		
<i>Billardiera cymosa s.l.</i>	Sweet Apple-berry			
<i>Blennospora drummondii</i>	Dwarf Beauty-heads			
<i>Brachyloma daphnoides</i>	Daphne Heath			

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<i>Brachypodium distachyon</i>	False Brome	*		
<i>Brachyscome paludicola</i>	Woodland Swamp-daisy			
<i>Briza maxima</i>	Large Quaking-grass	*		
<i>Briza minor</i>	Lesser Quaking-grass	*		
<i>Bromus diandrus</i>	Great Brome	*		
<i>Bromus hordeaceus</i>	Soft Brome	*		
<i>Bromus rubens</i>	Red Brome	*		
<i>Bromus spp.</i>	Brome			
<i>Brunonia australis</i>	Blue Pincushion			
<i>Bulbine bulbosa</i>	Bulbine Lily			
<i>Burchardia umbellata</i>	Milkmaids			
<i>Bursaria spinosa subsp. spinosa</i>	Sweet Bursaria			
<i>Cactaceae</i>	Cactus (planted)			
<i>Caladenia carnea</i> sensu Willis (1970)	Pink Fingers			
<i>Caladenia fulva</i>	Tawny Spider-orchid		EN	En, L
<i>Calocephalus spp.</i>	Calocephalus			
<i>Calotis anthemoides</i>	Cut-leaf Burr-daisy			
<i>Calytrix tetragona</i>	Common Fringe-myrtle			
<i>Carduus spp.</i>	Slender Thistle	*		
<i>Carex appressa</i>	Tall Sedge			
<i>Carex breviculmis</i>	Common Grass-sedge			
<i>Carex spp.</i>	Sedge			
<i>Carex spp.</i>	Sedge			
<i>Carex tereticaulis</i>	Poong'ort			
<i>Cassytha glabella</i>	Slender Dodder-laurel			
<i>Cassytha spp.</i>	Dodder-laurel			
<i>Centipeda cunninghamii</i>	Common Sneezeweed			
<i>Centrolepis strigosa subsp. strigosa</i>	Hairy Centrolepis			
<i>Cerastium glomeratum s.s.</i>	Sticky Mouse-ear Chickweed	*		
<i>Chamaescilla corymbosa var. corymbosa</i>	Blue Stars			
<i>Cheilanthes sieberi subsp. sieberi</i>	Narrow Rock-fern			
<i>Chloris truncata</i>	Windmill Grass			
<i>Convolvulus ?graminetinus</i>	Grassland Bindweed			vu
<i>Convolvulus angustissimus subsp. angustissimus</i>	Blushing Bindweed			
<i>Correa spp.</i>	Correa			
<i>Crassula colorata</i>	Dense Crassula			
<i>Crassula decumbens var. decumbens</i>	Spreading Crassula			
<i>Cyanicula caerulea</i>	Blue Fairy			
<i>Cynogeton spp.</i>	Water Ribbons			

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<i>Cynodon dactylon</i> var. <i>dactylon</i>	Couch	*		
<i>Cynoglossum suaveolens</i>	Sweet Hound's-tongue			
<i>Cynosurus echinatus</i>	Rough Dog's-tail	*		
<i>Cyperus gunnii</i> subsp. <i>gunnii</i>	Flecked Flat-sedge			
<i>Cyrtostylis reniformis</i>	Small Gnat-orchid			
<i>Dactylis glomerata</i>	Cocksfoot	*		
<i>Damasonium minus</i>	Star Fruit			
<i>Damasonium minus</i>	Starfruit			
<i>Daucus glochidiatus</i>	Australian Carrot			
<i>Daviesia brevifolia</i>	Leafless Bitter-pea			
<i>Daviesia leptophylla</i>	Narrow-leaf Bitter-pea			
<i>Deyeuxia</i> spp.	Bent Grass			
<i>Dianella longifolia</i> var. <i>grandis</i>	Flax-lily (subject to confirmation once flowering)			vu
<i>Dianella revoluta</i> s.l.	Black-anther Flax-lily			
<i>Dichondra repens</i>	Kidney-weed			
<i>Dillwynia sericea</i>	Showy Parrot-pea			
<i>Dittrichia graveolens</i>	Stinkwort	*		
<i>Diuris chryseopsis</i>	Golden Moths			
<i>Diuris pardina</i>	Leopard Orchid			
<i>Drosera aberrans</i>	Scented Sundew			
<i>Drosera glanduligera</i>	Scarlet Sundew			
<i>Drosera macrantha</i> subsp. <i>planchonii</i>	Climbing Sundew			
<i>Drosera peltata</i> subsp. <i>peltata</i> spp. <i>agg.</i>	Pale Sundew			
<i>Echinopogon ovatus</i>	Common Hedgehog-grass			
<i>Ehrharta longiflora</i>	Annual Veldt-grass	*		
<i>Eleocharis acuta</i>	Common Spike-sedge			
<i>Erodium crinitum</i>	Blue Heron's-bill			
<i>Erodium moschatum</i>	Musky Heron's-bill	*		
<i>Eryngium ovinum</i>	Blue Devil			
<i>Eucalyptus camaldulensis</i>	River Red-gum			
<i>Eucalyptus globulus</i> subsp. <i>globulus</i>	Southern Blue-gum (planted)			
<i>Eucalyptus goniocalyx</i> s.l.	Bundy			
<i>Eucalyptus leucoxydon</i> subsp. <i>leucoxydon</i>	Yellow Gum			
<i>Eucalyptus melliodora</i>	Yellow Box			
<i>Eucalyptus microcarpa</i>	Grey Box			
<i>Eucalyptus polyanthemos</i>	Red Box			
<i>Eucalyptus</i> spp.	Various non-indigenous Eucalypts (planted)	#		
<i>Eucalyptus tricarpa</i>	Red Ironbark			

