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West Mokoan Solar Farm

892 Yarrawonga Development Pty Ltd (trading as South Energy)

17-Jun-2021

Flora and Fauna Assessment Report

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Abbreviations

Acronym / Term	Explanation
BCS	Biodiversity Conservation Status
CaLP Act	*Catchment and Land Protection Act* 1994
DBH	Diameter at Breast Height
DEDJTR	Department of Economic Development, Jobs, Transport and Resources
DELWP	Department of Environment, Land, Water and Planning
DAWE	Department of Agriculture, Water and the Environment
EE Act	*Environment Effects Act* 1978
EPBC Act	*Environment Protection and Biodiversity Conservation Act* 1999
EVC	Ecological Vegetation Class
FFG Act	*Flora and Fauna Guarantee Act* 1988
FIS	Flora Information System
HHa	Habitat Hectare
HZ	Habitat Zone
Km	kilometre
MW	Megawatts
NVIM	Native Vegetation Information Management
P&E Act	*Planning and Environment Act* 1987
PMST	Protected Matters Search Tool
SPFF	State Planning Policy Framework
VQA	Vegetation Quality Assessment
VBA	Victorian Biodiversity Atlas
VROTS	Advisory list of threatened species in Victoria (flora and fauna)
WoNS	Weeds of national significance

Executive Summary

AECOM Australia (AECOM) was engaged by 892 Yarrawonga Development Pty Ltd (trading as South Energy) to undertake a detailed ecological assessment for the proposed West Mokoan Solar Farm ('the Project'). The Project is located between Benalla and Goorambat, approximately 10 kilometres north-east of Benalla, Victoria. The development being considered is a photovoltaic solar energy facility.

The purpose of this assessment was to identify and quantify flora and fauna values in line with Victorian and Commonwealth policy and legislation. An initial field assessment was undertaken in February 2019 and a detailed assessment in March 2019. An additional area directly adjoining the original assessment area was assessed on 25 July 2019. Further fauna habitat surveys were completed on 16 December 2020 and 19-20 January 2021.

This report provides the results of the flora and fauna assessment and discusses the relevant legislation and approvals associated with any proposed impacts to flora and fauna values. The summary below provides an overview of the on-site findings within the study area in relation to relevant environmental legislation and policy.

Legislation / Policy	Relevant on-site finding	Impacts (Design Revision H)	Implications
Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*	No listed flora species, or threatened ecological communities recorded. Potential for Regent Honeyeater, Plains-wanderer, Grey-headed Flying fox, Painted Honeyeater and Swift Parrot to occasionally and/or seasonally utilise woodland and Scattered Trees. Potential habitat for Striped Legless Lizard.	Large patch of woodland vegetation (HZ 14) retained. Loss of large Scattered Trees minimised (26 trees); trees retained on site will continue to provide resources to Swift Parrot as part of their wide foraging range. The two areas of potential habitat for Striped Legless Lizard are avoided.	The Project is not likely to have a significant impact on a MNES. Referral is not required.
Flora and Fauna Guarantee Act 1988	Potential habitat for several FFG Act-listed woodland fauna species. One listed ecological community present: Victorian Temperate Woodland Bird Community Potential for an FFG Act threatening process to occur - *loss of hollow-bearing trees from Victorian native forests and woodlands*.	Loss of large Scattered Trees minimised (26 trees); this includes 7 high-value trees, 18 medium-value trees and one low value tree. Of the large trees lost, high habitat value trees contained the highest number of habitat features (5-17 hollows), followed by medium habitat value trees (1-4 hollows). Of note, 12 medium value trees contained <1 hollow feature.	The loss of 7 large trees with high habitat value will contribute to an FFG Act threatening process - *loss of hollow-bearing trees from Victorian forests and woodlands*; however, the Project has demonstrated considerable effort to minimise tree losses through the avoid and minimise process and no further opportunities exist to reduce tree losses further.

Legislation / Policy	Relevant on-site finding	Impacts (Design Revision H)	Implications
	Potential habitat for Striped Legless Lizard Habitat for Lace Monitor	Trees retained on site will continue to provide resources for Victorian Temperate Woodland Bird Community. The two areas of potential habitat for Striped Legless Lizard are avoided.	
Planning and Environment Act 1987 Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017)	Patches of native vegetation totalling 27.94 ha (8.22 habitat hectares), 209 Scattered Trees (191 large and 18 small) and 112 Large Trees in Patches were recorded in the study area. Remnant patches consisted of EVC 55_62 Plains Grassy Woodland, EVC 175_61 Grassy Woodland, EVC 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic and EVC 803 Plains Woodland which are endangered in the Victorian Riverina bioregion.	Native vegetation removal has been minimised through an iterative design process. Losses comprise 1.891 hectares and 28 Scattered Trees (26 large and 2 small). No Large Trees in Patches will be impacted. The NVR Report states that the biodiversity offsets required include 0.394 general habitat units and 26 large trees with a minimum strategic biodiversity value score of 0.312.	Permit to remove native vegetation including remnant patches and scattered native trees if removal is required. Seek planning permit under the Victorian *Planning and Environment Act 1987* (Clause 52.17). Permit application requirements include provision of an NVR report, avoid and minimise statement and offset statement providing evidence that the offsets for the project are available and can be secured (Appendix F). Biodiversity offsets required to be achieved and secured.
Catchment and Land Protection Act 1994	Declared Noxious Weeds (Controlled) present.		No permit required. The proponent must comply with requirements to limit the spread and growth of declared noxious weeds within and outside of the project area, via vehicle hygiene procedures listed in an Environmental Management Plan (EMP).

Legislation / Policy	Relevant on-site finding	Impacts (Design Revision H)	Implications
Wildlife Act 1975	Potential for construction-related impacts on fauna species, particularly through the removal of hollow-bearing trees.	The 1.891 hectares and 28 Scattered Trees (26 large and 2 small) to be removed may be occupied by wildlife.	Liaise with DELWP to determine expectations in relation to permit requirements. Habitat clearance may require a permit from DELWP to wilfully disturb or destroy protected wildlife. Management Authorisation from DELWP if salvage of wildlife is required by DELWP.
Environment Effects Act 1978	Native vegetation present (27.94 hectares of endangered EVCs). A Potential habitat for Striped Legless Lizard	Vegetation removal is below the 10ha threshold. Potential Striped Legless Lizard habitat retained. Loss of large Scattered Trees has been reduced to 28; trees retained will continue to provide resources to Swift Parrot (and other woodland birds) as part of their wider range.	Project does not meet criteria for referral under the EE Act outlined in *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978*

1.0 Introduction

1.1 Project background

AECOM Australia (AECOM) was engaged by 892 Yarrawonga Development Pty Ltd (trading as South Energy) to undertake a detailed ecological assessment for the proposed West Mokoan Solar Farm ('the Project') at Benalla and Goorambat, Victoria. The purpose of the Project is to supply electricity generated from solar irradiation into the National Energy Market. The solar farm (referred to as the West Mokoan Solar Farm) is to connect to the overhead powerline via the existing 220 kV transmission lines associated with the Glenrowan to Shepparton network, operated by the Australian Energy Market Operator.

The Project is expected to have an installed capacity of up to 233 Megawatts (MW) (DC) which will be provided by approximately 531,216 solar photovoltaic (PV) panels/modules of 440 Watt PV collectors mounted on single axis trackers. Associated infrastructure for the solar farm will include approximately 57 power conversion units (PCUs) containing electrical switchgear, inverters and transformers and a central substation, operations and maintenance facility and energy storage area along with internal access tracks and security fencing which will surround the site. The Project also includes the realignment of easements.

The total project area is approximately 426 hectares (ha). The proposed project is located between Benalla and Goorambat, around 10 kilometres (kms) north-east of Benalla, Victoria and is predominately made up of freehold agricultural land utilised for dryland grazing ('the study area').

1.2 Assessment objectives

The purpose of this assessment was to identify and quantify ecological values in line with Victorian and Commonwealth policy and legislation; and advise South Energy on the next steps in progressing the proposed development. As an overview, this report aims to:

- Review and analyse existing reports relating to the study area.
- Document the flora and fauna values present within the study area as identified during the initial and detailed ecological surveys, including identifying and mapping the vegetation quality (applying the habitat hectares method) and fauna habitat present. The conservation significance of any flora and fauna present will also be determined.
- Detail potential ecological impacts resulting from development within the study area, in the context of relevant Victorian and Commonwealth policy and legislation and provide recommendations for avoiding or minimising such impacts.
- Provide South Energy with guidance as to how the development could be undertaken to avoid impact to flora and fauna values.

1.3 Study area

The study area is located approximately 10 kms north-east of Benalla, Victoria and 7.6 kms south-east of the Goorambat Township (Figure 1 – Appendix A). The study area is located within the Victorian Riverina bioregion, and is situated within the Benalla Local Government Area and the Goulburn Broken Catchment Management Authority area.

The study area comprises parcels of land including:

- Lot 1 PS625748;
- Lot 1 TP173518;
- Lot 1 TP104377;
- Lots 1-5 LP206524
- Lot 1\TP576184; and
- 98B PP2704

The project area for the purpose of this flora and fauna assessment does not include the roadsides of public road reserves (sealed or unsealed) adjacent to the study area. It does include gazetted (paper) road reserves that are located within the boundary of the study area. Although a detailed flora and fauna assessment was not undertaken on roadsides of public road reserves (sealed or unsealed) adjacent to the study area, the location of patches of vegetation, Scattered Trees and other ecological values were noted during the field assessment in order to inform the location of site access and infrastructure placement.

Excluded from the study area are land parcels designated for conservation which are located on the north side of Stockyard Creek. These parcels include PP2704 (95C, 97B and 97C) and Lot 2 TP173518.

1.4 Relevant state and national policy and legislation

Throughout the assessment process consideration has been given to the following biodiversity legislation and policies:

- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act);
- Victorian *Catchment and Land Protection Act 1994* (CaLP Act);
- Victorian *Wildlife Act 1975* (Wildlife Act);
- Victorian *Planning and Environment Act 1987* (P&E Act); and,
- *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a) (the Guidelines) and related policy documents.

An introduction to the above biodiversity legislation and policy and the implications on the Project development is provided in Section 4.0 of this report.

1.5 General disclaimer

This technical study has been undertaken to identify the ecological features present with the study area and the implications they may have on a solar farm development. The advice given in relation to legislative implications is general in nature and based on the planned development at the time of field assessments.

2.0 Methods

2.1 Desktop assessment

2.1.1 Literature

Ecological reports that cover sections of the study area reviewed as part of the desktop assessment included:

- **Benalla Rural City Environment Strategy 2016 – 2020**

  The Environment Strategy (Benalla Rural City, undated) aims to provide a proactive and strategic approach to environmental matters and identifies priorities for management for the municipality within the strategy's timeframe.

- **Benalla Rural City Council Roadside Vegetation Management Plan**

  The Roadside Vegetation Management Plan (Benalla Rural City 2014) seeks to identify roadside vegetation values across the municipality and provide a tool to assist the community, landholders, Council staff and contractors to manage roadside vegetation. The conservation values of Council roadsides have been assessed; the Roadside Vegetation Conservation Values Map is held at the Benalla Rural City offices.

- **Biodiversity Strategy for the Goulburn Broken Catchment 2016 - 2021**

  The Biodiversity Strategy for the Goulburn Broken Catchment (GBCMA, 2016) provides a strategic approach to improve conservation and ecological outcomes, outlines measurable targets, and tracks progress against these targets for the region within a given timeframe.

In addition, the *Management Plan for CO694* (TFN, 2018) was reviewed following the update to the Concept Plan in 2021. Any species of interest to the Project have been considered in the likelihood assessment (Section 2.3).

2.1.2 Database searches

The following State and Commonwealth-curated biodiversity datasets were reviewed and synthesised:

- EPBC Act Protected Matters Search Tool (PMST) administered by the Australian Government Department of Agriculture, Water and the Environment (DAWE);
- Victorian Biodiversity Atlas 2018 (VBA) administered by the Victorian Department of Environment, Land, Water and Planning (DELWP);
- Native Vegetation Information Management (NVIM) tool administered by DELWP
- NatureKit biodiversity mapping tool administered by DELWP
- Ecological Vegetation Class mapping administered by DELWP; and
- Aerial photographs and topographic maps.

Review of spatial datasets included a 10 km buffer around the study area to capture mobile fauna species, and to account for the possibility of a lack of past survey effort in the study area.

2.2 Field assessment

The field survey aimed to validate the findings from the desktop assessment and identify the conservation significance of any native vegetation, flora or fauna species present within the study area as well as habitat for fauna. A broad ecological constraints assessment was conducted from the 13-14 February 2019 and detailed ecological survey undertaken from the 20-21 March and 25 July 2019. In addition, a tree habitat value assessment and habitat survey for one threatened species – Striped Legless Lizard *Delma impar* - was undertaken on 16 December 2020 and 19-20 January 2021 following the DELWP Request for Information (RFI) issued on 26 November 2020.

2.2.1 General flora and fauna assessment

The Random Meander Method (Cropper 1993) was adopted to search for the presence of native flora. Where flora identification was difficult in the field, a sample of the species was taken to aid in later identification. A number of authoritative texts and databases were utilized to identify flora samples. Each of these is documented in the reference section of this report. The conservation significance of flora species identified within the study area was determined in accordance with Victorian and Commonwealth legislation and the Victoria Framework.

The assessment for vertebrate fauna at the site involved recording incidental records of all vertebrate fauna observed during the field surveys. This also involved identifying and examining habitat resources available within the study area.

2.2.2 Native Vegetation (Habitat Hectare Assessment)

Where present, native vegetation within the study area was mapped according to the prescriptions of the Guidelines (DELWP, 2017a). The definition of native vegetation is provided in Section 2.5.3 below.

A vegetation quality assessment (VQA) was undertaken for all patches of native vegetation using the Habitat Hectares methodology as described in the *Vegetation Quality Assessment Manual – guidelines for applying the habitat hectare scoring method* (DSE 2004) and Scattered Trees assessed using the criteria outlined in the Guidelines (DELWP 2017a). Native vegetation was assessed using version 1.3 of the 'Vegetation Quality Field Assessment Sheet' provided by DELWP and Ecological Vegetation Class (EVC) benchmarks for the Victorian Riverina Bioregion. Vegetation was classified based on the biophysical characteristics outlined in the EVC benchmarks such as geology, vegetation structure and species composition. A total of 27 VQAs were completed.

Scattered Trees were assessed using the criteria outlined in the Guidelines (DELWP 2017a). The Diameter at Breast Height (DBH) was measured for all Scattered Trees and Large Trees in Patches to determine whether they meet the EVC benchmark of a large tree or small tree.

The size class of scattered indigenous trees was determined by the EVC benchmark for each EVC as per methods prescribed by (DELWP 2017a). Size categories are provided in Table 1 below:

Table 1 Tree size classes of EVCs within study area

	Ecological Vegetation Class			
Size Classes	**Plains Grassy Woodland EVC 55_62**	**Grassy Woodland EVC 175_61**	**Plains Woodland/Herb-rich Gilgai Wetland Mosaic EVC 235**	**Plains Woodland EVC 803**
Small Tree	*Eucalyptus* spp. < 80 cm	*Eucalyptus* spp. < 70 cm *Allocasuarina* spp. < 40 cm	*Eucalyptus* spp. < 70 cm *Allocasuarina luehmannii* spp. < 40 cm	*Eucalyptus* spp. < 70 cm *Eucalyptus largiflorens* <50 cm *Allocasuarina* spp. < 40 cm
Large Tree	*Eucalyptus* spp. ≥ 80 cm	*Eucalyptus* spp. ≥70 cm *Allocasuarina* spp. ≥ 40 cm	*Eucalyptus* spp. ≥ 70 cm *Allocasuarina luehmannii* spp. ≥ 40 cm	*Eucalyptus* spp. ≥ 70 cm *Eucalyptus largiflorens* ≥50 cm *Allocasuarina* spp. ≥ 40 cm

The location of native vegetation patches and Scattered Trees was mapped using a Samsung tablet which has a spatial accuracy of approximately ± 7 metres depending on access to satellites.

The conservation significance of any native vegetation or flora species present on site was determined in line with Victorian and Commonwealth policy and legislation, including the Framework.

2.2.3 Tree habitat value assessment

A tree habitat value assessment was completed to document the habitat value of Scattered Trees proposed to be removed. The assessments were undertaken by a DELWP qualified VQA-assessor accompanied by a zoologist. The purpose of the survey was to document hollows that may provide habitat for fauna (den and/or nesting resources) to guide further refinements with regards to the loss of Scattered Trees and therefore potential fauna habitat. More broadly, this assessment was also required to review the loss of trees from the study area in the context of the wider landscape. As at Revision G, 43 trees were designated for removal; these trees were therefore included in the large tree habitat assessment. One additional tree was included in the assessment due to being located adjacent to a former proposed substation site (Revision G) and the potential loss of the tree.

The 44 trees were assessed according to their size, canopy health (foraging resource) and presence of hollows which were categorised by type (trunk or spout hollow), size and number as viewed from the ground with binoculars. Tree hollow categories are listed in Table 2. Any other habitat features such as nests were also noted during the assessment. Habitat features were scored and assigned an overall habitat ranking to provide further guidance on prioritising Scattered Trees for retention within the study area. The habitat ranking matrix is shown in Table 3.

Table 2 Tree hollow categories

Hollow size category	Arbitrary species
Large	Larger possums or owls
Medium	Possums, gliders, parrots, lorikeets
Small	Microbats, antechinus, pardalotes

Table 3 Tree habitat value rating matrix

	Tree size and health			
Hollows	Large, healthy	Large, unhealthy	Small, healthy	Small, unhealthy
≥5 hollows, range of sizes, evidence of fauna usage	High	High	High	Medium
3-4 hollows, similar size	High	Medium	Medium	Low
2-3 hollows	High	Medium	Low	Low
≤1 hollow	Medium	Low	Low	Low

*Large and small tree classes as described in Table 3 align with EVC benchmarks.

2.2.4 Striped Legless Lizard assessment

2.2.4.1 Targeted habitat assessment

A targeted habitat assessment for Striped Legless Lizard (SLL) was completed to identify areas of potential suitable habitat for the species within the study area. Targeted habitat assessments were undertaken by a DELWP qualified VQA-assessor accompanied by a zoologist with extensive experience with SLL habitat assessments.

Striped Legless Lizard is a grassland specialist. The species is generally known to inhabit native grasslands and grassy woodlands that contain native tussock-forming grasses, but it can also persist in degraded grasslands and non-native grasslands that have been historically grazed or subject to pasture improvement (DSEWPaC, 2011). As a semi-fossorial species, Striped Legless Lizards use burrows and cracks as retreats and shelter in tussocks and under rocks and fallen timber on the surface (Smith and Robertson, 2019). Striped Legless Lizard are less likely to occupy sites that have the incorrect soil type or sites that have been subject to major disturbance such as ploughing.

The primary feature used to identify potential Striped Legless Lizard habitat at West Mokoan was the presence of lowland native grassland and grassy woodland EVCs which support scattered eucalypts and a complex structure of grass tussocks (native or introduced). Other features which informed the assessment included the presence of soil cracks, rock, fallen timber, and sources of soil disturbance such as grazing or ploughing.

2.2.4.2 Detailed analysis

Following the targeted habitat assessment, a detailed analysis was undertaken to evaluate the potential for Striped Legless Lizard to occur in the study area (Appendix H). The detailed analysis considered historical records of the species on the VBA and DELWP's Habitat Importance Model for Striped Legless Lizards in north-east Victoria from NatureKit. GIS analysis was undertaken to identify any discernible patterns for occurrence of historical species records in association with topography, geology, bioregion and soils.

2.3 Likelihood of occurrence assessment

2.3.1 Threatened species

A likelihood of occurrence assessment was completed for each threatened species identified in the desktop study as either occurring or having the potential to occur within the field investigation extent. For the purposes of this report, 'threatened species' refers to those species that are:

- Listed as threatened under the EPBC Act
- Listed as migratory under the EPBC Act
- Listed as rare or threatened in Victoria (VROT) in the following:
  - FFG Act – Threatened List (DELWP, 2017b)
  - Advisory List of Rare or Threatened Plants in Victoria – 2014 (DEPI, 2014)
  - Advisory List of Threatened Vertebrate Fauna in Victoria – 2013 (DEPI, 2013a)
  - Advisory List of Threatened Invertebrate Fauna in Victoria – 2009 (DSE, 2009).

This assessment was completed for species recorded on the VBA and/or predicted to occur by the PMST, within 10 km of the study area.

A number of species were excluded from the list and are not considered further in this report on the basis of:

- Records older than 30 years (pre-1989)
- Fauna species considered 'data deficient' in the VROTS list unless they are also recognised under the EPBC Act and/or FFG Act.
- Flora listed as 'poorly known' in the VROTS list as the current knowledge of their distribution and abundance is not sufficient to determine whether these species should be considered as rare or threatened in Victoria.
- Some threatened flora species which are outside their natural range but are commonly used for landscaping and amenity, including Spotted Gum *Corymbia maculata* and Giant Honey-myrtle *Melaleuca armillaris*.
- Fauna reliant on marine environments as no habitat for these species is present in the study area.

The likelihood of occurrence assessment was based on the number of VBA records, year of most recent VBA record, species ecology and the habitat values observed during the field assessment. The likelihood assessment is presented in Appendix B (flora) and Appendix C (fauna).

The following likelihood categories were used to rate each species' likelihood of occurrence:

- **Unlikely:** No preferred habitat in the study area. Species unlikely to be present on the site at any time or during any season.
- **Possible:** Habitat is available in the study area which partially meets the requirements of the species. In the case of fauna, the species may infrequently visit for foraging but would not reside,

roost or otherwise depend on habitats in the study area for their survival. Migratory and aerial foraging birds may overfly the site.

- **Likely:** Species has historically been recorded in the study area (or within very close proximity). The study area contains habitat that meets their habitat requirements and is likely to support a population of the species
- **Present:** Species confirmed to be present within the study area during site assessment or has regularly been observed in recent times.

2.3.2 Threatened ecological communities

A likelihood assessment for threatened ecological communities – those communities listed under the provisions of the EPBC Act or FFG act was completed during the site assessment and in post-processing by assessing 'patch' vegetation against the relevant ecological community description and threshold criteria.

2.4 Habitat connectivity assessment (tree proximity analysis)

A tree proximity analysis was undertaken to prioritise trees for retention. The distance of trees from one another defined the 'habitat complexity' and the assumption that fauna species favour high habitat complexity was adopted.

A set of retention rules as defined by a review of available literature (Appendix G) were applied to identify trees to prioritise for retention when developing the solar grid layout (Table 4). Large trees in Patches and more connected large Scattered Trees provide increased habitat complexity and are desirable to a range of fauna species.

All large Scattered Trees and Large Trees in Patches were afforded the same 'value' in terms of fauna habitat potential as they generally all contained various habitat features including multiple hollows of varying sizes, loose bark and cracks. There was no differentiation between dead and living trees due to being given the same habitat value and offset requirement in the Guidelines (DELWP, 2017). Other habitat features considered in the tree proximity spatial analysis included dams, waterways and remnant patches of vegetation.

A GIS spatial analysis study was undertaken to implement the retention rules outlined in Table 4.

Table 4 Tree retention rules

Cat.	Description	Implementation	Retention rules	Rationale
1	All remnant patches containing a canopy component within Habitat Hectare Assessment.	Identify all patches that have a value in the tree canopy component as informed by the Habitat Hectare score sheet.	Retain Category 1 trees.	Suitable habitat for bat species. Increased habitat complexity desirable for a range of fauna species.
2	Large Scattered Trees (LST) within 75 m of a remnant patch, two or more LST or other habitat feature(s).	Identify all patches that have a value in the tree canopy component as informed by the Habitat Hectare score sheet. Also identify other habitat features that occur within the assessment area including waterways and waterbodies. Use this to conduct proximity analysis of LST within 75m of habitat features and other LSTs.	Retain Category 2 trees.	75 m is the threshold for gliding marsupials.

Cat.	Description	Implementation	Retention rules	Rationale
3	LST >75 m from other LST or habitat feature and, is not in Category 2.	Identify all patches that have a value in the tree canopy component (Habitat Hectare score sheet). Also identify other habitat features that occur within the assessment area including waterways and waterbodies. Use this to conduct proximity analysis of LST greater than 75m of habitat features and other LSTs.	Retain up to 30% of trees >75 m from other LST or habitat features.	Suitable for woodland bird species. Less than 10% foliage cover in a landscape would result in a significant reduction in species richness.

2.5 Nomenclature

2.5.1 Flora species

Common and scientific names for plants follow the VBA database (2018 version).

Flora conservation significance was determined in accordance with the EPBC Act, FFG Act, and VROTS (DEPI 2014).

