Barwon Solar Farm:
Flora and fauna assessment

Prepared for Elgin Energy Pty Ltd

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Summary

Biosis Pty Ltd (Biosis) was commissioned by Elgin Energy Pty Ltd (Elgin Energy) to undertake a flora and fauna assessment of a 800 hectare area of land proposed for development of a solar farm located at Little River, Victoria (the 'study area'), approximately 49 kilometres south west of Melbourne.

Ecological values

Key ecological values identified within the study area are as follows:

- 119 hectares of native patch vegetation comprised of EVC_VPP 55_63 Plains Grassy Woodland, EVC_VPP 68 Creekline Grassy Woodland, EVC_VPP 125 Plains Grassy Wetland, EVC_VPP 821 Tall Marsh and EVC_VPP 132_61 Heavier-soils Plains Grassland.
- 187 scattered trees (River Red-gum *Eucalyptus camaldulensis,* Melbourne Yellow Gum *Eucalyptus leucoxylon* subsp. *connata*, Yellow box *Eucalyptus melliodora,* Buloke *Allocasuarina luehmannii,* Grey Box *Eucalyptus microcarpa,* Manna Gum *Eucalyptus viminalis*) and 38 large patch trees (River Red-gum *Eucalyptus camaldulensis,* Melbourne Yellow Gum *Eucalyptus leucoxylon* subsp*. connata*, Yellow box *Eucalyptus melliodora,* Grey Box *Eucalyptus microcarpa* and Manna Gum *Eucalyptus viminalis*).
- Two threatened ecological communities including 84 hectares of Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVPP) and 1.4 hectares of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.
- Habitat for one threatened flora listed under the EPBC Act and three additional flora listed under the FFG Act (Appendix 1).
- Habitat for 18 threatened fauna; including seven species listed under the EPBC Act and 11 species listed under the FFG Act (Appendix 2).

Government legislation and policy

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

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
EPBC Act	Habitat for threatened species: • Swift Parrot • Grey-headed Flying-fox • Growling Grass Frog • Yarra Pygmy Perch • Golden Sun Moth (recorded) • Striped Legless Lizard • Spiny-rice Flower Two threatened ecological communities including	Referral recommended for impacts to Golden Sun Moth and NTGVPP. Should any works be proposed within the additional land parcel, located to the north of Little River or within patches of Plains Grassy Woodland, it is recommended that additional targeted	It is considered a low likelihood that the proposed Barwon Solar Farm will result in a significant impact on a population of Spiny-rice Flower. This species was not detected during targeted surveys of the initial investigation area, despite surveys being undertaken at appropriate times and in accordance with published survey methodologies. Grey-headed Flying-fox and Swift Parrot have a medium or higher likelihood to forage on flowering Eucalypts or lerp within

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
	Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVPP) and Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	surveys are undertaken for threatened species Striped Legless Lizard, Golden Sun Moth and Spiny Rice-flower.	the study area; with Melbourne Yellow Gum being a preferred tree species of Swift Parrot. However, as these trees form a very small component of a much larger network of foraging habitat utilised across much of Victoria and parts of South Australia, New South Wales and Queensland the proposed removal of any of these trees is considered unlikely to result in a significant impact on either of these species. It is considered a low likelihood that the proposed Barwon Solar Farm will result in a significant impact on a population of Striped Legless Lizard. This species was not detected during targeted surveys of the initial investigation area, despite tile grids being located within suitable habitat and surveys occurring during optimal weather conditions. Yarra Pygmy Perch has a medium of higher likelihood to occur within aquatic environments of Little River intercepting the study area. It is considered a low likelihood that the proposed Barwon Solar Farm would result in a significant impact on this species, as long as a site-specific Construction Environmental Management Plan (CEMP) implementing suitable erosion and pollutant control measures are applied. Growling Grass Frog has a medium likelihood to utilise aquatic environments within the study area for dispersal, foraging and shelter during periods of inactivity (over-wintering). Significant impact thresholds for the Growling Grass Frog (DEWHA 2009c) identify the potential for a significant impact to the species to occur where permanent removal or degradation of terrestrial habitat within 200 metres of a known waterbody is proposed, resulting in the loss of dispersal or overwintering activities. Installation of panels is proposed within

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
			200 m of Little River and Sandy Creek in some areas, however these areas are grazing or cropping land that does not support overwintering habitat such as dense vegetation or coarse woody debris, and they are unlikely to be used for dispersal as aquatic habitats are limited to the two waterways. If some occasional dispersal does occur, installation of solar panels is unlikely to limit dispersal activities as the ground layer will still be vegetated. The proposed Barwon Solar Farm proposes to remove 13.321 hectares of low-moderate quality Plains Grassland (Appendix 6), and is considered likely to result in a significant impact on Golden Sun Moth; which was recorded during targeted surveys of the initial investigation area. The study area contains 1.4 hectares of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia, corresponding with a patch of Plains Grassy Woodland. As this patch has been excluded by the project's design it is considered unlikely the proposed Barwon Solar Farm would result in a significant impact on this community. The proposed Barwon Solar Farm proposes to remove 8.409 hectares of NTGVVP, and is considered likely to result in a significant impact on this threatened ecological community. Referral is recommended for proposed impacts to this community.
FFG Act	Habitat for numerous birds (7), mammals (2), frogs (1) and reptiles (1) (Appendix 2).	Protected Flora Permit not required for removal of protected flora on private land.	Approvals for impacts to FFG Act fauna habitat are currently not required under the FFG Act. However, impacts will be considered by the Responsible Authority in determining its response to an application for vegetation removal under Clause 52.17.
Planning & Environment Act	The Barwon Solar Farm proposes to remove 14.294 ha of patch vegetation and 70 scattered trees.	Planning permit required to lop or remove native vegetation under Clause	The following overlays are relevant to the study area:

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
		52.17.	• Two Environmental Significance Overlays (ESOs) covers the area (ESO1 and ESO4). • ESO1 – a permit is required for the removal of exotic and native vegetation under Clause 42.01 of the City of Greater Geelong Planning Scheme. • ESO4 – a permit is required for the removal of native vegetation under Clause 42.01 of the City of Greater Geelong Planning Scheme. Outside of native vegetation, the majority of vegetation is crop, pasture grasses, introduced trees, weeds and planted vegetation. The proposed removal of any non-native vegetation will require further consideration during the detailed design phase.
CaLP Act	Numerous noxious weeds identified in the study area (Appendix 1). CALP Act listed fauna observed in the study area: • European Rabbit • Red Fox	N/A	Comply with requirements to eradicate regionally eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds and prevent the spread of and as far as possible eradicate established pest animals. The State is responsible for eradicating State prohibited weeds from all land in Victoria.
Water Act	Little River and Sandy Creek intercept the study area.	Providing suitable mitigation measures are applied to minimise soil erosion, land disturbance and discharge of sediment and other pollutants to Little River, Corangamite Catchment Management Authority (CMA) not recommended.	Proposed action greater than 50 metres from Little River and Sandy Creek.
Fisheries Act	Protected aquatic biota (Yarra Pygmy Perch) may exist within Little River within and downstream of the study area.	Providing suitable mitigation measures are applied to minimise soil erosion, land disturbance and discharge of sediment and other pollutants to	Proposed action greater than 50 metres from Little River.

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
		Little River, no permit is required.	
Environment Protection Act 2017	Little River and Sandy Creek intercept the study area.	N/a	To comply with the General Environmental Duty (GED), Elgin Energy must take all reasonable steps to prevent or minimise risks so as to avoid environmental damage (e.g. pollution of nearby waterways). It is recommended that Elgin Energy implement a site-specific CEMP in order to be able to effectively manage sediments and pollutants produced onsite during the construction phase. Control measures implemented should reflect the level of protection required to protect nearby ecological values and ensure that any impacts as a result of the project do not result in changes that exceed background levels and/or objectives; as outlined in Part Five, Division Three (Surface Waters) of the Environmental Reference Standards.

Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines)

Based on the current design, the proposed development will require the removal of 18.330 hectares of vegetation, including 14.294 hectares of patch vegetation and 70 scattered trees, from predominantly within location categories one and two. The planning permit application will therefore be assessed on the detailed assessment pathway. The strategic biodiversity value score of the native vegetation to be removed is 0.3828.

Avoidance measures implemented by Elgin Energy during the design of the Solar Farm include:

- Locating the project within modified cropland that is primarily cleared of native patch vegetation.
- Considering the preliminary constraints assessment and results of this assessment to amend the solar farm layout so as to avoid impacts to patch vegetation and scattered trees, where possible.

If a permit is granted, the offset requirements would be 4.855 general habitat units. The general offset must be within the Corangamite Catchment Management Authority (CMA) or the City of Greater Geelong municipal district and must have a minimum strategic biodiversity value score of 0.348.

It is likely that some of the general/species offsets could be generated through management of retained native vegetation within the study area. This would be a 'first party' offset and would require the appropriate vegetation security agreements and a 10 year offset management plan. Alternatively, the applicant may seek to purchase 'third party' specific offset credits via an accredited trading scheme.

Recommendations

The results of this assessment have been incorporated into the project design, to minimise impacts and retain as much of the mapped vegetation/habitats as possible.

Elgin Energy should also consider:

- Using existing access points to the properties, where possible, in order to avoid impacting roadside vegetation. Primary access points will use existing gateways. Secondary access points function as emergency entrances only.
- Confining machinery and personnel site access to existing areas where native vegetation does not persist.
- Avoiding tree removal in spring when most bird nesting occurs.

Retained vegetation areas within the site present opportunities for specific management to enhance biodiversity values. Most of the site is used agriculture and the condition of scattered trees and patches of native vegetation, including threatened Plains Grassland, is likely to continue to decline under the current management regime. Riparian vegetation and adjacent areas around Little River and Sandy Creek, in particular, provide a large area that could be managed to preserve and enhance native vegetation and habitat value.

1. Introduction

1.1 Project background

Biosis Pty Ltd (Biosis) was commissioned by Elgin Energy Pty Ltd (Elgin Energy) to undertake a flora and fauna assessment for a 735 hectare area of land proposed for development of a solar farm located at Little River, Victoria, approximately 49 kilometres south west of Melbourne.

To assist Elgin Energy in designing a development that avoids and minimises impacts to biodiversity, Biosis first undertook a preliminary biodiversity assessment of a 738 hectare area of land (the 'initial investigation area') in 2020. The objectives of the assessment were to identify the ecological values and constraints related to the proposed development (hereafter referred to as the ('Barwon Solar Farm' or 'project').

Following delivery of the preliminary biodiversity report, Biosis was commissioned to undertake targeted surveys for a range of threatened species listed under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* whose habitat was identified within the initial study area. Targeted surveys for threatened species included Golden Sun Moth *Synemon plana*, Striped Legless Lizard *Delma impar* and Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*.

The results of the preliminary biodiversity assessment and targeted surveys were used by Elgin Energy to refine the initial investigation area to include an additional 30 hectare land parcel not previously investigated in 2020. Biosis have recently been provided with the design plans for the proposed Barwon Solar Farm and engaged by Urbis Pty Ltd (Urbis) on behalf of Elgin Energy to undertake a flora and fauna assessment of the initial investigation area and the additional land parcel not previously investigated in 2020 (the 'study area').

Information obtained from our current assessment of the study area has been presented in this report for the purpose of application by Elgin Energy for permits and approvals to undertake the project. Where appropriate, biodiversity values relevant to the study area that were identified during the preliminary biodiversity assessment are discussed in this report.

1.2 Scope of assessment

The objectives of this investigation are to:

- Describe the vascular flora (ferns, conifers, flowering plants), vertebrate fauna (mammals, birds, reptiles, frogs, fishes) and decapod crustacea (e.g. crayfish).
- Review existing mapping of native vegetation and map native vegetation and other habitat features, where required.
- Review existing Vegetation Quality Assessment (VQA) scores and conduct VQAs of previously mapped vegetation or newly identified patches of vegetation, where required.
- Review the implications of relevant biodiversity legislation and policy, including Victoria's Guidelines for the removal, destruction or lopping of native vegetation ('the Guidelines').
- Identify potential implications of the proposed development and provide recommendations to assist with development design.
- Recommend any further assessments of the site that may be required (such as a vegetation impact assessment or targeted searches for threatened species).

1.3 Location of the study area

The study area is located in Little River, Victoria; approximately 49 kilometres south west of Melbourne (Figure 1). The study area is private land, zoned as FZ – farming, is north of the You Yangs Regional Park (PCRZ – Public Conservation and Resource Zone) and directly abuts the Mt Rothwell Conservation and Research Reserve directly to the east (RCZ – Rural Conservation).

The study area is within the following management areas relating to biodiversity:

- Victorian Volcanic Plain and Central Victorian Uplands bioregions
- Moorabool River Basin.
- Corangamite Catchment Management Authority (CMA).
- City of Greater Geelong

The study area location and related planning information informs the assessment throughout this report.

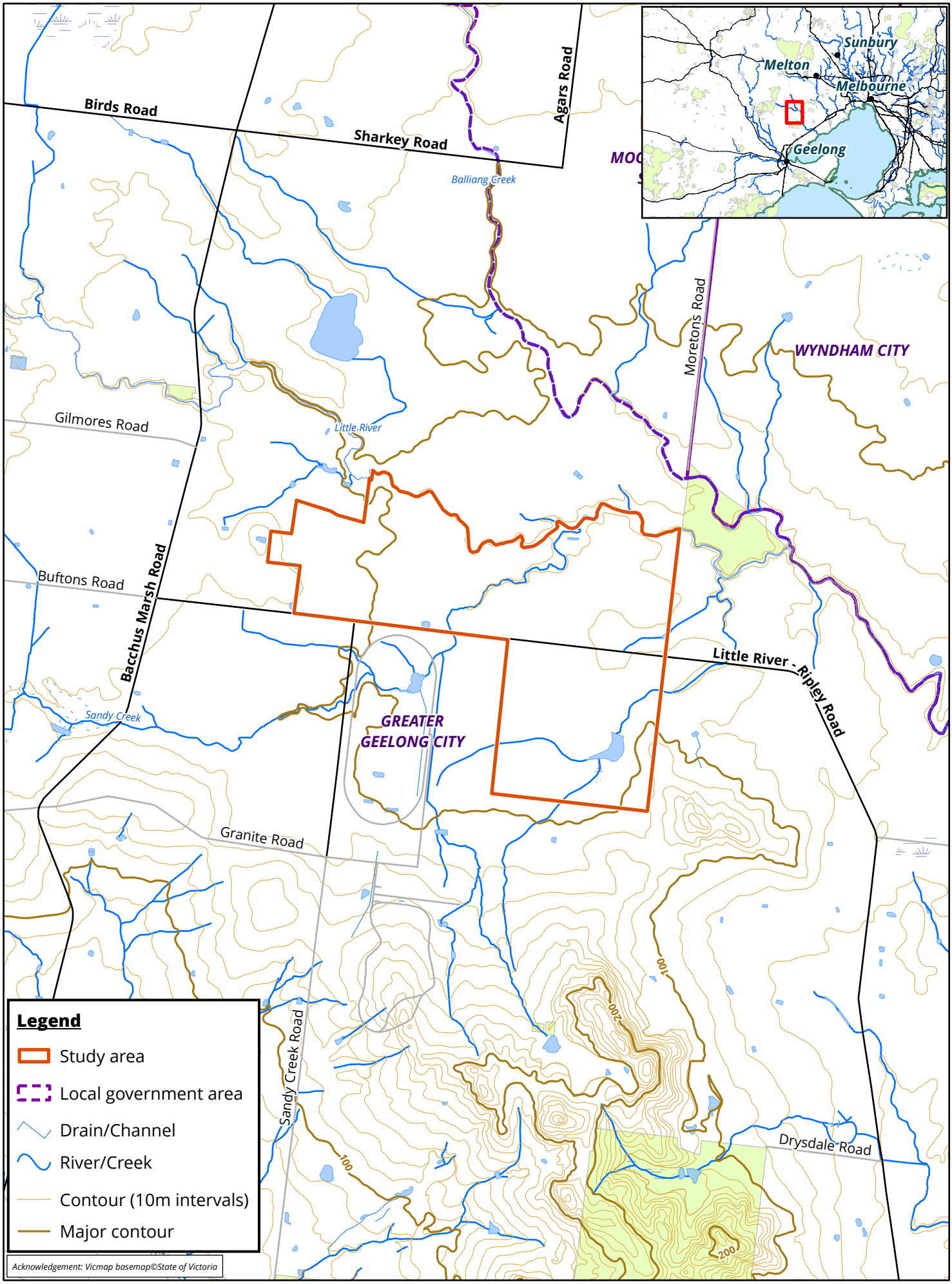


Figure 1 Location of the study area - Little River, Victoria

Matter: 36540,
Date: 31 May 2022 ,
Prepared for: EB, Prepared by: LW, Last edited by: jturner
Layout: 36540_F1_Locality
Project: P:\36500s\36540\Mapping\36540_LittleRiverSolarFarm_Eco_Mapping.aprx

2. Methods

2.1 Database review

In order to provide a context for the study area, information about flora and fauna from within 5 kilometres of the study area (the 'local area') was obtained from relevant biodiversity databases, many of which are maintained by the Victorian Government Department of Energy, Environment and Climate Action (DEECA) or the Australian Government Department of Climate Change, Energy, the Environment and Water (DCCEEW).

Records from the following databases were collated and reviewed:

- DEECA's Victorian Biodiversity Atlas (VBA), including the 'VBA_FLORA25, FLORA100 & FLORA Restricted' and 'VBA_FAUNA25, FAUNA100 & FAUNA Restricted' datasets
- DCCEEW's Protected Matters Search Tool for matters protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

Other sources of biodiversity information were examined including:

- DEECA's NatureKit mapping tool
- DEECA's Habitat Importance maps
- DEECA's Native Vegetation Information Management (NVIM) system
- DEECA's Ensym NVR Tool Support team was provided with site-based spatial information in order to generate a Native Vegetation Removal Report for the study area.
- Planning Scheme overlays relevant to biodiversity based on http://planningschemes.dpcd.vic.gov.au.

2.2 Determining likelihood of occurrence of listed threatened species

2.2.1 Definitions of threatened species or communities

Threatened species or communities include those species or communities that are listed under the EPBC Act and/or FFG Act. The conservation status of a species or ecological community is determined by its listing status under Commonwealth or State legislation / policy (Table 1).

Table 1 Conservation status of threatened species and ecological communities

Conservation status	
National	Listed as nationally critically endangered, endangered or vulnerable under the EPBC Act
State	Listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent in Victoria under the FFG Act

Lists of threatened species generated from the databases are provided in Appendix 1 (flora) and Appendix 2 (fauna) and the species have been assessed to determine their likelihood of occurrence based on the process outlined below.

2.2.2 Determining likelihood of occurrence

Likelihood of occurrence indicates the potential for a species or ecological community to occur regularly within the study area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low,

medium, high or recorded. The rationale for the rank assigned is provided for each species in Appendix 1 (flora) and Appendix 2 (fauna), and follows the definitions provided in Table 2.

Table 2 Rationale for likelihood of occurrence

Likelihood of occurrence	Definition
Recorded	• Suitable habitat present, and • Species confirmed as present via current assessment or targeted surveys.
High	• Suitable habitat present • Recent records of the species in local area, in similar habitat to what is found in the study area, and • Within the species' known range.
Medium	• Suitable habitat present • Some recent records of the species in local area, and • Within the species' known range.
Low	• Partially suitable habitat present • No recent records of the species in local area, and • Within the species' known range.
Negligible	• No suitable habitat or marginal habitat present, and/or • Outside the species' known range.

Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Only those species listed under the EPBC Act or the FFG Act (hereafter referred to as ' threatened species') are assessed to determine their likelihood of occurrence. The habitat value for threatened species is calculated by the Habitat Importance Modelling produced by DEECA (DELWP 2017a). Where threatened species are recorded in the study area this is noted in Appendix 1 (flora) and Appendix 2 (fauna). Threatened species which have at least medium likelihood of occurrence are given further consideration in this report. The need for targeted survey for these species is also considered.

2.3 Targeted surveys for threatened species

2.3.1 Preliminary biodiversity assessment

A preliminary biodiversity assessment of the initial instigation area was undertaken by Senior Ecologist Matt Gibson and Botanist Jane Kenny on the 9 April 2020. The objectives of the preliminary biodiversity assessment were to identify the ecological values and constraints related to the proposed development of a solar farm

Following delivery of the preliminary biodiversity report, Biosis was commissioned to undertake targeted surveys for a range of threatened species listed under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) whose habitat was identified within the initial investigation area. Survey methodologies undertaken for threatened species within the initial investigation area are described in the below sections.

2.3.2 Targeted survey for Spiny Rice-flower

Targeted surveys for Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* within the initial investigation area was undertaken on the 28-30 July 2020 and 5 August 2020 by Botanists Jane Kenny, Matt Dell, Damien Magner and Samantha Barron. July is considered the optimal time of year for such surveys because the species is likely to be flowering and thus more detectable. Surveys were conducted during the flowering period for the species, as noted at other survey and reference sites within the greater Melbourne area assessed during the same time period in 2020.

Botanists walked in parallel transects spaced 2-3 metres apart searching for Spiny Rice-flower. The surveys were undertaken in accordance with the survey protocols outlined in the Significant Impact Guidelines for the Critically Endangered Spiny Rice-flower (DEWHA 2009a).

2.3.3 Targeted surveys for Striped Legless Lizard

Targeted surveys for Striped Legless Lizard *Delma impar*, using the artificial shelter (tiles) method, were undertaken between September and December 2020 in accordance with the EPBC Act *Referral guidelines for the vulnerable striped legless lizard, Delma impar* (DSEWPC 2011).

Ten survey grids were deployed in July 2021 within the initial investigation area, allowing for the tiles to 'bed down' and for fauna to become accustomed to using them for shelter. Survey grids consisted of 50 tiles spaced approximately 5 meters apart, arranged in a rectangular grid of 10 tiles by 5 tiles.