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<i>Eutaxia microphylla</i> var. <i>microphylla</i>	Common Eutaxia			
<i>Freesia</i> spp.	Freesia	*		
<i>Galium divaricatum</i>	Slender Bedstraw	*		
<i>Galium</i> spp.	Bedstraw			
<i>Genista linifolia</i>	Flax-leaf Broom	*		
<i>Geranium</i> spp.	Crane's Bill			
<i>Gladiolus</i> spp.	Gladiolus	*		
<i>Glossodia major</i>	Wax-lip Orchid			
<i>Gnaphalium indutum</i>	Tiny Cudweed			
<i>Gonocarpus elatus</i>	Tall Raspwort			
<i>Gonocarpus tetragynus</i>	Common Raspwort			
<i>Goodenia blackiana</i>	Black's Goodenia			
<i>Goodenia pinnatifida</i>	Cut-leaf Goodenia			
<i>Grevillea alpina</i>	Cat's Claw Grevillea			
<i>Grevillea robusta</i>	Silky Oak (planted)	*		
<i>Hakea</i> spp.	Hakea			
? <i>Helichrysum leucopsideum</i>	Satin Everlasting			
<i>Helminthotheca echioides</i>	Ox-tongue	*		
<i>Hibbertia australis</i>	Upright Guinea-flower			
<i>Hibbertia exutiacies</i>	Spiky Guinea-flower			
<i>Holcus lanatus</i>	Yorkshire Fog	*		
<i>Hordeum murinum</i> s.l.	Barley-grass	*		
<i>Hyalosperma praecox</i>	Mayweed Sunray			
<i>Hydrocotyle foveolata</i>	Yellow Pennywort			
<i>Hydrocotyle</i> spp.	Pennywort			
<i>Hypochaeris glabra</i>	Smooth Cat's-ear	*		
<i>Hypochaeris radicata</i>	Flatweed	*		
<i>Hypoxis</i> s.l. spp.	Hypoxis			
<i>Isolepis hookeriana</i>	Grassy Club-sedge			
<i>Isolepis hystrix</i>	Awned Club-sedge	*		
<i>Isolepis levynsiana</i>	Tiny Flat-sedge	*		
<i>Juncus acutus</i> subsp. <i>acutus</i>	Spiny Rush	*		
<i>Juncus amabilis</i>	Hollow Rush			
<i>Juncus bufonius</i>	Toad Rush			
<i>Juncus capitatus</i>	Capitate Rush	*		
<i>Juncus</i> spp.	Rush			
<i>Juncus subsecundus</i>	Finger Rush			
<i>Kennedia prostrata</i>	Running Postman			
<i>Lachnagrostis</i> spp.	Blown-grass			
<i>Lagenophora huegelii</i>	Coarse Bottle-daisy			
<i>Laphangium luteoalbum</i>	Jersey Cudweed			

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<i>Lepidium africanum</i>	Common Peppercross	*		
<i>Lepidosperma laterale</i>	Variable Sword-sedge			
<i>Lepidosperma</i> spp.	Sword Sedge			
<i>Leptorhynchos squamatus</i> subsp. <i>squamatus</i>	Scaly Buttons			
<i>Leptospermum myrsinoides</i>	Heath Tea-tree			
<i>Leucopogon virgatus</i>	Common Beard-heath			
<i>Lissanthe strigosa</i> subsp. <i>subulata</i>	Peach Heath			
<i>Lobelia pratioides</i>	Poison Lobelia			
<i>Lolium</i> spp.	Rye Grass	*		
<i>Lomandra filiformis</i> subsp. <i>coriacea</i>	Wattle Mat-rush			
<i>Lomandra filiformis</i> subsp. <i>filiformis</i>	Wattle Mat-rush			
<i>Lophopyrum ponticum</i>	Tall Wheat-grass	*		
<i>Lysimachia arvensis</i> (Blue-flowered variant)	Blue Pimpernel	*		
<i>Lythrum hyssopifolia</i>	Small Loosestrife			
<i>Maireana enchylaenoides</i>	Wingless Bluebush			
<i>Malva</i> spp.	Mallow	*		
<i>Marrubium vulgare</i>	Horehound	*		
<i>Microlaena stipoides</i> var. <i>stipoides</i>	Weeping Grass			
<i>Microseris walteri</i>	Yam Daisy			
<i>Microtis</i> spp.	Onion Orchid			
<i>Millotia muelleri</i>	Common Bow-flower			
<i>Millotia tenuifolia</i> var. <i>tenuifolia</i>	Soft Millotia			
<i>Montia australasica</i>	White Purslane			
<i>Neurachne alopecuroidea</i>	Fox-tail Mulga-grass			
<i>Orchidaceae</i> spp.	Orchid			
<i>Oxalis perennans</i>	Grassland Wood-sorrel			
<i>Oxalis pes-caprae</i>	Soursob	*		
<i>Oxalis purpurea</i>	Large-flower Wood-sorrel	*		
<i>Oxalis</i> spp.	Wood Sorrel			
<i>Ozothamnus obcordatus</i>	Grey Everlasting			
<i>Pelargonium rodneyanum</i>	Magenta Stork's-bill			
<i>Persicaria prostrata</i>	Persicaria prostrata			
<i>Phalaris aquatica</i>	Toowoomba Canary-grass	*		
<i>Pimelea curviflora</i> s.l.	Curved Rice-flower			
<i>Pimelea humilis</i>	Common Rice-flower			
<i>Pimelea</i> spp.	Rice Flower			
<i>Plantago</i> spp.	Plantain			
<i>Poa bulbosa</i>	Bulbous Meadow-grass	*		
<i>Poa labillardierei</i> var. <i>labillardierei</i>	Common Tussock-grass			