2.5.2 Vegetation communities

Native vegetation in Victoria is classified into units known as EVCs, which are described according to a combination of floristic, life form and ecological characteristics, and through an inferred fidelity to particular environmental attributes. Each EVC occurs under a common regime of ecological processes within a given biogeographic range and may contain multiple floristic communities (DNRE 2002).

Other vegetation types that may occur in Victoria include flora communities listed as threatened under the Commonwealth EPBC Act and/or the Victorian FFG Act. These two Acts have vegetation classification systems that are separate to each other and separate to the EVC classification system. As such, any single patch of native vegetation would be classifiable as a particular EVC, and it may also be separately classified as a different vegetation community under the EPBC Act, and/or as another vegetation community under the FFG Act.

2.5.3 Native vegetation

Native vegetation is defined in the Victoria Planning Provisions as '*plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses*'. Under the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a), native vegetation is classified as either a patch or scattered tree.

A patch of native vegetation is defined as:

- *An area of vegetation where at least 25 per cent of the total perennial understory plant cover is native, or*
- *Any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or*
- *any mapped wetland included in the Current wetlands map, available in DELWP systems and tools.*

A scattered tree is:

- *A native canopy tree that does not form part of a patch*.

Scattered Trees can be classified as large or small on the proviso that they consist of a canopy species for the relevant EVC. Large scattered tree DBH is specified in the relevant EVC benchmark description. Small Scattered Trees are those less than the EVC DBH benchmark for a large tree but greater than 3 metres in height.

The term indigenous is used throughout this report to refer to native plant species that naturally occur within the relevant bioregion of Victoria.

2.5.4 Fauna species

Unless otherwise noted, common and scientific names for fauna follow the VBA database.

Fauna conservation significance was determined in accordance with the EPBC Act, FFG Act, and DELWP's Advisory Lists (DSE 2009; DSE 2013).

2.5.5 Fauna communities

Unlike flora and the use of EVCs, there is no official widespread classification system for fauna communities in Victoria. Both the EPBC Act and the FFG Act list a small number of fauna communities that are considered to be threatened at a national or state scale, respectively. Fauna communities known, or potentially occurring within the study area or surrounds, are only considered in this report if they are listed under either of these two Acts.

2.6 Limitations

This assessment has been undertaken to provide a broad overview of biodiversity assets within the study area. The study effort, combined with information available from other sources, is considered suitable to assess the overall ecological values within the study area. However, the following limitations apply:

- The information regarding flora species gathered during fieldwork for this project is not considered to be conclusive, as limitations may have resulted in some species remaining undetected.
- This ecological assessment is restricted to terrestrial vascular plant species (ferns, conifers and flowering plants) and terrestrial vertebrate fauna (mammals, birds, reptiles and frogs). Non-vascular flora (e.g. mosses, liverworts, lichens), fungi and terrestrial invertebrates have not been considered as part of this assessment, except where listed threatened species are known or suspected to occur, or where bryophytes comprise part of the EVC benchmark used for the habitat hectare assessment (e.g. cover of bryophytes).
- No targeted flora surveys were undertaken.
- No targeted fauna surveys were undertaken for this study, as comprehensive fauna surveys can take longer than most projects of this nature allow. They are also labour intensive, and costs can be prohibitive. Threatened fauna habitat assessments were based on professional judgements on the suitability of habitat present within the study site for any significant species detected on existing databases or as raised through consultation with DELWP.
- The spatial analysis of biodiversity attributes is complex and has significant limitations when it is driven by historical record data such as the Victorian Biodiversity Atlas. The timing of surveys and incidental observations may not correspond with ideal sampling periods; there may be limited survey effort in the area if it is extensively private land; and some species have naturally low detectability rates.
- Mapping was conducted using hand-held Samsung tablets and aerial photo interpretation. The accuracy of uncorrected GPS is subject to the accuracy of the unit and access to satellite information (generally <7 metres). As such, these points should not be relied on for design purposes.

3.0 Results

3.1 Database searches

3.1.1 EPBC Act Protected Matters Search Tool

Matters of National Environmental Significance (MNES) were analysed on the 5 March 2019 using the Protected Matters Search Tool (PMST). MNES that may occur, or are likely to occur, within 10 km of the study area are listed in Table 5.

Table 5 Summary of PMST results

MNES	Number of occurrences
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance (Ramsar Sites)	7 Ramsar sites: • Banrock station wetland complex 500 – 600 km upstream • Barmah forest 50 – 100 km upstream • Gunbower forest 100 – 150 km upstream • Hattah-kulkyne lakes 300 – 400 km upstream • NSW central Murray state forests 50 – 100 km upstream • Riverland 500 – 600 km upstream • The Coorong, and lakes alexandrina and albert wetland 500 – 600 km upstream
Listed threatened ecological communities	4 threatened ecological communities: • Buloke Woodlands of the Riverina and Murray-Darling Depressions Bioregions • Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia • Natural Grasslands of the Murray Valley Plains • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland
Listed threatened species	25 listed threatened species made up of: • 20 listed fauna species • 5 listed flora species
Listed migratory species	12
Commonwealth Marine Areas	None

Victorian Biodiversity Atlas

The VBA database search for records within 10 km of the study area identified (See Figure 1 - Appendix A)

- Five EPBC Act listed threatened species (0 flora and 5 fauna);
- Five EPBC Act listed migratory (but not threatened) bird species;
- Nineteen FFG Act listed terrestrial species (5 flora and 14 fauna); and
- Twenty-one species not listed under the EPBC Act or FFG Act but listed by DELWP as Victorian Rare or Threatened Species (VROTS)[1] (10 flora and 5 fauna).

[1] Excludes extinct species and near-threatened fauna (DEPI 2013) and rare, or poorly-known flora (DEPI 2014)

3.1.2 NatureKit

The presence and distribution of mapped EVCs were assessed using NatureKit (DELWP 2018c) available on the DELWP website. The study area is located within the Victorian Riverina bioregion; however, the Northern Inland slopes bioregion neighbours the study area to the northwest, north, and northeast of the study area. Investigation of current EVC mapping illustrates that four EVCs from the Northern Inland Slopes and five EVCs from the Victorian Riverina have been modelled as occurring within a 10 km radius of the study area. These EVCs and their bioregional conservation status (BCS) are presented in Table 6.

Table 6 EVC mapping derived from DELWP (2018)

Bioregion	EVC No.	EVC Name	BCS
Northern Inland Slopes	61	Box Ironbark Forest	Vulnerable
	175	Grassy Woodland	Endangered
	247	Box Ironbark Forest/Grassy Woodland Complex	Vulnerable
	803	Plains Woodland	Endangered
Victorian Riverina	55_62	Plains Grassy Woodland	Endangered
	175_61	Grassy Woodland	Endangered
	235	Plains Woodland/Herb-rich Gilgai Wetland Mosaic	Endangered
	247	Box Ironbark Forest/Grassy Woodland Complex	Vulnerable
	803	Plains Woodland	Endangered

3.2 Field assessment

3.2.1 Ecological features of the study area

In general, the study area has been significantly modified by past and current agricultural land uses including dryland cropping and grazing. The study area has predominantly been cleared of native vegetation for the above land uses, although Scattered Trees and patches of native vegetation remain (Figure **3**,Figure **4** – Appendix A). Photos of the ecological features of the study area are provided in Appendix E.

Patches of native vegetation identified within the study area were in general of low quality and tended to be represented by groups of three or more large canopy trees with a cropped or highly modified understorey. The capacity for these patches to provide habitat for native species is limited; however, the presence of large trees within these patches and their proximity to one another enhances the habitat values of the patches.

Scattered Trees, particularly large trees are an important landscape feature as they offer a range of fauna habitat values such as shelter and foraging resources in otherwise barren landscapes. In addition, they are critical in agricultural landscapes for their ability to provide connectivity with more densely vegetated areas. The Scattered Trees were primarily characteristic of EVC 175 Grassy Woodland and comprised Grey Box *Eucalyptus microcarpa*, River Red Gum *Eucalyptus camaldulensis*, White Box *Eucalyptus albens*, Red Box *Eucalyptus polyanthemos* and Yellow Box *Eucalyptus melliodora.*

Adjacent to the east and south of the study area is Lake Mokoan, an artificial lake created from the diversion of Broken River and Hollands Creek into Winton Swamp in the 1970s. The lake was decommissioned in 2009, with the aim of returning several thousand megalitres of water per year to the Broken, Goulburn, and Murray Rivers and restoration of the area's original ephemeral wetland state. This wetland provides habitat for a range of fauna species (e.g. birds, amphibians, fish).

Roadsides of public road reserves that surround and traverse the study area contain modified woodland vegetation. In particular, the Benalla-Yarrrawonga Road showed relatively dense vegetation that linked vegetation corridors in the north with a woodland area that is actively being managed for biodiversity purposes, just north of Stockyard Creek. Mt Meg Nature Conservation Reserve can be found approximately 3 kms north of the study area. This Reserve is also connected to other large patches of native vegetation within the region and has vegetation links via the road network with the study area. A detailed vegetation assessment of these roadsides was not undertaken as access routes had not been identified at the time of assessment . The location of access routes has since been designed to avoid areas of roadside vegetation by utilising existing property entrances and access tracks where possible. Gazetted (paper) road reserves that traverse the study area were included in this flora and fauna assessment.

A number of easements are present within the study area. These include a transmission powerline easement running from the north west of the study area towards the western boundary which dissects Benalla Yarrawonga Road to the west and Lake Mokoan Road in the south. In addition, two smaller easements run parallel with Benalla-Yarrawonga Road and Lake Mokoan Road.

3.2.2 Native vegetation

3.2.2.1 Ecological Vegetation Classes

Four EVCs were recorded within the study area, their bioregional conservation status (BCS) is shown in Table 7. These EVCs occurs within the Victorian Riverina bioregion (see Figure **3**- Appendix A for locations of patches). EVCs were largely represented in the study area by patches of vegetation dominated by three or more large canopy trees with a modified, exotic understory.

Table 7 Ecological Vegetation Class Bioregional Conservation Status

EVC	BCS
55_62 - Plains Grassy Woodland	Endangered
175_61 - Grassy Woodland	Endangered
235 - Plains Woodland/Herb-rich Gilgai Wetland Mosaic	Endangered
803 - Plains Woodland	Endangered

3.2.2.2 Patches

Twenty-six patches (or habitat zones) of native vegetation were recorded within the study area (Figure **3**- Appendix A). These patches total 27.94 hectares (Table 8) and were comprised of EVC 803 Plains Woodland (21.65 ha), EVC 55_62 Plains Grassy Woodland (4.27 ha), EVC 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic (1.58 ha) and EVC 175_61 Grassy Woodland (0.45 ha). Within these patches, 112 large trees were identified.

Vegetation quality (or condition) scores for each of the habitat zones was based on the assessment of the floral characteristics within each habitat zone and consideration of the extent of native vegetation within the surrounding landscape as detailed under the Habitat Hectare methodology (DSE 2004c). Across the study area, the 27.94 hectares of land was considered to be ‘habitat zones’ containing a total of 8.22 habitat hectares (Table 8). A summary of the calculation of the vegetation quality scores for each habitat zone is presented in Table 9.

Table 8 Summary of habitat hectares within study area

EVC	Habitat zones (ha)	Habitat hectares (Hha)
55_62 - Plains Grassy Woodland	4.27	1.39
175_61 - Grassy Woodland	0.45	0.11
235 - Plains Woodland/Herb-rich Gilgai Wetland Mosaic	1.58	0.48
803 - Plains Woodland	21.65	6.24
Total	**27.94**	**8.22**

Table 9 Quantification Patches of Native Vegetation located in the study area

Habitat Zone			HZ1	HZ2	HZ3	HZ4	HZ5	HZ6	HZ7	HZ8	HZ9	HZ10	HZ11	HZ12	HZ13	HZ14	HZ16
EVC			803	803	803	803	803	55_62	175_61	175_61	55_62	235	55_62	803	55_62	803	803
Bioregion			VR	VR	VR	VR	VR	VR	VR	VR	VR	VR	VR	VR	VR	VR	VR
Bioregional Conservation Status (BCS)			E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
Site Condition	Large Old Trees	10	9	10	10	9	10	9	10	8	10	10	10	10	10	0	10
	Tree Canopy Cover	5	3	3	3	4	5	4	5	5	3	4	4	5	5	0	3
	Lack of Weeds	15	4	7	0	4	4	4	4	4	4	7	11	7	0	11	0
	Understorey	25	0	0	0	0	0	0	0	0	0	5	5	0	5	5	0
	Recruitment	10	0	0	0	0	0	0	0	0	0	5	0	0	5	0	0
	Organic Litter	5	5	3	3	3	3	3	4	5	3	5	3	3	2	4	3
	Logs	5	4	4	4	4	0	0	0	2	5	2	5	4	5	0	4
	Total Site Score	75	25	27	20	29	22	20	23	24	25	38	38	29	32	20	20
Standardiser		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Standardised Site Score		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landscape Context	Patch Size	10	1	1	1	1	1	1	1	1	1	1	1	1	2	8	1
	Distance to Core Area	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Landscape Score	25	2	2	2	2	2	2	2	2	2	2	2	2	3	9	2
Habitat Score		100	27	29	22	31	24	22	25	26	27	40	40	31	35	29	22
Habitat Points = Score/100		1	0.27	0.29	0.22	0.31	0.24	0.22	0.25	0.26	0.27	0.40	0.40	0.31	0.35	0.29	0.22
Total area of Habitat Zone (ha)			0.18	0.05	0.15	0.30	0.12	0.30	0.15	0.29	0.15	0.65	0.10	0.08	3.34	20.68	0.10
Habitat Hectares (Hha)			0.05	0.01	0.03	0.09	0.03	0.07	0.04	0.08	0.04	0.26	0.04	0.02	1.17	6.00	0.02

Habitat Zone			HZ17	HZ18	HZ19	HZ20	HZ21	HZ22	HZ23	HZ24	HZ25	HZ26	HZ27
EVC			55_62	235	235	235	55_62	235	235	235	235	235	55_62
Bioregion			VR	VR	VR	VR	VR	VR	VR	VR	VR	VR	VR
Bioregional Conservation Status (BCS)			E	E	E	E	E	E	E	E	E	E	E
Site Condition	Large Old Trees	10	5	6	6	5	6	6	6	6	5	0	4
	Tree Canopy Cover	5	1	0	0	5	2	2	0	2	1	2	1
	Lack of Weeds	15	7	7	7	7	7	13	7	7	13	7	7
	Understorey	25	0	0	0	0	0	0	0	0	0	0	0
	Recruitment	10	0	0	0	0	0	0	0	0	0	5	0
	Organic Litter	5	3	2	2	4	4	4	4	0	4	4	4
	Logs	5	3	0	4	3	0	0	0	3	3	0	3
	Total Site Score	75	19	15	19	24	19	17	17	18	26	18	19
Standardiser		-	-	-	-	-	-	-	-	-	-	-	-
Standardised Site Score		-	-	-	-	-	-	-	-	-	-	-	-
Landscape Context	Patch Size	10	1	1	1	1	1	1	1	1	1	1	1
	Distance to Core Area	5	1	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0	0
	Total Landscape Score	25	2	2	2	2	2	2	2	2	2	2	2
Habitat Score		100	21	17	21	26	21	31	19	20	28	20	21
Habitat Points = Score/100		1	0.21	0.17	0.21	0.26	0.21	0.31	0.19	0.20	0.28	0.2	0.21
Total area of Habitat Zone (ha)			0.06	0.05	0.10	0.14	0.10	0.04	0.11	0.24	0.20	0.04	0.19
Total area (ha)												**27.94**	
Habitat Hectares (Hha)			0.02	0.01	0.02	0.04	0.02	0.01	0.02	0.05	0.06	0.01	0.04
Total Hha												**8.22**	

3.2.2.3 Mapped wetlands

No DELWP mapped wetlands occur within the study area. Adjacent to the east and south of the study area is Lake Mokoan.

3.2.2.4 Scattered Trees

A total of 209 Scattered Trees were identified across the study area. The location of these Scattered Trees is presented in Figure **4** (Appendix A).

Large Scattered Trees ranged in size from 70 to 241cm DBH while small Scattered Trees ranged in size from 10 to 65 cm DBH. The dominant tree species across the study area (including large trees within patches) was Grey Box with River Red Gum and White Box being sub-dominant species.

A summary of the trees recorded within the study area, their species and size classification is presented in Table 10. Of the 209 Scattered Trees within the project area there were 191 large trees and 18 small trees, as defined by the Guidelines. Additionally, 112 large trees were recorded within the habitat zones within the study area which are recorded as 'Large Trees in Patches' as defined by the guidelines. Large Trees in Patches are considered in biodiversity offset calculations for patches of native vegetation.

Table 10 Summary of trees within the study area

	Tree Categorization		
Species	**Small Scattered Tree**	**Large Scattered Tree**	**Large Trees in Patch**
White Box *Eucalyptus albens*		14	13
River Red Gum *Eucalyptus camaldulensis*	7	48	23
Yellow Box *Eucalyptus melliodora*		4	1
Grey Box *Eucalyptus microcarpa*	4	96	66
Red Box *Eucalyptus polyanthemos*	4	10	2
No species available (*Eucalyptus* spp.*)*	1	1	1
No species available (*Eucalyptus* spp.*)* (Stag)	2	18	6
Total	18	191	112
Grand Total	**321**		

**Size categories defined by the relevant EVC benchmark.*

3.2.3 Tree habitat values

Tree habitat values of each of the 44 trees assessed are detailed in Appendix D and shown in Figure **5** (Appendix A). Of the 44 trees assessed for habitat features (hollows) for fauna, 17 trees had high habitat value and were identified as high priority trees for retention. A further 22 trees had medium habitat value and five trees had a low number of habitat features. The tree most represented in the tree habitat value survey was Grey Box. A small number of River Red Gum, White Box, Yellow Box and Red Box were also represented. Trees within the study area (particularly Grey Box and White Box) are likely to provide food resources for a number of rare and threatened birds as part of a wide foraging range. This includes Swift Parrot which is discussed further in Section 3.3.1.2. In addition, the

high and moderate-ranked trees contained a variety of habitat (hollow) sizes that provide important habitat for common fauna.

3.3 Likelihood of occurrence assessment

3.3.1 Threatened species

A likelihood of presence rating has been assigned to each threatened species identified during the desktop assessment. The rating has been assigned based on the current assessment, number of records within proximity to the study area, appraisal of the species' habitat requirements, and availability of suitable habitat as recorded during the field assessment. An assessment of the likelihood of threatened species is presented in Appendix B (flora) and Appendix C (fauna), with those species assigned likelihood of 'likely' or above discussed below.

3.3.1.1 Flora

No threatened flora species were identified as having a likelihood of 'likely' or above, and no threatened flora was recorded within the study area during the field assessment.

3.3.1.2 Fauna

3.3.1.2.1 EPBC Act

EPBC Act listed fauna species which could possibly utilise habitat within the study area are:

- Common Greenshank *Tringa nebularia* is a migratory species under the EPBC Act. It is known to frequent dams and may be present within the study area during its migratory season.
- Fork-tailed Swift *Apus pacificus* is listed as migratory under the EPBC Act. This species is an aerial forager that utilise a range of habitats when in Australia and could therefore forage over the study area on occasion.
- Woodland birds (Painted Honeyeater *Grantiella picta,* Regent Honeyeater *Anthochaera Phrygia* and Swift Parrot *Lathamus discolour)* could forage in the trees within the study area and use those trees to move through the landscape. The study area is not an area of core breeding or foraging habitat for these species but may be utilised at varying regularity or intensity over time. These species are discussed further below.
- Plains-wanderer *Pedionomus torquatus* (critically endangered) has some potential to occur in areas of open pasture or stubble within the study area. The species is unlikely to regularly use the area; there are no records of Plains-wanderer within 10 km of the study area and the habitat is sub-optimal.
- Grey-headed Flying-fox *Pteropus poliocephalus* (vulnerable) which is a wide roaming species and could forage in the trees of the study area during movements from their camp at Cussen Park in Tatura.
- Striped Legless Lizard *Delma impar* (vulnerable) which has been historically recorded around Benalla and recent records from north-east Victoria suggest this species could occur in grassland and grassy woodlands in the area. This species is discussed further below.

Striped Legless Lizard

Striped Legless Lizard may occur in the study area to the north of Lake Mokoan Road. Two areas have been identified as potential habitat for Striped Legless Lizard (Figure 6- Appendix A) through the on-ground targeted habitat assessment and further analysis presented in Appendix H. The two areas comprise a large area centred around habitat zone 14 (Plains Woodland EVC) and a smaller area connected to habitat zone 14 and another large area of remnant vegetation mapped on an adjacent property during a previous iteration of the project.

Threatened woodland birds

In the region, the closest important or critical habitat for threatened birds including Swift Parrot, Regent Honeyeater and Painted Honeyeater is the Warby-Chiltern Box-Ironbark Region which includes a total area of 25,280 hectares of Box-Ironbark woodland that extends from south of Benalla to Chiltern (BirdLife International, 2021). The closest sites to West Mokoan include areas of remnant woodland vegetation around Goorambat and Winton Wetlands (Mount Meg Nature Conservation Reserve) and

the Warby-Ovens National Park. Other areas of woodland around Chesney Vale including the Lurg Hills are less suitable for the species like Swift Parrot but are still considered important for other woodland birds (BirdLife International, 2021).

3.3.1.2.2 FFG Act

FFG Act listed woodland species which could utilise the scattered woodland tree habitat of the study area are identified in Appendix C. Lace Monitor *Varanus varius*, Brown Treecreeper *Climacteris picumnus victoriae* and Bush Stone-curlew *Burhinus grallarius* have been previously recorded in the woodland adjoining the study area that is managed for biodiversity conservation (TFN, 2018). Woodland species are likely to use the trees as stepping-stones when moving between larger areas of woodland habitat. Some species may forage within the study area. For example, Bush Stone-curlew typically rest during the day in lightly timbered woodland areas (such as the Trust for Nature Woodland) and forage at night in paddocks, around wetlands and in woodland remnants up to 3 km from their daytime roost (DSE, 2004).

Eastern Great Egret *Ardea modesta* and Intermediate Egret *Ardea intermedia* could forage within farm dams and irrigation drainage lines which are found within and surrounding the study area.

3.3.2 Threatened ecological communities

3.3.2.1 Nationally threatened ecological communities

Four EPBC Act listed ecological communities where identified in the PMST search of the assessment area including Buloke Woodlands of the Riverina and Murray-Darling, Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia, Natural Grasslands of the Murray Valley Plains, White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland. These ecological communities are not considered present within the study area due to not meeting the listing criteria. This is due largely to remnant patches within the study area containing a high percentage cover of exotic grasses, poor species richness, or being outside of the natural range of the ecological community.

3.3.2.2 State threatened ecological communities

Historically it is considered likely that two FFG Act listed ecological communities would have been present within the study area including Grey Box - Buloke Grassy Woodland Community, and Victorian Temperate Woodland Bird Community. Although Grey Box is present within the study area, the study area is highly modified; lacks native understory species and Grey Box tend to occur as isolated Scattered Trees. Therefore, the study area is not considered to contain this ecological community. All patches dominated by large trees are considered synonymous with the FFG Act listed Victorian Temperate Woodland Bird Community (DELWP undated) adding additional significance to these areas.

3.4 Tree proximity analysis

The output of the tree proximity analysis undertaken to prioritise trees for retention is provided in Figure **8** (Appendix A). Table 11 provides a summary of the tree type and retention category for the West Mokoan Solar Farm Project.

Table 11 Summary of trees per tree retention category, West Mokoan

Category	Large Scattered Tree	Large Tree in Patch	Small Scattered Tree	Total
West Mokoan				
1	0	112	0	112
2	139	0	12	151
3	52	0	6	58
Total*	191	112	18	321

*Quantity of trees align with project area at the time of conducting spatial analysis.

4.0 Design process to retain ecological values

The West Mokoan Solar Farm has undergone several study area and design iterations. The design iterations have sought to avoid and minimise impacts to native vegetation where possible, while also maximising solar design and electricity generation performance.

During the detailed ecological assessment, 27.94 ha of native vegetation was mapped over 26 habitat zones (Figure **3**– Appendix A) and 112 Large Trees in Patches and 209 Scattered Trees (191 large and 18 small) were also mapped (Figure **4**– Appendix A). Additional studies were undertaken to obtain more detailed information on ecological values and inform refinement of the design concept. Those studies included a GIS-based landscape connectivity assessment based on the method outlined in Appendix G, a tree habitat value assessment (Appendix D) and a Striped Legless Lizard habitat assessment and analysis (Appendix H).