All tiles were checked once per week by Zoologists Erin Baldwin, Jules Farquhar, Wyn Russell, Matt Jones and Imogen Merlo in an attempt to detect and detect and record fauna sheltering beneath the tiles, resulting in a total of twelve checks between 9 October 2020 and 23 December 2020.

2.3.4 Targeted surveys for Golden Sun Moth

Targeted surveys for Golden Sun Moth *Synemon plana* were undertaken within the initial investigation area during the 2020-21 local flight season, between 14/12/2020 and 08/01/2021. As the timing of the flight season varies annually and geographically, commencement of the flight season was determined before the commencement of surveys by undertaking pre-season checks for the presence of flying males at known local sites.

Four surveys were undertaken by Ecologists Ben Howells, Matt Gibson, Dan Gilmore, Imogen Merlo and Jules Farquhar in accordance with the EPBC ACT *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth* (DEWHA 2009b), which includes the requirement for:

- Qualified observers to systematically walk a series of transects, approximately 5 metres apart.
- Surveys to be undertaken with at least a week interval to allow for variations in emergence patterns.
- Surveys to be undertaken during conditions favourable for male flight (generally >20^{o}C, bright, clear days, full sun, absence of rain and wind other than a light breeze) between 10:00 hrs and 15:00 hrs.

At the time of these surveys Golden Sun Moth was listed as Critically Endangered. The listing status of the species was revised to Vulnerable in December 2021, and a new Conservation Advice document was released (DAWE 2021).

2.4 Present assessment

2.4.1 Flora assessment

Detailed flora site investigations were undertaken by Senior Ecologist Matt Gibson, Project Zoologist Erin Baldwin and Consultant Botanist Jane Kenny between 17 February and 20 May 2022 to collect a list of flora species. Additional flora information has also been recorded when on site for targeted surveys. This list will be submitted to DEECA for incorporation into the Victorian Biodiversity Atlas. Planted species have not been recorded unless they are naturalised.

Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses' (Clause 73.01).

The Guidelines classify native vegetation into two categories (DELWP 2017a):

- A **patch** of native vegetation (measured in hectares) is either:
  - An area of native vegetation, with or without trees, where at least 25 percent of the total perennial understorey cover is native plants.
  - An area with three or more native canopy trees where the drip line (i.e. the outermost boundary of a tree canopy) of each tree touches the drip line of at least one other tree, forming a continuous canopy.
  - Any mapped wetland included in the *Current wetlands map,* available in DEECA systems and tools.

Patch vegetation is classified into ecological vegetation classes (EVCs). An EVC contains one or more floristic (plant) communities and represents a grouping of broadly similar environments. Definitions of EVCs and benchmarks (condition against which vegetation quality at the site can be compared) are determined by DEECA.

- A **scattered tree** is defined as a native canopy tree that does not form part of a patch of native vegetation.

A canopy tree is a mature tree that is greater than three metres in height and is normally found in the upper layer of a vegetation type. Ecological vegetation class descriptions provide a list of the typical canopy species. A scattered tree is defined as either small or large and is determined using the large tree benchmark for the relevant EVC. The extent of a small scattered tree is the area of a circle with a 10 metre radius (i.e. 0.031 hectares), while the extent of a large scattered tree is a circle with a 15 metre radius (i.e. 0.070 hectares). A condition score is applied to each scattered tree based on information provided by DEECA's NVIM.

A Vegetation Quality Assessment (VQA) was undertaken for all patches of native vegetation identified in the study area. This assessment is consistent with DEECA's habitat hectare method (DSE 2004) and the Guidelines (DELWP 2017a). For the purposes of this assessment the limit of the resolution for identification of a patch of native vegetation was taken to be 0.001 habitat hectares (Hha). That is, if a discrete patch native vegetation was present with sufficient cover but its condition and extent would not have resulted in the identification of at least 0.001 habitat hectares, the vegetation patch of vegetation was not mapped or included in the assessment.

Where relevant, notes were made on specific issues such as noxious weed infestations, evidence of management works, current grazing impacts and the regeneration capacity of the vegetation.

Species nomenclature for flora follows the Victorian Biodiversity Atlas (VBA).

2.4.2 Fauna assessment

Fauna site investigations were undertaken by Senior Ecologist Matt Gibson and Erin Baldwin between 17 February and 20 May 2022. Additional fauna surveys, including mapping of habitats and recording of species, has been conducted during all site visits, including the preliminary surveys, and targeted surveys for threatened species. All species of fauna observed during the assessment were noted and active searching for fauna was undertaken. This included direct observation, searching under rocks and logs, examination of tracks and scats and identifying calls. Likelihood of occurrence of fauna were also determined on the basis of the types and qualities of habitat(s) present. Particular attention was given to searching for significant species and their habitats.

2.4.3 Permits

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

- Permit to Take/Keep Protected Flora issued by DEECA under the *Flora and Fauna Guarantee Act 1988* (FFG Act) (Permit Number 10010120)
- Approvals 30.17 and 19.18 issued by the Wildlife and Small Institutions Animal Ethics Committee of the Victorian Government Department of Economic Development, Jobs, Transport and Resources (DEDJTR)
- Scientific Procedures Fieldwork Licence issued by DEDJTR's Wildlife and Small Institutions Animal Ethics Committee (Licence Number 20020).

2.5 Legislation and policy

The proposed works were assessed in relation to relevant biodiversity legislation and policy at state and federal levels of regulation. The following legislation and related policy documents were used in this assessment include:

- Matters listed under the EPBC Act, associated policy statements, significant impacts guidelines, listing advice and key threatening processes.
- Threatened taxa, communities and threatening processes listed under Section 10 of the FFG Act and associated action statements and listing advice.
- Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017a).
- Native Vegetation Management Plans prepared by Catchment Management Authorities
- *Planning and Environment Act 1987* – specifically Clauses 52.17 and Overlays in the City of Greater Bendigo Planning Scheme
- Noxious weeds and pest animals listed under the *Catchment and Land Protection Act 1994* (CaLP Act)
- *Environment Effects Act 1978.*
- *Water Act 1989*
- *Fisheries Act 1995*
- *Environment Protection Act 2017:* including Environmental Protection Regulations and Environmental Reference Standards

2.6 Qualifications for biodiversity information

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

2.6.1 Flora

The study area was assessed in summer and autumn, which is within the preferred seasonal time for survey of grassy vegetation. Tree Diameter at Breast Height (DBH) was measured for all scattered trees and trees within patches using the Habitat hectares method (DSE 2004).

2.6.2 Fauna

The fauna survey for the present assessment was undertaken with the aim of characterising the general values of the study area for native fauna and the extent of habitat for threatened species. The fauna survey was not intended to provide a comprehensive survey of all fauna species that have potential to occupy or visit the site over time. Any potential habitat for EPBC Act listed species was assessed in accordance with relevant DCCEEW guidelines (e.g. DEWHA 2009, DSEWPaC 2011).

2.6.3 Mapping

Urbis supplied spatial data (shapefiles) indicating the location of proposed infrastructure within the study area.

Mapping was conducted using hand-held GPS-enabled tablets and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the tablets (generally ± 7 metres) and dependent on the limitations of aerial photo rectification and registration.

2.6.4 Offsets

All assessment of state offset requirements are prepared using DEECA's NVIM or EnSym systems. Biosis is entirely dependent on the outputs from these systems for calculating offset requirements, termed Native Vegetation Removal (NVR) reports. Biosis makes every effort to ensure spatial information entered into the NVIM or DEECA's Ensym system is an accurate reflection of proposed native vegetation removal but cannot control this data once it is supplied to DEECA.

3. Results

3.1 Site investigation

The study area supports a range of ecological values including remnant patches of EVC 55_63 Plains Grassy Woodland, EVC 68 Creekline Grassy Woodland, EVC 71 Hills Herb-rich Woodland, EVC 125 Plains Grassy Wetland, EVC 821 Tall Marsh and EVC 132_61 Heavier-soils Plains Grassland.

These features are summarised in the below sections, detailed in Table 3 and mapped in Figure 2.

3.1.1 Landscape context

The topography of the study area and broader landscape within the northern sections of the search area is characterised as flat (study area: 87-101 m ASL). South of the study area, the topography rises within the nearby You Yangs Regional Park to a maximum of 319 metres above sea level (ASL)

The study area and broader landscape within the search area are predominantly comprised of texture contrast soils including dense, sodic subsoils (sodosols) utilised for cropping and pastoral activities. Geology of the nearby You Yangs Regional Park and Mt Rothwell Conservation and Research Reserve consist of a series of granite ridges exposed by the processes of weathering and erosion.

Prior to European settlement, the majority of the study area and broader search area would have been comprised of grasslands and open woodlands. Large, intact areas of native vegetation within the broader search area exist within the nearby You Yangs Regional Park and Mt Rothwell Conservation and Research Reserve, stream or creek corridors, scattered trees and remnant patches of native grassland and woodlands existing within private land primarily used for pastoral activities. Consequently, scattered trees and native vegetation remaining in these areas and study area function as important corridors and steppingstones for the movement of a diversity of locally common and threatened fauna species across the landscape.

3.1.2 Flora and fauna

One hundred and forty-two flora species and sixty-two fauna species were recorded within the study area. A list of these species is provided in Appendix 1 and Appendix 2. Unless of particular note, these species are not discussed further.

Whilst the study area has been cleared for broad-acre cropping and is utilised for pastoral activities, significant areas of the study area are dominated by native, short to medium height, tussock-forming grasses including Kangaroo Grass *Themeda triandra,* Spear Grass (Rough Spear-grass *Austrostipa scabra* and *Austrostipa* spp.) and Wallaby Grass (Common Wallaby-grass *Rytidosperma caespitosum,* Brown-back Wallaby-grass *Rytidosperma duttonianum*, Copper-awned Wallaby-grass *Rytidosperma fulvum,* Slender Wallaby-grass *Rytidosperma racemosum* var. *racemosum* and Bristly Wallaby-grass *Rytidosperma setaceum*). The identification of these grasses has subsequently resulted in many of these areas meeting the definition of a 'patch' of native vegetation (DELWP 2017) and the description of EVC 132_61 Heavier-soils Plains Grassland.

Most patches of EVC 132_61 Heavier-soils Plains Grassland identified within the study area also meet the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain; whereby the total perennial tussock cover within each patch is represented by the native grass genera *Themeda*, *Rytidosperma* (formally *Austrodanthonia*) or *Austrostipa* by at least 50 percent. The EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain community is known to provide habitat or foraging resources for a diversity of flora and fauna species, including skinks, snakes, birds of prey (raptors) and ground-dwelling birds.

The identification of perennial tussock grassland growing on deep cracking clay soils within patches of EVC 132_61 Heavier-soils Plains Grassland and EVC 55_63 Plains Grassy Woodland are considered to provide a suitable habitat for EPBC Act threatened species Striped Legless Lizard, Golden Sun Moth and Spiny Rice-flower. Targeted surveys for these species undertaken within the initial investigation area are discussed in Section 3.2.1-3.2.3 of this report.

Some wooded areas of the study area retain important structural elements, including large trees, canopy cover and fallen timber. The identification of these features has subsequently resulted in some areas of the study area meeting the definition of a 'patch' of EVC 55_63 Plains Grassy Woodland. One patch of EVC 55_63 Plains Grassy Woodland identified within the study area also meets the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia; whereby at least 50 percent of the ground cover in the ground layer is made up of perennial native species and dominated by an overstorey of Grey Box *Eucalyptus mircocarpa*. This ecological community is known to provide valuable habitat for a plethora of threatened species (e.g. Golden Sun Moth, Striped Legless Lizard, etc.) and foraging resources for a number of bird fauna representative of temperate forest and woodland ecosystems as well as species from drier inland semi-arid environments.

One hundred and eighty-eight (187) 'scattered' trees (DELWP 2017) were assessed and determined to be remnant canopy trees of the historical vegetation cover; with approximately 70% of these trees classified as large trees according to the EVC benchmark for their location (Appendix 6). Scattered trees were identified as River Red-gum *Eucalyptus camaldulensis*, Yellow Box *Eucalyptus melliodora*, Grey Box *Eucalyptus microcarpa,* Mana Gum *Eucalyptus viminalis* or the FFG At listed species Buloke *Allocasuarina luehmannii* and Melbourne Yellow Gum *Eucalyptus leucoxylon* subs. *connata*.

Sixty two (62) scattered trees and canopy trees (within patches, otherwise referred to in this report as 'patch trees') throughout the study area were observed to contain hollows. Additional trees present within riparian vegetation along Little River and Sandy Creek were not assessed. Trees within the site provide roosting and/or nesting opportunities for a range of locally common, hollow-dependent woodland avifauna, arboreal mammals and microbats. A Barn Owl *Tyto alba* was observed flying into a hollow during the present assessment and some records of the threatened Barking Owl *Ninox connivens* have been recorded in a patch of EVC 55_63 Plains Grassy Woodland adjoining the south east border of the site.

There is also potential for the canopies of scattered trees and patch trees to provide nesting opportunities for diurnal raptors and seasonal foraging resources (nectar and/or lerp) for a range of common migratory and/or volant fauna, as well as threatened species such as the Swift Parrot *Lathamus discolor* and Grey-headed Flying Fox *Pteropus poliocephalus.* Diurnal raptors recorded within the study area include Wedge-tailed eagle *Aquila audax*, Collared Sparrowhawk *Accipiter cirrocephalus*, Brown Falcon *Falco berigora*, Black-shouldered Kite *Elanus axillaris*. Neighboring landholders have noted that a nesting pair of the FFG Act listed Black Falcon *Falco subniger* is known from the study area.

Several farm dams are scattered throughout the study area, with one found to contain a patch of EVC 821 Tall Marsh. The majority of dams were small and contained Spikerush *Eleocharis spp.* within the ecotones of the waterbodies. Aquatic and riparian areas of the smaller dams were heard to provide habitat for a diversity of common frog species including Striped Marsh Frog *Limnodynastes peronii*, Common Froglet *Crinia signifera*, Southern Brown Tree Frog *Litoria ewingii* and Pobblebonk Frog *Limnodynastes dumerilii dumerilii*. Two larger dams were found to provide habitat for a diversity of common waterbird and one shorebird species, as listed in Appendix 2 of this report.

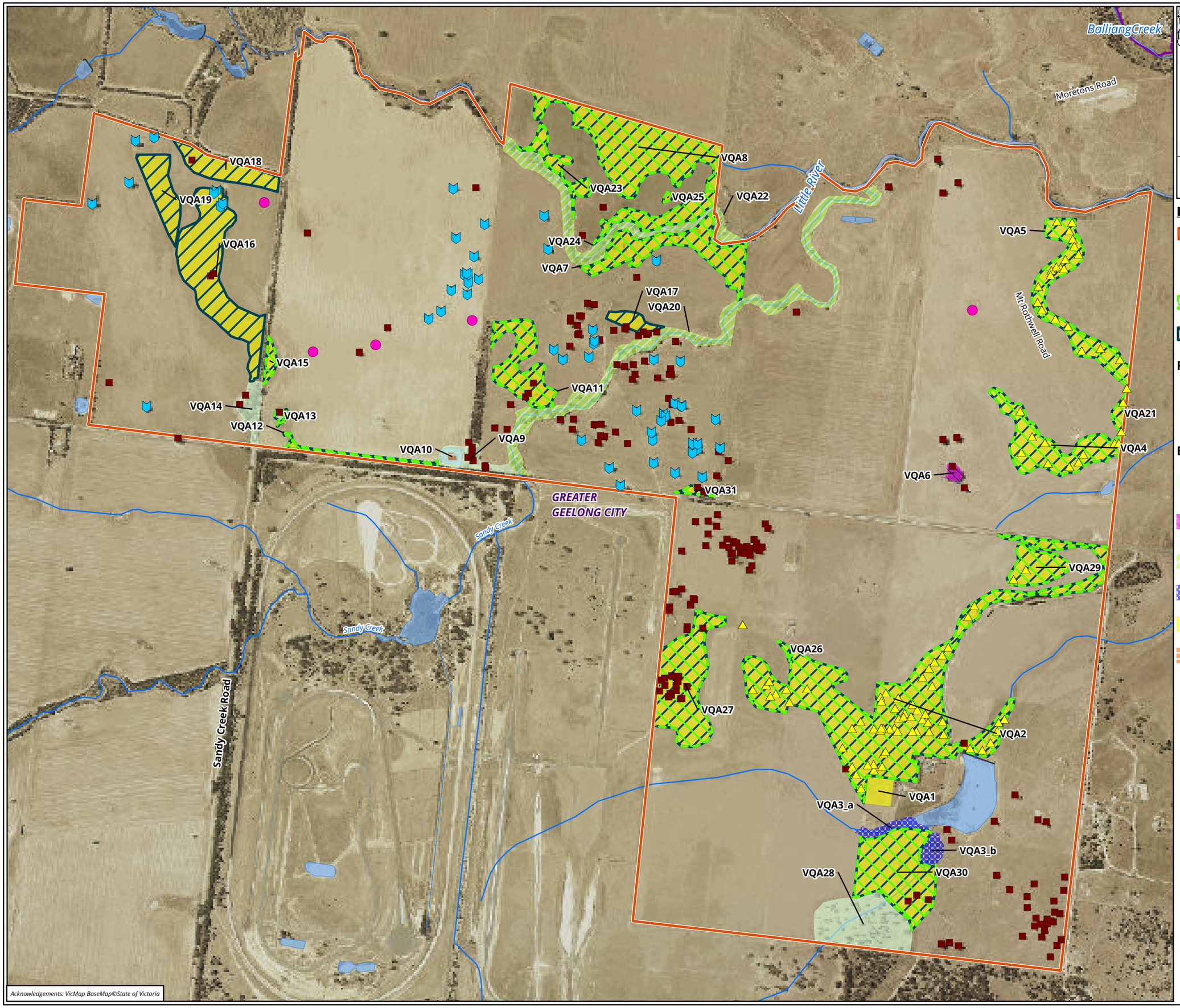
Table 3 Vegetation and habitat types within the study area

Vegetation or habitat type	Description	Location	Significant values
EVC_VPP 132_61 Heavier-soils Plains Grassland	Significant areas of the study area are dominated by native, short to medium height, tussock-forming grasses including Kangaroo Grass *Themeda triandra,* Spear Grass (Rough Spear-grass *Austrostipa scabra* and *Austrostipa* spp.) and Wallaby Grass (Common Wallaby-grass *Rytidosperma caespitosum,* Brown-back Wallaby-grass *Rytidosperma duttonianum*, Copper-awned Wallaby-grass *Rytidosperma fulvum,* Slender Wallaby-grass *Rytidosperma racemosum* var. *racemosum* and Bristly Wallaby-grass *Rytidosperma setaceum*) meeting the definition of EVC 132_61 Heavier-soils Plains Grassland. Whilst all patches of EVC 132_61 Heavier-soils Plains Grassland identified within the study area are considered to be of low quality, most meet the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain (Figure 2); given the total perennial tussock cover within each patch is represented by the native grass genera *Themeda*, *Rytidosperma* (formally *Austrodanthonia*) or *Austrostipa* by at least 50 percent.	Throughout study area. Represented by Habitat Zones VQA1, 2, 4, 5, 7, 8, 11, 12, 15-19, 21, 23-26, 27b, 29-32	EVC 132_61 Heavier-soils Plains Grassland and/or EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain community is known to provide habitat or foraging resources for a diversity of flora and fauna species, including skinks, snakes, birds of prey (raptors) and ground-dwelling birds. Threatened fauna recorded within these environments during assessment and/or targeted surveys include: Tussock Skink and Golden Sun Moth (see Section 3.2.2 of this report). Whilst not recorded during targeted surveys of the initial investigation area, there is potential for threatened species Striped Legless Lizard and Spiny Rice-flower to be present in the study area within the additional north of Little River.

Vegetation or habitat type	Description	Location	Significant values
EVC 55_63 Plains Grassy Woodland	Patches of open woodland comprised of Grey Box over a predominantly degraded grassy and herbaceous ground layer predominantly consisting of introduced grass species. Native vegetation in the ground layer consisted of scattered spear grasses and wallaby grasses including Bristly Wallaby-grass *Rytidosperma setaceum* and Rough Spear-grass *Austrostipa scabra*. One patch of EVC 55_63 Plains Grassy Woodland identified within the study area (VQA14) also meets the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia; whereby at least 50 percent of the ground cover in the ground layer is made up of perennial native species, and dominated by an overstorey of Grey Box *Eucalyptus mircocarpa*.	Small patches within study area. Represented by Habitat Zones VQA6, 9, 13, 14, 27a and 28	As above.
EVC 68 Creekline Grassy Woodland	Occurs within the riparian corridor of Sandy Creek and Little River within the study area.	Riparian corridor of Sandy Creek and Little River. Represented by Habitat Zones VQA20, 22.	Riparian areas adjacent to Sandy Creek and Little River may provide habitat for Growling Grass Frog, which may utilise these areas for dispersal, foraging and shelter during periods of inactivity (over-wintering). Important features typically associated with terrestrial areas adjacent to wetlands and streams inhabited by Growling Grass Frogs include the presence of soil cracks, logs and rock, which are present in areas of EVC 68 Creekline Grassy Woodland within the study area (Appendix 3: Photo 3). Rocky escarpments within the riparian corridor of Little River may also provide roosting opportunities for the FFG Act listed Eastern Bent-wing Bat.