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<i>Poa sieberiana</i>	Grey Tussock-grass			
<i>Podolepis decipiens</i>	Common Podolepis			
<i>Potamogeton cheesemanii</i>	Floating Pondweed			
<i>Prostanthera denticulata</i>	Rough Mint-bush			
<i>Ptilotus erubescens</i>	Hairy Tails			Vu, L
<i>Ptilotus spathulatus</i>	Pussy Tails			
<i>Pultenaea largiflorens</i>	Twiggy Bush-pea			
<i>Pultenaea tenuifolia</i>	Slender Bush-pea			
<i>Rhodanthe corymbiflora</i>	Paper Sunray			
<i>Romulea rosea</i>	Onion Grass	*		
<i>Rosa rubiginosa</i>	Sweet Briar	*		
<i>Rumex brownii</i>	Slender Dock			
<i>Rumex crispus</i>	Curled Dock	*		
<i>Rytidosperma duttonianum</i>	Brown-back Wallaby-grass			
<i>Rytidosperma erianthum</i>	Hill Wallaby-grass			
<i>Rytidosperma geniculatum</i>	Kneed Wallaby-grass			
<i>Rytidosperma lepidopodum</i>	Scaly-foot Wallaby-grass			
<i>Rytidosperma pallidum</i>	Silvertop Wallaby-grass			
<i>Rytidosperma racemosum var. racemosum</i>	Slender Wallaby-grass			
<i>Rytidosperma semiannulare</i>	Wetland Wallaby-grass			
<i>Rytidosperma setaceum</i>	Bristly Wallaby-grass			
<i>Rytidosperma spp.</i>	Wallaby Grass			
<i>Salpichroa origanifolia</i>	Pampas Lily-of-the-Valley	*		
<i>Schinus molle</i>	Pepper Tree	*		
<i>Schoenus breviculmis</i>	Matted Bog-sedge			
<i>Senecio phelleus</i>	Stony Fireweed			
<i>Senecio picridioides</i>	Hawkbit Fireweed			
<i>Senecio quadridentatus</i>	Cotton Fireweed			
<i>Siloxerus multiflorus</i>	Small Wrinklewort			
<i>Stackhousia monogyna s.l.</i>	Creamy Stackhousia			
<i>Stackhousia spp.</i>	Stackhousia			
<i>Stenantha conostephioides</i>	Flame Heath			
<i>Stuartina muelleri</i>	Spoon Cudweed			
<i>Tetrateca spp.</i>	Pink-bells			
<i>Thelymitra antennifera</i>	Rabbit Ears			
<i>Thelymitra spp.</i>	Sun Orchid			
<i>Themeda triandra</i>	Kangaroo Grass			
<i>Thysanotus patersonii</i>	Twining Fringe-lily			
<i>Trifolium arvense var. arvense</i>	Hare's-foot Clover	*		
<i>Trifolium spp.</i>	Clover	*		
<i>Vellereophyton dealbatum</i>	White Cudweed	*		



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<i>Vicia sativa</i> subsp. <i>sativa</i>	Common Vetch	*		
<i>Vicia</i> spp.	Vetch	*		
<i>Vicia villosa</i>	Russian Vetch			
<i>Vittadinia gracilis</i>	Woolly New Holland Daisy			
<i>Vulpia</i> spp.	Fescue	*		
<i>Wahlenbergia luteola</i>	Bronze Bluebell			
<i>Wahlenbergia</i> spp.	Bluebell			
<i>Wahlenbergia stricta</i> subsp. <i>stricta</i>	Tall Bluebell			
<i>Wurmbea dioica</i>	Common Early Nancy			
<i>Xerochrysum viscosum</i>	Shiny Everlasting			

Where: \* denotes exotic species and native species