4.1 Prioritisation approach

AECOM design engineers and South Energy worked closely with ecologists to review the ecological values within the project area and refine the Concept Plan to avoid and minimise impacts to native vegetation and threatened species habitat. Tree retention was a large component of the Concept Plan refinement process owing to the number of Large Trees in Patches and large Scattered Trees within the project area.

Areas prioritised for retention in development of the Concept Plan for the solar farm were:

- Patches of native vegetation (Figure 3 – Appendix A)
- Areas with a Strategic Biodiversity Value of >0.4 in NatureKit (Figure 7– Appendix A).
- Trees assigned higher proximity ratings via a habitat connectivity / tree proximity analysis (Figure 8 – Appendix A).
- Trees with a high or medium habitat value (Figure 5– Appendix A).
- Habitat for Striped Legless Lizard (Figure 6 – Appendix A).

Refinements to tree losses were made through design workshops with AECOM ecologists, engineers, and South Energy. During these workshops, tree location and retention values were reviewed alongside engineering constraints and solar output results (shading impacts). Engineering and solar-output constraints in these workshops revealed the following:

- Due to the large physical dimensions of the solar PV tracking systems and electrical configuration requirements of PV panels in an array, a number of trees were deemed unsuitable for retention largely due to the footprint of each array and spatial limitations within the project area.
- Further to the PV arrays themselves, a number of trees were also deemed unsuitable for retention where internal access tracks are required, particularly along the boundary of the project areas in accordance with CFA guidelines.

The outcome of these design workshops was the retention of 28 trees (26 Large Scattered Trees and two Small Scattered Trees). From the previous Concept Plan (Rev G), a total of 15 additional trees were able to be retained: 10 high-value trees, three moderate value trees and two low value trees.

The engineering justification as to why each of the 26 trees to be removed could not be retained is provided in Appendix D.

4.2 Outcome

Through an iterative design process (Table 12), AECOM design engineers and South Energy have achieved a design which:

- Avoids all patches of native vegetation
- Avoids potential habitat for Striped Legless Lizard

- Minimises tree losses to 28 Scattered Trees (26 large and two small trees); the reduction in tree losses has resulted in trees with important fauna habitat value being retained. This includes retaining all Category 1 and Category 2 trees and 30% of >Category 3.
- Most areas of SBV >0.4 have been retained (Figure **7** – Appendix A).

Table 12 - Design iterations and associated native vegetation losses

Design iteration	Extent of proposed vegetation removal (ha)	Number of Large Trees in Patches and large Scattered Trees (LST) proposed to be removed	Number of small Scattered Trees (SST) proposed to be removed
Revision A (10/04/2019)	42.584 ha	177	5
Revision B (19/06/2019)	35.045 ha	53	4
Revision C (06/08/2019)	49.928 ha	313	18
Revision D (30/09/2019)	8.210 ha	124	15
Revision E (20/02/2020)	2.344 ha	32	3
Revision F (25/04/2020)	2.376 ha	32	4
Revision G (26/08/2020)	2.868 ha	39	4
Revision H (19/04/2021)	1.891 ha	26	2

A summary of the ecological values and potential impacts of Design Concept H are provided below.

Table 13 Summary of existing values and impacts for West Mokoan Solar Farm (Design Concept H)

Value	Extent in study area	Impact
Native vegetation		
Patches	27.94 hectares (8.22 habitat hectares) comprised of 26 'Habitat Zones' of EVC 55_62 Plains Grassy Woodland, EVC 175_61 Grassy Woodland, EVC 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic and EVC 803 Plains Woodland	1.891 hectares
Large Trees in Patches	112 large trees were recorded within patches	No Large Trees in Patches will be impacted
Scattered Trees	209 Scattered Trees (191 large and 18 small) including Grey Box, Yellow Box, White Box, Red Box, River Red-gum and stags	28 Scattered Trees (26 large and 2 small)
Fauna		
EPBC Act listed fauna	Potential for Swift Parrot to utilise the study area as part of foraging habitat. Potential for Striped Legless Lizard to occur within the study area.	Potential habitat for Striped Legless Lizard identified within the study area will be avoided

Value	Extent in study area	Impact
FFG Act listed - Victorian Temperate Woodland Bird Community	Synonymous with woodland vegetation. Extent of this community therefore directly relates to the extent of native vegetation.	As per native vegetation
Hollow-bearing trees	Of the 44 trees assessed for presence of hollows (i.e. trees to be removed for Revision G of the Concept Plan), 17 trees had high habitat value and were identified as high priority trees for retention. A further 22 trees had medium and five trees had low habitat values.	7 high, 18 medium and 3 low habitat value trees will be removed. Of the large trees lost, high habitat value trees contained the highest number of habitat features (5-17 hollows), followed by medium habitat value trees (1-4 hollows). Of note, 12 medium value trees contained <1 hollow feature.

5.0 Legislation and policy implications

5.1 Commonwealth

5.1.1 Environmental Protection and Biodiversity Conservation Act 1999

One of the main aims of the EPBC Act is to provide for the conservation of biodiversity and the protection of the environment, particularly those aspects that are considered to be Matters of National Environmental Significance (MNES). The EPBC Act defines nine MNES as follows:

- World heritage properties
- National heritage places
- Wetlands of international importance (listed under the Ramsar Convention)
- Listed threatened species and ecological communities
- Migratory species protected under international agreements (JAMBA, CAMBA, ROKAMBA)
- Commonwealth marine environment
- Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- A water resource, in relation to coal seam gas development and large coal mining development.

Under the EPBC Act, actions[2] that are likely[3] to have a significant impact upon MNES are required to be referred to the Environment Minister for approval.

Implications:

MNES of relevance to the project are wetlands of international importance, listed threatened species and ecological communities and migratory species based on the PMST search (Section 3.1.1).

Wetlands of international importance are located more than 50 km from the study area and are unlikely to be impacted, particularly if impacts to waterways within the study area are avoided.

No listed threatened ecological communities or threatened flora are likely to occur in the study area.

It is possible that Swift Parrot, Regent Honeyeater, Plains-wanderer, Grey-headed Flying-fox, and Painted Honeyeater may utilise trees within the study area (Section 3.3.1.2). These species are unlikely to be significantly impacted by the project, particularly as loss of large Scattered Trees has been reduced to 28 (design concept Revision H) and trees retained on site will continue to provide resources to Swift Parrot as part of their wide foraging range.

The project Concept Plan (Revision H) avoids the two areas of potential habitat for Striped Legless Lizard (Figure 6- Appendix A). As such, the project is unlikely to have a significant impact on the species.

Implications

The project is not likely to have a significant impact on a MNES. As such, a referral is not required.

5.1.2 Weeds of National Significance (WoNS)

Currently there are 32 species classified as Weeds of National Significance (WoNS). These have been agreed by Australian governments based on an assessment process that prioritised these weeds based on their invasiveness, potential for spread, and environmental, social, and economic impacts. Consideration was also given to their ability to be successfully managed.

Under the CaLP Act certain plants are declared as noxious weeds in Victoria. These plants cause environmental or economic harm, or have the potential to cause such harm, and in some cases can

[2] Under the EPBC Act an 'action' includes any project, development, undertaking, activity or series of activities.
[3] Under the EPBC Act 'likely' refers to when the potential for a significant impact on the environment to be real or not a remote chance or possibility.

also present risks to human health (DEDJTR 2016). The CaLP Act defines four categories of noxious weeds in Victoria. These include State Prohibited Weeds (listed under Schedule 1), Regionally Prohibited Weeds (listed under Schedule 2); Regionally Controlled Weeds (listed under Schedule 2); Restricted Weeds (listed under Schedule 2). Other than State Prohibited weeds, the level of noxious weed declaration varies according to the Catchment Management Authority (CMA).

Implications:

Two high threat environmental weeds were observed within the study area, Horehound *Marrubium vulgare* and Bathurst Burr *Xanthium spinosum,* which are listed as Regionally Controlled within the Goulburn Broken CMA region.

No WoNS were recorded within the study area.

5.2 State

5.2.1 Planning and Environment Act 1987

The *Planning and Environment Act 1987* (P&E Act) establishes the framework for the use, development and protection of land in Victoria. The P&E Act provides the standard provisions for planning schemes administered by local government.

5.2.1.1 Native vegetation removal regulations

The Guidelines (DELWP 2017a) are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria. The Guidelines replace the previous incorporated document titled *Permitted clearing of native vegetation – biodiversity assessment guidelines* (DEPI, 2013). The Guidelines provide instructions on how an application for a permit to remove native vegetation is to be assessed under the P&E Act. This includes requirements to undertake a site assessment and specific conditions that may form part of a granted permit, such as offsetting.

Under the Guidelines, there are three pathways under which an application to remove native vegetation can be assessed including - Basic, Intermediate or Detailed assessment pathways. The assessment pathway determines the types of offsets that are required to be implemented for the removals. This is determined via an assessment of location and whether any large trees are to be removed and an assessment of risk to biodiversity by a particular project:

- Location risk is determined by assessing the likelihood that the removal of a small amount of native vegetation may impact the persistence of a rare or threatened species. Location risk has been determined for all of Victoria with areas being categorised into three categories which indicate potential risk to biodiversity from removing a small amount of native vegetation:
    - Location 3 – includes locations where the removal of less than 0.5 hectares of native vegetation could have a significant impact on habitat for a rare or threatened species.
    - Location 2 – includes locations that are mapped as endangered EVCs and/or sensitive wetlands and coastal areas (section 3.2.1) and are not included in Location 3.
    - Location 1 – includes all remaining locations in Victoria.
- The higher category is used if the native vegetation to be removed includes more than one location category.
- The location risk of a particular site is determined using the native vegetation location risk map available from the NVIM tool found on the DELWP website.
- Extent risk is determined by the extent of the native vegetation including the presence or absence of large trees that is proposed to be removed. Together, these two types of risk are used to determine the assessment pathway for a permit application to remove native vegetation (DELWP 2017a). The assessment pathway of an application is determined in accordance with Table 14.

Table 14 Native vegetation risk-based pathways

	Location		
Extent	**Location 1**	**Location 2**	**Location 3**
Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
≥ 0.5 hectares or more	Detailed	Detailed	Detailed

The assessment-based pathway determines the process to be followed when applying to remove native vegetation:

- Basic or Intermediate assessment pathway: A habitat hectare assessment is not required and modelled site condition scores can be used to assess basic and intermediate pathway applications. However, if a habitat hectare assessment report is available, then this can be used in place of modelled data for determining general offset requirements if a permit is granted.
- Detailed assessment pathway applications: A habitat hectare assessment report must be included and accompanied by a statement outlining the steps that have been taken to ensure that impacts on biodiversity from the removal of native vegetation has been minimised. Offsets required for detailed assessment pathway applications may trigger a *species offset requirement* (if the native vegetation to be removed is habitat for rare or threatened species).

Refer also to the *Applicant's guide Applications to remove, destroy or lop native vegetation* prepared by DELWP to assist applications to remove native vegetation (DELWP 2017b).

Implications:

Clause 52.17 of the Benalla planning scheme enacts the Guidelines. Any removal of native vegetation associated with the project is required to satisfy Clause 52.17 by submitting an application to the relevant planning authority for a permit to remove native vegetation.

In accordance to the Guidelines, the assessment area contains location categories 1, 2 and 3 and greater than 0.5 hectares of native vegetation. Subsequently the application to remove native vegetation will be assessed under the *detailed* pathway of assessment.

- Design concept Revision H will result in the removal of 1.891 hectares of native vegetation (26 large and two small Scattered Trees). An application to remove this native vegetation will be required. Information to address the requirements of an application to remove native vegetation is provided in Appendix F. This includes: A Native Vegetation Removal (NVR) report obtained from DELWP following the submission of spatial data identifying vegetation proposed to be removed (spatial data is to be formatted to DELWP data standards). The NVR report will state the biodiversity offset requirements and standards.
- An avoid and minimise statement that clearly demonstrates why vegetation must be removed, and that all options to retain vegetation including Scattered Trees have been considered.
- An offset statement that provides evidence that the offsets for the project are available and can be secured.

The NVR report provided in Attachment A - Appendix F states that an offset requirement of **0.394 general habitat units** and **26 large trees,** will be required within the Goulburn Broken CMA region or Benalla Rural City Council (Table 15).

Table 15 Native vegetation requirement summary

Unit type	Amount	Minimum strategic biodiversity value score	Large trees	Credit location
General offset amount	**0.394**	0.312	26	Goulburn Broken CMA region or Benalla Rural City Council

5.2.1.2 Planning overlays

Planning overlays are part of municipal planning schemes and are applied over areas of land to control development. Overlays may be applied to protect areas from adverse impacts or to allow easy identification of constraints in developments on that area. One or more overlays may be applied to an area and most overlays also have schedules which specify municipal objectives and requirements.

For the purpose of this report, consideration of planning overlays is limited to those of particular relevance to flora and fauna values, which include:

- Environmental Significance Overlays (ESOs). The broad intent of an ESO is to identify areas where the development of land may be affected by environmental constraints, and to ensure that if development does happen, it is compatible with the values that are highlighted in any schedule to the identified ESO;
- Vegetation Protection Overlays (VPOs). A VPO is specific to the removal of vegetation that has been deemed to be significant, and protects this vegetation against inappropriate development; and
- Significant Landscape Overlay (SLOs). A SLO identifies significant landscapes and conserves and enhances the character of significant landscapes.

A schedule to these overlays contains a statement of the significance of the environmental, vegetation or landscape value that is protected by the overlay, and the objective to be achieved. Approval is typically required to remove native vegetation within an ESO, VPO or SLO, and the application for an approval for vegetation removal must show that the proponent has been cognisant of the intent of each overlay.

Implications:

No planning overlays relevant to flora and fauna values are located within the study area.

5.2.2 Flora and Fauna Guarantee Act 1988

The FFG Act was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. One of the main features of the Act is the listing process, whereby native species and communities of flora and fauna, and the processes that threaten native flora and fauna are listed in the schedules of the Act. This assists in identifying those species and communities that require management to survive and identifies the potentially threatening processes that require management to minimise the threat to native flora and fauna species and communities within Victoria.

Implications:

No FFG Act listed flora species were recorded during the field assessment. Lace Monitor and Bush Stone-curlew have been recorded in the woodland area adjoining the study area (TFN, 2018) and may use the Scattered Trees in the study area as stepping-stones when moving between larger areas of woodland habitat.

A single FFG Act listed ecological community was recorded in the study area - the Victorian Temperate Woodland Bird Community. This community has been defined as a suite of bird species primarily associated with drier woodlands north of the Great Dividing Range. Many of the species have been recorded in the vicinity of the study area on the VBA. All patches of woodland considered synonymous with habitat for the FFG Act listed Victorian Temperate Woodland Bird Community and

are shown in Appendix A. No specific approvals are required under the FFG Act in relation to this community due to being located on private land; however, most woodland patches and Scattered Trees have been avoided during the design phase (Section 4.0).

The presence of hollow-bearing trees within the study area means the project has the potential to exacerbate a potentially threatening process listed under the FFG Act. This process - *loss of hollow-bearing trees from Victorian native forests and woodlands* – identifies the loss of scattered live or dead hollow-bearing trees on farms as one of the factors influencing the loss of hollow-bearing trees in Victoria (DSE 2003). An Action Statement has been prepared which set out the actions to conserve and manage hollow-bearing trees (DSE 2003). The objectives include significantly reducing the loss of hollow-bearing trees from private land. No specific approvals are required under the FFG Act but consideration should be given to avoiding and minimising loss of hollow-bearing trees during the design phase which is consistent with the requirements under the P&E Act in relation to loss of native vegetation. Design concept Revision H demonstrates the project commitment to reducing the removal of native vegetation and hollow-bearing trees (Section 4.0).

A permit is not required under the FFG Act to 'take' listed flora species that are members of listed communities or protected flora as the study area is private land. The exception to this would be if listed species were present and the land is declared 'critical habitat' for the species; no critical habitat has been identified in Victoria to date.

5.2.3 Environmental Effects Act 1978

Under Victoria's *Environmental Effects Act* 1978 (EEA), projects that could have a 'significant effect' on Victoria's environment can potentially require an Environmental Effect Statement (EES). This Act applies to any public works 'reasonably considered to have or be capable of having a significant effect on the environment. The Minister for Planning and Environment is the responsible person for assessing whether this Act applies. Before commencing any public works to which this Act applies, the proponent must cause an EES to be prepared and submit it to the Minister for the Minister's assessment of the environmental effects of the works.

Implications:

The Project does not meet criteria for referral under the EE Act outlined in *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978* (DSE 2006b). Table 16 lists the criteria of relevance to the West Mokoan Solar Farm.

Table 16 EES referral criteria applicable to the Project (DSE 2006)

Referral criteria	Criteria met?
Referral criteria: individual potential environmental effects	
Potential clearing of 10 ha or more of native vegetation from an area that: • is of an Ecological Vegetation Class identified as 'endangered' by the Department of Sustainability and Environment (in accordance with Appendix 2 of Victoria's Native Vegetation Management Framework); or • is, or is likely to be, of very high conservation significance (as defined in accordance with Appendix 3 of Victoria's Native Vegetation Management Framework); and • is not authorised under an approved Forest Management Plan or Fire Protection Plan	No. Vegetation clearance proposed for the Project does not meet the 10 ha threshold.
Potential long-term loss of a significant proportion (e.g. 1 to 5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria.	No. Potential Striped Legless Lizard habitat retained.

Referral criteria	Criteria met?
	Loss of large Scattered Trees has been reduced to 26; trees retained will continue to provide resources to Swift Parrot (and other woodland birds) as part of their wider foraging range.

5.2.4 Catchment and Land Protection Act 1994

The CaLP Act establishes a framework for management and protection of catchments through the management of land and water resources. The CaLP Act is the principal legislation relating to the management of pest plants and animals in Victoria.

Under the CaLP Act, landowners have a number of responsibilities including:

- Avoiding causing or contributing to land degradation
- Taking all reasonable steps to conserve soil
- Protecting water resources
- Eradicating regionally prohibited weeds
- Preventing the growth and spread of regionally controlled weeds
- Where possible eradicating established pest animals declared under the CaLP Act.

Invasive species can, or have the potential to, cause environmental and economic harm. They can also present risks to human health (DEDJTR 2016). The CaLP Act defines four categories of noxious weeds in Victoria:

- State prohibited weeds (SP);
- Regionally prohibited weeds (RP);
- Regionally controlled weeds (RC); and
- Restricted weeds (R).

These categories are described in Table 17. Other than State Prohibited weeds, the level of noxious weed declaration varies according to the CMA.

Table 17 Noxious weed classifications under the CaLP Act (DEDJTR 2016)

Noxious weed category	Definition	Requirement under the CaLP Act
State Prohibited Weeds (listed under Schedule 1)	State prohibited weeds are the highest category of declared noxious weeds in Victoria. By definition they are either not yet in Victoria, or are here in small numbers, where their eradication is still possible. The Department of Economic Development, Jobs, Transport and Resources (DEDJTR) aims to prevent the introduction of State prohibited weeds into Victoria, and to detect and eradicate any infestations before they become widespread.	The Victorian Government (DEDJTR) is responsible for their eradication, but under Section 70(1) of the CaLP Act, it may direct land owners to prevent their growth and spread. It is an offence to buy, sell, display or transport a State prohibited weed within Victoria.

Noxious weed category	Definition	Requirement under the CaLP Act
Regionally Prohibited Weeds (listed under Schedule 2)	Regionally prohibited weeds are not widely distributed in a region but are capable of spreading further. It is reasonable to expect that they can be eradicated from a region and they must be managed with that goal.	Landowners, including public authorities responsible for crown land management, must take all reasonable steps to eradicate regionally prohibited weeds on their land.
Regionally Controlled Weeds (listed under Schedule 2)	These invasive plants are usually widespread in a region. To prevent their spread, ongoing control measures are required.	Landowners have the responsibility to take all reasonable steps to prevent the growth and spread of Regionally controlled weeds on their land.
Restricted Weeds (listed under Schedule 2)	This category includes plants that pose an unacceptable risk of spreading in this State and are a serious threat to another State or Territory of Australia.	Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited.

Implications:

Two high threat environmental weeds were observed within the study area (Horehound and Bathurst Burr) which are listed as Regionally Controlled within the Goulburn – Broken CMA region. Measures should be put in place during and post construction of this development to prevent further spread and growth of these weeds.

5.2.5 Wildlife Act 1975

The *Wildlife Act* 1975 forms the procedural, administrative and operational basis for the protection and conservation of native wildlife within Victoria. The purposes of the Act are:

1. to establish procedures in order to promote
   - the protection and conservation of wildlife; and
   - the prevention of taxa of wildlife from becoming extinct; and
   - the sustainable use of and access to wildlife; and
2. to prohibit and regulate the conduct of persons engaged in activities concerning or related to wildlife.

This Act often sits as the default reference for other associated policies regarding wildlife management. For example, the operation of the FFG Act often needs to be considered in conjunction with the provisions and procedures of the Wildlife Act as some wildlife will be both protected wildlife under the Wildlife Act and listed threatened species under the FFG Act.

With the exception of pest animals declared under the CaLP Act or wildlife declared to be unprotected wildlife, all fauna species indigenous to Victoria are listed as protected under the Wildlife Act. Protected wildlife may be declared to be ‘threatened wildlife’ which is defined as any wildlife listed under the FFG Act. The Wildlife Act makes it an offence to wilfully disturb or destroy protected or threatened wildlife without authorisation.

Translocation of wildlife requires approval under the Wildlife Act. Salvage and translocation of non-threatened native wildlife from an area to be disturbed to an area reserved or protected from future development is generally not supported by DELWP for wildlife welfare reasons (DELWP 2017e).

Translocation of threatened species requires authorisation. Applicants must apply for a scientific permit under the Wildlife Act which will not be issued unless a Translocation Plan is approved by the Threatened Fauna Translocation Evaluation Panel (TEP).

Implications:

Any potential for impact to protected wildlife requires authorisation from DELWP under the Wildlife Act. DELWP will need to be consulted to ascertain their expectations in relation to activities requiring authorisation under the Wildlife Act.

5.3 Other standards and guidelines

5.3.1 DELWP Victorian Advisory Lists

The presence, or likely presence, of a species listed on the DELWP Victorian Advisory Lists is used to determine whether species-specific habitat is required to be offset, rather than statutory lists of species for which conservation management is recommended. As such, any advisory listed species will be offset following the process described in Section 5.2.1.

6.0 Conclusion

The study area supports patches of native vegetation (including Large Trees in Patches), Scattered Trees and potential habitat for threatened fauna, particularly woodland birds and Striped Legless Lizard. The site also supports woodland habitat consistent with the FFG Act-listed Victorian Temperate Woodland Bird Community.

Design of the West Mokoan Solar Farm has sought to avoid and minimise loss of native vegetation where possible. The design footprint will impact 1.891 hectares of native vegetation (26 large and two small Scattered Trees). Concept design Revision H avoids of all patches of native vegetation, avoids potential habitat for Striped Legless Lizard, and minimises of tree losses to 28 Scattered Trees (26 large and two small trees); the reduction in tree losses has resulted in >90% of the Scattered Trees on site being retained including trees with important fauna habitat value. Only six of the trees to be lost have high habitat value.

A summary of the ecological values and potential impacts is provided in Section 5.0.

7.0 Recommendations

The following recommendations should be considered for the Project:

- Implement appropriate protection measures prior to construction to avoid adverse impact to retained environmental features within or adjacent to the study area, particularly Scattered Trees, native vegetation patches and areas identified as potential habitat for Striped Legless Lizard.
- Implement appropriate measures to avoid the spread of high threat environmental weeds including those identified in this report. Measures can be captured in an Environmental Management Plan.
- Implement measures to reduce impacts on wildlife during construction. These measures should be outlined in a Wildlife Management Plan and should consider:
    - Design of fencing to allow for the safe passage of wildlife through the landscape. For example:
        - fence construction should not use barbed wire to reduce the risk of injury or entanglement and should prevent populations of wildlife from becoming trapped within the solar farm area.
    - Potential for collisions if birds and bats mistake photovoltaic solar farms for water or are attracted to the site by insect species that are attracted to the panels.
    - How wildlife will affect the infrastructure and operation of the site e.g. ‘white’ cockatoos (long- and short-billed corellas, sulphur-crested cockatoos and galahs) are well documented for their behaviour in damaging infrastructure, particularly rubber seals, timber structures and cables, as well as flocking and roosting in large numbers. The plan should focus on design and operational strategies to minimise reliance on lethal control methods via Authority to Control Wildlife sought under the Wildlife Act 1975. Consider mitigation such as the armouring of cables, covering and protection of rubber seals), and monitoring the impacts to enable adaptive management offsite.
    - Species-specific management controls for any threatened species present or located during works developed in consultation with DELWP.