Vegetation or habitat type	Description	Location	Significant values
EVC 821 Tall Marsh	Closed to open sedgeland to 2-3 m tall, dominated by Broad-leaf Cumbungi *Typha orientalis*.	Identified within one small dam within the study area.	Aquatic and riparian areas of this habitat were heard to provide habitat for common frog species such as Common Froglet and Pobblebonk Frog, as well as a diversity of common bird species including Willie Wagtail *Rhipidura leucophrys*.
Constructed dams	Numerous farm dams are scattered throughout the study area. The majority of dams were small and contained Spikerush *Eleocharis spp.* within the ecotones of the waterbodies.	Throughout study area.	Aquatic and riparian areas of the smaller dams were heard to provide habitat for a diversity of common frog species including Striped Marsh Frog *Limnodynastes peronii*, Common Froglet *Crinia signifera*, Southern Brown Tree Frog *Litoria ewingii* and Pobblebonk Frog *Limnodynastes dumerilii dumerilii*. Two larger dams were found to provide habitat for a diversity of common waterbird and one shorebird species, as listed in Appendix 2 of this report.
Scattered trees	187 'scattered' trees (DELWP 2017) were assessed and determined to be remnant canopy trees of the historical vegetation cover; with approximately 127 of these trees classified as large trees according to the EVC benchmark for their location (Appendix 6). Scattered trees were identified as River Red-gum *Eucalyptus camaldulensis*, Yellow Box *Eucalyptus melliodora*, Grey Box *Eucalyptus microcarpa,* Mana Gum *Eucalyptus viminalis* or the FFG At listed species Buloke *Allocasuarina luehmannii* and Yellow Melbourne Gum *Eucalyptus leucoxylon* subs. *connata*.	Throughout the study area.	Scattered trees provide essential resources in the landscape including steppingstone connectivity, large canopies and decorticating bark for foraging and habitat. The canopies of scattered trees within the study area are likely to provide habitat or seasonal foraging resources (nectar) for a range of locally common and/or mobile fauna, including threatened species such as the Grey-headed Flying Fox, Swift Parrot and Black Falcon. A number of scattered trees throughout the study area were observed to contain hollows. These ecological features provide roosting and/or nesting opportunities for a range of locally common, hollow-dependent woodland avifauna, arboreal mammals and microbats. A Barn Owl *Tyto alba* was observed flying into a hollow during the present assessment and some records of the threatened Barking Owl *Ninox connivens* have been recorded in a patch of EVC 55_63 Plains Grassy Woodland adjoining the south east border of the site.

Vegetation or habitat type	Description	Location	Significant values
Predominantly introduced vegetation	Combination of crop and introduced grassed used for pastoral activities.	Throughout study area.	Introduced vegetation is likely to provide essential resources in the landscape including steppingstone connectivity for a diversity of mobile fauna. These areas also provide foraging habitat for a diversity of common and threatened raptor species including Wedge-tailed eagle *Aquila audax*, Collared Sparrowhawk *Accipiter cirrocephalus*, Brown Falcon *Falco berigora*, Black-shouldered Kite *Elanus axillaris*, Black Falcon, Barn Owl and Barking Owl.



Legend

- Study area
- Tree
- Golden Sun Moth Biosis record
- Golden Sun Moth habitat
- Natural Temperate Grassland of the Victorian Volcanic Plain

FFG listed tree species

- Allocasuarina luehmannii - Buloke
- Eucalyptus leucoxylon subsp. connata - Melbourne Yellow-gum

Ecological Vegetation Class

- (VVP_0055_61) Plains Grassy Woodland
- (VVP_0055_63) Plains Grassy Woodland
- (VVP_0068) Creekline Grassy Woodland
- (VVP_0125) Plains Grassy Wetland
- (VVP_0132_61) Heavier-soils Plains Grassland
- (VVP_0821) Tall Marsh

Figure 2.1 Ecological features of the study area

0 100 200 300 400 500

Metres

Scale: 1:13,000 @ A3

Coordinate System: GDA 1994 MGA Zone 55

N

biosis

Matter: 36540,
Date: 28 March 2022 ,
Prepared for: MG, Prepared by: LW, Last edited by: lwilson
Layout: 36540_F2-1_EcoFeatures
Project: P:\36500s\36540\Mapping\
36540_LittleRiverSolarFarm_Eco_Mapping.aprx

3.2 Threatened species and ecological communities

Threatened species recorded or predicted to occur within 5 kilometres of the study area are listed in Appendix 1 (flora) and Appendix 2 (fauna). An assessment of the likelihood of these species occurring in the study area and an indication of where within the site (i.e. which habitats or features of relevance to the species) is included. A summary of those species recorded or with a medium or higher likelihood of occurring in the study area is provided in Table 4.

Table 4 Summary of EPBC and FFG Act listed species most likely to occur in the study area

Species name	Listing status	Area of value within the study area
Spiny Rice-flower	Cr under EPBC Act cr under FFG Act	Not recorded during targeted surveys of potential habitat to the south of Little River. Targeted surveys have not been conducted in the section of the study area to the north of Little River.
Swift Parrot	Cr under EPBC Act cr under FFG Act	May forage on woodland patch and scattered Eucalypts, particularly Melbourne Yellow Gum (a favoured foraging source), during overwintering.
White-throated Needletail	VU under EPBC Act v under FFG Act	May be present in airspace above the study area on regular basis but unlikely to impacted by ground based activities.
Grey-headed Flying-fox	VU under EPBC Act v under FFG Act	May forage on woodland patch and scattered Eucalypts, when flowering.
Growling Grass Frog	VU under EPBC Act v under FFG Act	May utilise aquatic and riparian environments of Little River and Sandy Creek for dispersal, foraging and over-wintering activities.
Yarra Pygmy Perch	VU under EPBC Act v under FFG Act	Recorded within similar habitat within the Moorabool River catchment. May occur within aquatic environments of Little River intercepting the study area.
Golden Sun Moth	VU under EPBC Act v under FFG Act	Recorded within patches of native tussock forming grasses (e.g. Spear Grasses and Wallaby Grasses) within the initial investigation area (see Section 3.2.2 of this report). High likelihood for this species to be present in suitable grassland areas throughout study area.
Little Eagle	v under FFG Act	May forage over wooded and modified, open areas within the study area on occasion.
Square-tailed Kite	v under FFG Act	May forage over wooded and modified, open areas within the study area on occasion.
Black Falcon	cr under FFG Act	May forage over wooded, modified, open areas and creeklines within the study area on occasion. Nesting pair observed in study area by neighboring landholder.
Barking Owl	cr under FFG Act	Recorded in wooded areas south of study area. May nest in wooded area in south-east corner of study area and/or forage over wooded and modified, open areas within the study area on occasion.

Species name	Listing status	Area of value within the study area
Hooded Robin	v under FFG Act	Occasional use of woodland patches possible; scattered trees may provide stepping stones across the landscape.
Speckled Warbler	e under FFG Act	Occasional use of woodland and creekline grassy woodland patches possible; scattered trees may provide stepping stones across the landscape.
Diamond Firetail	v under FFG Act	Occasional use of woodland patches possible; scattered trees may provide stepping stones across the landscape.
Brush-tailed Phascogale	v under FFG Act	Occasional use of woodland patches possible; scattered trees may provide stepping stones across the landscape
Eastern Bent-winged Bat	Cr under FFG Act	May forage over modified, open areas and creeklines within the study area on occasion.
Tussock Skink	e under FFG Act	Recorded within native, tussock forming grasses within study area and road reserves.
Brown Toadlet	e under FFG Act	May occur in seasonally damp depressions containing an abundance of organic matter within Creekline Grassy Woodland.

3.2.1 Spiny-rice Flower Surveys

The EPBC Act listed Spiny-rice Flower was not detected during targeted surveys within the initial investigation area. Surveys were undertaken at appropriate times and in accordance with published survey methodologies.

Although Spiny-rice Flower has been recorded in the broader local area (DELWP 2020), results of targeted surveys suggest there is a low likelihood that the proposed Barwon River Solar Farm will have an impact on Spiny-rice Flower.

No further surveys or assessments related to this species are recommended for the study area based on the current design footprint. However, should any works be proposed in the additional land parcel (located to the north of Little River within the study area) or within patches of Plains Grassy Woodland it is recommended that additional targeted surveys are undertaken in these locations to determine the likelihood of a population being present.

3.2.2 Striped Legless Lizard

The EPBC Act listed Striped Legless Lizard was not detected during targeted surveys. Tile grids were located within suitable habitat within the initial investigation area and surveys were conducted during optimal weather conditions (Appendix 5). While recorded within the local area, results of targeted surveys suggest there is a low likelihood for Striped Legless Lizard to occur within the study area.

Five vertebrate fauna species were recorded during targeted surveys undertaken between October 2020 and December 2020 (Appendix 5). This includes one threatened species (Tussock Skink *Pseudemoia pagenstecheri*) listed as endangered under the FFG Act.

Results of targeted surveys suggest there is a low likelihood that the proposed Barwon Solar Farm will have an impact on Striped Legless Lizard. No further surveys or assessments related to this species are recommended for the study area based on the current design footprint. However, should any works be proposed in the additional land parcel (located to the north of Little River within the study area) or within patches of Plains Grassy Woodland it is recommended that additional targeted surveys are undertaken in these locations to determine the likelihood of a population being present.

3.2.3 Golden Sun Moth surveys

The EPBC Act listed Golden Sun Moth (vulnerable) was detected in suitable habitat within the initial investigation area during targeted surveys; undertaken at appropriate times and during optimal weather conditions (Appendix 5). No further surveys are recommended for this species prior to submission of EPBC and EES referrals, however if any Golden Sun Moth habitat is proposed for removal it is likely that additional surveys will be required to document the size of the impacted populations, in order to quantify offset requirements and complete approval documentation.

Should any works be proposed in the additional land parcel (located to the north of Little River within the study area) or within patches of Plains Grassy Woodland it is recommended that additional targeted surveys are undertaken in these locations to determine the likelihood of a population being present.

3.2.4 Eastern Bent-wing Bat

The FFG Act listed Eastern Bent-wing Bat may forage over modified, open areas and creeklines within the study area on occasion. Although no known roost caves are located in the vicinity of the study area, Bent-wing Bats are known to be capable of long distance flights, both during nightly foraging and in broader movements between roosts, and there is potential for the Eastern Bent-wing Bat to forage or fly through the general area.

3.2.5 Grassland Earless Dragon

The FFG Act listed Grassland Earless Dragon has not been recorded in Victoria since 1969 and is now widely regarded to be extinct in Victoria. This species was not detected by active searching by Biosis herpetologist Jules Farquhar during the initial biodiversity assessment within suitable habitat or during targeted surveys for Striped Legless Lizard. It is considered a low likelihood this species is present within the study area.

3.2.6 DEECA habitat importance modelling for threatened species

To support decision making under the Guidelines, DEECA has produced maps for Victoria showing the modelled extent of habitat for most threatened species. These maps are called 'habitat importance maps' and they assign a 'habitat importance score' to a location based on the importance of that location in the landscape as habitat for a particular threatened species, in relation to other suitable habitat for that species (DELWP 2017a).

Under the Guidelines, these maps form the basis for determining the impact of potential native vegetation removal on threatened species. The maps only apply where a proposal to remove native vegetation is considered on detailed assessment pathway. The habitat importance scores are used to calculate the type and extent of biodiversity offsets required for native vegetation removal that impacts on individual threatened species habitat.

A list of those species for which habitat is modelled in the study area is provided in Table 4 and Appendix 7. Only one of these species was recorded within the study area. A single Bearded Dragon *Pogona barbata* was recorded basking on a fence post along Brownes Lane. Likelihood of occurrence of flora and fauna species is assessed in Appendix 1 and 2, based on buffered database searches and the EPBC Act Protected Matters Search Tool (PMST). Threatened species that have modelled habitat within the study area but that did not appear within the database search area or PMST search are identified as 'not assessed' in Table 5.

Determination of the requirement for a species offset based on the extent of impact to one or more rare or threatened species is addressed in Section 5.

Table 5 Summary of EPBC and FFG Act listed species most likely to occur in the study area

Species number	Scientific name	Common name	FFG Status	Likelihood of occurrence
Threatened fauna species				
10177	*Antigone rubicunda*	Brolga	e	Low
10215	*Aythya australis*	Hardhead	v	Medium
10217	*Biziura lobata*	Musk Duck	v	Medium
12159	*Delma impar*	Striped Legless Lizard	e	Medium
10238	*Falco subniger*	Black Falcon	cr	Observed by neighbouring landholder
10598	*Grantiella picta*	Painted Honeyeater	v	Medium
13207	*Litoria raniformis*	Growling Grass Frog	v	Medium
12813	*Parasuta spectabilis*	Port Lincoln Snake	e	Not assessed
10170	*Rostratula australis*	Australian Painted-snipe	cr	Low
10212	*Spatula rhynchotis*	Australasian Shoveler	v	Medium
15021	*Synemon plana*	Golden Sun Moth	v	Recorded
10019	*Turnix pyrrhothorax*	Red-chested Button-quail	e	Low
12922	*Tympanocryptis pinguicolla*	Grassland Earless Dragon	cr	Low
Threatened flora species				
500678	*Allocasuarina luehmannii*	Buloke	v	Recorded
503624	*Amphibromus pithogastrus*	Plump Swamp Wallaby-grass	cr	Not assessed
500217	*Amyema linophylla* subsp. *orientalis*	Buloke Mistletoe	cr	Low
503630	*Aristida calycina* var. *calycina*	Dark Wire-grass	-	Not assessed
503268	*Austrostipa breviglumis*	Cane Spear-grass	e	Not assessed
503984	*Austrostipa exilis*	Heath Spear-grass	v	Not assessed
500798	*Comesperma polygaloides*	Small Milkwort	cr	Low
504655	*Coronidium gunnianum*	Pale Swamp Everlasting	cr	Low
502773	*Cullen parvum*	Small Scurf-pea	e	Medium
502776	*Cullen tenax*	Tough Scurf-pea	e	Medium
505084	*Dianella amoena*	Matted Flax-lily	cr	Medium

Species number	Scientific name	Common name	FFG Status	Likelihood of occurrence
505560	*Dianella* sp. aff. *longifolia* (Benambra)	Arching Flax-lily	cr	Not assessed
505085	*Dianella tarda*	Late-flower Flax-lily	cr	Not assessed
505786	*Dichondra* sp. 1	Silky Kidney-weed	e	Not assessed
501473	*Diuris basaltica*	Small Golden Moths	cr	Low
501061	*Diuris behrii*	Golden Cowslips	e	Not assessed
504887	*Diuris gregaria*	Clumping Golden Moths	cr	Not assessed
501084	*Diuris punctata var. punctata*	Purple Diuris	e	Not assessed
507580	*Eucalyptus baueriana* subsp. *thalassina*	Werribee Blue-box	e	Not assessed
504484	*Eucalyptus leucoxylon* subsp. *connata*	Melbourne Yellow-gum	e	Recorded
505337	*Geranium solanderi* var. *solanderi s.s.*	Austral Crane's-bill	e	Not assessed
505342	*Geranium* sp. 1	Large-flower Crane's-bill	cr	Not assessed
505344	*Geranium* sp. 3	Pale-flower Crane's-bill	e	Not assessed
501456	*Glycine latrobeana*	Clover Glycine	v	Low
501513	*Goodenia macbarronii*	Narrow Goodenia	e	Low
503753	*Gratiola pumilo*	Dwarf Brooklime	e	Not assessed
504066	*Grevillea rosmarinifolia* subsp. *rosmarinifolia*	Rosemary Grevillea	-	Low
505478	*Leionema lamprophyllum* subsp. *obovatum*	Shiny Leionema	v	Not assessed
502240	*Myoporum montanum*	Waterbush	e	Not assessed
502275	*Nicotiana suaveolens*	Austral Tobacco	e	Low
502317	*Olearia pannosa* subsp. *cardiophylla*	Velvet Daisy-bush	e	Low
504823	*Pimelea spinescens* subsp. *spinescens*	Spiny Rice-flower	cr	Medium
504658	*Podolepis linearifolia*	Basalt Podolepis	e	Low
502739	*Prostanthera decussata*	Dense Mint-bush	e	Not assessed
502746	*Prostanthera nivea* var. *nivea*	Snowy Mint-bush	v	Low
502821	*Pterostylis truncata*	Brittle Greenhood	cr	Low

Species number	Scientific name	Common name	FFG Status	Likelihood of occurrence
502825	*Ptilotus erubescens*	Hairy Tails	cr	Low
504314	*Ranunculus diminutus*	Brackish Plains Buttercup	e	Not assessed
502929	*Rhagodia parabolica*	Fragrant Saltbush	v	Low
502982	*Rutidosis leptorhynchoides*	Button Wrinklewort	e	Low
503104	*Senecio cunninghamii* var. *cunninghamii*	Branching Groundsel	e	Not assessed
503116	*Senecio macrocarpus*	Large-headed Fireweed	cr	Medium
504659	*Senecio psilocarpus*	Swamp Fireweed	-	Not assessed
503455	*Tripogonella loliiformis*	Rye Beetle-grass	e	Low
504562	*Xanthosia leiophylla*	Parsley Xanthosia	e	Not assessed

3.2.7 Threatened ecological communities

The EPBC Protected Matters Search Tool indicates that five Threatened Ecological Communities (TECs) occur or have potential to occur in the local area. These are:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain
- Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia
- Natural Damp Grassland of Victorian Coastal Plains
- Natural Temperate Grassland of the Victorian Volcanic Plain
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

Most patches of EVC 132_61 Heavier-soils Plains Grassland identified within the study area also meet the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain; whereby the total perennial tussock cover within each patch is represented by the native grass genera *Themeda*, *Rytidosperma* or *Austrostipa* by at least 50 percent.

One patch (VQA 14) of EVC 55_63 Plains Grassy Woodland identified within the study area also meets the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Grey Box (*Eucalyptus macrocarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia; whereby at least 50 percent of the ground cover in the ground layer is made up of perennial native species and dominated by an overstorey of Grey Box *Eucalyptus mircocarpa*.

DEECA vegetation modelling also suggests there is potential for two State listed TECs to occur or have potential to occur within the local area. These include:

- Western Basalt Plains (River Red Gum) Grassy Woodland Floristic Community 55-04
- Western (Basalt) Plains Grasslands Community

Most patches of Plains Grassland within the study area would represent examples of the Western (Basalt) Plains Grassland Community. The Western Basalt Plains (River Red Gum) Grassy Woodland community is not present.

Two patches of EVC 125 Plains Grassy Wetland were mapped associated with the constructed dam in the south-east section of the study area. These patches are not considered to represent examples of 'Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains' as they are associated with a constructed dam, and the area would not have supported wetland plants prior to the construction of the dam.

4. Biodiversity legislation and government policy

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

4.1 Commonwealth

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

MNES relevant to the project are summarised in Table 6. It includes an assessment against the EPBC Act policy statements published by the Australian Government which provide guidance on the practical application of EPBC Act.

Table 6 Assessment of project in relation to the EPBC Act

MNES	Project specifics	Assessment against significant impact guidelines
EPBC Act listed species	Forty-three EPBC Act listed species have predicted to occur in the project search area. The likelihood and predicted location of these species occurring in the study area is assessed in Appendix 1 (flora) and Appendix 2 (fauna).	The majority of these species are unlikely to occur within the study area. This conclusion is attributed to the highly modified nature of the study area, paucity of recent local records and absence of suitable habitat. Spiny Rice-flower has a medium likelihood to occur within the study area. Based on the results of targeted surveys and the current design footprint, it is considered a low likelihood that the proposed Barwon Solar Farm will result in a significant impact on a population of Spiny-rice Flower. White-throated Needletail has a medium potential to fly over the study area on occasion. However, as White-throated Needletail is considered an almost exclusively aerial species in Australia (outside of densely forested environments where it may occasionally roost), ground-based activities proposed by the Barwon Solar Farm are considered unlikely to impact the species. Migratory and volant species including Grey-headed Flying-fox and Swift Parrot have a medium likelihood to forage on flowering Eucalypts or lerp within the study area; with Melbourne Yellow Gum being a preferred tree species of Swift Parrot. However, as these trees form a very small component of a much larger network of foraging habitat utilised across much of Victoria and parts of South Australia, New South Wales and Queensland the proposed removal of any of these trees is considered unlikely to result in a significant impact on either of these species (as assessed in accordance with *Significant Impact Guidelines 1.1 – Matters of National Environmental Significance*).

MNES	Project specifics	Assessment against significant impact guidelines
		Yarra Pygmy Perch has a medium likelihood to occur within aquatic environments of Little River intercepting the study area. It is considered a low likelihood that the proposed Barwon Solar Farm would result in a significant impact on this species, as long as a site-specific Construction Environmental Management Plan (CEMP) implementing suitable erosion and pollutant control measures are applied. Growling Grass Frog has a medium likelihood to utilise aquatic or terrestrial environments within the study area. Whilst farm dams within the study area are considered unlikely to provide suitable breeding habitat (i.e. dense submergent and floating macrophytes), the species has been recorded within Little River and is highly mobile; dependent on the migration of adults between waterbodies, and between breeding and non-breeding habitats (Clemann & Gillespie 2012). Significant impact thresholds for the Growling Grass Frog (DEWHA 2009c) identify the potential for a significant impact to the species to occur where permanent removal or degradation of terrestrial habitat within 200 metres of a known waterbody is proposed, resulting in the loss of dispersal or overwintering activities. Installation of panels is proposed within 200 m of Little River and Sandy Creek in some areas, however these areas are grazing or cropping land that does not support overwintering habitat such as dense vegetation, rocks or coarse woody debris, and they are unlikely to be used for dispersal as aquatic habitats are limited to the two waterways. If some occasional dispersal does occur, installation of solar panels is unlikely to limit dispersal activities as the ground layer will still be vegetated. It is considered a low likelihood that the proposed Barwon Solar Farm will result in a significant impact on a population of Striped Legless Lizard. This species was not detected during targeted surveys of the initial investigation area, despite tile grids being located within suitable habitat and surveys occurring during optimal weather conditions. The proposed Barwon Solar Farm proposes to remove 13.3 hectares of Plains Grassland, and is considered likely to result in a significant on Golden Sun Moth; which was recorded during targeted surveys of the initial investigation area. A significant impact assessment for this species against relevant EPBC Act policy documents is presented in Table 7 below.
EPBC Act listed ecological communities	Six EPBC Act listed threatened ecological communities (TECs) have been recorded or predicted to occur in the project search area. The likelihood of these TECs occurring in the study area is assessed in Appendix	Two TECs were detected within the study area during ground-based site assessments. The study area contains 1.4 hectares of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia, corresponding with a patch of Plains Grassy Woodland. As this patch has been excluded by the project's design it is considered unlikely the proposed Barwon Solar Farm would result in a significant impact on this community (as assessed in accordance with criteria outlined in EPBC

MNES	Project specifics	Assessment against significant impact guidelines
	1 (flora).	Act policy documents). The study area contains 92 hectares of NTGVVP, of which the proposed Barwon Solar Farm proposes to remove 8.4 hectares. Referral of the project to the Australian Government (Minister for the Environment) to determine whether the proposed action requires approval under the EPBC Act is recommended. A significant impact assessment considering impacts to this community in accordance with relevant EPBC Act policy documents is provided in Table 8.
Migratory species	Eleven migratory species have been recorded or predicted to occur in the project search area (Appendix 2).	The majority of these majority of these species are unlikely to occur within the study area. This conclusion is attributed to the highly modified nature of the study area, paucity of recent local records and absence of suitable aquatic habitat. While some species would be expected to use the study area on occasions, and some of them may do so regularly or may be resident, it does not provide important habitat for an ecologically significant proportion of any of these species. Referral is not considered necessary for this MNES.
Wetlands of international importance (Ramsar sites).	The study area is identified as being within 10 kilometres of the Port Phillip Bay (western shoreline) and Bellarine Peninsula	The study area does not drain directly into any Ramsar site and thus considered unlikely to result in a significant impact. Referral is not considered necessary for this MNES.