Permit and approval requirements

A planning permit from the relevant authority to remove native vegetation will be required. A planning submission seeking a permit to remove native vegetation will need to be accompanied by the information provided in Appendix F which includes an NVR report, an avoid and minimise statement and an offset statement.

Prior to Project commencement, the proponent will need to supply DELWP with a credit extract identifying that biodiversity offset requirements have been achieved and secured.

A permit under the FFG Act and/or the Wildlife Act may be required (to be determined in consultation with DELWP).

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Appendix A

Figures

Appendix A Figures

PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 18 JUN 2021

AECOM
www.aecom.com

N

Coordinate System: GDA 1994 MGA Zone 55

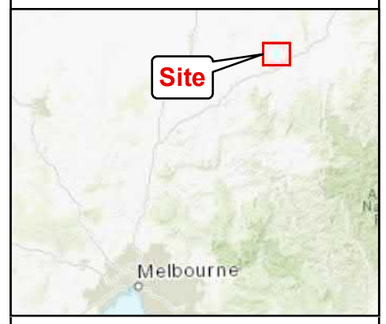
0 500 1,000 2,000

metres

1:50,000 (when printed at A3)

Legend

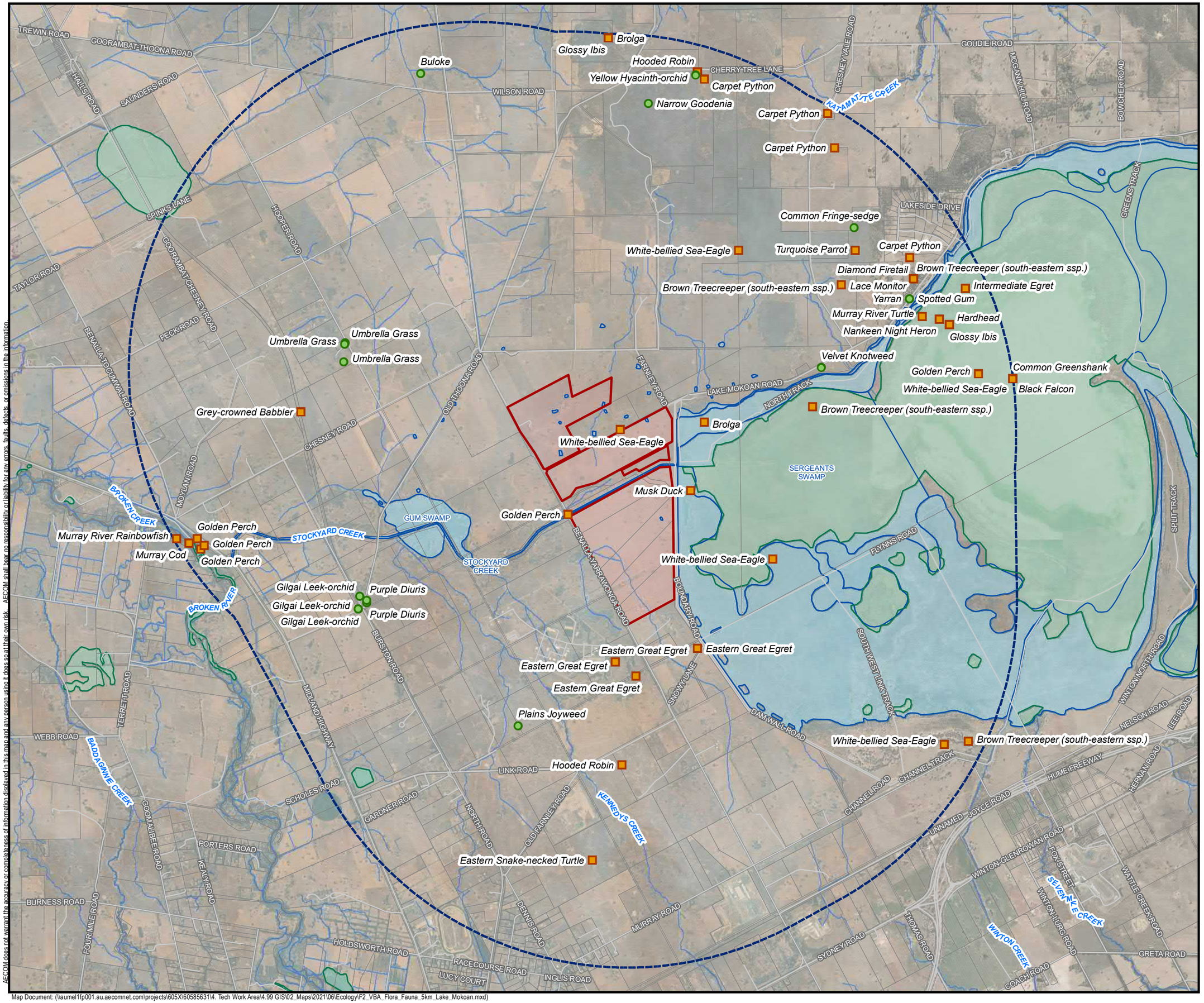
- Study Area
- Locality
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland



Site Location
West Mokoan Solar Farm

South Energy *West Mokoan Solar Farm* 892 Benalla-Yarrawonga Rd,	**Figure** **1**

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\605856314. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F1_Site_Location_Lake_Mokoan.mxd)



PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 18 JUN 2021

AECOM
www.aecom.com

N

Coordinate System: GDA 1994 MGA Zone 55

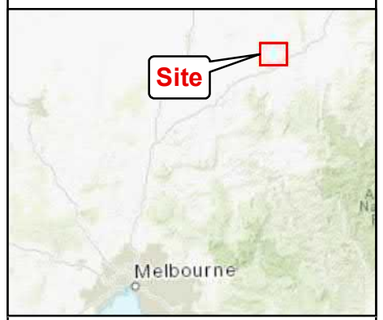
0 500 1,000 2,000

metres

1:50,000 (when printed at A3)

Legend

- Study Area
- 5km Buffer
- Threatened Flora Records
- Threatened Fauna Records
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland



Flora and Fauna Records

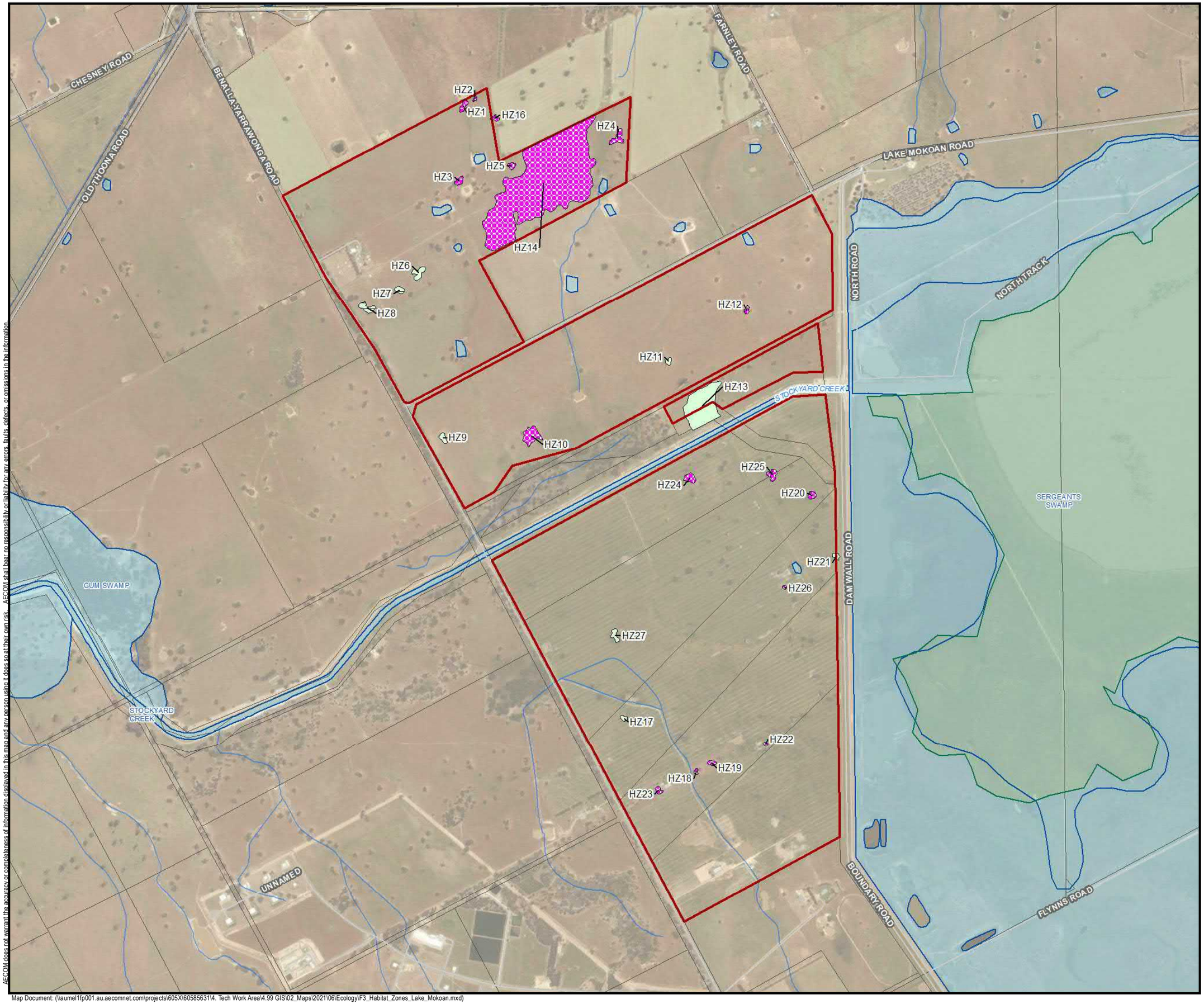
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 2

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F2_VBA_Flora_Fauna_5km_Lake_Mokoan.mxd)



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N

Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

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LEGEND

- Study Area
- Watercourses
- Roadways
- Cadastre
- Waterbodies

Ecological Vegetation Classes

- 175 Grassy Woodland
- 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic
- 55 Plains Grassy Woodland
- 803 Plains Woodland

Patches (Habitat Zones) of Native Vegetation

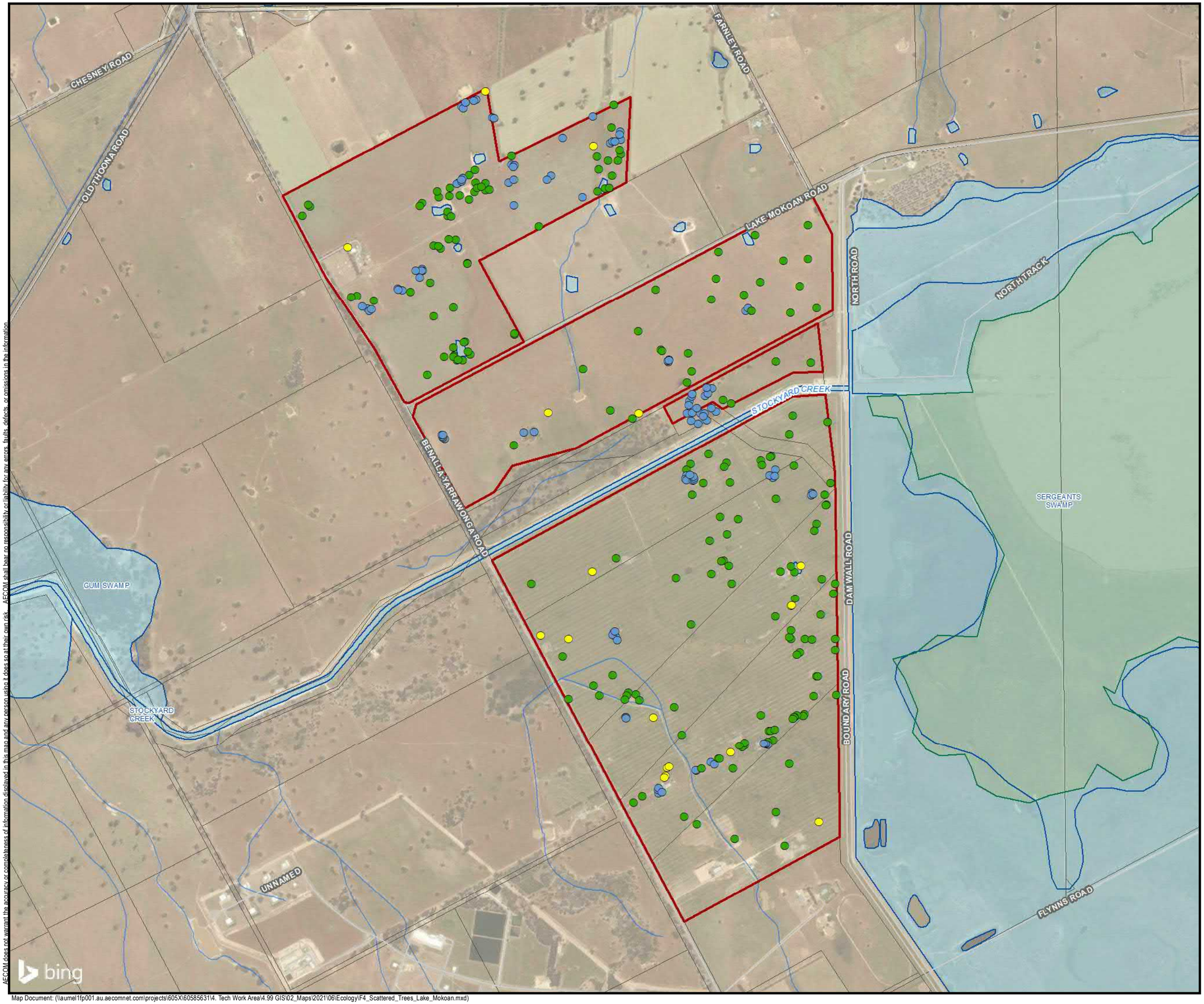
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 3

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\6058563114. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F3_Habitat_Zones_Lake_Mokoan.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500
metres

1:15,000 (when printed at A3)

Legend

- Study Area
- Large Scattered Tree
- Large Tree in Patch
- Small Scattered Tree
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

Trees in the Study Area

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure
4

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\605856314. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F4_Scattered_Trees_Lake_Mokoan.mxd)

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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

1:15,000 (when printed at A3)

Legend

- Study Area
- Land parcel included in Rev G
- Low
- Medium
- High
- Trees to be Removed
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

CHESNEY ROAD
OLD THOONA ROAD
FARNLEY ROAD
LAKE MOKOAN ROAD
NORTH ROAD
NORTH TRACK
STOCKYARD CREEK
BENALLA-YARRAWONGA ROAD
DAM WALL ROAD
BOUNDARY ROAD
FLYNNS ROAD
SERGEANTS SWAMP
GUM SWAMP
STOCKYARD CREEK
UNNAMED

43 3 4 36 5 31 38 33 39 41 42 32 6 30 44 40 34 37 7 35 24 25 26 2 29 1 21 23 22 9 8 19 20 18 13 15 14 27 28 10 17 16 11 12

Tree habitat value

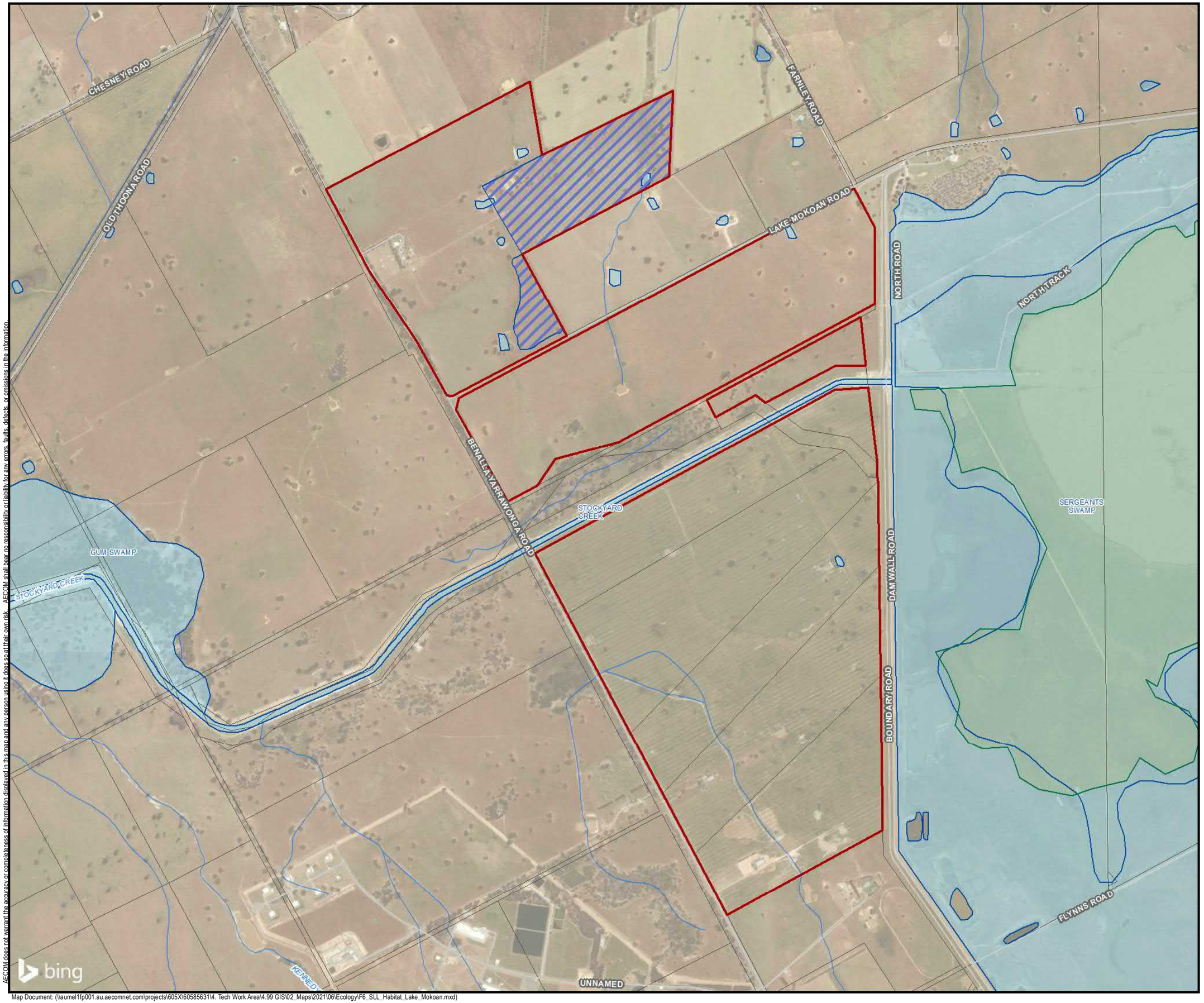
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 5

Map Document: (P:\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F5_Trees_Habitat_Value_Lake_Mokoan.mxd)



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N

Coordinate System: GDA 1994 MGA Zone 55

0 130 260 520

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Potential Habitat for Striped Legless Lizard
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

Striped Legless Lizard Habitat within West Mokoan Solar Farm

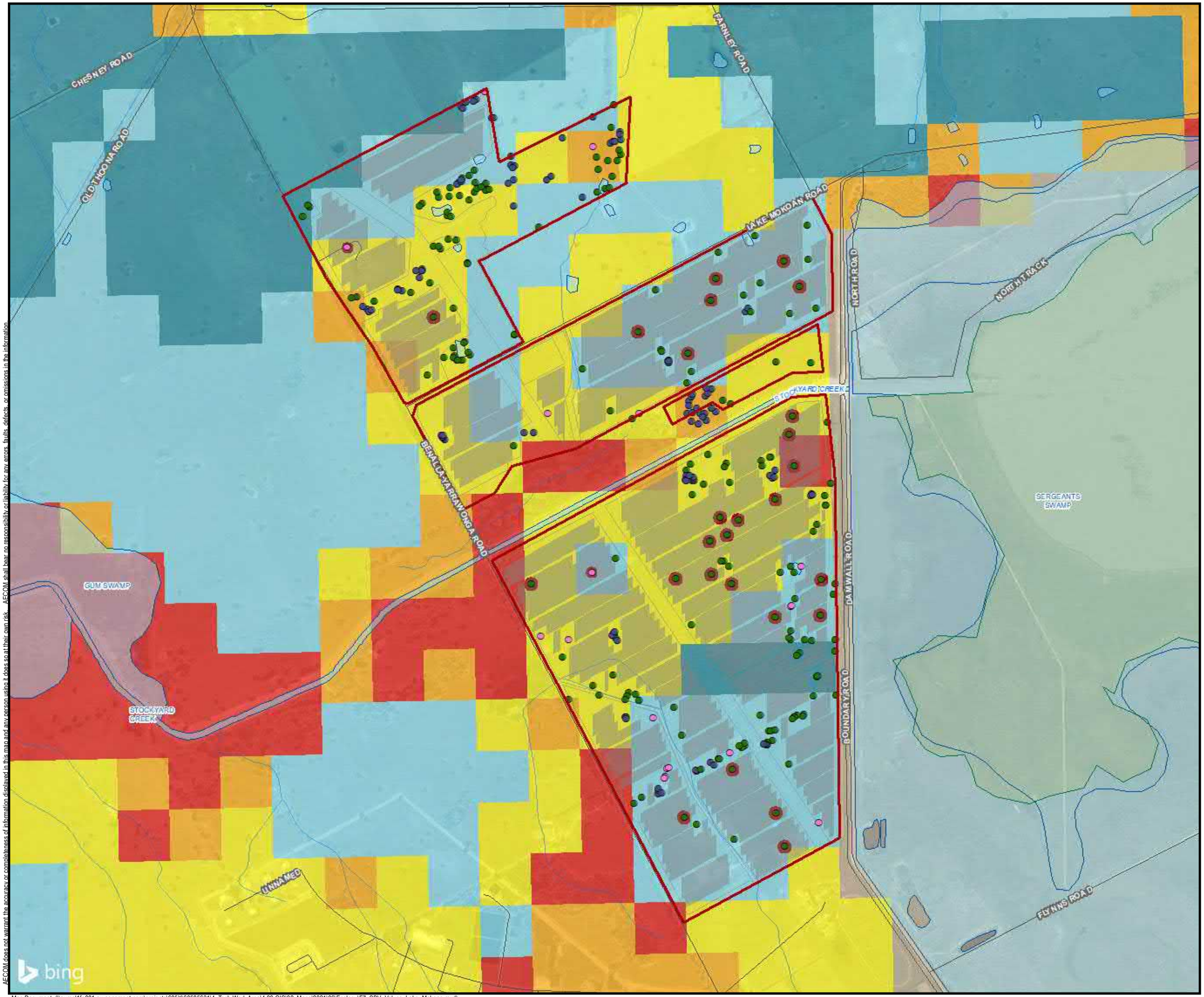
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 6

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\605856314. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F6_SLL_Habitat_Lake_Mokoan.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Large Scattered Tree
- Large Tree in Patch
- Small Scattered Tree
- Solar Design Layout
- Watercourses
- Roadways
- Waterbodies
- Wetland
- Impacted Vegetation

Strategic Biodiversity Values

- 0.00 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.80 - 1.00

Strategic Biodiversity Values

South Energy

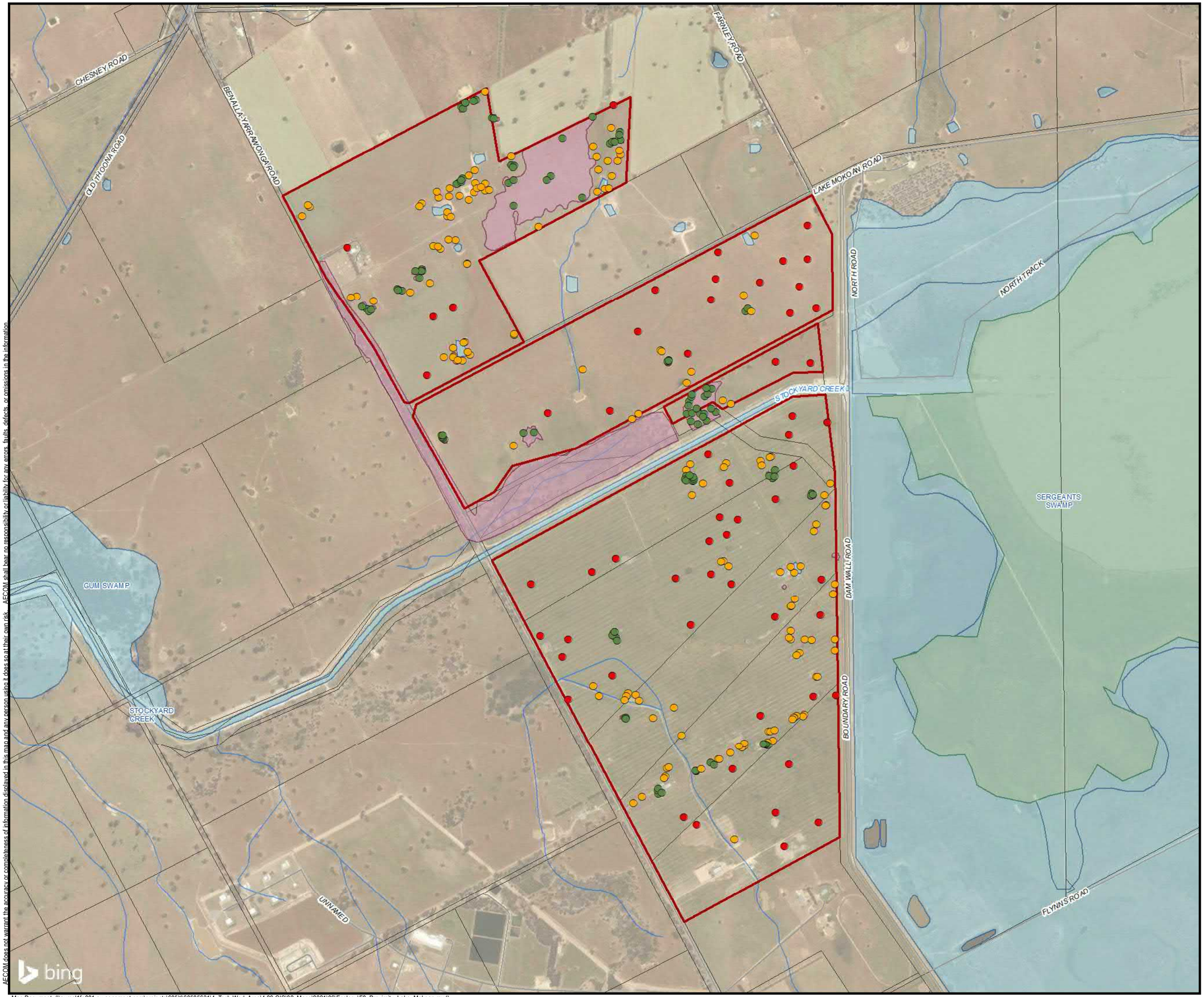
West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

7

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F7_SBV_Values_Lake_Mokoan.mxd)



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N

Coordinate System: GDA 1994 MGA Zone 55

0 145 290 580

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area

Tree Proximity Category

- 1
- 2
- 3
- Watercourses
- Roadways
- Habitat Zones
- Cadastre
- Waterbodies
- Wetland

Tree Proximity Analysis

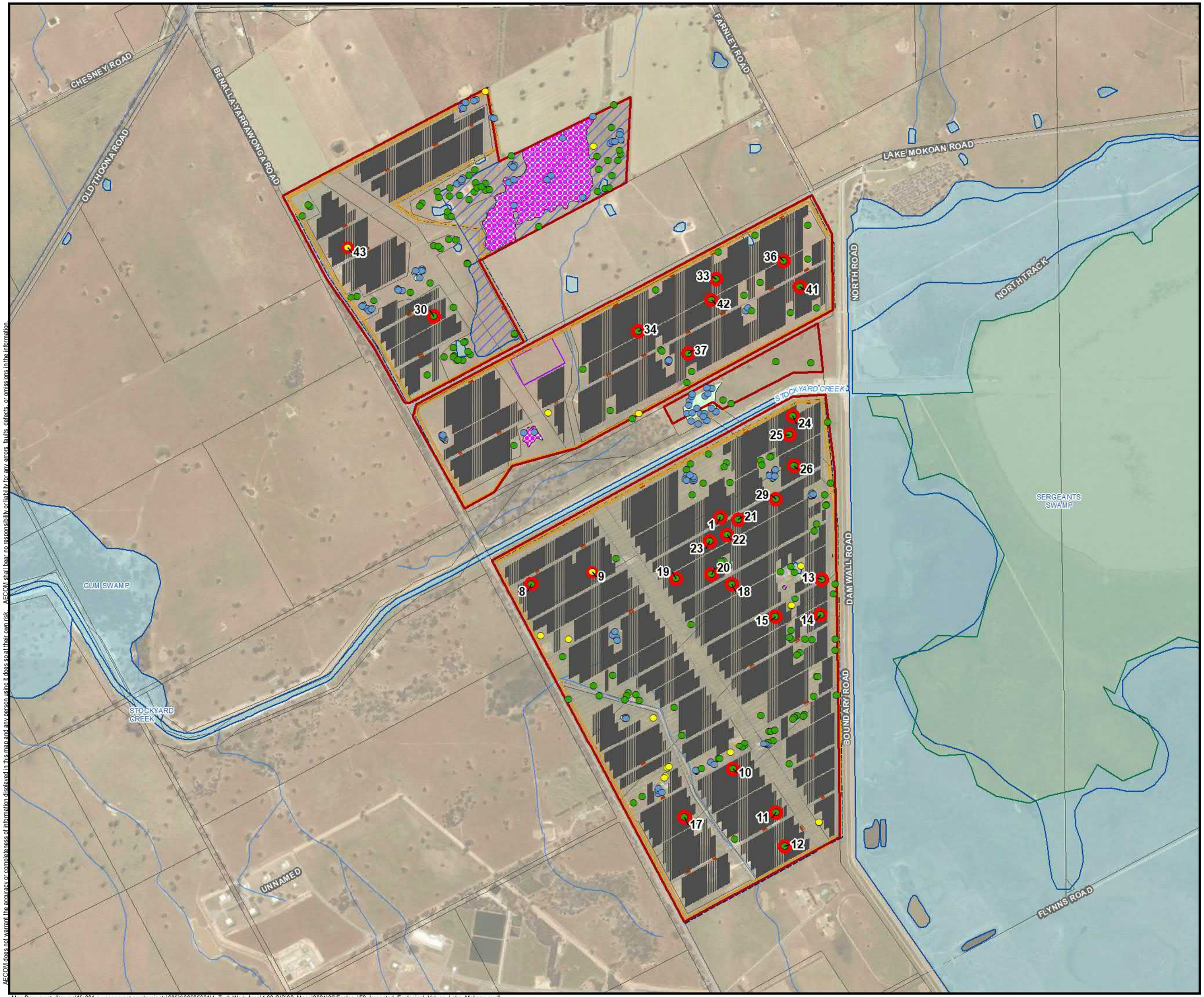
South Energy

Flora and Fauna assessment report
Benalla North Solar Farm

892 Benalla-Yarrawonga Rd,

Figure
8

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F8_Proximity_Lake_Mokoan.mxd)



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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Large Scattered Tree
- Large Tree in Patch
- Small Scattered Tree
- Solar Panels Layout
- Substation Laydown
- Internal Road
- Firebreak 10m
- Inverter
- Security Fence
- Watercourses
- Roadways
- Potential Habitat for Striped Legless Lizard
- Cadastre
- Waterbodies

Ecological Vegetation Classes

- 175 Grassy Woodland
- 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic
- 55 Plains Grassy Woodland
- 803 Plains Woodland
- Impacted Vegetation

Impacted Ecological Values

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

9

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F9_Impacted_Ecological_Values_Lake_Mokoan.mxd)

Appendix B

Threatened flora species likelihood of occurrence

Appendix B Threatened flora species likelihood of occurrence

Scientific Name	Common Name	Conservation Status				(Year)	Source	Habitat Preference	Likelihood of Occurrence
		EPBC	FFG listed	FFG protected	VROT				Post-field Assessment
Acacia melvillei	Yarran			P	v	1, (2006)	VBA	Distributed through north-western Victoria, particularly along the Murray River and flood plain. Often found in woodland.	Unlikely
Allocasuarina luehmannii	Buloke		L	P	e	2, (1992)	VBA	Usually found growing in woodland with Grey Box on a range of on non-calcareous soils types, mainly sandy loams. It is usually found on lower parts of the landscape mainly north and west of the Great Dividing Range and within the Murray-Darling Basin.	Unlikely
Amphibromus fluitans	River Swamp Wallaby-grass	VU					PMST	Inhabits both natural and man-made water-bodies, including swamps, lagoons, billabongs and dams.	Unlikely
Brachyscome muelleroides	Mueller Daisy	VU	L		e		PMST	Generally found in open positions on the Murray River floodplain, swampy River Red Gum Forest and damp depressions	Unlikely
Digitaria divaricatissima var. *divaricatissima*	Umbrella Grass				v	5, (2010)	VBA	Rare in Victoria, only recorded in Dimboola, Mildura, Tocumwal, Mitiamo and Springhurst areas. Found on heavier soils that are often flood.	Unlikely
Dipodium hamiltonianum	Yellow Hyacinth-orchid		L	P	e	2, (1997)	VBA	Very rare. Distribution restricted to dry open-forest or woodland in the north east between Wangaratta and Wodonga and near Wulgulmerang in the east.	Unlikely
Diuris punctata var. *punctata*	Purple Diuris		L	P	v	3, (1992)	VBA	Moist areas in box, red gum and sclerophyll woodlands, grassy low open forest.	Unlikely
Eucalyptus sideroxylon subsp. *sideroxylon*	Mugga				r	2, (1993)	VBA	Distribution within Victoria is confined to the Chiltern area, northern Warby Range and south of Winton.	Unlikely

Scientific Name	Common Name	Conservation Status				(Year)	Source	Habitat Preference	Likelihood of Occurrence
		EPBC	FFG listed	FFG protected	VROT				Post-field Assessment
Fimbristylis dichotoma	Common Fringe-sedge				v	1, (1991)	VBA	Widespread in a variety of habitats; north from Griffith area. Rare or sporadic in Victoria, collected only from near Benalla, Euroa and Boort (pre-1950 records).	Unlikely
Glycine latrobeana	Clover Glycine	VU	L	P	v		PMST	Endemic in Victoria and sporadically dispersed. Grows mainly in grasslands and grassy woodlands. Native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer	Unlikely
Goodenia macbarronii	Narrow Goodenia		L	P	v	1, (1995)	VBA	Rare in Victoria, confined to forests and grassy areas between Wedderburn and Euroa north to the Murray River, usually in damp sandy soils.	Unlikely
Goodia medicaginea	Western Golden-tip				r	1, (2002)	VBA	In Victoria, found sporadically in the south-west, at Long Forest west of Melbourne, in central Victoria near Eaglehawk and Killawarra Forest. Favours dry, inland sites.	Unlikely
Prasophyllum gilgai	Gilgai Leek-orchid		L		e	3, (2003)	VBA	Endemic to Victoria. Located in seasonally inundated grassy woodland on heavy clay loams and in gilgai formations.	Unlikely
Prasophyllum sp. aff. validum A	Woodland Leek-orchid	VU		P	e	1, (2000)	VBA PMST	Endemic to Victoria. Sparsely located across northern and west open forest and woodlands. Found on stony and sandy soils.	Unlikely
Pultenaea platyphylla	Flat-leaf Bush-pea				r	2, (1991)	VBA	Confined to dry forest on granite hills, particularly in the Warby Range and near Beechworth.	Unlikely

Legend:

EPBC Act
CR – Critically Endangered
EN – Endangered
VU – Vulnerable

FFG Act
L – Listed
P - Protected

VROTS
c – Critically Endangered
e – Endangered
v – Vulnerable

Records
(####) – VBA results: (year of last record)
PMST – Protected Matters Search Tool

Appendix C

Threatened fauna species likelihood of occurrence

Appendix C Threatened fauna species likelihood of occurrence

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Frogs								
Delma impar	Striped Legless Lizard	VU	L	en		PMST	Native grasslands and grassy woodland, within grass tussocks, cracks in the ground or under rocks. Has been recorded in exotic pasture.	Possible
Litoria raniformis	Growling Grass Frog	VU	L	en		PMST	Permanent lakes, swamps, dams and lagoons or very wet areas in woodland and shrubland; often in waterbodies with dense standing and floating vegetation.	Unlikely
Birds								
Actitis hypoleucos	Common Sandpiper	Ma, Mi				PMST	Edges of saltwater to fresh waterbodies and wetlands, including estuaries, lakes, drainage lines, tidal watercourses and mudflats; occasionally beaches and rocky headlands; mainly spring-summer non-breeding migrant	Unlikely
Anas rhynchotis	Australasian Shoveler			vu	2, (2006)	VBA	Inhabits various wetlands, preferring large, well-vegetated freshwater swamps and wetlands. Also estuaries, coastal inlets and artificial waterbodies (e.g. dams, sewage ponds).	Unlikely
Anthochaera phrygia	Regent Honeyeater	CR	L	cr	2, (1989)	VBA PMST	Widespread but with an extremely patchy distribution. In Victoria, most sightings originate from a few sites in north-east Victoria and includes breeding habitat (Chiltern-Albury).	Possible
Apus pacificus	Fork-tailed Swift	Ma, Mi			1, (2001)	VBA PMST	Aerial over a wide range of habitats, from inland to coast; spring-summer non-breeding migrant	Possible
Ardea intermedia	Intermediate Egret	Ma	L	en	1, (2017)	VBA	Freshwater swamps, intertidal mudflats, inland lakes and floodplains, well vegetated rivers; also farm dams, pastures and artificial wetlands	Possible
Ardea modesta	Eastern Great Egret	Ma	L	vu	6, (2017)	VBA PMST	Freshwater and brackish wetlands and watercourses, intertidal mudflats, inland lakes, swamps and rivers; also farm dams, irrigation drainages and artificial wetlands.	Possible

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Aythya australis	Hardhead			vu	1, (2016)	VBA	Deep, permanent open freshwater wetlands and waterbodies with dense fringing vegetation. Sometimes artificial wetlands (dams, sewage ponds), especially during dry periods inland.	Possible
Biziura lobata	Musk Duck	Ma		vu	2, (2006)	VBA	Permanent freshwater and brackish swamps and wetlands with dense vegetation, more open waters in non-breeding season; occasionally coastal areas and estuaries.	Unlikely
Botaurus poiciloptilus	Australasian Bittern	EN	L	en		PMST	Occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands.	Unlikely
Burhinus grallarius	Bush Stone-curlew		L	en	1, (2001)	VBA	In south-eastern Australia, occur in open grassy woodlands, including box-ironbark and Buloke woodlands, often near watercourses and areas with dense leaf litter and fallen timber; sometimes on farmlands. Occupy a wider variety of habitats in northern Australia.	Possible – recorded within the adjoining TFN woodland (TFN, 2018)
Calidris acuminata	Sharp-tailed Sandpiper	Ma, Mi			1, (2015)	VBA PMST	Margins of brackish waterbodies with emergent sedges grassland, saltmarsh or similar vegetation.	Unlikely
Calidris ferruginea	Curlew Sandpiper	CR, Ma, Ma		en		PMST	Coastal estuaries, bays and shallow wetlands, tidal mudflats and sandflats; mainly spring-summer non-breeding migrant	Unlikely
Calidris melanotos	Pectoral Sandpiper	Ma, Mi		nt		PMST	Shallow freshwater or brackish wetlands, including swamps, flooded grasslands, sewage ponds, occasionally tidal flats and saltmarshes	Unlikely
Chalcites osculans	Black-eared Cuckoo	Ma		nt	1, (2000)	VBA PMST	Spring-summer migrant to southern and central Victoria, inhabiting mallee scrub, dry woodlands and box ironbark forests	Unlikely
Charadrius bicinctus	Double-banded Plover	Ma, Mi			1, (2013)	VBA	Coastal or near-coastal habitat on firm tidal flats or nearby short, open saltmarsh, and freshwater wetlands. May also utilise open grasslands and short-cropped pasture near water.	Unlikely

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Chlidonias hybridus javanicus	Whiskered Tern	Ma		nt	2, (2017)	VBA	Prefers shallow terrestrial freshwater wetlands, freshwater swamps, brackish and saline lakes, floodwaters, sewage farms, irrigated croplands and large dams.	Unlikely
Chthonicola sagittata	Speckled Warbler		L	vu	8, (2001)	VBA	Eucalypt-dominated open forests and grassy woodlands, including box-ironbark forests, dense shrublands on rocky ridges or in gullies.	Unlikely
Climacteris picumnus victoriae	Brown Treecreeper (south-eastern ssp.)			nt	30, (2013)	VBA	Prefers open eucalypt woodland, often along watercourses and drainages, typically lacking a dense understorey but with substantial fallen timber and logs. Sometimes also margins of wooded areas. Forages on tree trunks and on or near ground.	Possible – recorded within the adjoining TFN woodland (TFN, 2018)
Falco subniger	Black Falcon		L	vu	1, (2015)	VBA	Woodland, scrub, shrubland and grassland types in arid and semi-arid zones.	Possible
Gallinago hardwickii	Latham's Snipe	Ma, Mi	N	nt	1, (2017)	VBA PMST	Wet grasslands and pastures, open and wooded swamps; spring-summer non-breeding migrant	Unlikely
Grantiella picta	Painted Honeyeater	VU	L	vu	1, (1990)	VBA PMST	Open box-ironbark forests, eucalypt and casuarina woodlands and well vegetated watercourses, particularly where trees are infested with mistletoe; mainly spring-summer migrant to south-eastern Australia	Possible
Grus rubicunda	Brolga		L	vu	3, (2008)	VBA	Largely associated with ephemeral freshwater and brackish wetlands, grasslands, floodplains, irrigated pastures and saltmarsh.	Unlikely
Haliaeetus leucogaster	White-bellied Sea-Eagle	Ma	L	vu	6, (2016)	VBA PMST	Occupies all coastal areas extending inland through main waterways, coastal islands, coastal lakes and along some inland rivers. It forages primarily for fish over large areas of open water.	Unlikely
Hirundapus caudacutus	White-throated Needletail	Ma, Mi		vu	2, (2000)	VBA PMST	Aerial, mainly eastern Australia often associated with coastal and mountain regions; spring-summer non-breeding migrant.	Unlikely

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Lathamus discolor	Swift Parrot	CR, Ma	L	en	6, (1999)	VBA PMST	Breeds in Tasmania, late spring-summer; occurs as non-breeding migrant to mainland south-eastern Australia mainly autumn-early spring. Generally prefers Box-Ironbark forests and woodlands inland of the Great Dividing Range; sometimes also other forests and woodlands in coastal and sub-coastal areas.	Possible
Motacilla flava	Yellow Wagtail	Ma, Mi				PMST	Grassland habitat subject to inundation	Possible
Myiagra cyanoleuca	Satin Flycatcher	Ma, Mi				PMST	Mainly in wet forests and dense woodlands, particularly with tall canopy of eucalypts with an understorey of tea-trees and wattles along streams. Seasonal visitor (mainly spring) to drier inland woodlands, coastal areas and occasionally gardens and parklands.	Possible
Neophema pulchella	Turquoise Parrot		L	nt	5, (2001)	VBA	Inhabits arid to semi-arid areas within mallee and acacia (Mulga) scrublands/open woodlands with spinifex and saltbush ground covers. Occurs in both recently burnt and older growth mallee. Known to occur within the Lower Murray/Darling and Western catchment management authority regions.	Unlikely
Polytelis swainsonii	Superb Parrot	VU	L	en		PMST	River Red Gum, Black Box and other eucalypt woodlands and timbered watercourses; sometimes in pastures, stubbles, clearings and wooded farmland and often killed on roads when feeding on spilt grain	Possible

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Rostratula australis	Australian Painted Snipe	EN, Ma	L	cr		PMST	Has been recorded from wetlands in all Australian states, however is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter. Inhabits shallow, well vegetated, temporary or infrequently filled wetlands, which may have associated trees, shrubs or samphire. Occasionally inhabits brackish wetlands, saltmarsh or claypans. Typical sites include those with rank emergent tussocks of grass, sedges, rushes, reeds or samphire, often with clumps of Muehlenbeckia or sometimes Melaleuca. Feeds on seeds and invertebrates from the water's edge.	Unlikely
Stictonetta naevosa	Freckled Duck		L	en	1, (2006)	VBA	Large, well vegetated swamps and wetlands, including ephemeral open lakes when inundated	Unlikely
Tringa nebularia	Common Greenshank	Mi, Ma			1, (2015)	VBA	Margins of freshwater and brackish wetlands, sewage ponds, saltmarshes, dams and sometimes tidal flats and estuaries.	Unlikely
Numenius madagascariensis	Eastern Curlew	CR, Ma, Mi		vu		PMST	Coastal lakes, estuaries, tidal mudflats and sandflats, mangroves and saltmarshes; occasionally fresh or brackish lakes near coast; mainly spring-summer non-breeding migrant	Unlikely
Pandion cristatus	Eastern Osprey	Mi, Ma				PMST	Littoral and coastal habitats, and terrestrial wetlands generally preferring coastal cliffs. May also occur in atypical habitats.	Possible
Pedionomus torquatus	Plains-wanderer	CR	L	cr		PMST	Low, open native grasslands, typically with sward less than 1m high, with extensive inter-tussock spaces and high diversity of small herbs; sometimes in unimproved pastures or crops.	Unlikely

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Rhipidura rufifrons	Rufous Fantail	Ma, Mi				PMST	Typically a fantail of dense forests such as rainforests, wet sclerophyll forests, monsoon forests, mangroves and riparian vegetation with a common preference for a shrubby understory. Inhabits and breeds in wet eucalypt forests and rainforests, particularly gullies and in dense undergrowth. Seasonal (mainly autumn-winter) dispersal to more open habitat (e.g. woodlands, parklands with areas of dense undergrowth, box ironbark forests).	Unlikely
Stagonopleura guttata	Diamond Firetail		L	nt	19, (2001)	VBA	Open grassy eucalypt or cypress pine woodlands, acacia shrublands and edges of farmland or grassland close to wooded or lightly timbered areas. Often in wooded areas close to watercourses.	Possible
Fish								
Galaxias rostratus	Flat-headed Galaxias	CR	I	vu	2, (1990)	VBA PMST	Shoals in mid-water. Usually below 150 m altitude in Murray system in still or gently flowing waters, lakes, billabongs and backwaters. Depth 1 m, substrate of coarse sand and mud, and debris.	Unlikely
Maccullochella peelii peelii	Murray Cod	VU	L	en	3, (2013)	VBA PMST	Small clear, rocky, upland streams with riffle and pool structure on the upper western slopes of the Great Dividing Range to large, meandering, slow flowing, often silty rivers in the alluvial lowland reaches of the Murray Darling Basin.	Unlikely
Macquaria ambigua	Golden Perch			vu	7, (2009)	VBA	Variety of environments, but most frequently occurs in warm, turbid, sluggish inland waters and associated backwaters and billabongs. A tolerant fish able to withstand water temperatures of 4 to 37°C, and salinities up to 33,000 parts per million (almost that of sea-water).	Unlikely
Macquaria australasica	Macquarie Perch	EN	L	en		PMST	Deep, rocky holes with considerable cover and flowing water over unsilted cobble and gravel substrate.	Unlikely

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Melanotaenia fluviatilis	Crimson-spotted Rainbowfish		L	vu	1, (2001)	VBA	Inhabits streams, backwaters of larger rivers, drainage ditches, overflow ponds and reservoirs. Usually congregates along grassy banks or around submerged logs and branches.	Unlikely
Invertebrate								
Synemon plana	Golden Sun Moth	CR	L	cr		PMST	Native grasslands and grassy woodlands, particularly where Wallaby-grasses dominant. Now recognised to occur also in exotic grasslands dominated by Chilean Needle Grass.	Unlikely
Mammal								
Pteropus poliocephalus	Grey-headed Flying-fox	VU	L	vu		PMST	Requires foraging resources and roost sites which differ in their characteristics and therefore location. Roost sites commonly occur in gullies, in vegetation with dense canopy cover and close to water. Foraging resources include blossom from eucalypts (preferred food) and a range of rainforest fruits, commercial fruit crops and introduced trees in urban areas. The species is highly mobile and commutes daily from roost sites to foraging areas.	Possible
Pseudomys fumeus	Smoky Mouse	EN	L	cr		PMST	A variety of vegetation communities, ranging from coastal heath to dry ridgeline forest, sub-alpine heath and, occasionally, wetter gullies (Menkhorst and Seebeck 1981). Except for the wetter sites, a consistent feature of Smoky Mouse habitats is the diversity of heath and bush-pea species present, combined with potential shelter sites in the form of woody debris or rocks. The vegetation at capture sites varies widely in age post-fire.	Unlikely
Reptile								