4.1.2 Assessment against EPBC Act significant impact guidelines

Golden Sun Moth

Table 7 Assessment of Golden Sun Moth (listed vulnerable species) in relation to Significant Impact Criteria for vulnerable species

Significant Impact Criteria	Likelihood of Triggering	Assessment against significant impact guidelines
Lead to a long-term decrease in the size of an important population of a species	Possible	The Conservation Advice (DAWE 2021) does not provide a clear definition of an 'important population' and there has been no update to the species' significant impact guidelines since the revision the status to vulnerable. The Conservation Advice does state, however, that all occupied habitat is important for the breeding activity of the associated sub-population. The advice also states that large sub-populations or smaller well-connected subpopulations occurring in high quality habitat would classify for their importance in the long term maintenance of the species, including maintenance of genetic diversity. The populations recorded within the study area would be considered small-medium sized populations, based on the

Significant Impact Criteria	Likelihood of Triggering	Assessment against significant impact guidelines
		area of habitat, but these are associated with larger populations within extensive areas of grassland to the north of the study area. Based on this, the populations present within the study area are likely to be considered important populations, and removal of habitat, particularly habitat zone VQA5 and VQA21 in the north-eastern section of the site would be considered to trigger this criterion.
Reduce the area of occupancy of an important population	Possible	Impacts to VQA5 and VQA21 results in the loss of 5.3 ha of habitat for the species.
Fragment an existing important population into two or more populations	Possible	Removal of VQA5 and VQA21 potentially isolates other areas of recorded habitat within the site (VQA4 and VQA2), however it is likely that the species may be able to disperse across the site.
Adversely affect habitat critical to the survival of a species	Impacts limited to the project footprint.	There is an opportunity to improve management of retained habitat areas to benefit the species.
Disrupt the breeding cycle of an important population	Impacts limited to the project footprint.	All occupied habitat is used for breeding.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	Loss of habitat resulting from this project is relatively minor in the context of our current understanding of the distribution of the species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely	There is an opportunity to improve management of retained habitat areas to benefit the species.
Introduce disease that may cause the species to decline	Unlikely	
Interfere substantially with the recovery of the species	Unlikely	There is an opportunity to improve management of retained habitat areas to benefit the species.

Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP)

Table 8 Assessment of Natural Temperate Grassland of the Victorian Volcanoic Plain (listed vulnerable species) in relation to Significant Impact Criteria for critically endangered or endangeerd ecological communities

Significant Impact Criteria	Likelihood of Triggering	Assessment against significant impact guidelines
Reduce the extent of an ecological community	Likely	Project design involves the Removal of 8.409 hectares of Natural Temperate Grassland of the Victorian Volcanic Plain. Most grassland is in relatively poor condition and are not currently managed to reduce threats, however poor condition examples of the community are still protected under the EPBC Act.
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	Unlikely	NTVVP within the site is patchy in distribution. Larger patches have been preserved within the design and poor quality patches have been identified for removal, particularly where the project design requires access to adjacent cleared areas.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	No Recovery Plan has been prepared or adopted for this TEC and no critical habitats have been formerly identified by the Australian Government. However, given that less than 2% of the TEC is estimated to still exist, most areas that continue to support the TEC are likely to be considered critical habitat, particularly if those areas support moderate to high quality examples of the TEC. This example of NTGVVP is of low to moderate quality. Given the NTGVVP is located within farmland, without active management, this vegetation is likely to continue to degrade in quality over-time.
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Likely, but impacts are limited to the project footprint.	The project hydrology report (Eco Logical Australia 2022) has determined that the project will not result in hydrological changes that would impact adjacent, protected areas of the community.
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Impacts limited to the project footprint	The project hydrology report (Eco Logical Australia 2022) has determined that the project will not result in hydrological changes that would impact adjacent protected areas of the community.

Significant Impact Criteria	Likelihood of Triggering	Assessment against significant impact guidelines
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: • **Assisting invasive species, that are harmful to the listed ecological community, to become established, or** • **Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or**	Impacts limited to the project footprint	The change in land use presents an opportunity to improve management of retained patches, including improved weed control, discontinuation of fertiliser use and management of grazing regime for biodiversity outcomes.
Interfere with the recovery of an ecological community.	Impacts limited to the project footprint	No Recovery Plan has been prepared or adopted for this TEC and therefore recovery priorities (actions and locations) have not been formerly articulated by the Australian Government. As noted above the project presents an opportunity to improve the management of retained patches.

4.2 State

4.2.1 Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Under the FFG Act a permit is required from DELWP to 'take' protected flora species. Permit exemptions under the FFG Act generally apply to the non-commercial removal of protected flora from private land, unless there is 'critical habitat' that has been declared on the land. Authorisation under the FFG Act is required to collect, kill, injure or disturb listed fish on private or public land.

Link for further information: https://www.environment.vic.gov.au/conserving-threatened-species/victorias-framework-for-conserving-threatened-species

The FFG Act defines public land as *Crown land or land owned by, or vested in, a public authority,* while private land is defined as *any land other than public land.* A public authority is defined in the FFG Act as a body established for a public purpose by or under any Act and includes:

- an Administrative Office
- a Government Department
- a municipal council
- a public entity
- a State-owned enterprise.

The study area is predominantly on private land, does not contain any declared 'critical habitat' for the purposes of the FFG Act and the flora species within are not being taken for the purpose of commercial sale. A protected flora permit is therefore not required, however the presence of rare or threatened flora and habitat for threatened fauna will be considered by the Responsible Authority in determining its response to an application for native vegetation removal under Clause 52.17 (see below).

The study area also encompasses a section of road reserve along Russells Bridge Road and Brownes Lane. Both road reserves occur on Crown Land and are therefore considered public land for the purposes of the FFG Act. Two protected flora species were identified in these reserves (Appendix 1), and a protected flora permit from DEECA would be required if any of these species will be affected by the proposal.

4.2.2 Catchment and Land Protection Act 1994 (CaLP Act)

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

Declared noxious weeds identified in the study area include (Appendix 1):

- *Carthamus lanatus*
- *Chrysanthemoides monilifera*
- *Cirsium vulgare*
- *Cynara cardunculus subsp. flavescens*
- *Echium plantagineum*
- *Eragrostis curvula*
- *Lycium ferocissimum*
- *Marrubium vulgare*
- *Nassella neesiana*
- *Nassella trichotoma*
- *Opuntia spp.*
- *Rosa rubiginosa*
- *Silybum marianum*
- *Xanthium spinosum*

Two pest species were also observed during site assessment, including Red Fox *Vulpes vulpes* and European Rabbit *Oryctolagus cuniculus*.

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

Link for further information: http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds.

4.2.3 Planning and Environment Act 1987 (incl. Planning Schemes)

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

Of particular relevance to the development proposal are controls relating to the removal, destruction or lopping of native vegetation contained within the City of Greater Geelong Planning Scheme (the Scheme), including permit requirements. The Scheme (Clause 73.01) defines 'native vegetation' as 'Plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses'. It is an objective of Clause 12.01-2 of the State Planning Policy Framework (Native Vegetation Management) that removal of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.

Clause 52.17 (Native Vegetation) requires a planning permit to remove, destroy or lop native vegetation including some dead native vegetation. Decision guidelines that must be considered by the referral or responsible authority are contained in Section 7 of the Guidelines, and referred to in Clause 52.17-4. Clause 52.17 does not apply if a Native Vegetation Precinct Plan corresponding to the land is incorporated in the Scheme. It should be noted that where native vegetation does not meet the definition of a patch or scattered tree, as described in Section 3.1.1, the Guidelines do not apply. However, a permit may still be required to remove, destroy or lop native vegetation under the provisions of the Scheme.

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

- the class of application is on the detailed assessment pathway
- a property vegetation precinct plan applies to the site or
- the native vegetation is on Crown land occupied or managed by the Responsible Authority.

The need for a permit to remove native or exotic vegetation within the study area may also be triggered by Two Environmental Significance Overlays (ESOs) within the Scheme (ESO1 and ESO4). The location of the overlays in relation to the study area can be determined via the following link: http://planningschemes.dpcd.vic.gov.au.

The provisions of the ESOs that apply to the study area include:

- ESO1 – a permit is required for the removal of exotic and native vegetation under Clause 42.01 of the City of Greater Geelong Planning Scheme.
- ESO4 – a permit is required for the removal of native vegetation under Clause 42.01 of the City of Greater Geelong Planning Scheme.

Outside of native vegetation, the majority of vegetation is crop, pasture grasses, introduced trees, weeds and planted vegetation. The proposed removal of any non-native vegetation will require further consideration during the detailed design phase.

Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria (DELWP 2017a). The Guidelines replaced the previous incorporated document titled *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI 2013) on 12 December 2017.

The purpose of the Guidelines is to guide how impacts to biodiversity should be considered when assessing a permit application to remove, destroy or lop native vegetation. The objective for the guidelines in Victoria is 'No net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

A detailed assessment of the implications for the project under the Guidelines is provided in Section 5 of this report. Under the Guidelines, there are three assessment pathways for assessing an application for a permit to remove native vegetation: basic, intermediate and detailed.

A detailed determination of the assessment pathway for the planning application relevant to the proposed development is provided in Section 5.3. In summary, the planning application for removal of native vegetation must meet the requirements of, and be assessed in, the detailed assessment pathway.

4.2.4 Environment Effects Act 1978

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

The general objective of the assessment process is *to provide for the transparent, integrated and timely assessment of the environmental effects of projects capable of having a significant effect on the environment* (DSE 2005).

The 'Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978' (DSE 2005) provide a range of criteria that can be used to determine whether an EES may be required for a project. These criteria relate to individual potential environmental effects and a combination of (two or more) potential environmental effects.

As the project, in its current form, requires the removal of more than 10 hectares of native vegetation, removal of a FFG Act listed ecological community (Western Plains Grassland) and a critically endangered FFG Act listed species (Golden Sun Moth), referral of the project to the Victorian Government (Minister for Planning) is recommended.

4.2.5 Fisheries Act 1995

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

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

The FFG Act listed species Yarra Pygmy Perch has potential to occur in Little River within and downstream of the study area. Construction activities within or near Little River has potential to change the condition of the waterway because of erosion, sediment and dust; in turn, impacting on inhabiting protected aquatic biota.

Providing suitable mitigation measures are adhered to minimise soil erosion, land disturbance and discharge of sediment and other pollutants to Little River, the potential for protected aquatic biota to be injured, damaged or destroyed is considered to be negligible and no permit is required from DEECA.

4.2.6 Water Act 1989

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

The proposed development within the study area will involve construction activities located greater than 50 metres from Little River and Sandy Creek. Development within the study area is unlikely to require a permit from Corangamite Catchment Management Authority (CMA) provided suitable mitigation measures are adhered to minimise soil erosion, land disturbance and discharge of sediment and other pollutants to Anderson's Inlet.

4.2.7 Environment Protection Act 2017: Environmental Reference Standards

The Environment Protection Act 2017 provides a legal framework for the systematic and strategic management of potential and realised environmental impacts. The Environment Protection Act 2017, the Environment Protection Regulations 2021 and Environment Reference Standards (ERS) introduced from 1 July 2021 provide a regulatory framework designed to prevent harm by eliminating or minimising risks of harm to human health and the environment.

Under the regulatory changes, SEPP (Waters) will not continue as a subordinate instrument under the EP Act, and its formal statutory role ended on 1 July 2021. Much of the content of SEPP (Waters) has been saved under the Environment Protection Transitional Regulations 2021 for a period of 2 years after the commencement of the Environment Protection Regulations 2021. As SEPP (Waters) contributes to the state of knowledge and provides guidance on compliance with the General Environmental Duty (GED), the policy remains relevant to the protection and management of Victoria's water environments, including surface waters, estuarine and marine waters and groundwaters.

While not being saved under the Environment Protection Transitional Regulations 2021, the following clauses of SEPP (Waters) applicable to the project remain relevant as they provide guidance for compliance with the GED under the Environment Protection Act 2017:

Clause 42 – Construction activities:

- Minimise soil erosion, land disturbance and discharge of sediment and other pollutants to surface waters
- Where construction activities impinge on surface waters, construction managers need to monitor affected surface waters to assess whether beneficial uses are being protected

Clause 45 – Native vegetation protection and rehabilitation:

- Minimise the removal of and rehabilitate native vegetation within or adjacent to surface waters

The ERS requires that aquatic ecosystem values be protected. Environmental quality objectives and indicators are defined to protect beneficial uses (i.e. the uses and values of the water environment) and an attainment program provides guidance on protection of the beneficial uses. Impacts to surface water quality as a result of the project must not result in changes that exceed background levels and/or the water quality objectives specified for the Central Bass segment to protect surface water uses and values.

To ensure that direct and indirect (e.g. runoff) impacts to surface water quality do not exceed the background levels and/or water quality objectives, it is recommended that Elgin Energy prepare and implement a site-specific Constructional Environmental Management Plan, which includes mitigation measures to minimise soil erosion, land disturbance and discharge of sediment and other pollutants to Little River.

Temporary control measures should be inspected during rainfall events to ensure controls are able to prevent/minimize offsite discharges and longer term impacts. Sediment control measures selected should also reflect the level of protection required to protect the ecological values within Little River, within and downstream of the study area.

Link to further information: http://www.gazette.vic.gov.au/gazette/Gazettes2021/GG2021S245.pdf

5. Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The Guidelines were introduced in December 2017. They set out and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation in order to achieve the objective of 'no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This objective is to be achieved through Victoria's planning system using an assessment approach that relies on strategic planning and the permit and offset system. The key policy for achieving no net loss to biodiversity is the three-step approach of avoid, minimise and offset:

- **Avoid** the removal, destruction or lopping of native vegetation to ensure that the important biodiversity values of native vegetation continue to be delivered into the future.
- **Minimise** impacts resulting from the removal of native vegetation that cannot be avoided.
- Provide an **offset** to compensate for the biodiversity impact resulting from the removal of native vegetation.

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

- Locating the project within modified cropland that is primarily cleared of native patch vegetation.
- Considering the preliminary results of this assessment and amending the solar farm layout so as to avoid impacts to patch vegetation and scattered trees, where possible.

DEECA has provided biodiversity information tools to assist with determining the assessment pathway associated with the removal of native vegetation and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

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

The biodiversity information tools have two components:

Site-based information

The site-based information is observable at a particular site. Biosis has collected the requisite site-based information for the assessment against the Guidelines.

Landscape scale information

Landscape scale information requires consideration of information beyond the site. This information is managed by DEECA and can be accessed via the NVIM.

The following section summarises the results of the site-based assessment and the outputs generated by the Native Vegetation Removal Report, which identifies the assessment pathway on which the planning application will be assessed. The full Native Vegetation Removal Report can be viewed in Appendix 7.

5.1 Avoid and minimise statement

5.1.1 Site selection

Biosis's involvement in the flora and fauna assessment process commenced once the initial site had been selected. The site selection process is documented in other parts of the planning permit assessment. It is our understanding that the site was selected for access to the power network, the locations of adjacent properties (willing to be involved) that could be combined into a commercially viable project, and characteristics of the site, being a largely cleared agricultural landscape.

Biosis did not assess any alternative sites.

5.1.2 Planning Permit design process

The design process for the Barwon solar farm commenced in 2020. Initial vegetation mapping was conducted by Biosis in 2020 to inform the design. This included mapping of grassland patches, woodland patches and locations of scattered trees. The vegetation mapping was refined following further survey work between 2020 and 2022. Several design iterations were undertaken as knowledge of the site was improved, in particular the locations of key ecological features such as habitat for threatened species, locations of FFG Act listed trees and FFG Act and EPBC Act listed threatened ecological communities.

The design presented in the Planning Permit Application prioritised the protection of remnant native grasslands and woodland vegetation. To achieve the development area required for economic viability, some regularly cropped areas supporting remnant scattered trees were identified for development.

The following features were prioritised for avoidance:

- Creekline Grassy Woodland associated with Little River and Sandy Creek.
- Remnant vegetation within the Little River-Ripley Road reserve.
- Areas of Plains Grassy Woodland, including VQA 13 and VQA 28.
- Plains Grassland corresponding with the definition of the EPBC Act listed threatened ecological community Natural Temperate Grassland of the Victorian Volcanic Plain and the FFG Act listed Western (Basalt) Plains Grasslands.
- Plains Grassland where Golden Sun-moth (listed as Vulnerable under the EPBC Act) were recorded.
- A group of scattered trees including and near the Black Falcon nest, to the south of Little River Ripley Road (directly south-east of VQA 31).

Note that some areas of Plains Grassland were identified for development. The design process considered the quality of the grasslands, as assessed in the Habitat Hectare assessment, the shape and level of connectivity and the presence of Golden Sun Moth. Patches selected for partial development included:

- Sections of low quality VQA 16 and VQA 19 were included in the project footprint, to allow for access between two adjacent areas of panels.
- Portion of low quality grassland in VQA 30, to provide additional panel area and connection through the site.

- Low quality grassland within VQA 5. Although Golden Sun Moth were observed using this area, the grassland is in poor condition, and a very narrow shape that would be difficult to manage into the future.

Current land use, and ongoing management in the absence of the solar development were also considerations in the design. Most remnant grasslands within the study area were located in areas unsuitable for cultivation, including rocky areas, or low-lying seasonally wet areas. None of these areas are currently managed for protection of biodiversity values. All areas are subject impacts from adjacent land, including grazing by stock and weed infestations. High threat weeds are common throughout the study area, and pose a major risk to the ongoing viability of biodiversity values within grassland areas, unless there is a change to the management regime. The following species are of particular concern.

- Serrated Tussock *Nassella trichotoma*
- Chilean Needle-grass *Nassella neesiana*
- Cane Needle-grass *Nassella hyalina*
- Galenia *Aizoon pubescens*
- Cape Weed *Arctotheca calendula*
- Saffron Thistle *Carthamus lanatus*
- Boneseed *Chrysanthemoides monilifera*
- African Box-thorn *Lycium ferocissimum*
- Horehound *Marrubium vulgare*
- Tiger Pear *Opuntia aurantiaca*

5.1.3 Current design

The design was again modified in January-February 2023, in response to consultation with DEECA (including the DEECA RFI to the Planning Permit Application). The resulting design is referred to as the 'current design' and the impacts of this design are quantified in this report.

Key considerations in the design modification were to:

- Minimise the removal of scattered trees by fine tuning the design in several locations, particularly around the edges of the panel development area.
- Adjust the locations of fences and access tracks, to avoid individual trees where possible.
- Protect a number of scattered trees in the central portion of the site to increase the area of retained vegetation and improve connectivity.

Specific design changes include:

- Contraction of the panel area in the cropping paddock to the south of Sandy Creek (north of Little River – Ripley Road). These trees have been prioritised for retention, as they assist in improving connectivity and the area of remnant vegetation along Sandy Creek. The current design avoids impacts to 17 individual scattered trees in this area, as listed below:
  - Nine Melbourne Yellow Gum *Eucalyptus leucoxylon* subsp. *connata* (ST0006, ST0014, ST0029, ST0030, ST0035, ST0036, ST0037, ST0038, ST0039), eight of which are large trees (DBH > 80).

- Five Yellow Box *Eucalyptus melliodora* (ST0003, ST0004, ST0005, ST0010, ST0033), including three large trees.
- One large Grey Box *Eucalyptus microcarpa* (ST0012).
- Two dead trees (ST0013 and ST0034).

- Alterations to the layout to the south of Little River – Ripley Road, resulting in the avoidance of four individual scattered trees, as listed below:
  - Three Grey Box *Eucalyptus microcarpa* trees (ST0081, ST0082, ST0116).
  - One large Yellow Box *Eucalyptus melliodora* (ST00118).
- Alterations to the panel layout and location of fencing and access tracks in the south-east of the project area, avoiding the avoidance of five scattered Yellow Box *Eucalyptus melliodora* trees (ST1016, ST1017, ST1020, ST1025, ST1026), including one large tree.

5.1.4 Tree impacts (Current design)

The site supports a range of remnant indigenous tree species, including:

- Buloke *Allocasuarina luehmannii* (FFG Act: Vulnerable)
- River Red-gum *Eucalyptus camaldulensis*
- Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata* (FFG Act: Endangered)
- Yellow Box *Eucalyptus melliodora*
- Grey Box *Eucalyptus microcarpa*
- Manna Gum *Eucalyptus viminalis*

Scattered trees were identified across the entire site. 187 scattered trees were mapped in total.

Some patch trees were individually mapped and assessed within grassland areas, but no individual assessment of patch trees were undertaken in woodland patches that were identified for retention early in the design process. As a result, we do not have a complete audit of the number of trees to be retained and impacted across the entire site.

Unimpacted areas where patch trees were not assessed include:

- Creekline Grassy Woodlands along Little River and Sandy Creek
- Plains Grassy Woodland near the southern boundary of the site (VQA 28)
- Plains Grassy Woodland (Grey Box dominated) within VQA 14.
- River Red-gum within VQA 6.
- Remnant Woodlands along the Little River Ripley Road reserve.