Scientific Name	Common Name	Conservation Status			Number of sightings (Year)	Source	Habitat Preference	Likelihood of occurrence
		EPBC	FFG	VROT				
Aprasia parapulchella	Pink-tailed Worm-Lizard	VU	L	en		PMST	Inhabits sloping, open woodland areas with predominantly grassy ground layers and rocky outcrops, particularly those dominated by Kangaroo Grass. Vic distribution restricted to isolated population near Bendigo.	Unlikely
Chelodina longicollis	Common Long-necked Turtle			dd	3, (2016)	VBA	Found in freshwater environments including wetlands. Spends most of its time water but may move overland searching for new waterholes and nesting areas. Found through coastal and inland waterways from south-eastern Australia to eastern Queensland.	Unlikely
Emydura macquarii	Murray Short-necked Turtle			vu	1, (2009)	VBA	Restricted to the Murray-Darling River system in south-eastern Australia, inhabiting larger rivers and permanent lakes in this region.	Unlikely
Morelia spilota metcalfei	Carpet Python		L	en	7, (1997)	VBA	Generally associated with large eucalypts along rivers in the Murray/Darling basin.	Unlikely
Varanus varius	Lace Goanna			en	2, (1995)	VBA	Occurs in well timbered areas from dry woodlands to cool temperate forests.	Likely – recorded within the adjoining TFN woodland (TFN, 2018)

**Indicates exotic species*

Legend:

EPBC Act	FFG Act	VROTS	Record
CR – Critically Endangered	L – Listed	cr – Critically Endangered	Year – Most recent record from the Victorian Biodiversity Atlas (VBA)
EN – Endangered	N – Nominated for listing	e – Endangered	PMST – Protected Matters Search Tool (prediction)
VU – Vulnerable	I – Invalid or ineligible	vu – Vulnerable	
Mi – Migratory	D – Delisted	nt – Near Threatened	

Sources for habitat preferences descriptions: Birds Australia, 2003; Churchill, 2008; Cogger 1990; DPI NSW, 2008; Emison et al., 1987; Gray and Knight, 2001; HANZAB, 1990-2006; Hero et al., 1991; Inland Fisheries Service, 2000; NSW DEC, 2005; Menkhorst and Knight, 2001; Robinson, 2005; Strahan 1995; Wilson and Swan 2008; Tyler and Knight, 2009; Viridans Just a Minute 2005 and the Australian Government Department of Environment and Energy Species Profiles and Threats (SPRaT) Database

Appendix D

Tree habitat value

Appendix D Tree habitat value

Table 18 – Tree habitat value assessment

Tree removal ID	Species	Common Name	Tree Type	DBH	Canopy health	LTH	MTH	STH	LSH	MSH	SSH	Microbat Hollows	Other habitat features	Total habitat features	Ecology Rating	Retained (Y/N)	Justification for loss
1	*Eucalyptus camaldulensis*	River Red Gum	LST	141	Moderate (30-70%)	0	0	0	0	0	0	N	Nest	1	Medium	N	Tree in the middle of solar arrays. Removal to enable design efficiency
2	*Eucalyptus microcarpa*	Grey Box	LST	109	No canopy	0	0	0	0	1	5	N	Stag	6	High	Y	Trees retained
3	*Eucalyptus microcarpa*	Grey Box	LST	100	No canopy	0	1	0	0	4	0	N	Stag	5	High	Y	
4	*Eucalyptus microcarpa*	Grey Box	LST	110	Moderate (30-70%)	0	1	0	0	2	2	N	Nest	6	High	Y	
5	*Eucalyptus microcarpa*	Grey Box	LST	110	Good (>70%)	0	0	0	0	0	7	N	Nest	8	High	Y	
6	*Stag*	Stag	LST	120	No canopy	1	3	0	0	2	2	N		8	High	Y	
7	*Eucalyptus microcarpa*	Grey Box	LST	105	Good (>70%)	0	0	0	1	7	1	N		9	High	Y	
8	*Eucalyptus microcarpa*	Grey Box	LST	110	Moderate (30-70%)	0	0	0	0	2	2	N		4	Medium	N	Cannot retain as there is no space to replace lost panels due to fixed size and electrical configuration of tracking system and array.
9	*Eucalyptus microcarpa*	Grey Box	SST	25	Good (>70%)	0	0	0	0	0	0	N		0	Low	N	
10	*Eucalyptus microcarpa*	Grey Box	LST	124	Poor (<30%)	1	0	0	0	4	0	Y		5	High	N	
11	*Stag*	Stag	LST	139	No canopy	0	3	0	0	3	10	Y		16	High	N	
12	*Eucalyptus camaldulensis*	River Red Gum	LST	186	Moderate (30-70%)	1	1	0	1	4	1	N		8	High	N	
13	*Eucalyptus camaldulensis*	River Red Gum	LST	148	Good (>70%)	0	0	0	0	0	1	N		1	Medium	N	
14	*Eucalyptus microcarpa*	Grey Box	LST	123	Good (>70%)	0	1	0	0	0	0	Y		1	Medium	N	
15	*Eucalyptus camaldulensis*	River Red Gum	LST	119	Moderate (30-70%)	0	1	0	0	0	0	N		1	Medium	N	
16	*Eucalyptus albens*	White Box	LST	117	Good (>70%)	0	0	0	0	0	10	N		10	Medium	Y	
17	*Eucalyptus albens*	White Box	LST	117	Good (>70%)	0	0	0	0	0	1	N		1	Medium	N	
18	*Eucalyptus camaldulensis*	River Red Gum	LST	241	Good (>70%)	0	2	1	0	0	0	N		3	Medium	N	
19	*Eucalyptus camaldulensis*	River Red Gum	LST	159	Good (>70%)	1	0	0	0	0	0	N		1	Medium	N	
20	*Eucalyptus camaldulensis*	River Red Gum	LST	109	Moderate (30-70%)	0	0	0	0	0	0	N		0	Medium	N	

Tree removal ID	Species	Common Name	Tree Type	DBH	Canopy health	LTH	MTH	STH	LSH	MSH	SSH	Microbat Hollows	Other habitat features	Total habitat features	Ecology Rating	Retained (Y/N)	Justification for loss
21	*Eucalyptus camaldulensis*	River Red Gum	LST	96	Moderate (30-70%)	0	0	1	0	0	1	N		2	Medium	N	
22	*Eucalyptus camaldulensis*	River Red Gum	LST	87	Good (>70%)	0	0	0	0	0	0	N		0	Medium	N	
23	*Eucalyptus camaldulensis*	River Red Gum	LST	72	Moderate (30-70%)	0	0	0	0	0	0	N		0	Medium	N	
24	*Eucalyptus camaldulensis*	River Red Gum	LST	104	Good (>70%)	0	0	0	0	0	1	N		1	Medium	N	
25	*Eucalyptus microcarpa*	Grey Box	LST	215	Good (>70%)	0	0	0	0	1	3	N		4	Medium	N	
26	*Eucalyptus camaldulensis*	River Red Gum	LST	189	Good (>70%)	2	0	0	0	1	0	N		3	Medium	N	
27	*Eucalyptus camaldulensis*	River Red Gum	SST	45	Good (>70%)	0	0	0	0	0	0	N		0	Low	Y	Tree retained
28	*Eucalyptus microcarpa*	Grey Box	LST	172	No canopy	2	0	0	2	10	8	Y	Stag	22	High	Y	Tree retained
29	*Eucalyptus camaldulensis*	River Red Gum	LST	143	Good (>70%)	0	0	1	0	0	0	Y		1	Medium	N	Cannot retain as there is no space to replace lost panels due to fixed size and electrical configuration of tracking system and array
30	*Eucalyptus microcarpa*	Grey Box	LST	160	Good (>70%)	0	1	0	0	0	0	N		1	Medium	N	
31	*Eucalyptus microcarpa*	Grey Box	SST	65	Moderate (30-70%)	0	0	0	0	2	1	N		3	Medium	Y	Tree retained – tree no longer within project area (Rev H)
32	*Eucalyptus microcarpa*	Grey Box	LST	130	Good (>70%)	0	0	0	0	5	8	Y	Nest	14	High	Y	Tree retained
33	*Eucalyptus microcarpa*	Grey Box	LST	150	Good (>70%)	0	0	0	0	5	7	N		12	High	N	Cannot retain as there is no space to replace lost panels due to fixed size and electrical configuration of tracking system and array
34	*Stag*	Stag	LST	80	No canopy	1	0	1	0	0	0	Y		2	Low	N	Tree in the middle of solar arrays. Removal to enable design efficiency
35	*Eucalyptus melliodora*	Yellow Box	LST	100	Good (>70%)	1	0	0	2	2	1	N	Nest	7	High	Y	Tree retained
36	*Eucalyptus microcarpa*	Grey Box	LST	100	Good (>70%)	0	1	0	1	2	1	N	Nest	6	High	N	Tree in the middle of solar arrays. Removal to enable design efficiency
37	*Eucalyptus microcarpa*	Grey Box	LST	110	Poor (<30%)	0	1	0	0	8	8	Y		17	High	N	Cannot retain as there is no space to

Tree removal ID	Species	Common Name	Tree Type	DBH	Canopy health	LTH	MTH	STH	LSH	MSH	SSH	Microbat Hollows	Other habitat features	Total habitat features	Ecology Rating	Retained (Y/N)	Justification for loss
																	replace lost panels due to fixed size and electrical configuration of tracking system and array
38	*Stag*	Stag	LST	99	No canopy	0	0	0	0	0	0	N		0	Low	Y	Tree retained
39	*Eucalyptus microcarpa*	Grey Box	LST	150	Moderate (30-70%)	0	2	0	0	3	1	Y		6	High	Y	Tree retained
40	*Eucalyptus albens*	White Box	LST	130	Good (>70%)	0	0	0	0	0	0	N	Nest	1	Medium	Y	Tree retained
41	*Eucalyptus microcarpa*	Grey Box	LST	130	Good (>70%)	0	0	0	0	1	1	Y	Nest	3	Medium	N	Cannot retain as there is no space to replace lost panels due to fixed size and electrical configuration of tracking system and array
42	*Eucalyptus microcarpa*	Grey Box	LST	120	Moderate (30-70%)	0	3	2	0	1	0	N		6	High	N	Tree in the middle of solar arrays. Removal to enable design efficiency
43			SST	55	Good (>70%)	0	0	0	0	0	0	N		0	Low	N	Tree in the middle of solar arrays. Removal to enable design efficiency
44	*Stag*	Stag	LST	130	No canopy	0	0	0	3	0	1	Y	Stag	4	Medium	Y	Tree retained

LTH = Large Trunk Hollow, MTH = Medium Trunk Hollow, STH = Small Trunk Hollow, LSH = Large Spout Hollow, MSH = Medium Spout Hollow, SSH = Small Spout Hollow

Appendix E

Plates

Appendix E Plates

Plate 1 **HZ 14 within study area**

Plate 2 **Non-native vegetation south of Lake Mokoan Road with TFN woodland in background**

Plate 3 **Cropped land south of Stockyard Creek**

Plate 4 **Cropped land with Scattered Trees south of Stockyard Creek**

Plate 5 **A Grassy Woodland Habitat Zone with large trees in patch**

Plate 6 **Large Scattered Trees within the study area**

Plate 7 **Planted trees within the study area**

Plate 8 **Potential SLL habitat supporting continuous native grass tussock cover**

Appendix F

Clause 52.17 Permit Application Requirements

Appendix F Clause 52.17 Permit Requirements

The following pages provide the information necessary to submit to the responsible Authority in order to seek a permit to remove the native vegetation present at the site.

Application to remove native vegetation

The tables below provide the necessary information to inform the application under the 'Detailed' pathway.

Number	Application requirement
1	Information about the native vegetation to be removed, including: • The assessment pathway and reason for the assessment pathway. This includes the location category of the native vegetation to be removed. • A description of the native vegetation to be removed that includes: - whether it is a patch or a scattered tree (or both); - the extent (in hectares); - the number and circumference (in centimetres measured at 1.3 metres above ground level) of any large trees within a patch; - the number and circumference (in centimetres measured at 1.3 metres above ground level) of any Scattered Trees, and whether each tree is small or large; - the strategic biodiversity value score; - the condition score; - if it includes endangered Ecological Vegetation Classes; and - if it includes sensitive wetland or coastal areas. • Maps showing the native vegetation and property in context and containing: - scale, north point and property boundaries; - location of any patches of native vegetation and the number of large trees within the patch proposed to be removed; and - location of Scattered Trees proposed to be removed, including their size. • The offset requirement, determined in accordance with section 5 of the Guidelines, that will apply if the native vegetation is approved to be removed.
Response	See **Attachment A** **See Attachment C (**Figure **3** Figure **4** Figure **7** Figure **9)**

Number	Application requirement
2	Topographic and land information relating to the native vegetation to be removed, showing ridges, crests and hilltops, wetlands and waterways, slopes of more than 20 percent, drainage lines, low lying areas, saline discharge areas, and areas of existing erosion, as appropriate. This may be represented in a map or plan.
Response	See AECOM 2020a (Figures 2, 3, 5, 6 12, 13, 15) See AECOM 2020b (Figure 2) It is noted the assessment area is generally of very low relief which is characteristic of land located within the Victoria Riverina bioregion and

Number	Application requirement
	represented by contours within **Attachment C**. Low-lying areas, DELWP mapped wetlands and drainage lines are also represented in **Attachment C**. The assessment area does not contain steep slopes, existing erosion and saline discharge areas.

Number	Application requirement
3	Recent, dated photographs of the native vegetation to be removed
Response	**See Attachment E**

Number	Application requirement
4	Details of any other native vegetation approved to be removed, or that was removed without the required approvals, on the same property or on contiguous land in the same ownership as the applicant in the five-year period before the application for a permit was lodged
Response	There has been no removal of vegetation within the property in the 5 years preceding this permit application

Number	Application requirement
5	An avoid and minimise statement. The statement describes any efforts to avoid the removal of and minimise the impacts on the biodiversity and other values of native vegetation, and how these efforts focused on areas of native vegetation that have the most value. The statement should include a description of the following: • Strategic level planning – any regional or landscape scale strategic planning process that the site has been subject to that avoided and minimised impacts on native vegetation across a region or landscape • Site level planning – how the proposed use or development has been sited or designed to avoid and minimise impacts on native vegetation. • That no feasible opportunities exist to further avoid and minimise impacts on native vegetation without undermining the key objectives of the proposal.
Response	**Strategic level planning:** South Energy engaged with the Benalla City Council during the solar farm site selection process. Through this process the study area was identified as a suitable location for a solar farm due to the land being zoned as Farming and access to existing transmission powerline to connect the solar farm. Adjoining land parcels were considered in the site selection process. Adjoining landowners were either not interested in joining the Project due to existing land uses or the land use was considered not appropriate for solar panels. Strategic level planning was also undertaken in accordance with the requirements of regional policy, namely the *Goulburn Broken Regional Catchment Strategy (2013-2019).* The RCS highlights the importance of biodiversity within the region, including the important habitat that native vegetation provides for many species. The RCS also identifies the dominant land use within the Catchment as being privately owned land used for dryland agriculture. Waterways, floodplains and wetlands are an integral part of the Catchment due to their environmental, social and economic values. The vision

	of the RCS aims to achieve healthy, resilient and increasingly productive landscapes supporting vibrant communities.
	The RCS provides the strategic framework for aligning sub-strategy implementation by listing the sub-strategies' 20 to 30-year objectives for biodiversity, land, water and people. The Biodiversity Strategy outlines a series of management measures to meet biodiversity objectives and prioritises geographic areas for two main actions: 1) protecting ecosystem services and 2) enhancing existing remnant vegetation through corridors and linkages.
	
	The RCS identifies Benalla as located within 'Productive Plains'. It is highlighted that conservation reserves are too few and small to sustain wildlife, however, the area can be considered fragmented with potential for revegetation and connection of remnant patches. The focus for the area of 'Productive Plains' includes to increase native vegetation areas and connections to Goulburn and Broken Rivers, Holland and Hughes Creek and Winton Wetland.
	Consideration to RCS is demonstrated through the following engagement with local authorities and stakeholders as well as Project design refinements:
	
	• Consultation was undertaken with the Winton Wetlands Committee, and the Regent Honeyeater Group (AECOM 2021b Section 1.4.2) where support was provided from both groups for the Project.
	• Floodplain advice was sought from the GBCMA and a site meeting was held with the GBCMA and GMW (refer to AECOM 2021b Section 1.4.2.7). The GBCMA and GMW were supportive of the Project and written advice was received confirming that they would not object to the proposed solar farm, subject to conditions (refer to AECOM 2021a Appendix D for full GBCMA advice and Appendix R for GMW letter).
	• The layout of the solar farm was designed to ensure minimum setbacks of 15 metres from waterways were achieved in accordance with advice received from the GBCMA (AECOM 2021b Section 1.4.2.7).
	• Solar panels are proposed to be elevated in flood prone areas, as shown on the Concept Plan, in accordance with advice received from the GBCMA (refer to Appendix D for full GBCMA advice).
	• Ecological assessments have been undertaken and results incorporated into the Project design to ensure that values identified as 'high value' during ecological assessments are retained. This includes:
	  • Retaining all patches of native vegetation
	  • Retaining all potential habitat for Striped Legless Lizard
	  • Minimising tree losses to 28 Scattered Trees (26 large and two small trees); the reduction in tree losses has resulted in trees with important fauna habitat value being retained. This includes retaining all Category 1 and Category 2 trees and 30% of >Category 3
	  • Most areas of SBV >0.4 have been retained (Figure **7** – Appendix A)
	• A Woodland Management Plan (AECOM, 2021a) has been prepared with the aim of contributing to regional landscape linkages by adding value to past revegetation efforts and connecting areas of remnant woodland

	through biodiversity enhancement activities. An area of modified Plains Grassy Woodland Ecological Vegetation Class (EVC) is proposed to be rehabilitated where trees and larger woody plants will be replanted to contribute to the landscape link between Winton Wetlands and the Broken River. In addition, a remnant woodland currently managed for biodiversity conservation and protected under a Trust for Nature conservation covenant will also be managed by the Project. **Site level planning:** South Energy has invested significant effort in ensuring that the ultimate design of the solar farm facility has avoided and minimised ecological impact to those areas of the site that have been revealed through detailed ecology surveys to be of higher biodiversity value. Initially, a desktop assessment was undertaken to determine whether any past records of significant flora and fauna species or vegetation communities had been recorded from within the site, or within close proximity to the property boundaries. This assessment informed the due diligence of the suitability of the site for a solar farm, informed the early design of the proposed facility, and informed the scope of the detailed site assessments that followed. Detailed assessments and analysis to establish the ecological values of the project area are outlined in Sections 2.2-2.4 and results are provided in Section 3.0. The assessments included a broad ecological constraints assessment conducted from the 13-14 February 2019 and detailed ecological survey undertaken from the 20-21 March and 25 July 2019. In addition, a tree habitat value assessment and habitat survey for Striped Legless Lizard was undertaken on 16 December 2020 and 19-20 January 2021. A GIS based 'habitat connectivity assessment' (tree proximity analysis) was also undertaken to determine those trees on the site that should be a higher priority for retention based on their regional habitat connectivity. An iterative design process was undertaken by the Project to avoid impact to the ecological values identified by those investigations (Section 4.0) which included: • Patches of native vegetation (Figure **3** – Attachment C) • Areas with a Strategic Biodiversity Value of >0.4 in NatureKit (Figure **7** – Attachment C). • Trees assigned higher proximity ratings via a habitat connectivity / tree proximity analysis (Figure 8 - Attachment C). • Trees with a high or medium habitat value (Figure **5** – Attachment C). • Habitat for Striped Legless Lizard (Figure 6 – Attachment C). Through the iterative design process, AECOM design engineers and South Energy have achieved a design which: • Avoids of all patches of native vegetation • Avoids potential habitat for Striped Legless Lizard

- Minimises tree losses to 28 Scattered Trees (26 large and two small trees); the reduction in tree losses has resulted in trees with important fauna habitat value being retained. This includes retaining all Category 1 and Category 2 trees and 30% of >Category 3.

The table below provides the results of each stage of design of the facility, articulating the impact of the minimisation strategies adopted.

Design iteration	Extent of proposed vegetation removal (ha)	Number of Large Trees in Patches and large Scattered Trees (LST) proposed to be removed	Number of small Scattered SST) proposed to be removed
Revision A (10/04/2019)	42.584 ha	177	5
Revision B (19/06/2019)	35.045 ha	53	4
Revision C (06/08/219)	49.928 ha	313	18
Revision D (30/09/2019)	8.210 ha	124	15
Revision E (20/02/2020)	2.344 ha	32	3
Revision F (25/04/2020)	2.376 ha	32	4
Revision G (26/08/2020)	2.868 ha	39	4
Revision H (19/04/2021)	1.891 ha	26	2

In addition, the Project has also sought to avoid and minimise any impacts to remnant roadside vegetation for site access from public roads. Upgrades to existing access points and construction of new access roads are exempt from requiring a permit to remove, destroy or lop native vegetation under Clause 52.17-7 vehicle access from public roads as they will be no wider than 6 metres. Additional measures have been included to further reduce any direct and indirect impacts to remnant roadside vegetation – this includes siting new access roads in non-native vegetation outside of tree protection zones (TPZs) and limiting construction activities where upgrades to existing access roads may interact with adjacent tree protection zones (e.g. no machinery movement or storage of fill within the TPZ).

The role of native vegetation to be removed

As at design iteration H 28 trees (26 large and two small Scattered Trees) are proposed to be removed. Scattered Trees or ‘paddock trees’ play a crucial role in the Benalla region by acting as stepping-stones between intact remnant areas of vegetation. Individually, Scattered Trees also provide habitat to a variety or rare, threatened and common fauna species through provision or

	food resources and hollows that provide den/nesting habitat. The Project has undergone several design iterations to avoid and minimise loss of Scattered Trees to the minimum extent. This iterative process has included consideration of the SBV map, the habitat connectivity assessment and the tree habitat value assessment so that trees retained will still function as stepping stones to larger areas of remnant vegetation in the wider landscape – that is, trees are connected, are located proximal to 'patch vegetation' mapped within the study area and provide a range of habitat resources for fauna. **The need to manage native vegetation to preserve identified landscape values:** It is widely acknowledged the role that large remnant trees play in the Victorian Riverina and surrounding bioregions in relation to providing habitat corridors and stepping-stones between intact remnant areas of vegetation. The design of this project has taken these landscape values into account and minimised the number of tree losses and prioritised the retention of large trees with important habitat features. Subsequently, the number of tree losses has been reduced to 28 which includes trees that are located greater than 75 m from the next nearest tree or habitat feature. In the broader Benalla and Wangaratta regions, there are several solar farm projects that will result in the loss of large trees from the landscape. Consideration of the loss of large trees at West Mokoan is thus important in the context of tree losses in the wider region. In total, there are 1,046 large Scattered Trees identified across these renewable energy projects and 216 large trees have been approved to be removed. It is unknown whether the number of large trees removed are large Scattered Trees only or whether the large tree losses are a result of large tree in patch loss. Through the avoid and minimise process the Project has reduced tree losses from the highest number (330 trees) to the lowest number (the current revision; 28 trees – 26 large and two small Scattered Trees). No Large Trees in Patches will be removed. During the current revision of the project (Rev H), the Project sought to reduce tree losses and completed a tree habitat value assessment to further prioritise the retention of large trees that provide habitat value for fauna. The outcome was the reduction in tree losses from 43 trees to 28 trees. Of these losses, the majority of trees were rated as having moderate habitat value, and only seven trees lost had high habitat value. The total cumulative loss of large trees across the region is 242 trees and therefore the loss of trees associated with West Mokoan contributes to 11% of large tree losses. In addition, tree removal will not contribute to or further exacerbate degradation of waterways as tree removal does not occur within 30 metres of a wetland or waterway. Tree removal is also not expected to advance land degradation, including soil erosion, salination, acidity, instability and water logging.

	Whether any part of the native vegetation to be removed, destroyed or lopped is protected under the *Aboriginal Heritage Act 2006*: Trees to be removed occur within an area of Cultural Heritage Sensitivity as shown in **Attachment C** (Figure 10). A complex Cultural Heritage Assessment has been drafted and is expected to be completed in mid-2021. Areas of Cultural Heritage Sensitivity will be captured under this CHMP. Areas of Cultural Heritage Sensitivity are mapped in **Attachment C**. **Consider the impacts on habitat for rare or threatened species:** The Project has been designed to avoid impacting on habitat for rare and threatened species by avoiding removal of all habitat zones and reducing tree losses to the minimum number practicable. The results of ecology technical studies have informed the iterative design process to avoid and minimise impacts to habitat for rare and threatened species (Section 4.0). The most recent design iteration following the RFI dated 26 November 2020 has resulted in a reduced number of scattered tree losses and the avoidance of potential habitat for Striped Legless Lizard in the northern project area. As a result, no species offset requirements (see **Attachment A**). **No feasible opportunities exist to further avoid and minimise impacts on native vegetation:** Due to the engineering requirements of a solar panel layout, no further opportunities exist to reduce tree losses. Additionally, a further reduction in the number of panels would somewhat limit the viability of the Project. Where possible, trees that were originally considered for removal that occurred adjacent to access tracks or on the edge of the panel layout have since been retained through tree retention workshops between AECOM ecologists, design engineers and South Energy. The 28 trees that are to be removed are located within the middle of the solar layout and are unable to be designed around.

Number	Application requirement
6	A copy of any Property Vegetation Plan contained within an agreement made pursuant to section 69 of the *Conservation, Forests and Lands Act 1987* that applies to the native vegetation to be removed.
Response	**No Property Vegetation Plan applies to the site**

Number	Application requirement
7	Where the removal of native vegetation is to create defendable space, a written statement explaining why the removal of native vegetation is necessary. This statement must have regard to other available bushfire risk mitigation measures. This statement is not required when the creation of defendable space is in conjunction with an application under the Bushfire Management Overlay.
Response	**Not applicable**

Number	Application requirement
8	If the application is under Clause 52.16, a statement that explains how the proposal responds to the Native Vegetation Precinct Plan considerations at decision guideline 8.
Response	**Not applicable**

Number	Application requirement
9	An offset statement providing evidence that an offset that meets the offset requirements for the native vegetation to be removed has been identified and can be secured in accordance with the Guidelines. A suitable statement includes evidence that the required offset: • is available to purchase from a third party, or • will be established as a new offset and has the agreement of the proposed offset provider, or • can be met by a first party offset.
Response	See **Attachment B**

Number	Application requirement
10	A site assessment report of the native vegetation to be removed, including: • A habitat hectare assessment of any patches of native vegetation, including the condition, extent (in hectares), Ecological Vegetation Class and Bioregional Conservation Status; • The location, number, circumference (in cm measured at 1.3 metres above ground level) and species of large trees within patches; • The location, number, circumference (in cm measured at 1.3 metres above ground level) and species of Scattered Trees and whether each tree is small or large.
Response	See section 3.2 and 5.2.1 See Attachment A (Figure **3**, Figure **4**, Figure **7** & Figure **9**) No patches of native vegetation are proposed to be removed. 26 large Scattered Trees and two small Scattered Trees are proposed to be removed (**Attachment A**). Scattered Trees to be removed are listed in the table below. Photos of the trees to be removed are provided in Attachment D.

Tree ID	Tree Removal No.	Common Name	Scientific Name	DBH	X - MGA 55	Y - MGA 55
1	37	River Red Gum	*Eucalyptus camaldulensis*	141	411701.12295700000	5963545.699780000
8	4	Grey Box	*Eucalyptus microcarpa*	110	410875.17429400000	5963255.374220000
9	1	Grey Box	*Eucalyptus microcarpa*	25	411140.46711500000	5963306.545900000
10	5	Grey Box	*Eucalyptus microcarpa*	124	411755.92360900000	5962445.106810000
11	6	Stag	Stag	139	411943.87647400000	5962255.396780000
12	7	River Red Gum	*Eucalyptus camaldulensis*	186	411982.78333400000	5962107.752630000
13	8	River Red Gum	*Eucalyptus camaldulensis*	148	412144.40972000000	5963274.808690000
14	9	Grey Box	*Eucalyptus microcarpa*	123	412138.60949900000	5963119.108640000
15	10	River Red Gum	*Eucalyptus camaldulensis*	119	411940.82599700000	5963112.412040000
17	12	White Box	*Eucalyptus albens*	117	411542.98797900000	5962235.443460000
18	13	River Red Gum	*Eucalyptus camaldulensis*	241	411751.54458300000	5963254.706840000

19	14	River Red Gum	*Eucalyptus camaldulensis*	159	411507.14771400000	5963278.45016000000
20	15	River Red Gum	*Eucalyptus camaldulensis*	109	411662.01840700000	5963297.61443000000
21	16	River Red Gum	*Eucalyptus camaldulensis*	96	411779.44341100000	5963535.16483000000
22	17	River Red Gum	*Eucalyptus camaldulensis*	87	411730.67338900000	5963469.14463000000
23	18	River Red Gum	*Eucalyptus camaldulensis*	72	411653.82585300000	5963441.09420000000
24	19	River Red Gum	*Eucalyptus camaldulensis*	104	412017.63027100000	5963988.55672000000
25	20	Grey Box	*Eucalyptus microcarpa*	215	412003.24513100000	5963907.20795000000
26	21	River Red Gum	*Eucalyptus camaldulensis*	189	412023.16810800000	5963770.06438000000
29	23	River Red Gum	*Eucalyptus camaldulensis*	143	411943.03359100000	5963624.51837000000
30	24	Grey Box	*Eucalyptus microcarpa*	160	410448.26230600000	5964422.68098000000
33	26	Grey Box	*Eucalyptus microcarpa*	150	411683.19022200000	5964588.33406000000
34	27	Stag	*Stag*	80	411342.18784000000	5964357.38902000000
36	29	Grey Box	*Eucalyptus microcarpa*	100	411977.94256000000	5964667.24308000000
37	30	Grey Box	*Eucalyptus microcarpa*	110	411561.30525900000	5964260.95550000000
41	34	Grey Box	*Eucalyptus microcarpa*	130	412048.81384900000	5964555.08565000000
42	35	Grey Box	*Eucalyptus microcarpa*	120	411661.01267000000	5964496.16196000000
43	36	River Red Gum	*Eucalyptus camaldulensis*	55	410071.86470400000	5964725.07377000000

Number	Application requirement
11	Information about impacts on rare or threatened species habitat, including: • The relevant section of the *habitat importance map* for each rare or threatened species requiring a species offset • For each rare or threatened species that the native vegetation to be removed is habitat for, according to the Habitat importance maps: - The species' conservation status

	- The proportional impact of the removal of native vegetation on the total habitat for that species - Whether their habitat are highly localized habitats, dispersed habitats, or important areas of habitat within a dispersed species habitat.
Response	As identified in **Attachment A**, there are no species present on the site that require a species offset. Offsets necessary for the removals are general offsets only. As per the RFI dated 26 November 2020, further consideration of the potential for Striped Legless Lizard was investigated in iteration G. Ecologists undertook a targeted habitat assessment for Striped Legless lizard to identify potential habitat within the study area that was then analysed through consideration of historical records for Striped Legless Lizard in north-east Victoria and GIS-based analysis of patterns in topography, geology and soils in relation to those historical records (Appendix H). The result of the detailed analysis allowed the area of potential habitat to be refined to two areas. The two areas comprise a large area centred around habitat zone 14 (Plains Woodland EVC) and a smaller area connected to habitat zone 14. Another large area of remnant vegetation mapped on an adjacent property during a previous iteration of the project is also noted. In the wider landscape these areas are similar in geology and topography to locations where Striped Legless Lizard have been recorded previously. All areas of potential Striped Legless Lizard habitat have been fully retained by the Project. Other potential habitat within the study area identified during the targeted habitat assessment provide a 'low' likelihood for Striped Legless Lizard due to a combination of factors including historical site management, limited 'typical' habitat for the species and the areas being within a former wetland basin where waterlogging would periodically occur.

Attachment A - Native Vegetation Removal Report

Native vegetation removal report

This report provides information to support an application to remove, destroy or lop native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*. The report **is not an assessment by DELWP** of the proposed native vegetation removal. Native vegetation information and offset requirements have been determined using spatial data provided by the applicant or their consultant.

Date of issue: **20/04/2021**
Time of issue: **12:59 pm**

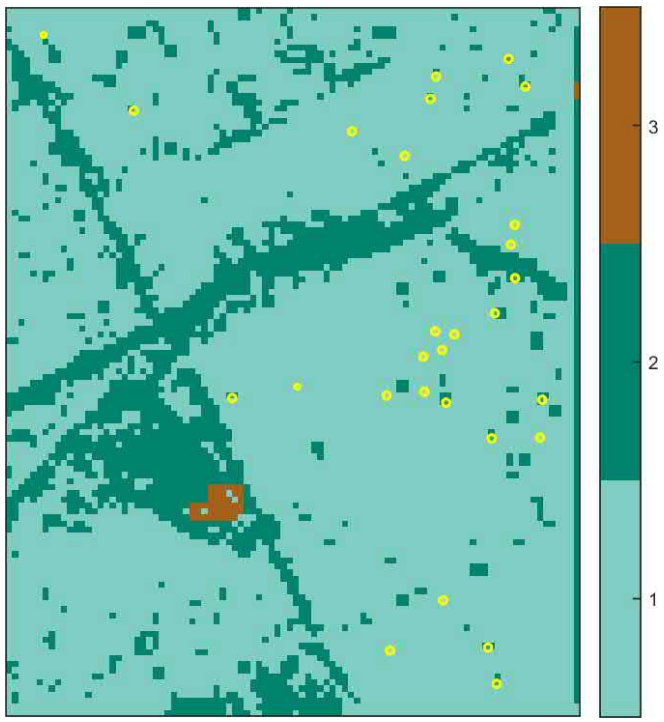
Report ID: ACM_2021_003

Project ID	Lake_Mokoan_ENSYM_Clearance_Scenario8

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	1.891 ha
Extent of past removal	0.000 ha
Extent of proposed removal	1.891 ha
No. Large trees proposed to be removed	26
Location category of proposed removal	Location 2 The native vegetation is in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map). Removal of less than 0.5 hectares of native vegetation in this location will not have a significant impact on any habitat for a rare or threatened species.

1. Location map



Offset requirements if a permit is granted

Any approval granted will include a condition to obtain an offset that meets the following requirements:

General offset amount[1]	0.394 general habitat units
Vicinity	Goulburn Broken Catchment Management Authority (CMA) or Benalla Rural City Council
Minimum strategic biodiversity value score[2]	0.312
Large trees	26 large trees

NB: values within tables in this document may not add to the totals shown above due to rounding

Appendix 1 includes information about the native vegetation to be removed

Appendix 2 includes information about the rare or threatened species mapped at the site.

Appendix 3 includes maps showing native vegetation to be removed and extracts of relevant species habitat importance maps

1 The general offset amount required is the sum of all general habitat units in Appendix 1.

2 Minimum strategic biodiversity score is 80 per cent of the weighted average score across habitat zones where a general offset is required

Next steps

Any proposal to remove native vegetation must meet the application requirements of the Detailed Assessment Pathway and it will be assessed under the Detailed Assessment Pathway.

If you wish to remove the mapped native vegetation you are required to apply for a permit from your local council. Council will refer your application to DELWP for assessment, as required. **This report is not a referral assessment by DELWP.**

This *Native vegetation removal report* must be submitted with your application for a permit to remove, destroy or lop native vegetation.

Refer to the *Guidelines for the removal, destruction or lopping of native* vegetation (the Guidelines) for a full list of application requirements This report provides information that meets the following application requirements:

- The assessment pathway and reason for the assessment pathway
- A description of the native vegetation to be removed (partly met)
- Maps showing the native vegetation and property (partly met)
- Information about the impacts on rare or threatened species.
- The offset requirements determined in accordance with section 5 of the Guidelines that apply if approval is granted to remove native vegetation.

Additional application requirements must be met including:

- Topographical and land information
- Recent dated photographs
- Details of past native vegetation removal
- An avoid and minimise statement
- A copy of any Property Vegetation Plan that applies
- A defendable space statement as applicable
- A statement about the Native Vegetation Precinct Plan as applicable
- A site assessment report including a habitat hectare assessment of any patches of native vegetation and details of trees
- An offset statement that explains that an offset has been identified and how it will be secured.

Authorised by the Victorian Government, 8 Nicholson Street, East Melbourne.

For more information contact the DELWP Customer Service Centre 136 186

www.delwp.vic.gov.au

Appendix 1: Description of native vegetation to be removed

The species-general offset test was applied to your proposal. This test determines if the proposed removal of native vegetation has a proportional impact on any rare or threatened species habitats above the species offset threshold. The threshold is set at 0.005 per cent of the mapped habitat value for a species. When the proportional impact is above the species offset threshold a species offset is required. This test is done for all species mapped at the site. Multiple species offsets will be required if the species offset threshold is exceeded for multiple species.

Where a zone requires species offset(s), the species habitat units for each species in that zone is calculated by the following equation in accordance with the Guidelines:

Species habitat units = extent x condition x species landscape factor x 2, where the species landscape factor = 0.5 + (habitat importance score/2)

The species offset amount(s) required is the sum of all species habitat units per zone

Where a zone does not require a species offset, the general habitat units in that zone is calculated by the following equation in accordance with the Guidelines:

General habitat units = extent x condition x general landscape factor x 1.5, where the general landscape factor = 0.5 + (strategic biodiversity value score/2)

The general offset amount required is the sum of all general habitat units per zone.

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	**Type**	**BioEVC**	**BioEVC conservation status**	**Large tree(s)**	**Partial removal**	**Condition score**	**Polygon Extent**	**Extent without overlap**	**SBV score**	**HI score**	**Habitat units**	**Offset type**
37-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.450		0.015	General
4-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.430		0.015	General
1-A	Scattered Tree	vriv0235	Endangered	0	no	0.200	0.031	0.031	0.390		0.007	General
5-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.249		0.013	General
6-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.250		0.013	General
7-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.250		0.013	General
8-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.260		0.013	General
9-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.250		0.013	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
10-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.250		0.013	General
12-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.250		0.013	General
13-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.444		0.015	General
14-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.440		0.015	General
15-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.450		0.015	General
16-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.440		0.015	General
17-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.450		0.015	General
18-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.450		0.015	General
19-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.450		0.015	General
20-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.551		0.016	General
21-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.840		0.019	General
23-A	Scattered Tree	vriv0235	Endangered	1	no	0.200	0.070	0.070	0.440		0.015	General
24-A	Scattered Tree	vriv0803	Endangered	1	no	0.200	0.070	0.070	0.410		0.015	General
26-A	Scattered Tree	vriv0055	Endangered	1	no	0.200	0.070	0.070	0.380		0.015	General
27-A	Scattered Tree	vriv0055	Endangered	1	no	0.200	0.070	0.070	0.350		0.014	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
29-A	Scattered Tree	vriv0055	Endangered	1	no	0.200	0.070	0.070	0.350		0.014	General
30-A	Scattered Tree	vriv0055	Endangered	1	no	0.200	0.070	0.070	0.340		0.014	General
34-A	Scattered Tree	vriv0055	Endangered	1	no	0.200	0.070	0.070	0.360		0.014	General
35-A	Scattered Tree	vriv0055	Endangered	1	no	0.200	0.070	0.070	0.340		0.014	General
36-A	Scattered Tree	vriv0803	Endangered	0	no	0.200	0.031	0.031	0.450		0.007	General

Appendix 2: Information about impacts to rare or threatened species' habitats on site

This table lists all rare or threatened species' habitats mapped at the site.

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Plump Windmill Grass	*Chloris ventricosa*	500757	Vulnerable	Dispersed	Habitat importance map	0.0001
Mueller Daisy	*Brachyscome muelleroides*	500465	Endangered	Dispersed	Habitat importance map	0.0001
Yarran Wattle	*Acacia omalophylla*	500069	Endangered	Dispersed	Habitat importance map	0.0001
Western Silver Wattle	*Acacia decora*	500027	Vulnerable	Dispersed	Habitat importance map	0.0001
Ridged Water-milfoil	*Myriophyllum porcatum*	502257	Vulnerable	Dispersed	Habitat importance map	0.0000
Euroa Guinea-flower	*Hibbertia humifusa subsp. erigens*	505083	Vulnerable	Dispersed	Habitat importance map	0.0000
Stiff Groundsel	*Senecio behrianus*	503101	Endangered	Dispersed	Habitat importance map	0.0000
Mugga	*Eucalyptus sideroxylon subsp. sideroxylon*	504493	Rare	Dispersed	Habitat importance map	0.0000
Woolly Wattle	*Acacia lanigera var. lanigera*	505093	Rare	Dispersed	Habitat importance map	0.0000
Striped Water-milfoil	*Myriophyllum striatum*	503869	Vulnerable	Dispersed	Habitat importance map	0.0000
Narrow Goodenia	*Goodenia macbarronii*	501513	Vulnerable	Dispersed	Habitat importance map	0.0000
Silky Umbrella-grass	*Digitaria ammophila*	501041	Vulnerable	Dispersed	Habitat importance map	0.0000
Northern Sandalwood	*Santalum lanceolatum*	503005	Endangered	Dispersed	Habitat importance map	0.0000
Veiled Fringe-sedge	*Fimbristylis velata*	501369	Rare	Dispersed	Habitat importance map	0.0000
Bent-leaf Wattle	*Acacia flexifolia*	500035	Rare	Dispersed	Habitat importance map	0.0000
Cottony Cassinia	*Cassinia ozothamnoides*	501560	Vulnerable	Dispersed	Habitat importance map	0.0000
Dookie Daisy	*Brachyscome gracilis*	505494	Vulnerable	Dispersed	Habitat importance map	0.0000
Pale Flax-lily	*Dianella sp. aff. longifolia (Riverina)*	507399	Vulnerable	Dispersed	Habitat importance map	0.0000
Pepper Grass	*Panicum laevinode*	504808	Vulnerable	Dispersed	Habitat importance map	0.0000

Jericho Wire-grass	*Aristida jerichoensis var. subspinulifera*	504631	Endangered	Dispersed	Habitat importance map	0.0000
Ausfeld's Wattle	*Acacia ausfeldii*	500013	Vulnerable	Dispersed	Habitat importance map	0.0000
Velvet Daisy-bush	*Olearia pannosa subsp. cardiophylla*	502317	Vulnerable	Dispersed	Habitat importance map	0.0000
Silky Swainson-pea	*Swainsona sericea*	504946	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Scurf-pea	*Cullen parvum*	502773	Endangered	Dispersed	Habitat importance map	0.0000
Yellow-tongue Daisy	*Brachyscome chrysoglossa*	503654	Vulnerable	Dispersed	Habitat importance map	0.0000
Umbrella Grass	*Digitaria divaricatissima var. divaricatissima*	501045	Vulnerable	Dispersed	Habitat importance map	0.0000
Western Golden-tip	*Goodia medicaginea*	501518	Rare	Dispersed	Habitat importance map	0.0000
Rye Beetle-grass	*Tripogon loliiformis*	503455	Rare	Dispersed	Habitat importance map	0.0000
Broom Bitter-pea	*Daviesia genistifolia s.s.*	503813	Rare	Dispersed	Habitat importance map	0.0000
Golden Cowslips	*Diuris behrii*	501061	Vulnerable	Dispersed	Habitat importance map	0.0000
Dark Wire-grass	*Aristida calycina var. calycina*	503630	Rare	Dispersed	Habitat importance map	0.0000
Long Eryngium	*Eryngium paludosum*	501238	Vulnerable	Dispersed	Habitat importance map	0.0000
Riverina Bitter-cress	*Cardamine moirensis*	505032	Rare	Dispersed	Habitat importance map	0.0000
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0000
Dwarf Bitter-cress	*Rorippa eustylis*	502944	Rare	Dispersed	Habitat importance map	0.0000
Delicate Crane's-bill	*Geranium sp. 6*	505347	Vulnerable	Dispersed	Habitat importance map	0.0000
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0000
Smooth Minuria	*Minuria integerrima*	502201	Rare	Dispersed	Habitat importance map	0.0000
Rosemary Grevillea	*Grevillea rosmarinifolia subsp. rosmarinifolia*	504066	Rare	Dispersed	Habitat importance map	0.0000
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0000
Southern Swainson-pea	*Swainsona behriana*	504944	Rare	Dispersed	Habitat importance map	0.0000
Late-flower Flax-lily	*Dianella tarda*	505085	Vulnerable	Dispersed	Habitat importance map	0.0000

Branching Groundsel	*Senecio cunninghamii var. cunninghamii*	503104	Rare	Dispersed	Habitat importance map	0.0000
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*	10443	Endangered	Dispersed	Habitat importance map	0.0000
Slender Club-sedge	*Isolepis congrua*	501773	Vulnerable	Dispersed	Habitat importance map	0.0000
Twiggy Sida	*Sida intricata*	503143	Vulnerable	Dispersed	Habitat importance map	0.0000
Fuzzy New Holland Daisy	*Vittadinia cuneata var. morrisii*	505060	Rare	Dispersed	Habitat importance map	0.0000
Downy Swainson-pea	*Swainsona swainsonioides*	503328	Endangered	Dispersed	Habitat importance map	0.0000
Grassland Velleia	*Velleia arguta*	503487	Rare	Dispersed	Habitat importance map	0.0000
Dwarf Brooklime	*Gratiola pumilo*	503753	Rare	Dispersed	Habitat importance map	0.0000
Grey Grass-tree	*Xanthorrhoea glauca subsp. angustifolia*	507229	Endangered	Dispersed	Habitat importance map	0.0000
Red Swainson-pea	*Swainsona plagiotropis*	503324	Endangered	Dispersed	Habitat importance map	0.0000
Waterbush	*Myoporum montanum*	502240	Rare	Dispersed	Habitat importance map	0.0000
Hairy Tails	*Ptilotus erubescens*	502825	Vulnerable	Dispersed	Habitat importance map	0.0000
Dwarf Cassinia	*Cassinia diminuta*	507664	Rare	Dispersed	Habitat importance map	0.0000
Lanky Buttons	*Leptorhynchos elongatus*	501941	Endangered	Dispersed	Habitat importance map	0.0000
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0000
Brolga	*Grus rubicunda*	10177	Vulnerable	Dispersed	Habitat importance map	0.0000
Spiny-fruit Saltbush	*Atriplex spinibractea*	504608	Endangered	Dispersed	Habitat importance map	0.0000
Kamarooka Mallee	*Eucalyptus froggattii*	501279	Rare	Dispersed	Habitat importance map	0.0000
Buloke	*Allocasuarina luehmannii*	500678	Endangered	Dispersed	Habitat importance map	0.0000
Small Burr-grass	*Tragus australianus*	503418	Rare	Dispersed	Habitat importance map	0.0000
Spotted Emu-bush	*Eremophila maculata subsp. maculata*	501204	Rare	Dispersed	Habitat importance map	0.0000
Bearded Dragon	*Pogona barbata*	12177	Vulnerable	Dispersed	Habitat importance map	0.0000
Bush Stone-curlew	*Burhinus grallarius*	10174	Endangered	Dispersed	Habitat importance map	0.0000

Elegant Parrot	*Neophema elegans*	10307	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	504823	Endangered	Dispersed	Habitat importance map	0.0000
Buloke Mistletoe	*Amyema linophylla subsp. orientalis*	500217	Vulnerable	Dispersed	Habitat importance map	0.0000

Habitat group

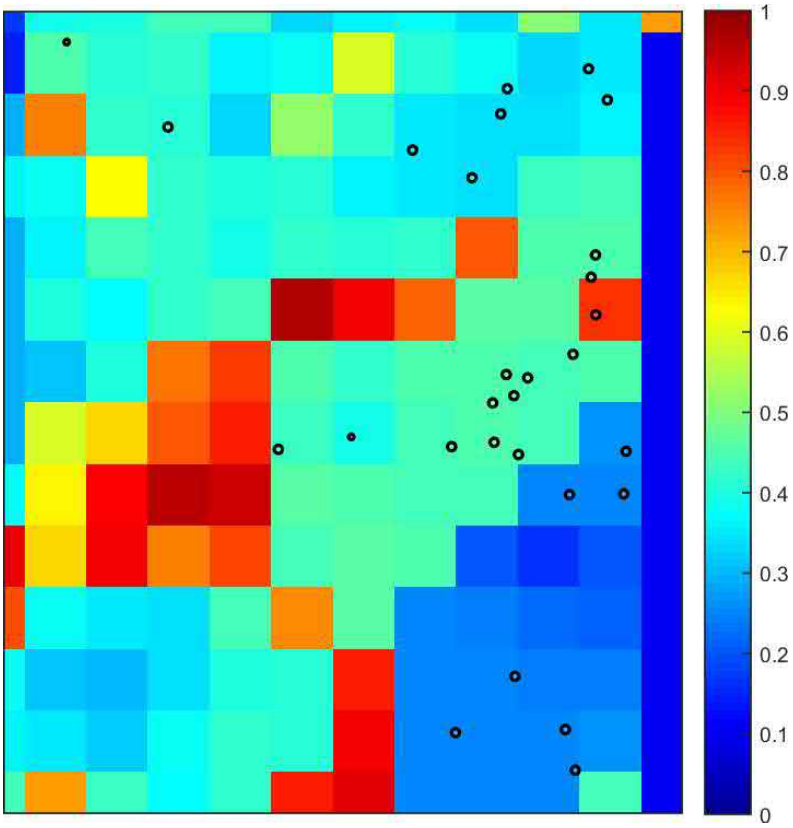
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

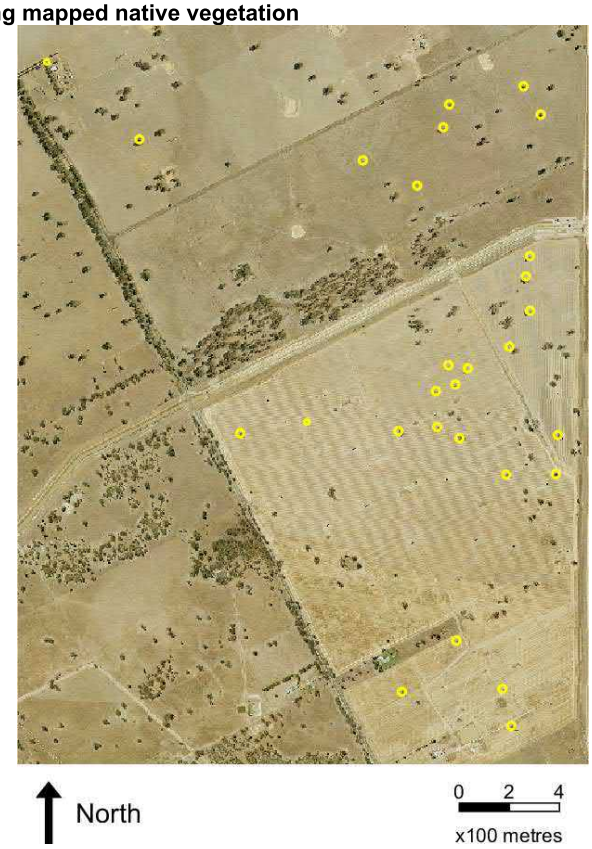
- Habitat importance maps are the maps defined in the Guidelines that include all the mapped habitat for a rare or threatened species
- Top ranking maps are the maps defined in the Guidelines that depict the important areas of a dispersed species habitat, developed from the highest habitat importance scores in dispersed species habitat maps and selected VBA records
- Selected VBA record is an area in Victoria that represents a large population, roosting or breeding site etc.