Scattered tree impacts

In the design presented in the original Planning Permit application, 97 of the 187 scattered trees were identified for removal. In the current design, scattered tree impacts have been reduced to 70 trees. This equates to 37% of the scattered trees mapped within the study area.

Table 9 Summary of scattered tree impacts in the current design

Species	Total	Retained	Removed
Buloke *Allocasuarina luehmannii*	8	2	6
River Red-gum *Eucalyptus camaldulensis*	9	4	5
Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	53	24	29
Yellow Box *Eucalyptus melliodora*	47	35	12
Grey Box *Eucalyptus microcarpa*	56	42	14
Manna Gum *Eucalyptus viminalis*	3	3	0
Dead	11	7	4
Total	**187**	**117**	**70**

In general, scattered trees were identified for removal if they were located within cultivated paddocks, or paddocks of introduced pasture, away from other areas of native vegetation.

5.1.5 Grassland impacts (Current design)

The project design intersects with panel 13.321 hectares of Plains Grassland (as noted in Section 5.1.2). While these intersections are assumed to result in loss of the grassland area and associated habitat for Golden Sun Moth, and these losses have been included in the impact and offset calculations, there is potential for some grassland biodiversity values to persist beneath the solar panels.

Installation of the panels does not require complete ground disturbance (ie scalping of the surface). Panels are installed on posts, with a relatively small direct disturbance footprint. Other disturbance due to machinery access will be temporary in nature. There is a growing body of evidence from other solar projects that the partial shading caused by solar panels does not completely kill grassland species, and it is possible that some elements of the grassland (ie. Native grass species), may survive into the long term. This project presents an opportunity

5.2 Proposed removal of native vegetation

The extent of native vegetation patches, the location of large trees within patches and any scattered trees were mapped within the study area (Figure 2) and the condition was assessed in relation to standard methods provided by DSE (2004) and pre-determined EVC benchmarks: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks.

DEECA's Native Vegetation Information Management system was also used to determine vegetation extent.

The proposed removal of native vegetation (Figure 3) was assessed in accordance with the concept design provided (Appendix 8).

Proposed removal includes:

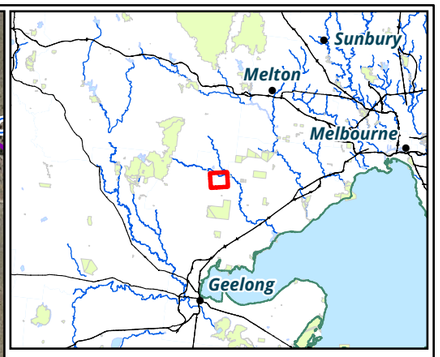
- Total removal: 18.330 hectares
- Patch removal: 14.294 hectares (Appendix 6, Table A6.1)
- Patch trees: Five trees including two live LTs (Large Trees), 1 dead LT and two smaller live trees (Appendix 6, Table A6.3)
- Scattered trees: 70 in total (Appendix 6, Table A6.2), including:
  - 46 live LOTs
  - four dead LOTs
  - 20 smaller live trees

Spatial data (shapefiles) of proposed vegetation removal were submitted to DEECA's native vegetation support team, who provided a Native Vegetation Removal Report for the project. This is provided in Appendix 7 and summarised in the following sections.

5.2.1 Habitat hectares

A continuous area of the same EVC is termed a 'habitat zone'. Different habitat zones exists where there are different EVCs present and/or discrete (non-continuous) patches of the same EVC. A separate vegetation quality assessment was conducted for each habitat zone. The vegetation quality assessment score was multiplied by the extent of the habitat zone to give a value in habitat hectares.

Thirty-six habitat zones were identified during the site assessment. The results of the vegetation quality assessment are provided in Appendix 6, with the number of habitat hectares in each habitat zone.



Legend

- Study area
- Bioregions
- Works footprint
- Patch vegetation to be removed

Ecological Vegetation Class

- 55_61 Plains Grassy Woodland
- 68 Creekline Grassy Woodland
- 71 Hills Herb-rich Woodland
- 128 Grassy Forest
- 132_61 Heavier-soils Plains Grassland
- 821 Tall Marsh

Patch trees

- Small, retained
- Large, retained
- Small, removed
- Large, removed

Scattered trees

- Small, retained
- Large, retained
- Small, removed
- Large, removed

Figure 3 Vegetation proposed for removal

0 100 200 300 400 500

Metres

Scale: 1:13,000 @ A3

Coordinate System: GDA 1994 MGA Zone 54

N

biosis

Matter: 36540,
Date: 24 February 2023 ,
Prepared for: MG, Prepared by: LW, Last edited by: jturner
Layout: 36540_F3_VegRemoval
Project: P:\36500s\36540\Mapping\
36540_LittleRiverSolarFarm_Eco_Mapping.aprx

5.3 Determining the assessment pathway

Applications to remove native vegetation are categorised into one of three assessment pathways: basic, intermediate or detailed. Two factors are used to determine the assessment pathway for a permit application, the **location** and **extent** of the native vegetation proposed to be removed. Location has been divided into three possible categories by DEECA, and has been pre-determined by DEECA for all locations in Victoria. The location of a particular site is determined using the *location map* available in the Native Vegetation Information Management (NVIM) system (http://nvim.depi.vic.gov.au).

The extent of native vegetation proposed to be removed determines the assessment pathway by considering the following:

- The total area (hectares) of native vegetation (including any patches and scattered trees) proposed to be removed
- Whether any large trees are proposed to be removed, either as scattered trees or occurring in patches.

It is proposed to remove greater than 0.5 hectares of native vegetation predominantly from within location category 2. The application for removal of this native vegetation must therefore meet the requirements of, and be assessed in, the detailed assessment pathway. These requirements are provided in Appendix 7.

5.4 Offset requirements

In order to ensure a gain to Victoria's biodiversity that is equivalent to the loss resulting from the proposed removal of native vegetation, compensatory offsets are required. Losses and gains are measured in general or species habitat scores or units. The offset must also include at least one large tree for every large tree removed.

For a detailed assessment pathway application, the species-general offset test will determine if a general offset, species offset or combination of both is required.

The results of the species-general offset test are provided in Appendix 7 and summarized in Table 10.

Table 10 Summary of DEECA Native Vegetation Removal Report

Attribute	Outcome
Location category	1 and 2
Native vegetation removal extent	18.330 hectares
Assessment pathway	Detailed
Modelled habitat for threatened species	Yes
Offset type	General
Offset amount: general habitat units	4.855 units
General offset vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Greater Geelong City Council
General offset minimum Strategic Biodiversity Value Score	0.348
Large tree attributes	54 large trees

5.5 Proposed offset strategy

The proponent intends to satisfy offset requirements through a combination of on-site offsetting, if possible, and purchase of offsets through the offset register.

Offsets will be required for native vegetation removal (State offsets) and any impacts to Matters of Natural Environmental Significance listed under the EPBC Act, including removal of Natural Temperate Grassland of the Victorian Volcanic Plain (Critically endangered listed community) and Golden Sun Moth (Vulnerable species) habitat.

6. Key ecological values and recommendations

This section identifies the key ecological features of the study area, provides an outline of potential implications of proposed development on those values and includes recommendations to assist Elgin Energy to avoid, mitigate and offset impacts on biodiversity.

Key ecological values

Effective project planning for protecting ecological values requires an understanding of the occurrence and/or condition of environments that may be impacted by project activities. Key ecological values identified within the study area that should be considered during the design phase of the project include:

- 119 hectares of native patch vegetation comprised of EVC 55_63 Plains Grassy Woodland, EVC 68 Creekline Grassy Woodland, EVC 125 Plains Grassy Wetland, EVC 821 Tall Marsh and EVC 132_61 Heavier-soils Plains Grassland.
- 187 scattered trees (River Red-gum *Eucalyptus camaldulensis,* Melbourne Yellow Gum *Eucalyptus leucoxylon* subsp. *connata*, Yellow box *Eucalyptus melliodora,* Buloke *Allocasuarina luehmannii,* Grey Box *Eucalyptus microcarpa,* Manna Gum *Eucalyptus viminalis*).
- Two threatened ecological communities including 92 hectares of Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVPP) and 1.4 hectares of Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.
- Habitat for one threatened flora listed under the EPBC Act and three additional flora listed under the FFG Act (Appendix 2).
- Habitat for 18 threatened fauna; including seven species listed under the EPBC Act and 11 species listed under the FFG Act (Appendix 2).

Design phase recommendations

The primary measure to reduce impacts to biodiversity values is to avoid and minimise removal of native vegetation, both patches and scattered trees. Design plans should delineate the total extent of works including access tracks and road batters, drainage infrastructure, underground or overhead services, and provision for future works where this is foreseeable. Failure to do so, may result in unanticipated impacts on native vegetation during construction.

Avoidance measures implemented by Elgin Energy during the design of the Barwon Solar Farm include:

- Locating the project within modified grazing and cropland that is primarily cleared of native patch vegetation. The design has avoided the majority of Plains Grassland within the site, and riparian vegetation along Little River and Sandy Creek.
- Using existing gateways for site access, and positioning any new site access points away from identified areas of native vegetation.
- Considering the preliminary results of this assessment and amending the solar farm layout so as to avoid impacts to patch vegetation and scattered trees, where possible, including avoidance of scattered trees near the south-eastern section and north-western sections of the site.

Based on the results of targeted surveys and the current design footprint, it is considered a low likelihood that the proposed Barwon Solar Farm will have an impact on threatened species Spiny Rice-flower and Striped

Legless Lizard. However, should any works be proposed in the additional land parcel (located to the north of Little River within the study area) or within patches of Plains Grassy Woodland it is recommended that additional targeted surveys are undertaken in these locations to determine the likelihood of a population of these species being present.

Migratory and volant species including Grey-headed Flying-fox and Swift Parrot have a medium likelihood to forage on flowering Eucalypts or lerp within the study area; with a historical record of Swift Parrot having been recorded within the study area. Whilst the proposed removal of any of these trees is unlikely to result in a significant impact on either of these species (given they form a very small component of a much larger network of foraging habitat utilised across much of Victoria and parts of South Australia, New South Wales and Queensland) it is recommended that scattered trees are retained within the study area, where feasible.

Yarra Pygmy Perch has a medium likelihood to occur within aquatic environments of Little River within and downstream of the study area. It is considered a low likelihood that the proposed Barwon Solar Farm would result in a significant impact on this species within or downstream of the study area, as long as a site-specific Construction Environmental Management Plan (CEMP) implementing suitable erosion and pollutant control measures are applied during construction.

Growling Grass Frog is a highly mobile species that is dependent on the migration of adults between waterbodies, and between breeding and non-breeding habitats (Clemann & Gillespie 2012). Growling Grass Frog has historically been recorded within terrestrial areas of the study area, and within aquatic environments of Little River, downstream of the study area.

Farm dams within the study area represent low quality habitat for Growling Grass Frog and are considered unsuitable to support breeding activities. These waterbodies lack the species key preferences, i.e. permanent waterbodies that contain shallow areas and a complex vegetation structure (e.g. dense submergent and floating macrophytes) (DELWP 2017b); which provide egg-laying sites, staging sites for calling males and food/shelter for tadpoles (Clemann & Gillespie 2012). Whilst there is potential for some individuals to visit these dams on occasion during dispersal (when surrounding biomass within the study area is low), the local viability of Growling Grass Frog is not considered dependent on these waterbodies, singly or in combination.

Terrestrial areas adjacent to wetlands and streams are known to provide important habitat for Growling Grass Frog, which utilise these areas for dispersal, foraging and shelter during periods of inactivity (over-wintering). Important features typically associated with terrestrial areas adjacent to wetlands and streams inhabited by Growling Grass Frogs include the presence of soil cracks, logs and rock, which are present in areas of EVC 68 Creekline Grassy Woodland within the study area (Appendix 3: Photo 3).

Significant impact thresholds for the Growling Grass Frog (DEWHA 2009c) identify the potential for a significant impact to the species to occur where permanent removal or degradation of terrestrial habitat within 200 metres of a known waterbody is proposed, resulting in the loss of dispersal or overwintering activities. Installation of panels is proposed within 200 m of Little River and Sandy Creek in some areas, however these areas are grazing or cropping land that does not support overwintering habitat such as dense vegetation or coarse woody debris, and they are unlikely to be used for dispersal as aquatic habitats are limited to the two waterways. If some occasional dispersal does occur, installation of solar panels is unlikely to limit movement as the ground layer will remain vegetated.

A summary of potential implications of development of the study area on key ecological values and additional recommendations to minimise impacts during the design phase of the project is provided in Table 11 below.

Table 11 Summary of key ecological values, potential implications of developing the study area and recommendations to minimise ecological impacts during the design phase.

Ecological feature	Implications of development	Recommendations
Native vegetation	Permanent removal of 18.330 hectares of native vegetation, comprised of 14.294 ha of patch vegetation and 70 scattered trees. Impacts include 54 large trees (51 scattered trees and 3 patch trees). The application will be assessed on the detailed assessment pathway.	• Develop appropriate buffers (15 meters) to protect retained scattered trees and patches of native vegetation. • If possible, prioritise retention of FFG Act listed scattered tree species, Melbourne Yellow Gum and Buloke. • Confine access to existing access points to the properties in order to avoid impacting roadside vegetation. • Confine machinery and personnel site access to existing areas where native vegetation does not persist. • Locate stockpiles and or construction materials away from native vegetation. • Identify and implement appropriate offsets for vegetation losses as outlined in Section 5.4 and Appendix 4 of this report.
Threatened species and ecological communities	Removal of known/potential habitat for threatened species (as identified in Table 4).	• Minimise the removal of scattered trees. • Avoid tree removal in spring, when bird nesting occurs. • Recommendation for pre-clearance survey and wildlife salvage provided in Table 11. • Implement a site-specific CEMP to ensure appropriate sediment control measures are put in place to ensure run-off during construction does not impact potential aquatic habitat for threatened species Growling Grass Frog and Yarra Pygmy Perch.
Aquatic habitat	Potential impacts to Little River and Sandy Creek	• Comply with the General Environmental Duty (GED) of the EP Act 2017, by taking all reasonable steps to prevent or minimise risks so as to avoid environmental damage (e.g. pollution of nearby waterways). • Implement a site-specific CEMP to ensure appropriate sediment control measures are put in place to ensure run-off during construction does not impact Little River or Sandy Creek. Control measures implemented should reflect the level of protection required to protect nearby ecological values and ensure that any impacts as a result of the project do not result in changes that exceed background levels and/or objectives; as outlined in Part Five, Division Three (Surface Waters) of the Environmental Reference Standards.

Opportunities for biodiversity enhancement within the study area

The study area includes large areas of native vegetation and riparian habitats that have been excluded from development to minimise impacts during the design process. This includes riparian vegetation and associated areas along Little River and Sandy Creek, and retained areas of grassland within the site. Management of these areas could be targeted at protection and enhancement of biodiversity values, guided by a management plan.

Key recommended actions include:

- Protection of the area around Sandy Creek. This area supports aquatic and remnant riparian habitats, numerous scattered large trees and some patches of Plains Grassland. This area could be enhanced by exclusion of stock, or management of stock for biodiversity outcomes, weed control (particularly removal of Tiger Pear) and revegetation with site appropriate species including Melbourne Yellow Gum and Buloke. There is also potential for this area to receive relocated hollow-bearing tree stems removed from other parts of the site, for provision of bird habitat. Management of this area should also consider the potential occasional presence or movement of Growling Grass Frog through the aquatic zone.
- Protection of larger patches of retained Plains Grassland, including the area to the north of Little River if possible. These areas support grassland vegetation in a range of condition states, and some areas support populations of Golden Sun Moth. There may be potential to include these areas in on-site offset areas, or to manage the areas under voluntary offset agreements. Key actions would include weed control, biomass management and potentially seeding with locally sourced seed to improve native herb cover and diversity and to extend/join the grassland patches into previously disturbed areas.

Construction and post-construction recommendations

Mitigation measures are designed to reduce remaining environmental impacts. Most mitigation measures will need to be incorporated in the construction process through the development and implementation of a high quality Environmental Management Plan (EMP); prepared in accordance with the *Solar Energy Facilities Design and Development Guideline* (DELWP 2019). Development of this plan may include the preparation of sub-plans by qualified consultants to address specific issues in accordance with the guidelines, including:

- Measures to minimise the amenity and environmental impacts during the construction, operation and decommissioning of the solar energy facility (such as dust, noise, erosion mud and stormwater run-off).
- A drainage and stormwater plan; detailing how water is to be managed onsite and addressing other requirements of the relevant FMA.
- A wildlife management plan; detailing how animal or bird species affected by the proposal are to be managed.
- A glint, glare and light spill management plan; detailing ongoing arrangements for the management of these matters.

Recommended mitigation measures to be considered during the design, pre- and post-construction stages and in the course of EMP development are provided in Table 12; noting this is not an exhaustive list.

Table 12 Mitigation measures to be considered during the design, pre- and post construction stages and in the course of CEMP development

Actions		Timing	Responsibility
Preparation of Management Plans	• Prepare EMP and relevant sub-plans in accordance with the *Solar Energy Facilities Design and Development Guideline* (DELWP 2019).	Prior to construction	Elgin Energy, construction contractor and/or contract ecologist
No go areas to protect retained vegetation	Installation of appropriate exclusion fencing around trees and vegetation to be retained: • Appropriate signage such as 'No Go Zone' or 'Environmental Protection Area' should be installed. • Identify the location of any 'No Go Zones' in site inductions. • Fencing should be star pickets with high visibility bunting, or temporary fencing. • All works should be conducted from the existing tracks or road surface.	Prior to construction	Elgin Energy and/or construction contractor
Stockpiles & laydown areas	All material stockpiles, vehicle parking and machinery storage will be located within cleared areas or areas proposed for clearing.	Prior to and during construction	Elgin Energy and/or construction contractor
Wildlife rescue during tree removal	• A licenced wildlife salvage team should be on-site during tree removal to catch and relocate (if appropriate) any wildlife encountered in hollow-bearing trees.	During construction	Project ecologist, Elgin Energy and/or construction contractor
Dust suppression Soil erosion/sedimentation	• Dust suppression measures should be implemented during construction. • Implementation of temporary stormwater controls during construction is necessary to ensure that discharges are consistent with existing conditions and adhere to Environmental Reference Standards. • Sediment and erosion control measures should be implemented prior to construction works commencing (e.g. silt fences, sediment traps), to prevent runoff into watercourses and drainage lines. These should conform to relevant guidelines, should be maintained throughout the construction period and should be carefully removed following the completion of works. • Sediment controls should be monitored weekly or after rainfall events.	Prior to and during construction	Elgin Energy and/or construction contractor
Weed control on site	• All fill, soil or rocks transported on site should be weed and pathogen free and all vehicles	During construction	Elgin Energy, construction contractor

Actions		Timing	Responsibility
	operating on site should be washed down prior to works commencing.		
Pathogen control	• Develop and implement protocols to prevent the introduction of any pathogens.	Pre and during construction	Elgin Energy, construction contractor

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Appendices

Appendix 1 Flora

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
PMST	Protected Matters Search Tool	
State listings (FFG Act and DEECA Advisory List)		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (public land only)	
(e)	Endangered	DEECA's Advisory List of Rare or Threatened Plants in Victoria (DEPI 2014a)
(v)	Vulnerable	
(r)	Rare	
(k)	Poorly known	
Weed status (CaLP Act, DCCEEW Weeds of National Significance and DEECA Advisory List[1])		
SP	State prohibited species	Victorian *Catchment and Land Protection Act 1994* (CaLP Act)
RP	Regionally prohibited species	
RC	Regionally controlled species	

[1] The DELWP Advisory List for Rare or Threatened Plants was revoked in 2021 and are superseded by the current list of threatened species under the FFG Act 1988.

Code	Meaning	Reference
R	Restricted species	
WoNS	Weed of National Significance	Australian Weeds Strategy (DAWR 2017)
vh	Very high risk	DEECA's Advisory List of Environmental Weeds (ARI 2018)
h	High risk	
mh	Moderately high risk	
m	Medium risk	
l	Lower risk	
p	Potential risk	
Other		
#	Native species outside its natural range	Victorian Biodiversity Atlas (VBA)

A1.1 Flora species recorded from the study area

Table A1.1 Flora species recorded from the study area during present assessment and preliminary biodiversity constraints assessment

Status	Scientific name	Common name
Indigenous species		
P	*Acacia acinacea s.s.*	Gold-dust Wattle
	Acacia paradoxa	Hedge Wattle
P	*Acacia pycnantha*	Golden Wattle
P	*Acacia verniciflua s.s.*	Varnish Wattle
e v P	*Allocasuarina luehmannii*	Buloke
k	*Alternanthera nodiflora*	Common Joyweed
k	*Alternanthera* sp. 1 (Plains)	Plains Joyweed
	Atriplex semibaccata	Berry Saltbush
	Austrostipa scabra	Rough Spear-grass
	Austrostipa spp.	Spear Grass
	Bothriochloa macra	Red-leg Grass
	Carex inversa	Knob Sedge
	Carex tereticaulis	Poong'ort
	Carpobrotus modestus	Inland Pigface
m	*Cassinia sifton*	Drooping Cassinia
P	*Cassinia* spp.	Cassinia
	Chloris truncata	Windmill Grass
v e	*Chloris ventricosa*	Plump Windmill Grass
P	*Chrysocephalum apiculatum s.s.*	Common Everlasting
	Convolvulus angustissimus	Blushing Bindweed
	Convolvulus erubescens s.l.	Pink Bindweed
	Convolvulus spp.	Bindweed
	Damasonium minus	Star Fruit
	Dianella longifolia var. *longifolia*	Pale Flax-lily
	Dianella revoluta s.l.	Black-anther Flax-lily
	Dichondra repens	Kidney-weed
	Duma florulenta	Tangled Lignum
	Dysphania pumilio	Clammy Goosefoot
	Echinopogon ovatus	Common Hedgehog-grass
	Einadia nutans	Nodding Saltbush
	Eleocharis acuta	Common Spike-sedge
	Eleocharis pusilla	Small Spike-sedge
	Enchylaena tomentosa var. *tomentosa*	Ruby Saltbush
	Enneapogon avenaceus	Common Bottle-washers
	Enteropogon acicularis	Spider Grass
	Eragrostis spp.	Love Grass
	Erodium crinitum	Blue Heron's-bill
	Eucalyptus camaldulensis	River Red-gum

Status	Scientific name	Common name
v e	*Eucalyptus leucoxylon* subsp. *connata*	Melbourne Yellow-gum
	Eucalyptus melliodora	Yellow Box
	Eucalyptus microcarpa	Grey Box
	Eucalyptus viminalis	Manna Gum
P	*Euchiton sphaericus*	Annual Cudweed
	Euphorbia drummondii s.l.	Flat Spurge
l	*Juncus bufonius*	Toad Rush
	Juncus spp.	Rush
	Lachnagrostis filiformis s.l.	Common Blown-grass
P	*Laphangium luteoalbum*	Jersey Cudweed
	Lemna disperma	Common Duckweed
	Lobelia pratioides	Poison Lobelia
	Lomandra filiformis subsp. *coriacea*	Wattle Mat-rush
	Lomandra filiformis subsp. *filiformis*	Wattle Mat-rush
	Lythrum hyssopifolia	Small Loosestrife
P	*Marsilea costulifera*	Narrow-leaf Nardoo
P	*Marsilea drummondii*	Common Nardoo
#	*Melaleuca armillaris* subsp. *armillaris*	Giant Honey-myrtle
	Melaleuca spp.	Honey-myrtle
	Melicytus dentatus s.s.	Tree Violet
	Microlaena stipoides var. *stipoides*	Weeping Grass
	Montia australasica	White Purslane
	Oxalis perennans	Grassland Wood-sorrel
	Oxalis spp.	Wood Sorrel
	Panicum spp.	Panic
r v	*Rhagodia parabolica*	Fragrant Saltbush
	Rumex brownii	Slender Dock
	Rytidosperma caespitosum	Common Wallaby-grass
	Rytidosperma duttonianum	Brown-back Wallaby-grass
	Rytidosperma fulvum	Copper-awned Wallaby-grass
	Rytidosperma racemosum var. *racemosum*	Slender Wallaby-grass
	Rytidosperma setaceum	Bristly Wallaby-grass
	Rytidosperma spp.	Wallaby Grass
	Salvia spp.	Sage
	Senna artemisioides subsp. *filifolia*	Fine-leaf Desert Cassia
	Solanum aviculare	Kangaroo Apple
	Solanum spp.	Nightshade
	Themeda triandra	Kangaroo Grass
	Typha orientalis	Broad-leaf Cumbungi
	Walwhalleya proluta	Rigid Panic
Introduced species		
mh	*Acetosella vulgaris*	Sheep Sorrel
mh	*Aira spp.*	Hair Grass

Status	Scientific name	Common name
mh	*Aizoon pubescens*	Galenia
m	*Arctotheca calendula*	Cape Weed
h	*Atriplex prostrata*	Hastate Orache
h	*Avena fatua*	Wild Oat
h	*Bromus catharticus*	Prairie Grass
m	*Bromus hordeaceus*	Soft Brome
R, mh	*Carthamus lanatus*	Saffron Thistle
RC, h	*Chrysanthemoides monilifera*	Boneseed
R, mh	*Cirsium vulgare*	Spear Thistle
m	*Cucumis myriocarpus* subsp. *myriocarpus*	Paddy Melon
RC, m	*Cynara cardunculus* subsp. *flavescens*	Artichoke Thistle
mh	*Cynodon dactylon* var. *dactylon*	Couch
m	*Cyperus eragrostis*	Drain Flat-sedge
h	*Dactylis glomerata*	Cocksfoot
RC, h	*Echium plantagineum*	Paterson's Curse
vh	*Ehrharta erecta*	Panic Veldt-grass
mh	*Eleusine tristachya*	American Crows-foot Grass
RC, vh	*Eragrostis curvula*	African Love-grass
mh	*Erigeron bonariensis*	Flaxleaf Fleabane
Mh	*Erodium malacoides*	Oval Heron's-bill
h	*Helminthotheca echioides*	Ox-tongue
h	*Holcus lanatus*	Yorkshire Fog
h	*Hordeum murinum s.l.*	Barley-grass
mh	*Hypochaeris radicata*	Flatweed
l	*Lactuca serriola*	Prickly Lettuce
m	*Lagurus ovatus*	Hare's-tail Grass
mh	*Lepidium africanum*	Common Peppercress
m	*Lolium perenne*	Perennial Rye-grass
vh	*Lophopyrum ponticum*	Tall Wheat-grass
RC, WoNS, h	*Lycium ferocissimum*	African Box-thorn
h	*Malva parviflora*	Small-flower Mallow
RC, h	*Marrubium vulgare*	Horehound
l	*Medicago sativa* subsp. *sativa*	Lucerne
m	*Modiola caroliniana*	Red-flower Mallow
Vh	*Nassella hyalina*	Cane Needle-grass
R, WoNS, vh	*Nassella neesiana*	Chilean Needle-grass
RC, WoNS, vh	*Nassella trichotoma*	Serrated Tussock
l	*Oenothera* spp.	Evening Primrose
vh	*Olea europaea*	Olive
WoNS, h	*Opuntia aurantiaca*	Tiger Pear
l	*Panicum capillare*	Common Millet
m	*Paspalum dilatatum*	Paspalum
vh	*Paspalum distichum*	Water Couch

Status	Scientific name	Common name
h	*Phalaris aquatica*	Toowoomba Canary-grass
h	*Phytolacca octandra*	Red-ink Weed
h	*Plantago coronopus*	Buck's-horn Plantain
m	*Plantago lanceolata*	Ribwort
h	*Polygonum aviculare s.s.*	Hogweed
h	*Romulea rosea*	Onion Grass
RC, h	*Rosa rubiginosa*	Sweet Briar
h	*Rumex crispus*	Curled Dock
m	*Salvia verbenaca*	Wild Sage
h	*Setaria parviflora*	Slender Pigeon Grass
R, m	*Silybum marianum*	Variegated Thistle
m	*Solanum nigrum s.s.*	Black Nightshade
mh	*Sonchus asper* subsp. *asper*	Rough Sow-thistle
mh	*Sonchus oleraceus*	Common Sow-thistle
H	*Sporobolus africanus*	Rat-tail Grass
m	*Trifolium angustifolium* var. *angustifolium*	Narrow-leaf Clover
m	*Trifolium arvense* var. *arvense*	Hare's-foot Clover
mh	*Vulpia bromoides*	Squirrel-tail Fescue
RC, m	*Xanthium spinosum*	Bathurst Burr

A1.2 Listed flora species

The following table includes threatened flora species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 09 September 2021). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur. A proportion of the flora habitat descriptions have been reproduced with permission from the Royal Botanic Gardens Victoria (RBGV 2020).

Table A1.2 Threatened flora species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Amphibromus fluitans	River Swamp Wallaby-grass	VU			PMST	Swampy areas, mainly along the Murray River between Wodonga and Echuca with scattered records from southern Victoria.	**Low**	Limited suitable habitat and very few local records. Recorded downstream near the mouth of Little River.
Dianella amoena	Matted Flax-lily	EN	cr	2010	PMST	Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam soils to heavy cracking clays.	**Medium**	Only one record within 5km radius. Higher quality areas of grassland and woodland may support this species.
Diuris basaltica	Small Golden Moths	EN	cr		PMST	Plains Grassland dominated by tussock-forming perennial grasses (including Kangaroo Grass); often with embedded surface basalt.	**Low**	No nearby records. Grassland within study area is of poor quality and subject to grazing pressure.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Diuris fragrantissima	Sunshine Diuris	EN	cr		PMST	Grassland dominated by Themeda trianda, on plains with heavy basalt soils and embedded boulders; only known naturally occurring population is in Sunshine.	**Negligible**	No nearby records. Grassland within study area is of poor quality and subject to grazing pressure.
Dodonaea procumbens	Trailing Hop-bush	VU			PMST	Sandy or clay soils in low-lying, winter-wet areas in grasslands, woodlands, and low-open forest.	**Negligible**	No nearby records. No suitable habitat.
Euphrasia collina subsp. *muelleri*	Purple Eyebright	EN	e	1853		Grasslands and grassy woodlands; few populations are known to still exist.	**Negligible**	No contemporary records.
Glycine latrobeana	Clover Glycine	VU	v	2008	PMST	Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	**Low**	Grassland within study area is of poor quality and subject to grazing pressure. Not recorded during site surveys.
Lachnagrostis adamsonii	Adamson's Blown-grass	EN	e		PMST	Low-lying, seasonally wet or swampy areas of plains communities, often in slightly saline conditions.	**Negligible**	No suitable habitat.
Lepidium aschersonii	Spiny Peppercress	VU	e		PMST	Heavy clay soils near salt lakes on the volcanic plains; disjunct records near Lake Omeo.	**Negligible**	No suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Lepidium hyssopifolium s.s.	Basalt Peppercress	EN	e		PMST	Basalt plains grassland and woodland communities.	**Low**	No nearby records. Grassland within study area is of poor quality and subject to grazing pressure.
Leucochrysum albicans subsp. *tricolor*	White Sunray	EN	e	1853	PMST	Grasslands of the Victorian Volcanic Plains, primarily on acidic clay soils derived from basalt, with occasional occurrences on adjacent sedimentary, sandy-clay soils.	**Low**	No records within 5km radius. Grassland areas within study area significantly modified.
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	CR	cr	2011	PMST	Primarily grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although also recorded in grassland dominated by introduced perennial grasses.	**Medium**	Recorded within similar habitats nearby. Not recorded during targeted survey of suitable habitats within the study area.
Pterostylis chlorogramma	Green-striped Greenhood	VU	e		PMST	Heathy woodland; more specific habitat requirements are poorly known.	**Negligible**	No suitable habitat.
Pterostylis cucullata	Leafy Greenhood	VU			PMST	Sand dune scrubs in coastal areas, and inland on slopes and river flats in moist foothill and montane forests.	**Negligible**	No records within 5km radius. No suitable habitat present.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Rutidosis leptorhynchoides	Button Wrinklewort	EN	e	2001	PMST	Higher quality Plains Grassland and Grassy Woodland in Western Victoria, particularly those with fertile soil and light timber cover.	**Low**	No records within 5km radius. Some suitable habitat present in higher quality patches.
Senecio macrocarpus	Large-headed Fireweed	VU	cr	2011	PMST	Grassland, shrubland and woodland habitats on heavy soils subject to waterlogging and/or drought conditions in summer.	**Medium**	No records within 5km radius. Some habitat within study area may support this species.
Xerochrysum palustre	Swamp Everlasting	VU	cr		PMST	Sedge-swamps and shallow freshwater marshes and swamps in lowlands, on black cracking clay soils.	**Medium**	No records within 5km radius. Marsh vegetation within study area may support this species.
State significance								
Acacia boormanii	Snowy River Wattle		e	2002		Restricted mostly to open forest on rocky slopes and along banks of the Snowy River and its tributaries, with outlying populations at Mt Typo and Gapsted in the Myrtleford area.	**Negligible**	Any local records are of planted specimens.
Allocasuarina luehmannii	Buloke		v	2020		Non-calcareous soils in drier areas on slopes and plains; often in woodlands associated with Grey Box.	**Recorded**	Recorded within the study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Amyema linophylla subsp. *orientalis*	Buloke Mistletoe		cr	2018		Likely to occur anywhere where its host plant Buloke *Allocasuarina leuhmannii* is present.	**Low**	Not observed in any of the Buloke present in the study area.
Amyema pendula subsp. *longifolia*	Drooping Mistletoe		cr	2002		Known in Victoria by only two collections from Wallpolla Island, west of Mildura, where parasitic on Eucalyptus camaldulensis.	**Negligible**	Record to the south of the You Yangs is questionable.
Calotis anthemoides	Cut-leaf Burr-daisy		cr	1770		Scattered north and west of Melbourne (e.g. Sunshine, Camperdown, Moyston, Dunkeld, Numurkah regions) on heavy soils prone to waterlogging, but now rather rare due to habitat depletion.	**Low**	Habitat generally unsuiable and highly modified.
Comesperma polygaloides	Small Milkwort		cr	2011		Grasslands on the western basalt plains; less commonly in grassy woodlands between Bendigo and the Wimmera.	**Low**	Grassland within study area is of poor quality and subject to grazing pressure.
Coronidium gunnianum	Pale Swamp Everlasting		cr	1904		Widespread and sometimes locally common, particularly in high-rainfall areas of Victoria; often in moist sites in open forests and woodlands.	**Low**	No suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Cullen parvum	Small Scurf-pea		e	2010		Lowland grasslands, including pastures and occasionally in otherwise disturbed grassy areas.	**Medium**	Potentially present in higher quality grassland areas. Not recorded in site surveys to date.
Cullen tenax	Tough Scurf-pea		e	1770		Lowland grasslands, including pastures and occasionally in otherwise disturbed grassy areas.	**Medium**	Potentially present in higher quality grassland areas. Not recorded in site surveys to date.
Dianella longifolia var. *grandis*	Flax-lily		cr	2011		Lowland plains grasslands and grassy woodlands.	**Medium**	Potentially present in higher quality grassland areas. Not recorded in site surveys to date.
Diuris palustris	Swamp Diuris		e	1971		Grasslands and open woodlands, often in swampy depressions; confined to the west of the State.	**Low**	No suitable habitat.
Eucalyptus goniocalyx subsp. *laxa*	Gum-barked Bundy		e	2004		Apparently restricted to the Brisbane Ranges, in relatively damp, heavy soils. Typical E. goniocalyx also occurs in the Brisbane Ranges, but tends to grow in drier sites.	**Negligible**	Limited to the Brisbane Ranges.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow-gum		e	2011		Well-drained slopes in a restricted area around Melbourne and Geelong.	**Recorded**	Present within the site.
Goodenia macbarronii	Narrow Goodenia		e	2009		Sandy to clay/silt soils in areas that are moist or wet year round, such as spring-soaks and alluvial fans of drainage lines, and including disturbed areas.	**Low**	Records within 10km. Man-made wetland and marsh area may support this species.
Grevillea chrysophaea	Golden Grevillea		v	1988		Silty sand and sandy loam soils in woodlands and heath.	**Low**	No suitable habitat.
Grevillea rosmarinifolia subsp. *glabella*	Smooth Grevillea		e	1980		Typically on sandy soils in association with shrublands or mallee; widely cultivated and several varieties are garden escapes.	**Low**	No suitable habitat.
Grevillea steiglitziana	Brisbane Range Grevillea		e	1988		Rocky environments with sandy or quartzitic-clay soils in dry sclerophyll forest.	**Negligible**	Nearby records limited to the Brisbane Ranges.
Lachnagrostis semibarbata var. *semibarbata*	Purple Blown-grass		e	2010		Wet marshes and slightly saline swamps and depressions in plains communities.	**Low**	No suitable habitat.
Leptorhynchos elongatus	Lanky Buttons		e	1770		Grassy Eucalyptus pauciflora woodlands in the eastern uplands; dry open forest in the west and southern mallee.	**Low**	No suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle		e	2017		Near coastal heath/scrub, rocky coast and foothill outcrops.	**Low**	No suitable habitat. Widely planted.
Nicotiana suaveolens	Austral Tobacco		e	2012		Areas of sandy or gravelly soil typically associated with streams, gullies and other drainage lines; also grasslands and escarpment shrublands.	**Low**	No suitable habitat within the study area. Recorded nearby in the You Yangs.
Olearia pannosa subsp. *cardiophylla*	Velvet Daisy-bush		e	1911		Coastal woodland and inland in dry open forest on shallow rocky soil.	**Low**	No suitable habitat.
Podolepis linearifolia	Basalt Podolepis		e	2011		Grasslands and grassy woodlands.	**Low**	Limited suitable habitat. Poor quality grasslands. Not recorded during site surveys.
Prostanthera nivea var. *nivea*	Snowy Mint-bush		v	2017		Largely confined to shrubland and open woodland associated with granite outcrops.	**Low**	No suitable habitat.
Pterostylis truncata	Brittle Greenhood		cr	2014		Grassland and grassy woodland habitats, on well drained soil largely to the west of Melbourne.	**Low**	Known to occur on rocky/sandy sites within the You Yangs. Habitat on site is generally unsuitable and subject to high grazing pressure.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Ptilotus erubescens	Hairy Tails		cr	1993		Grasslands and woodlands on relatively fertile soils.	**Low**	Conspicuous species with very few nearby records.
Rhagodia parabolica	Fragrant Saltbush		v	2017		Plains and escarpment grassland, shrubland and woodland.	**Low**	Unsuitable habitat.
Rytidosperma monticola	Small-flower Wallaby-grass		e	2008		Tablelands up to c. 1400m ASL, and common on heathlands with shallow soils over sandstone, and in grasslands with heavier, deep soils.	**Low**	No suitable habitat.
Swainsona behriana	Southern Swainson-pea		e	1926		Grasslands and grassy woodlands.	**Medium**	Potential grassland habitat present
Tripogonella loliiformis	Rye Beetle-grass		e	2018		Dry sites in association with escarpments and rocky outcrops.	**Low**	No suitable habitat.

A1.3 Threated ecological communities

The following table includes the threatened ecological communities that have potential to occur within the project area. The list of threatened ecological communities has been compiled with reference to characteristics of FFG Act threatened communities (SAC 2013) and predictive output from the PMST (accessed on 9 September 2021).

Table A1.3 Threatened ecological communities predicted to occur within 5 km of the project area.

Community Name	Conservation status	Source	Description
National significance			
Natural Temperate Grasslands of the Victorian Volcanic Plain	Critically Endangered		Present within the study area.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered		Not present. Two patches of Plains Grassy Wetland were mapped, but these are associated with a constructed dam.
Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions	Endangered	PMST	Not present within the study area.
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	PMST	Known to occur along road reserves within the region, where condition and size thresholds are satisfied. One patch (VQA14 - 1.4 hectares) identified within the study area has been excluded from the project footprint.
Natural Grasslands of the Murray Valley Plains	Critically Endangered	PMST	Not present within the study area.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	PMST	Not present within the study area. Scattered Yellow Box trees present within the property.
State significance			
Northern Plains Grassland Community	Threatened		Not present within the study area.
Creekline Grassy Woodland (Goldfields) Community	Threatened		Creekline Grassy Woodland EVC not present within the study area
Grey Box - Buloke Grassy Woodland Community	Threatened		Not present within the study area.

Appendix 2 Fauna

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
NT	Near threatened	
CD	Conservation dependent	
PMST	Protected Matters Search Tool	
State listings (FFG Act)[2]		
x	Extinct	Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (fish only)	
(nt)	Near threatened	
(dd)	Data deficient	
Pest animal status (CaLP Act and Fisheries Act)		
PS	Declared pest animal	Victorian *Catchment and Land Protection Act 1994* (CaLP Act)
*****	Introduced species	Victorian Biodiversity Atlas (VBA)

[2] The DELWP Advisory Lists for Threatened Terrestrial and Invertebrate Fauna were revoked in 2021 and are superseded by the current list of threatened species under the FFG Act 1988.

A2.1 Fauna species recorded from the study area

Table A2.1 Vertebrate fauna recorded from the study area during present assessment and targeted surveys

Status	Scientific name	Common name
Indigenous species		
	Coturnix pectoralis	Stubble Quail
	Ocyphaps lophotes	Crested Pigeon
	Tachybaptus novaehollandiae	Australasian Grebe
	Poliocephalus poliocephalus	Hoary-headed Grebe
	Vanellus miles	Masked Lapwing
	Elseyornis melanops	Black-fronted Dotterel
	Threskiornis spinicollis	Straw-necked Ibis
	Platalea flavipes	Yellow-billed Spoonbill
	Egretta novaehollandiae	White-faced Heron
	Chenonetta jubata	Australian Wood Duck
	Anas superciliosa	Pacific Black Duck
	Anas castanea	Chestnut Teal
	Anas gracilis	Grey Teal
nt	*Circus assimilis*	Spotted Harrier
	Accipiter cirrocephalus	Collared Sparrowhawk
	Aquila audax	Wedge-tailed Eagle
	Elanus axillaris	Black-shouldered Kite
	Falco berigora	Brown Falcon
	Tyto alba	Barn Owl
	Parvipsitta pusilla	Little Lorikeet
	Cacatua galerita	Sulphur-crested Cockatoo
	Eolophus roseicapilla	Galah
	Platycercus elegans	Crimson Rosella
	Psephotus haematonotus	Red-rumped Parrot
	Merops ornatus	Rainbow Bee-eater
	Rhipidura leucophrys	Willie Wagtail
	Grallina cyanoleuca	Magpie-lark
	Coracina novaehollandiae	Black-faced Cuckoo-shrike
	Smicrornis brevirostris	Weebill
	Acanthiza nana	Yellow Thornbill
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill
	Cisticola exilis	Golden-headed Cisticola
	Malurus cyaneus	Superb Fairy-wren
	Melithreptus brevirostris	Brown-headed Honeyeater
	Ptilotula penicillata	White-plumed Honeyeater
	Phylidonyris novaehollandiae	New Holland Honeyeater

Status	Scientific name	Common name
	Anthochaera carunculata	Red Wattlebird
	Anthus australis	Australian Pipit
	Taeniopygia guttata	Zebra Finch
	Neochmia temporalis	Red-browed Finch
	Corcorax melanorhamphos	White-winged Chough
	Gymnorhina tibicen	Australian Magpie
	Corvus mellori	Little Raven
	Alauda arvensis	Eurasian Skylark
	Passer montanus	Eurasian Tree Sparrow
	Acridotheres tristis	Common Myna
	Sturnus vulgaris	Common Starling
	Macropus giganteus	Eastern Grey Kangaroo
	Ctenotus spaldingi	Large Striped Skink
	Tiliqua scincoides	Common Blue-tongued Lizard
	Pseudonaja textilis	Eastern Brown Snake
	Parasuta flagellum	Little Whip Snake
vu	*Pseudemoia pagenstecheri*	Tussock Skink
	Limnodynastes peronii	Striped Marsh Frog
	Crinia signifera	Common Froglet
	Litoria ewingii	Southern Brown Tree Frog
VU cr	*Synemon plana*	Golden Sun Moth
	Limnodynastes dumerilii dumerilii	Pobblebonk Frog
Introduced species		
	Carduelis carduelis	European Goldfinch
PS	*Oryctolagus cuniculus*	European Rabbit
	Sturnus vulgaris	Common Starling
	Passer domesticus	House Sparrow
PS	*Vulpes vulpes*	Red Fox

A2.2 Listed fauna species

The following table includes a list of threatened fauna species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 16 February 2022). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur.

Table A2.3 Threatened fauna species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Pedionomus torquatus	Plains-wanderer	CR	cr	2013	PMST	Native grassland with a sparse, open structure.	**Low**	Recorded in local area, but strongholds of the population predominantly known from north-central Victoria. This species is cryptic and may occur within grassland in the study area where it adjoins more contiguous areas of native vegetation, on occasion.
Rostratula australis	Australian Painted-snipe	EN	cr	1987	PMST	Shallows of well-vegetated freshwater wetlands.	**Low**	Limited suitable habitat.
Botaurus poiciloptilus	Australasian Bittern	EN	cr	1990	PMST	Shallow freshwater and brackish wetlands with abundant emergent aquatic vegetation.	**Low**	Limited suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Falco hypoleucos	Grey Falcon	VU	v		PMST	Lightly timbered plains and Acacia scrub.	**Negligible**	No records from local area and predominantly known from semi-arid to arid environments (NW Victoria).
Lathamus discolor	Swift Parrot	CR	cr	2016	PMST	A range of forests and woodlands, especially those supporting nectar-producing tree species. Also well-treed urban areas.	**Medium**	Not within core over-wintering range. However, recorded in study area and surrounding local area. May forage on flowering Eucalypts within study area on occasion.
Hirundapus caudacutus	White-throated Needletail	VU	v	2007	PMST	An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas.	**Medium**	May occur within airspace above the study area on occasion.
Sternula nereis nereis	Australian Fairy Tern	VU			PMST	Coastal environments including intertidal mudflats, sand flats and beaches. Nests above high-water mark on sandy shell-grit beaches.	**Negligible**	No suitable habitat.
Limosa lapponica baueri	Bar-tailed Godwit (baueri)	VU			PMST	Estuarine mudflats, beaches and mangroves.	**Negligible**	No suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Numenius madagascariensis	Eastern Curlew	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	**Negligible**	No suitable habitat.
Limosa lapponica	Bar-tailed Godwit	VU	v		PMST	Estuarine mudflats, beaches and mangroves.	**Negligible**	Outside species range. Not recorded within Australia.
Calidris ferruginea	Curlew Sandpiper	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	**Negligible**	No suitable habitat.
Calidris canutus	Red Knot	EN	e		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	**Negligible**	No suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Grantiella picta	Painted Honeyeater	VU	v	2015	PMST	Dry open woodlands and forests. Typically forages for fruit and nectar in mistletoes and in tree canopies.	**Medium**	Recent records in nearby You Yangs Regional Park and Brisbane Ranges National Park. May forage on flowering Eucalypts within study area on occasion.
Anthochaera phrygia	Regent Honeyeater	CR	cr	1989	PMST	A range of dry woodlands and forests dominated by nectar-producing tree species.	**Low**	Very few recent records from local area. May forage on flowering Eucalypts within study area on occasion.
Dasyurus maculatus maculatus (SE mainland population)	Spot-tailed Quoll	EN	e		PMST	Rainforest and wet and dry sclerophyll forests and woodlands.	**Negligible**	Considered restricted to intact vegetated areas which support species large home range requirements.
Perameles gunnii (Victorian subspecies)	Eastern Barred Bandicoot (Mainland)	EN	e		PMST	Natural temperate grasslands and grassy woodlands.	**Negligible**	Considered restricted to reintroduced populations in predator-free reserves.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Petauroides volans	Southern Greater Glider	VU	v		PMST	Wet and damp sclerophyll forest with large hollow-bearing trees.	**Negligible**	No suitable habitat.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	v	2017	PMST	Rainforest, wet and dry sclerophyll forest, woodland and urban areas.	**Medium**	May forage on flowering Eucalypts within study area on occasion.
Aprasia parapulchella	Pink-tailed Worm-Lizard	VU	e		PMST	Woodland and grassland with partially buried rocks.	**Negligible**	Outside species current known range within Victoria.
Delma impar	Striped Legless Lizard	VU	e	2019	PMST	Natural temperate grassland, grassy woodland and exotic grassland.	**Low (Medium)**	Not detected during targeted surveys within initial investigation area. However, this species may be present within suitable grassland habitat in the additional land parcel added to the study area following targeted surveys undertaken in 2020.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Tympanocryptis pinguicolla	Grassland Earless Dragon	EN	cr	1990	PMST	Natural temperate grassland.	**Low**	No recent records from local area. Not detected during targeted surveys for Striped Legless Lizard or by methods of active searching.
Litoria raniformis	Growling Grass Frog	VU	v	2017	PMST	Still or slow-flowing waterbodies and surrounding terrestrial vegetation.	**Medium**	May utilise aquatic and riparian environments of Little River intercepting the study area for dispersal, foraging and over-wintering activities. Farm dams do not support preferred breeding habitat.
Prototroctes maraena	Australian Grayling	VU	e		PMST	Adults inhabit cool, clear, freshwater streams.	**Low**	Not previously recorded within Little River and limited habitat suitability (i.e. gravel beds and alternating pool riffle sequences).
*Galaxiella pusilla**	Dwarf Galaxias	VU	e		PMST	Slow-flowing or still freshwater wetlands such as swamps, drains and backwaters of streams.	**Negligible**	Outside species current known range (Coleman 2015).

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Nannoperca obscura	Yarra Pygmy Perch	VU	v		PMST	Lakes, pools and slow-flowing streams with abundant aquatic vegetation.	**Medium**	Recorded from Moorabool River catchment. May occur within aquatic environments of Little River intercepting the study area.
Synemon plana	Golden Sun Moth	CR	v	2018	PMST	Natural temperate grassland, grassy woodland and pasture supporting spear grasses and wallaby grasses and exotic grassland dominated by Chilean needle grass.	**Recorded (High)**	Recorded within some patches of native, tussock forming grasses within study area. This species may also be present within suitable grassland habitat in the additional land parcel added to the study area following targeted surveys undertaken in 2020.
State significance								
Turnix pyrrhothorax	Red-chested Button-quail		e	1990		Grassland, grassy woodland and crops.	**Low**	Recorded in local area. This species cryptic and has potential to occur within suitable habitat in the study area where it adjoins more contiguous areas of native vegetation.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Geopelia cuneata	Diamond Dove		v	1905		Drier woodlands and scrub, spinifex and mulga.	**Negligible**	Outside current known distribution (NW Victoria).
Lewinia pectoralis	Lewin's Rail		v	2006		Swamps, dense riparian vegetation and saltmarsh.	**Low**	Limited suitable habitat.
Burhinus grallarius	Bush Stone-curlew		cr	1961		Open woodland, treed farmland.	**Low**	No recent records and limited habitat suitability.
Antigone rubicunda	Brolga		e	1989		Shallow freshwater and brackish wetlands, crops, grassland and pasture.	**Low**	No recent records from local area. May forage within seasonally damp depressions within grassland, crop and pasture within study area on occasion.
Egretta garzetta	Little Egret		e	2019		Swamps, billabongs, floodplain pools, mudflats, mangroves and channels; breeds in trees standing in water.	**Low**	Limited records from local area. May forage within seasonally damp depressions and farm dams in study area on occasion.
Ixobrychus dubius	Australian Little Bittern		e	1990		Freshwater swamps, lakes and rivers with dense reedbeds, saltmarsh and coastal lagoons.	**Low**	Limited suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Anseranas semipalmata	Magpie Goose		v	2018		Swamps, lakes, sewage ponds, flooded pasture, dams.	**Low**	Limited records from local area. May forage within seasonally damp depressions within grassland, crop and pasture on rare occasion.
Spatula rhynchotis	Australasian Shoveler		v	2019		Prefers permanent lakes and swamps with deep water for foraging. Uses dense aquatic fringing vegetation for nesting. Can occur in shallow waters, such as billabongs, sewage ponds, freshwater rivers and densely vegetated farm dams.	**Medium**	May utilise farm dams within study area on occasion.
Stictonetta naevosa	Freckled Duck		e	2002		Large freshwater wetlands, generally with dense vegetation.	**Low**	Limited suitable habitat.
Aythya australis	Hardhead		v	2019		Freshwater swamps and wetlands and occasionally in sheltered estuaries. Uses low branches and stumps near the water for roosting. They prefer deep, fresh open water and	**Medium**	May utilise farm dams within study area on occasion.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
						densely vegetated wetlands for breeding.		
Oxyura australis	Blue-billed Duck		v	2011		Open or densely vegetated wetlands.	**Medium**	May utilise farm dams within study area on occasion.
Biziura lobata	Musk Duck		v	2011		Prefers deep water in permanent freshwater swamps and estuaries with abundant aquatic vegetation. Less commonly recorded in small or shallow waterbodies and rivers.	**Medium**	May utilise farm dams within study area on occasion.
Accipiter novaehollandiae	Grey Goshawk		e	2018		Rainforest, gallery forest, tall wet forest and woodland. Also partially cleared agricultural land.	**Low**	May forage over study area on occasion. However, will prefer intact vegetation of the nearby You Yangs Regional Park
Hieraaetus morphnoides	Little Eagle		v	2016		Woodland and open areas. Rabbits are a key component of their diet. Nesting occurs in mature trees in open woodland or riparian vegetation.	**High**	Recent and numerous records adjacent to study area. May forage over study area on regular occasion.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Haliaeetus leucogaster	White-bellied Sea-Eagle		e	1987		Coastal areas such as beaches and estuaries, inland wetlands and major inland streams.	**Low**	May fly over study area on rare occasion.
Lophoictinia isura	Square-tailed Kite		v	2018		Eucalypt woodlands, open forest and partially cleared farmland.	**Medium**	May forage over study area on occasion. However, will prefer intact vegetation of the nearby You Yangs Regional Park
Falco subniger	Black Falcon		cr	2019		Woodlands, open country and around terrestrial wetlands areas, including rivers and creeks.	**Recorded**	Nesting pair known from study area.
Ninox connivens	Barking Owl		cr	2006		Eucalypt forests and woodlands.	**Medium**	Recorded south of the study area. May forage over study area on occasion. However, likely to prefer habitat values offered by intact vegetation of the nearby You Yangs Regional Park.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Ninox strenua	Powerful Owl		v	1983		Eucalypt forests and woodlands, well-treed urban areas.	**Low**	Limited records from local area, predominantly known from intact vegetation within Brisbane Ranges National Park (west of study area).
Tyto novaehollandiae	Masked Owl		cr	1992		A variety of lowland forests and woodlands.	**Low**	Limited records from local area. May forage over study area on occasion. However, likely to prefer habitat values offered by intact vegetation of the nearby You Yangs Regional Park.
Lophochroa leadbeateri	Major Mitchell's Cockatoo		cr	2005		Mallee, mulga, treed farmland, cereal crops and Callitris woodland.	**Negligible**	Outside species current known range.
Neophema elegans	Elegant Parrot		v	1993		Woodlands, open woody grasslands, partially cleared farmlands and the fringes of clearings in forests, tree-lined watercourses and Mallee environments.	**Low**	Limited records from local area and limited suitable habitat within study area.
Tringa glareola	Wood Sandpiper		e	1988		Well-vegetated shallow freshwater wetlands with emergent aquatic	**Low**	Limited suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
						plants and dense fringing vegetation.		
Actitis hypoleucos	Common Sandpiper		v	1975	PMST	Migrates to Australia from Eurasia in August where it inhabits a wide variety of coastal and inland wetlands with muddy margins before departing north in March.	**Low**	Limited suitable habitat.
Tringa nebularia	Common Greenshank		e	1990	PMST	A variety of ephemeral and permanent inland wetlands and sheltered coastal wetlands.	**Low**	Limited suitable habitat.
Tringa stagnatilis	Marsh Sandpiper		e	1990		Permanent or ephemeral wetlands, mudflats and saltmarshes in coastal and inland environments.	**Low**	Limited suitable habitat.
Melanodryas cucullata	Hooded Robin		v	2007		Woodlands of eucalypt, Mallee, semi-cleared farmland.	**Low**	May occur within study area on occasion. However, likely to prefer habitat values offered by intact vegetation of the nearby You Yangs Regional Park.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Pomatostomus temporalis	Grey-crowned Babbler		v	1960		Open forests and woodlands.	**Low**	No recent records from local area.
Pyrrholaemus sagittatus	Speckled Warbler		e	2019		Eucalypt woodland with rocky gullies, ridges, tussock grasses and a sparse shrub understorey.	**Low**	Limited suitable habitat present within Creekline Grassy Woodland in study area. However, will prefer intact vegetation of the nearby You Yangs Regional Park
Stagonopleura guttata	Diamond Firetail		v	2018		Open forests and woodlands with a grassy ground layer.	**Medium**	Numerous and recent records from study area and local area.
Phascogale tapoatafa	Brush-tailed Phascogale		v	2018		Drier sclerophyll forests and woodlands.	**Low**	Limited suitable habitat.
Sminthopsis murina murina	Common Dunnart		v	1989		Found in heathland areas, open forests and woodlands that have structurally complex microhabitats.	**Negligible**	Limited suitable habitat.
Miniopterus orianae oceanensis	Eastern Bent-winged Bat		cr	2017		A variety of treed and treeless habitats. Roosts in caves and man-made structures.	**Medium**	Recorded from local area. May forage over study area on occasion. However, no habitat suitable for roosting or nesting.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Pseudemoia pagenstecheri	Tussock Skink		e	2019		On the ground in a range of grasslands or sparse grassy woodlands from alps to coast.	**Recorded**	Recorded within native, tussock forming grasses within study area and road reserves.
Pseudophryne bibronii	Brown Toadlet		e	1989		A wide variety of woodland, forest and grassland habitats.	**Medium**	May occur in seasonally damp depressions containing an abundance of organic matter within Creekline Grassy Woodland.

A2.3 Migratory species (EPBC Act listed)

Table A2.4 Migratory fauna species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Most recent record
Migratory species		
Gallinago hardwickii	Latham's Snipe	PMST
Hirundapus caudacutus	White-throated Needletail	2017
Apus pacificus	Fork-tailed Swift	PMST
Numenius madagascariensis	Eastern Curlew	PMST
Actitis hypoleucos	Common Sandpiper	PMST
Calidris ferruginea	Curlew Sandpiper	PMST
Calidris acuminata	Sharp-tailed Sandpiper	PMST
Calidris melanotos	Pectoral Sandpiper	PMST
Motacilla flava	Yellow Wagtail	PMST
Rhipidura rufifrons	Rufous Fantail	PMST
Myiagra cyanoleuca	Satin Flycatcher	PMST

Appendix 3 Photos of the study area

Photo 1 **Patch of EVC 132_61 Heavier-soils Plains Grassland, consistent with the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Natural Temperate Grassland of the Victorian Volcanic Plain.**

Photo 2 **Section of Little River, intercepting the study area; surrounded by EVC 68 Creekline Grassy Woodland. Photos highlights potential habitat for Growling Grass Frog including surface rock and instream macrophytes (*Phragmites* spp.) suitable for foraging, dispersal and overwintering activities.**

Photo 3 **Patch of EVC 55_63 Plains Grassy Woodland, consistent with the key diagnostic characteristics and condition thresholds for the EPBC Act listed community Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia.**

Appendix 4 Striped Legless Lizard surveys

Table A4.1 Targeted Striped Legless Lizard survey details and results

Survey	Date	Time	Cloud Cover %	Temperature °C	Wind Direction	Wind Speed km/hr	Precipitation	Humidity %	Vertebrate fauna	Tile location
Grid One										
1	9/10/2020	9:28 AM	100	12.2	W	9.8	Nil	64.2	-	-
2	16/10/2020	9:24 AM	25	12.5	SE	3.0	Nil	64.0	-	-
3	22/10/2020	10:12 AM	100	15.0	S	2.0	Nil	72.0	Tussock Skink	1d, 2d
4	30/10/2020	9:54 AM	75	15.4	S	5.0	Nil	87.0	Little Whip Snake	3i
5	10/11/2020	12:56 PM	0	30.0	NNE	26.0	Nil	28.0	-	-
6	26/11/2020	11:37 AM	87.5	18.4	S	27.8	Nil	66.0	House Mouse	9d
7	9/12/2020	12:08 PM	12.5	20.7	WNW	14.8	Nil	51.0	House Mouse	3e
8	23/12/2020	10:17 AM	75	15.4	S	5.0	Nil	87.0	-	-
Grid Two										
1	9/10/2020	9:45 AM	100	15.0	W	11.4	Nil	56.2	-	-
2	-	-	-	-	-	-	-	-	-	-
3	22/10/2020	10:25 AM	100	15.0	S	2.0	Nil	72.0	-	-
4	30/10/2020	10:20 AM	75	15.0	W	11.4	Nil	56.2	Eastern Brown Snake	6a
5	10/11/2020	12:32 PM	0	30.0	NNE	26.0	Nil	28.0	-	-
6	26/11/2020	11:50 AM	75	18.4	S	27.8	Nil	64.0	Eastern Brown Snake	6b, 6d
7	9/12/2020	12:21 PM	12.5	20.8	WNW	13.0	Nil	51.0	-	-
8	23/12/2020	9:56 AM	87.5	16.9	E	5.0	Nil	74.0	-	-
Grid Three										
1	9/10/2020	9:58 AM	100	12.2	W	8.7	Nil	57.7	-	-

Survey	Date	Time	Cloud Cover %	Temperature °C	Wind Direction	Wind Speed km/hr	Precipitation	Humidity %	Vertebrate fauna	Tile location
2	16/10/2020	10:01 AM	12.5	13.0	ESE	4.0	Nil	61.0	-	-
3	22/10/2020	10:12 AM	100	15.0	S	2.0	Nil	72.0	Common Blue-tonguned Lizard	1c
4	30/10/2020	10:26 AM	75	16.0	W	3.0	Nil	87.0	-	-
5	10/11/2020	12:32 PM	0	30.0	NNE	26.0	Nil	28.0	-	-
6	26/11/2020	12:05 PM	75	18.2	S	35.2	Nil	64.0	-	-
7	9/12/2020	12:30 PM	12.5	21.8	W	22.2	Nil	50.0	-	-
8	23/12/2020	10:03 AM	87.5	16.0	W	6.0	Nil	87.0	-	-
Grid Four										
1	9/10/2020	10:38 AM	87.5	13.0	W	11.1	Nil	61.2	-	-
2	16/10/2020	10:45 AM	12.5	13.2	ESE	20.0	Nil	61.0	-	-
3	22/10/2020	11:26 AM	87.5	15.0	SE	13.0	Nil	72.0	Tussock Skink	7e
4	30/10/2020	11:05 AM	62.5	16.7	S	6.4	Nil	61.2	-	-
5	10/11/2020	11:09 AM	0	27.0	N	26.0	Nil	31.0	-	-
6	26/11/2020	1:11 PM	62.5	17.9	S	24.0	Nil	60.0	-	-
7	9/12/2020	1:46 PM	12.5	22.2	WNW	22.2	Nil	47.0	-	-
8	23/12/2020	12:33 PM	87.5	15.0	SE	13.0	Nil	72.0	-	-
Grid Five										
1	9/10/2020	11:41 AM	100	12.1	W	15.2	Nil	57.8	-	-
2	16/10/2020	1:25 PM	75	15.1	ESE	4.0	Nil	54.0	-	-
3	22/10/2020	12:31 PM	50	16.2	SSW	13.0	Nil	62.0	-	-
4	30/10/2020	1:23 PM	62.5	17.0	S	3.0	Nil	80.0	-	-
5	10/11/2020	10:28 AM	0	27.0	N	26.0	Nil	31.0	-	-
6	26/11/2020	10:57 AM	100	18.0	S	27.8	Nil	70.0	-	-
7	9/12/2020	11:30 AM	12.5	19.8	WNW	20.4	Nil	56.0	-	-

Survey	Date	Time	Cloud Cover %	Temperature °C	Wind Direction	Wind Speed km/hr	Precipitation	Humidity %	Vertebrate fauna	Tile location
8	23/12/2020	11:01 AM	75	15.1	ESE	4.0	Nil	54.0	-	-
Grid Six										
1	9/10/2020	12:14 PM	87.5	15.3	W	13.4	Nil	56.7	-	-
2	16/10/2020	12:59 PM	50	14.6	ESE	4.0	Nil	55.0	-	-
3	22/10/2020	2:03 PM	25	17.0	SE	19.0	Nil	64.0	-	-
4	30/10/2020	12:51 PM	62.5	17.1	S	5.0	Nil	80.0	-	-
5	10/11/2020	10:01 AM	0	27.0	N	26.0	Nil	31.0	-	-
6	26/11/2020	10:27 AM	100	17.5	S	24.0	Nil	69.0	Tussock Skink	7a
7	9/12/2020	10:49 AM	12.5	17.8	W	7.4	Nil	59.0	-	-
8	-	-	-	-	-	-	-	-	-	-
Grid Seven										
1	9/10/2020	11:52 AM	87.5	13.6	W	16.7	Nil	57.8	Common Blue-tongued Lizard	2b
2	16/10/2020	12:23 PM	37.5	14.8	ESE	12.0	Nil	58.0	Common Blue-tongued Lizard	-
3	22/10/2020	2:26 PM	50	16.2	SSW	13.0	Nil	62.0	-	-
4	30/10/2020	1:06 PM	62.5	17.1	S	5.0	Nil	80.0	-	-
5	10/11/2020	10:14 AM	0	27.0	N	26.0	Nil	31.0	Large Striped Skink	-
6	26/11/2020	10:46 AM	100	17.0	S	19.0	Nil	73.0	Tussock Skink	-
7	9/12/2020	11:12 AM	12.5	18.4	W	13.0	Nil	56.0	-	-
8	23/12/2020	11:01 AM	37.5	14.8	ESE	12.0	Nil	58.0	-	-
Grid Eight										
1	9/10/2020	10:29 AM	87.5	14.3	W	12.2	Nil	47.6	-	-
2	16/10/2020	11:05 AM	12.5	3.8	E	20.0	Nil	56.0	-	-
3	22/10/2020	11:26 AM	87.5	15.0	SE	13.0	Nil	72.0	-	-
4	30/10/2020	11:22 AM	62.5	17.0	S	8.3	Nil	70.0	-	-

Survey	Date	Time	Cloud Cover %	Temperature °C	Wind Direction	Wind Speed km/hr	Precipitation	Humidity %	Vertebrate fauna	Tile location
5	10/11/2020	10:54 AM	0	27.0	N	26.0	Nil	31.0	Eastern Brown Snake	-
6	26/11/2020	12:57 PM	62.5	18.4	S	26.0	Nil	58.0	-	-
7	9/12/2020	1:10 PM	12.5	22.2	W	18.5	Nil	46.0	-	-
8	23/12/2020	12:04 PM	100	16.3	S	13.0	Nil	86.0	-	-
Grid Nine										
1	9/10/2020	10:52 AM	87.5	14.2	W	4.1	Nil	60.1	-	-
2	16/10/2020	11:19 AM	25	14.0	ESE	10.0	Nil	58.0	Tussock Skink	-
3	22/10/2020	11:45 AM	87.5	15.0	SE	13.0	Nil	72.0	-	-
4	30/10/2020	11:34 AM	62.5	17.0	S	4.1	Nil	NA	-	-
5	10/11/2020	11:31 AM	0	30.0	NNE	26.0	Nil	28	-	-
6	26/11/2020	1:25 PM	50	19.1	SSE	22.2	Nil	58	-	-
7	9/12/2020	1:24 PM	12.5	22.4	WNW	18.5	Nil	46	House Mouse	-
8	23/12/2020	12:51 PM	62.5	17.0	S	4.1	Nil	NA	-	-
Grid Ten										
1	9/10/2020	11:01 AM	87.5	13.7	W	11.7	Nil	63.4	-	-
2	16/10/2020	11:46 AM	25	14.7	ESE	6.0	Nil	57	-	-
3	22/10/2020	12:03 PM	87.5	15.0	SE	13.0	Nil	72	-	-
4	30/10/2020	11:48 AM	62.5	17.0	S	7.6	Nil	64	Large Striped Skink	9a
5	10/11/2020	11:47 AM	0	30.0	NNE	26.0	Nil	28	Large Striped Skink	-
6	26/11/2020	1:43 PM	50	18.6	S	25.9	Nil	58	-	-
7	9/12/2020	2:07 PM	12.5	22.8	WNW	24.1	Nil	45	-	-
8	23/12/2020	1:22 PM	25	14.7	ESE	6.0	Nil	57	-	-

Appendix 5 Golden Sun Moth survey conditions

Table A5.1 Targeted Golden Sun Moth survey details

Date	Time Start	Time End	Cloud Cover %	Temperature °C	Wind Direction	Wind Speed km/hr	Precipitation	Humidity %
9/12/2020	11:06 AM	2:20 PM	12.5%	22.8	W	24.1	Nil	45
14/12/2020	11:42 AM	3:51 PM	0.0%	30.3	N	5.3	Nil	32.4
21/12/2020	11:25 AM	12:58 PM	75.0%	24.0	SE	6.0	Nil	52.0
8/1/2021	10:35 AM	2:19 PM	0.0%	20.0	S	8.0	Nil	62.0

Appendix 6 Vegetation impact assessment results

Table A6.1 Summary of vegetation quality assessment

HZ Number	EVC	EVC #	Bioregion	Standardised site score	Landscape Score	Habitat points (/100)	Quality class	Zone area (ha)	Impacted area (ha)
VQA_01	Heavier-soils Plains Grassland	132_61	VVP	13.64	4	17.64	Very low	1.05	
VQA_02	Heavier-soils Plains Grassland	132_61	VVP	23.18	11	34.18	Low	24.53	
VQA_03a	Plains Grassy Wetland	125	VVP	36.82	4	40.82	Moderate	0.93	0.02
VQA_03b	Plains Grassy Wetland	125	VVP	36.82	4	40.82	Moderate	0.83	0.39
VQA_04	Heavier-soils Plains Grassland	132_61	VVP	16.36	6	22.36	Very low	5.17	
VQA_05	Heavier-soils Plains Grassland	132_61	VVP	23.18	4	27.18	Low	4.95	4.89
VQA_06	Plains Grassy Woodland	55_61	VVP	35.00	3	38.00	Moderate	0.32	0.32
VQA_07	Heavier-soils Plains Grassland	132_61	VVP	23.18	6	29.18	Low	8.20	
VQA_08	Heavier-soils Plains Grassland	132_62	VVP	23.18	3	26.18	Low	1.04	
VQA_09	Plains Grassy Woodland	55_61	VVP	38.00	3	41.00	Moderate	1.53	
VQA_10	Tall Marsh	821	VVP	19.09	3	22.09	Low	0.07	
VQA_11	Heavier-soils Plains Grassland	132_61	VVP	23.18	4	27.18	Low	3.86	
VQA_12	Heavier-soils Plains Grassland	132_61	VVP	21.82	3	24.82	Low	0.41	
VQA_13	Plains Grassy Woodland	55_61	VVP	22.00	3	25.00	Low	0.15	
VQA_14	Plains Grassy Woodland	55_61	VVP	28.00	3	31.00	High	1.37	

HZ Number	EVC	EVC #	Bioregion	Standardised site score	Landscape Score	Habitat points (/100)	Quality class	Zone area (ha)	Impacted area (ha)
VQA_15	Heavier-soils Plains Grassland	132_60	VVP	23.12	3	26.12	Low	0.46	
VQA_16	Heavier-soils Plains Grassland	132_61	VVP	20.45	6	26.45	Low	8.75	3.53
VQA_17	Heavier-soils Plains Grassland	132_62	VVP	21.82	3	24.82	Low	0.88	
VQA_18	Heavier-soils Plains Grassland	132_63	VVP	20.45	4	24.45	Low	2.71	
VQA_19	Heavier-soils Plains Grassland	132_61	VVP	21.82	4	25.82	Low	2.64	0.36
VQA_20	Creekline Grassy Woodland	68	VVP	26.00	6	32.00	High	9.11	
VQA_21	Heavier-soils Plains Grassland	132_61	VVP	23.12	3	26.12	Low	0.46	0.44
VQA_22	Creekline Grassy Woodland	68	VVP	26.00	3	29.00	High	0.00	
VQA_23	Heavier-soils Plains Grassland	132_61	VVP	29.92	3	32.92	Moderate	1.47	
VQA_24	Heavier-soils Plains Grassland	132_61	VVP	29.92	4	33.92	Moderate	2.32	
VQA_25	Heavier-soils Plains Grassland	132_61	VVP	29.92	3	32.92	Low	0.08	
VQA_26	Heavier-soils Plains Grassland	132_61	VVP	23.12	4	27.12	Low	0.11	
VQA_27a	Plains Grassy Woodland	132_61	VVP	22.00	5	27.00	Moderate	2.00	
VQA_27b	Heavier-soils Plains Grassland	132_62	VVP	31.28	5	36.28	Moderate	5.00	
VQA_28	Plains Grassy Woodland	55_61	VVP	36.00	7	43.00	High	6.25	0.24
VQA_29	Heavier-soils Plains Grassland	132_61	VVP	16.32	5	21.32	Low	2.30	
VQA_30	Heavier-soils Plains Grassland	132_61	VVP	16.32	7	23.32	Low	7.41	6.08
VQA_31	Heavier-soils Plains Grassland	132_61	VVP	16.32	3	19.32	Low	0.25	

HZ Number	EVC	EVC #	Bioregion	Standardised site score	Landscape Score	Habitat points (/100)	Quality class	Zone area (ha)	Impacted area (ha)
VQA_32	Heavier-soils Plains Grassland	132_61	VVP	16.32	3	19.32	Low	0.04	0.02
VQA_33	Hills Herb Rich Woodland	71	CVU	20.00	4	24.00	Low	0.05	0.05
VQA_34	Hills Herb Rich Woodland	71	CVU	20.00	4	24.00	Low	0.02	

Table A6.2 Scattered trees within the study area

* denotes trees additional trees that have been avoided in the current design.

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST0001	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	71			No
ST0002	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	148	LOT		Yes
ST0003	Yellow Box *Eucalyptus melliodora*	66			No*
ST0004	Yellow Box *Eucalyptus melliodora*	89	LOT		No*
ST0005	Yellow Box *Eucalyptus melliodora*	76			No*
ST0006	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	116	LOT		No*
ST0007	Yellow Box *Eucalyptus melliodora*	87	LOT		No
ST0008	Yellow Box *Eucalyptus melliodora*	103	LOT		No
ST0009	River Red-gum *Eucalyptus camaldulensis*	168	LOT		No
ST0010	Yellow Box *Eucalyptus melliodora*	86	LOT		No*
ST0011	Yellow Box *Eucalyptus melliodora*	102	LOT		No
ST0012	Grey Box *Eucalyptus microcarpa*	93	LOT		No*
ST0013	Dead	84	LOT		No*
ST0014	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	123	LOT		No*
ST0015	Yellow Box *Eucalyptus melliodora*	127	LOT		No
ST0016	Yellow Box *Eucalyptus melliodora*	65			No
ST0017	Yellow Box *Eucalyptus melliodora*	94	LOT	Yes	No
ST0019	Yellow Box *Eucalyptus melliodora*	107	LOT		No
ST0020	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	80	LOT		No
ST0021	Yellow Box *Eucalyptus melliodora*	95	LOT		No
ST0022	Yellow Box *Eucalyptus melliodora*	81	LOT		No
ST0023	Yellow Box *Eucalyptus melliodora*	119	LOT		No
ST0023	Grey Box *Eucalyptus microcarpa*	118	LOT	Yes	No
ST0024	Yellow Box *Eucalyptus melliodora*	95	LOT	Yes	No
ST0025	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	130	LOT	Yes	No

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST0026	Yellow Box *Eucalyptus melliodora*	120	LOT		No
ST0027	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	72			No
ST0028	Dead	98	LOT		No
ST0029	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	74			No*
ST0030	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	130	LOT		No*
ST0031	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	107	LOT		Yes
ST0032	Dead	110	LOT		Yes
ST0033	Yellow Box *Eucalyptus melliodora*	95	LOT		No*
ST0034	Dead	103	LOT		No*
ST0035	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	93	LOT		No*
ST0036	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	83	LOT		No*
ST0037	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	100	LOT		No*
ST0038	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	123	LOT		No*
ST0039	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	150	LOT		No*
ST0040	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	80	LOT		Yes
ST0041	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	97	LOT		Yes
ST0042	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	127	LOT		Yes
ST0043	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	105	LOT		Yes
ST0044	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	80	LOT		Yes
ST0045	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	74			Yes
ST0046	Yellow Box *Eucalyptus melliodora*	107	LOT		Yes
ST0047	Grey Box *Eucalyptus microcarpa*	100	LOT		Yes
ST0048	Grey Box *Eucalyptus microcarpa*	110	LOT		Yes
ST0051	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	95	LOT		Yes
ST0052	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	102	LOT		Yes
ST0053	Yellow Box *Eucalyptus melliodora*	93	LOT		Yes
ST0054	Yellow Box *Eucalyptus melliodora*	125	LOT		Yes

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST0055	Grey Box *Eucalyptus microcarpa*	76			Yes
ST0056	Grey Box *Eucalyptus microcarpa*	115	LOT		Yes
ST0057	Grey Box *Eucalyptus microcarpa*	60			Yes
ST0058	Grey Box *Eucalyptus microcarpa*	60			Yes
ST0059	Grey Box *Eucalyptus microcarpa*	80	LOT		Yes
ST0060	Grey Box *Eucalyptus microcarpa*	80	LOT		No
ST0061	Grey Box *Eucalyptus microcarpa*	85	LOT		No
ST0081	Grey Box *Eucalyptus microcarpa*	66			No*
ST0082	Grey Box *Eucalyptus microcarpa*	60			No*
ST0083	Grey Box *Eucalyptus microcarpa*	73			Yes
ST0084	Grey Box *Eucalyptus microcarpa*	72			Yes
ST0085	Grey Box *Eucalyptus microcarpa*	91	LOT		No
ST0086	Grey Box *Eucalyptus microcarpa*	110	LOT		No
ST0087	Grey Box *Eucalyptus microcarpa*	65			No
ST0088	Grey Box *Eucalyptus microcarpa*	75			No
ST0090	Grey Box *Eucalyptus microcarpa*	115	LOT		No
ST0092	Grey Box *Eucalyptus microcarpa*	42			No
ST0092	Grey Box *Eucalyptus microcarpa*	68			No
ST0093	Grey Box *Eucalyptus microcarpa*	53			No
ST0094	Grey Box *Eucalyptus microcarpa*	77			No
ST0095	Grey Box *Eucalyptus microcarpa*	70			No
ST0096	Grey Box *Eucalyptus microcarpa*	65			No
ST0097	Grey Box *Eucalyptus microcarpa*	90	LOT		No
ST0098	Grey Box *Eucalyptus microcarpa*	101	LOT		No
ST0099	Grey Box *Eucalyptus microcarpa*	90	LOT		No
ST0100	Grey Box *Eucalyptus microcarpa*	78			No

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST0101	Grey Box *Eucalyptus microcarpa*	58			No
ST0102	Grey Box *Eucalyptus microcarpa*	49			No
ST0103	Grey Box *Eucalyptus microcarpa*	87	LOT		No
ST0104	Grey Box *Eucalyptus microcarpa*	93	LOT		No
ST0105	Grey Box *Eucalyptus microcarpa*	59			No
ST0106	Grey Box *Eucalyptus microcarpa*	60			No
ST0107	Grey Box *Eucalyptus microcarpa*	73			No
ST0108	Grey Box *Eucalyptus microcarpa*	76			No
ST0109	Grey Box *Eucalyptus microcarpa*	55			No
ST0110	Grey Box *Eucalyptus microcarpa*	60			No
ST0111	Grey Box *Eucalyptus microcarpa*	105	LOT		No
ST0112	Grey Box *Eucalyptus microcarpa*	92	LOT		Yes
ST0113	Grey Box *Eucalyptus microcarpa*	113	LOT		Yes
ST0114	Grey Box *Eucalyptus microcarpa*	83	LOT		Yes
ST0115	Grey Box *Eucalyptus microcarpa*	96	LOT		Yes
ST0116	Grey Box *Eucalyptus microcarpa*	72			No*
ST0117	Yellow Box *Eucalyptus melliodora*	70			Yes
ST0118	Yellow Box *Eucalyptus melliodora*	80	LOT		No*
ST0501	River Red-gum *Eucalyptus camaldulensis*	137	LOT		No
ST0502	River Red-gum *Eucalyptus camaldulensis*	138	LOT	Yes	Yes
ST0503	River Red-gum *Eucalyptus camaldulensis*	99	LOT		Yes
ST0504	Buloke *Allocasuarina luehmannii*	63		Yes	Yes
ST0505	River Red-gum *Eucalyptus camaldulensis*	126	LOT	Yes	Yes
ST0507	River Red-gum *Eucalyptus camaldulensis*	196	LOT		Yes
ST0508	River Red-gum *Eucalyptus camaldulensis*	204	LOT	Yes	Yes
ST0509	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	127	LOT		No

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST0510	Dead	129	LOT	Yes	No
ST0511	Yellow Box *Eucalyptus melliodora*	84	LOT	Yes	No
ST0518	Dead	94	LOT	Yes	No
ST0519	Grey Box *Eucalyptus microcarpa*	104	LOT	Yes	No
ST0520	Grey Box *Eucalyptus microcarpa*	104	LOT		No
ST0521	Grey Box *Eucalyptus microcarpa*	96	LOT		No
ST0522	Grey Box *Eucalyptus microcarpa*	89	LOT	Yes	No
ST0524	Grey Box *Eucalyptus microcarpa*	98	LOT		No
ST0525	Grey Box *Eucalyptus microcarpa*	83	LOT		No
ST0526	Grey Box *Eucalyptus microcarpa*	87	LOT		No
ST0527	Grey Box *Eucalyptus microcarpa*	69			No
ST0528	Grey Box *Eucalyptus microcarpa*	106	LOT		No
ST0529	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	102	LOT		No
ST0530	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	87	LOT	Yes	No
ST0531	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	166	LOT	Yes	No
ST0532	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	106	LOT	Yes	No
ST0533	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	95	LOT		No
ST0534	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	60			No
ST0610	Manna Gum *Eucalyptus viminalis*	180	LOT	Yes	No
ST0611	Manna Gum *Eucalyptus viminalis*	84	LOT	Yes	No
ST0612	Manna Gum *Eucalyptus viminalis*	89	LOT		No
ST0617	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	159	LOT	Yes	Yes
ST0618	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	84	LOT	Yes	Yes
ST0619	Grey Box *Eucalyptus microcarpa*	123	LOT	Yes	Yes
ST0620	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	100	LOT		Yes
ST0621	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	82	LOT		Yes
ST0622	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	122	LOT		Yes

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST0623	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	140	LOT		Yes
ST0624	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	85	LOT		Yes
ST0625	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	104	LOT	Yes	Yes
ST0626	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	62			Yes
ST0627	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	74			Yes
ST0628	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	72			Yes
ST0629	Buloke *Allocasuarina luehmannii*	54			Yes
ST0630	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	81	LOT	Yes	Yes
ST0631	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	101	LOT	Yes	Yes
ST0632	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	117	LOT	Yes	Yes
ST0633	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	81	LOT	Yes	Yes
ST0634	Yellow Box *Eucalyptus melliodora*	96	LOT		Yes
ST0635	Buloke *Allocasuarina luehmannii*	53			Yes
ST0636	Yellow Box *Eucalyptus melliodora*	89	LOT		Yes
ST0637	Buloke *Allocasuarina luehmannii*	70			Yes
ST0641	Buloke *Allocasuarina luehmannii*	50			Yes
ST0647	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	122	LOT		No
ST0648	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	103	LOT		No
ST0649	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	150	LOT		Yes
ST0650	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	130	LOT		Yes
ST0651	Dead	150	LOT		Yes
ST0652	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	129	LOT		Yes
ST1005	Buloke *Allocasuarina luehmannii*	72			No
ST1006	Buloke *Allocasuarina luehmannii*	59			No
ST1007	River Red-gum *Eucalyptus camaldulensis*	94	LOT	Yes	No
ST1008	River Red-gum *Eucalyptus camaldulensis*	205	LOT	Yes	No

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST1009	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	69			No
ST1010	Yellow Box *Eucalyptus melliodora*	135	LOT		No
ST1011	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	87	LOT		No
ST1012	Melbourne Yellow-gum *Eucalyptus leucoxylon* subsp. *connata*	55			Yes
ST1013	Yellow Box *Eucalyptus melliodora*	123	LOT		Yes
ST1014	Dead	95	LOT	Yes	Yes
ST1015	Yellow Box *Eucalyptus melliodora*	63			Yes
ST1016	Yellow Box *Eucalyptus melliodora*	53			No*
ST1017	Yellow Box *Eucalyptus melliodora*	60			No*
ST1018	Yellow Box *Eucalyptus melliodora*	51			Yes
ST1019	Yellow Box *Eucalyptus melliodora*	19			Yes
ST1020	Yellow Box *Eucalyptus melliodora*	75	LOT	Yes	No*
ST1025	Yellow Box *Eucalyptus melliodora*	47		Yes	No*
ST1026	Yellow Box *Eucalyptus melliodora*	54		Yes	No*
ST1027	Yellow Box *Eucalyptus melliodora*	108	LOT	Yes	No
ST1028	Yellow Box *Eucalyptus melliodora*	67		Yes	No
ST1029	Yellow Box *Eucalyptus melliodora*	60			No
ST1030	Yellow Box *Eucalyptus melliodora*	33			No
ST1034	Yellow Box *Eucalyptus melliodora*	98	LOT		No
ST1035	Yellow Box *Eucalyptus melliodora*	88	LOT	Yes	No
ST1036	Yellow Box *Eucalyptus melliodora*	72	LOT	Yes	No
ST1037	Yellow Box *Eucalyptus melliodora*	51			No
ST1038	Yellow Box *Eucalyptus melliodora*	104	LOT		Yes
ST1039	Dead	97	LOT	Yes	Yes
ST1040	Yellow Box *Eucalyptus melliodora*	110	LOT	Yes	Yes
ST1041	Yellow Box *Eucalyptus melliodora*	67		Yes	No
ST1042	Yellow Box *Eucalyptus melliodora*	110	LOT	Yes	No

Tree ID	Species name	DBH (cm)	Size Class	Hollows observed?	Will tree be impacted?*
ST1044	Dead	90	LOT	Yes	No
ST1045	Dead	81	LOT	Yes	No
ST1046	Buloke *Allocasuarina luehmannii*	49			Yes

Table A6.3 Impacted patch trees

Tree #	Patch	Species name	DBH (cm)	Size Class	Hollows observed?
PT1002	VQA30	Dead	59	LOT	Yes
PT0506	VQA6	River Red-gum *Eucalyptus camaldulensis*	115	LOT	Yes
PT1003	VQA30	Yellow Box *Eucalyptus melliodora*	77		
PT1001	VQA30	Yellow Box *Eucalyptus melliodora*	56		Yes
PT1004	VQA30	Grey Box *Eucalyptus microcarpa*	106	LOT	

Appendix 7 Native Vegetation Removal Report

Appendix 8 Proposed site plan

Include pic of proposed site plan