Appendix 3 – Images of mapped native vegetation

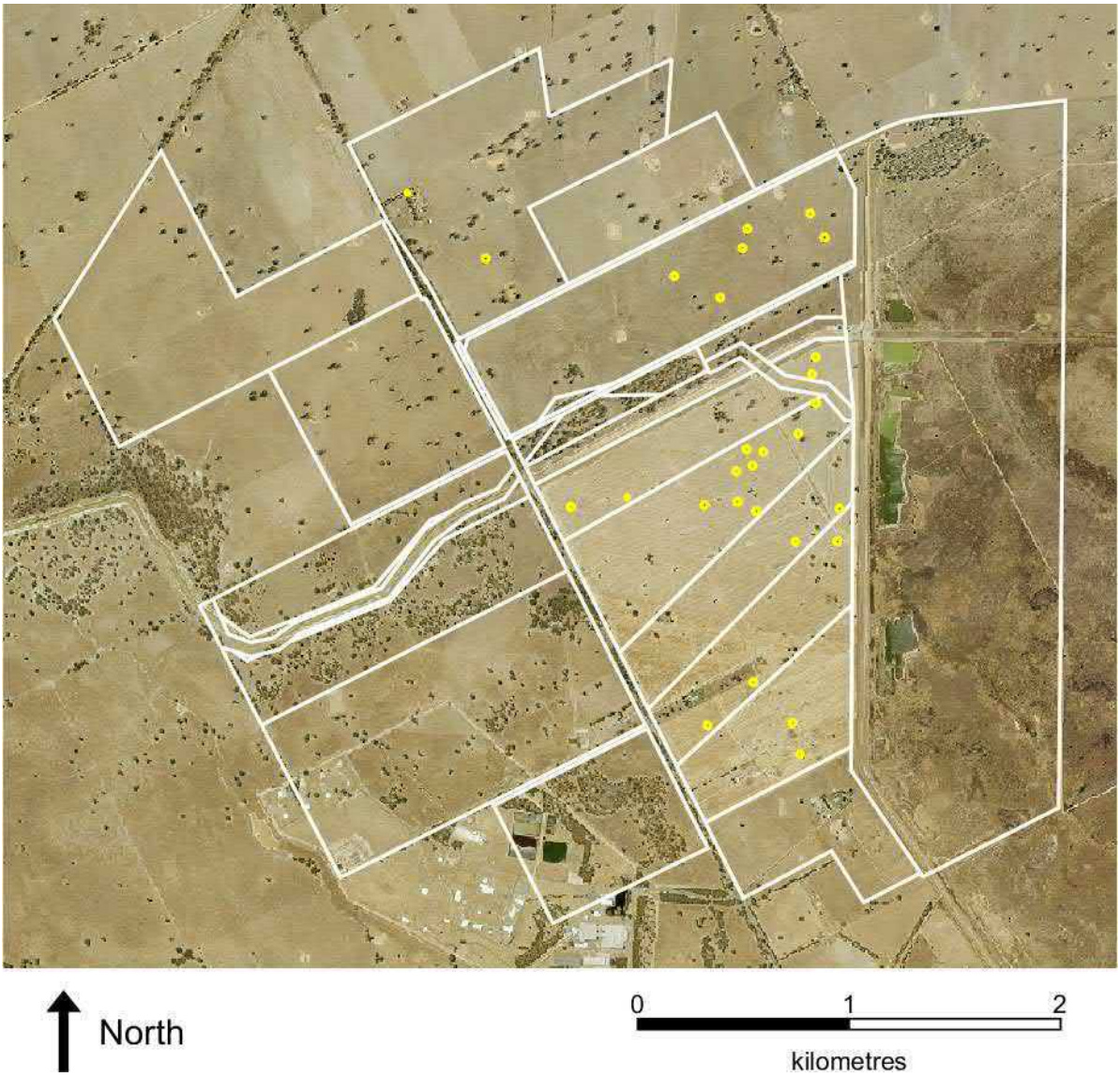
2. Strategic biodiversity values map



3. Aerial photograph showing mapped native vegetation



4. Map of the property in context



Yellow boundaries denote areas of proposed native vegetation removal.

Attachment B – Offset Statement

AECOM Imagine it. Delivered.

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Melbourne VIC 3008
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ABN 20 093 846 925

19 April 2021

David Huang
Project Manager
Level 19, 303 Collins Street, Melbourne VIC 3000

Dear David,

I understand the biodiversity offsets required for your project known as West Mokoan Solar Farm to include those listed in Table 1.

Table 1 Offset requirement

General offset amount	Vicinity	Minimum Strategic Biodiversity Value Score	Large trees
0.394 General habitat units (GHU)s	Goulburn Broken Catchment Management Authority or Benalla Rural City Council	0.312	26 Large trees

I have consulted the Native Vegetation Credit Register (NVCR) online tool on 19/04/2021 and can confirm that there are seven credit providers that meet your offset requirement. The report (Report ID 8566) is attached to this letter for your information.

I have also reviewed a register of historical GHU trading prices administered by DELWP to provide a price range of offsets you require for your project. The trade register indicates that historical prices of GHU within the Goulburn Broken Catchment Management Authority range from $100,000 to $693,750.

Kind regards

Ben Roberts
Principal Ecologist - Botany
D +61 3 9653 8385
Ben.Roberts@aecom.com

Report of available native vegetation credits

This report lists native vegetation credits available to purchase through the Native Vegetation Credit Register.

This report is **not evidence** that an offset has been secured. An offset is only secured when the units have been purchased and allocated to a permit or other approval and an allocated credit extract is provided by the Native Vegetation Credit Register.

Date and time: 19/04/2021 09:56 **Report ID: 8566**

What was searched for?

General offset

General habitat units	Strategic biodiversity value	Large trees	Vicinity (Catchment Management Authority or Municipal district)	
0.394	0.312	26	CMA	Goulburn Broken
			or LGA	Benalla Rural City

Details of available native vegetation credits on 19 April 2021 09:56

These sites meet your requirements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)
BBA-1145	1.177	56	Goulburn Broken	Mitchell Shire	No	Yes	No	Ethos
VC_CFL-2636_01	19.455	137	Goulburn Broken	Strathbogie Shire	Yes	Yes	No	Bio Offsets, VegLink
VC_CFL-3075_01	9.585	132	Goulburn Broken	Greater Shepparton City	Yes	Yes	No	VegLink
VC_TFN-C2047_01	9.059	47	Goulburn Broken	Mitchell Shire	Yes	Yes	No	VegLink

These sites meet your requirements using alternative arrangements for general offsets.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)

There are no sites listed in the Native Vegetation Credit Register that meet your offset requirements when applying the alternative arrangements as listed in section 11.2 of the Guidelines for the removal, destruction or lopping of native vegetation.

These potential sites are not yet available, land owners may finalise them once a buyer is confirmed.

Credit Site ID	GHU	LT	CMA	LGA	Land owner	Trader	Fixed price	Broker(s)

There are no potential sites listed in the Native Vegetation Credit Register that meet your offset requirements.

LT - Large Trees *CMA - Catchment Management Authority* *LGA - Municipal District or Local Government Authority*

Next steps

If applying for approval to remove native vegetation
Attach this report to an application to remove native vegetation as evidence that your offset requirement is currently available.

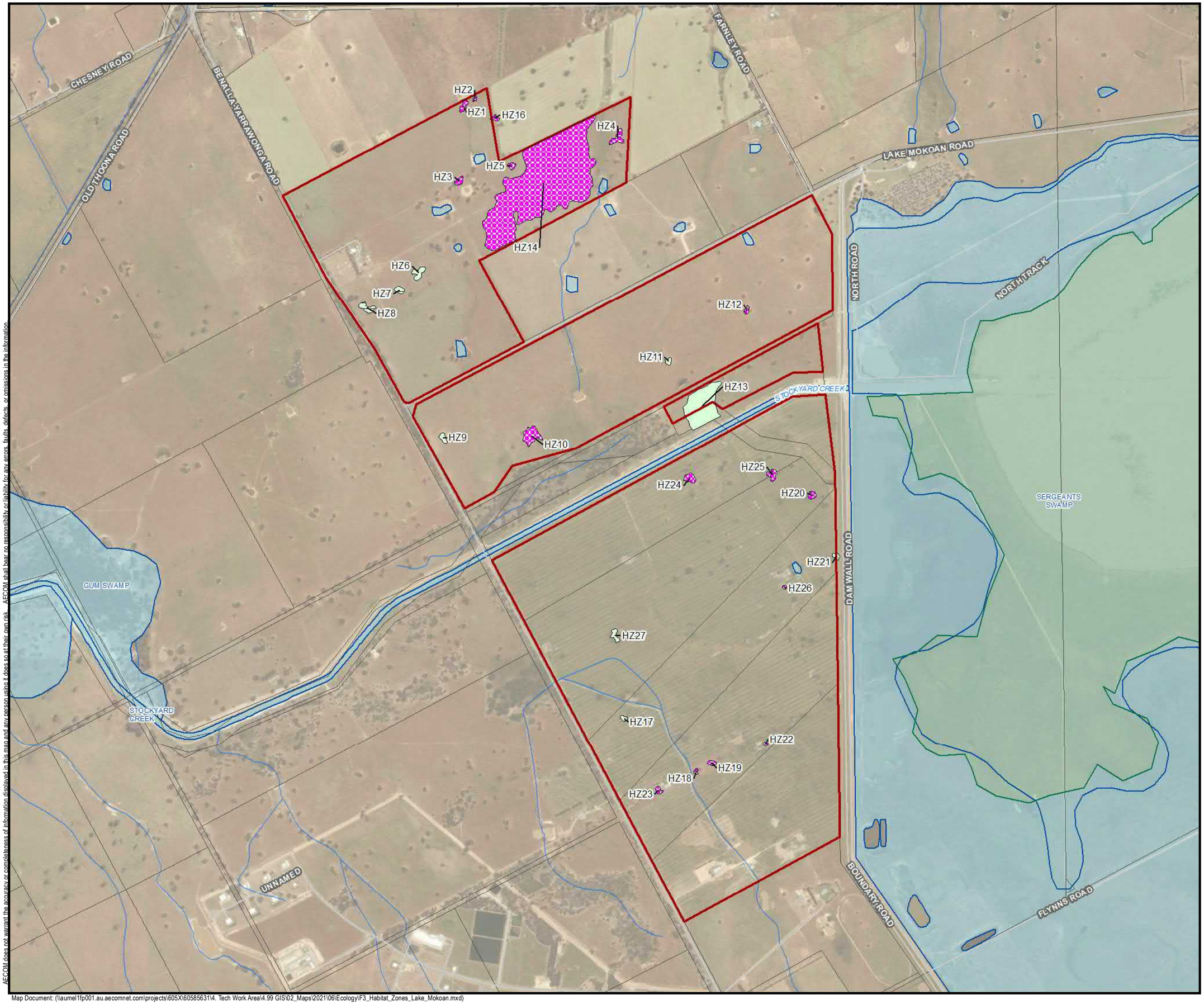
If you have approval to remove native vegetation
Below are the contact details for all brokers. Contact the broker(s) listed for the credit site(s) that meet your offset requirements. These are shown in the above tables. If more than one broker or site is listed, you should get more than one quote before deciding which offset to secure.

Broker contact details

Broker Abbreviation	Broker Name	Phone	Email	Website
Abezco	Abzeco Pty. Ltd.	(03) 9431 5444	offsets@abzeco.com.au	www.abzeco.com.au
Baw Baw SC	Baw Baw Shire Council	(03) 5624 2411	bawbaw@bawbawshire.vic.gov.au	www.bawbawshire.vic.gov.au
Bio Offsets	Biodiversity Offsets Victoria	0452 161 013	info@offsetsvictoria.com.au	www.offsetsvictoria.com.au
Contact NVOR	Native Vegetation Offset Register	136 186	nativevegetation.offsetregister@delwp.vic.gov.au	www.environment.vic.gov.au/native-vegetation
Ecocentric	Ecocentric Environmental Consulting	0410 564 139	ecocentric@me.com	Not avaliable
Ethos	Ethos NRM Pty Ltd	(03) 5153 0037	offsets@ethosnrm.com.au	www.ethosnrm.com.au
Nillumbik SC	Nillumbik Shire Council	(03) 9433 3316	offsets@nillumbik.vic.gov.au	www.nillumbik.vic.gov.au
TFN	Trust for Nature	8631 5888	offsets@tfn.org.au	www.trustfornature.org.au
VegLink	Vegetation Link Pty Ltd	(03) 8578 4250 or 1300 834 546	offsets@vegetationlink.com.au	www.vegetationlink.com.au
Yarra Ranges SC	Yarra Ranges Shire Council	1300 368 333	biodiversityoffsets@yarraranges.vic.gov.au	www.yarraranges.vic.gov.au

For more information contact the DELWP Customer Service Centre 136 186 or the Native Vegetation Credit Register at nativevegetation.offsetregister@delwp.vic.gov.au

Attachment C – Figures



PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 18 JUN 2021

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N

Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Watercourses
- Roadways
- Cadastre
- Waterbodies

Ecological Vegetation Classes

- 175 Grassy Woodland
- 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic
- 55 Plains Grassy Woodland
- 803 Plains Woodland

Patches (Habitat Zones) of Native Vegetation

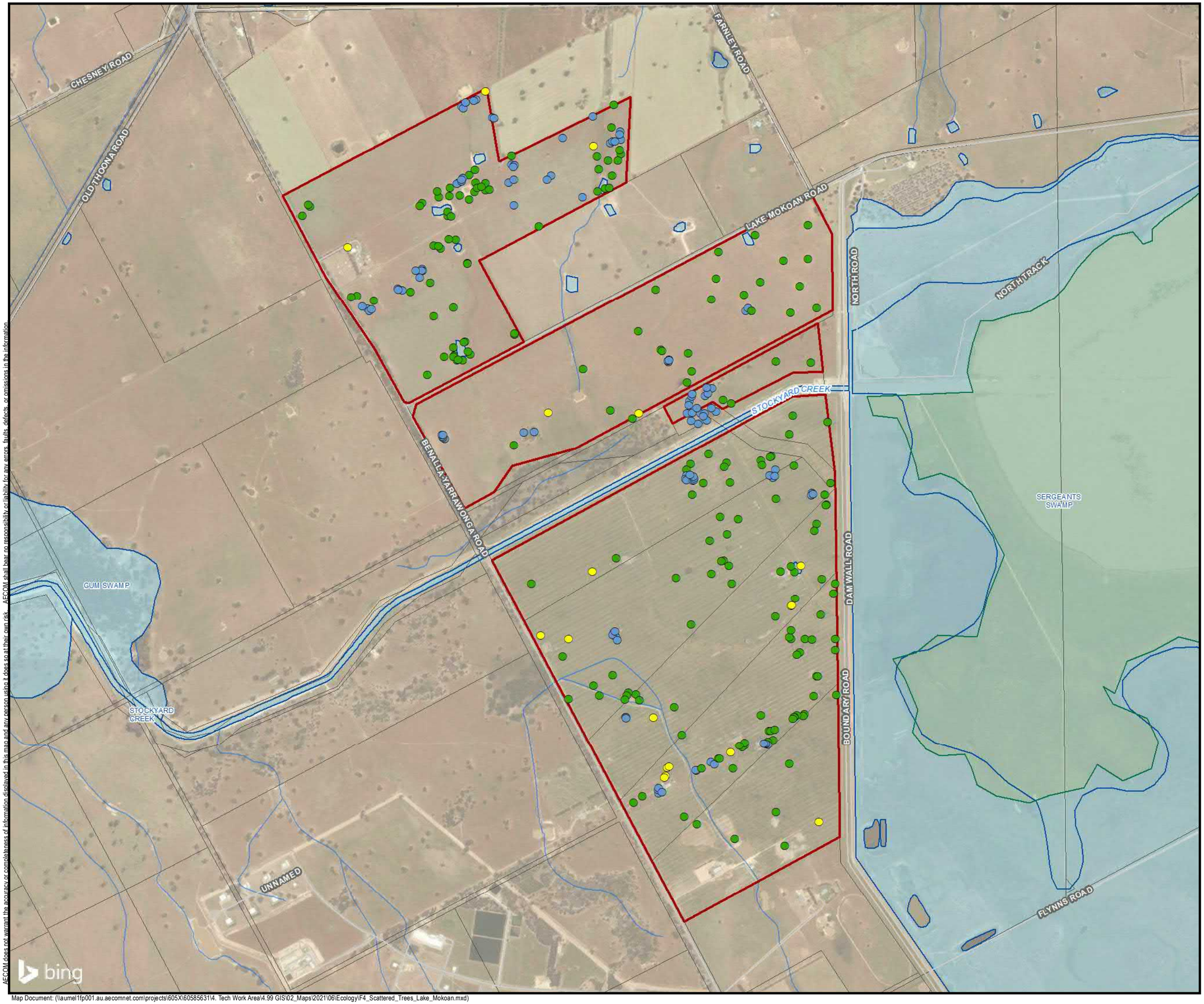
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 3

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\6058563114. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F3_Habitat_Zones_Lake_Mokoan.mxd)



PROJECT ID 60585631
CREATED BY brierej
LAST MODIFIED brierej 18 JUN 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500
metres

1:15,000 (when printed at A3)

Legend

- Study Area
- Large Scattered Tree
- Large Tree in Patch
- Small Scattered Tree
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

Trees in the Study Area

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure
4

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\605856314. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F4_Scattered_Trees_Lake_Mokoan.mxd)

PROJECT ID	60585631
CREATED BY	jasmine.bettiol
LAST MODIFIED	jasmine.bettiol 18 JUN 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

1:15,000 (when printed at A3)

Legend

- Study Area
- Land parcel included in Rev G
- Low
- Medium
- High
- Trees to be Removed
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

CHESNEY ROAD
OLD THOONA ROAD
FARNLEY ROAD
LAKE MOKOAN ROAD
NORTH ROAD
NORTH TRACK
STOCKYARD CREEK
BENALLA-YARRAWONGA ROAD
DAM WALL ROAD
BOUNDARY ROAD
FLYNNS ROAD
SERGEANTS SWAMP
GUM SWAMP
STOCKYARD CREEK
UNNAMED

43 3 4 36 5 31 38 33 39 41 42 32 6 30 44 40 34 37 7 35 24 25 26 2 29 1 21 23 22 9 8 19 20 18 13 15 14 27 28 10 17 16 11 12

Tree habitat value

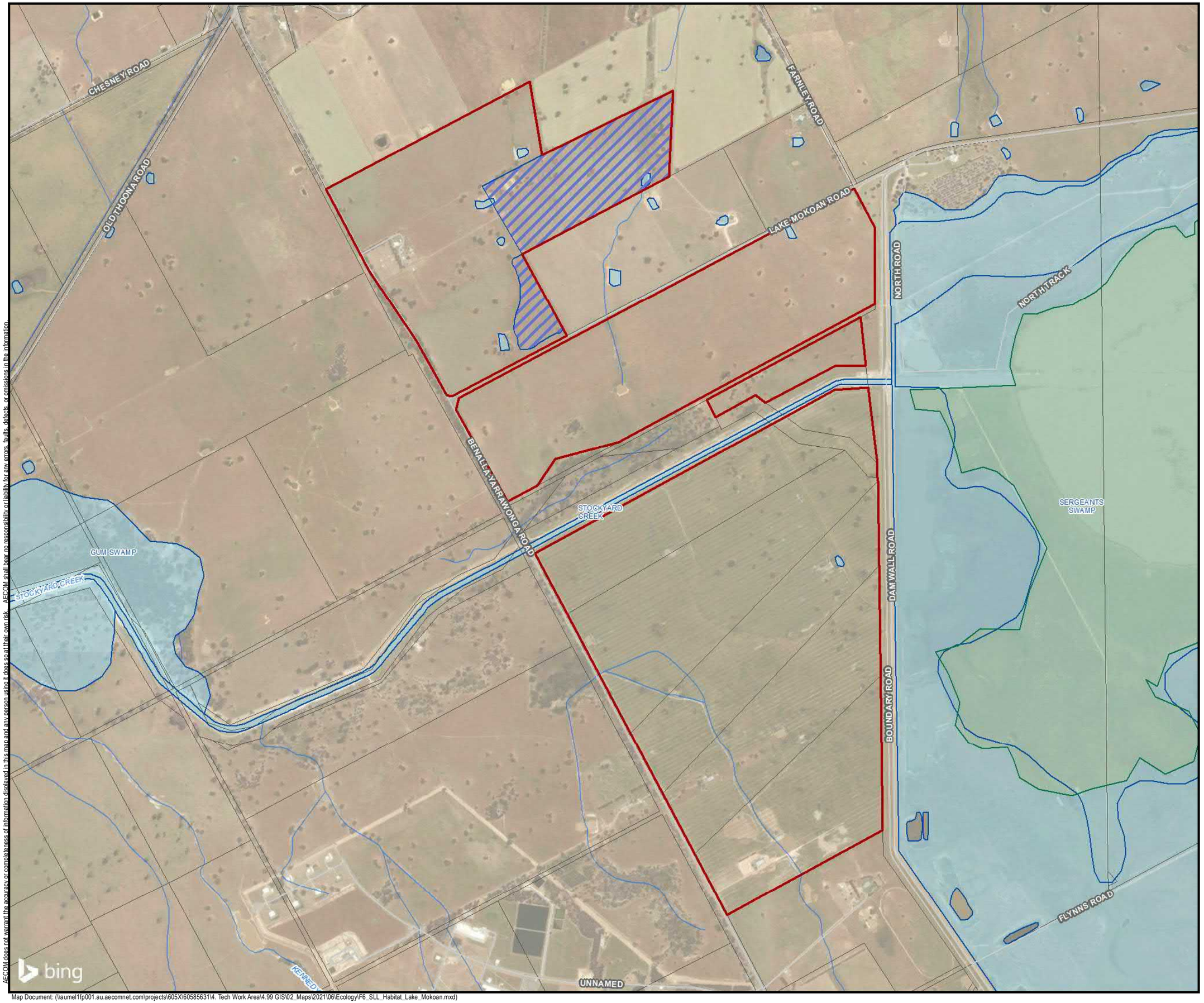
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 5

Map Document: (P:\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F5_Trees_Habitat_Value_Lake_Mokoan.mxd)



PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 18 JUN 2021

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N

Coordinate System: GDA 1994 MGA Zone 55

0 130 260 520

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Potential Habitat for Striped Legless Lizard
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

Striped Legless Lizard Habitat within West Mokoan Solar Farm

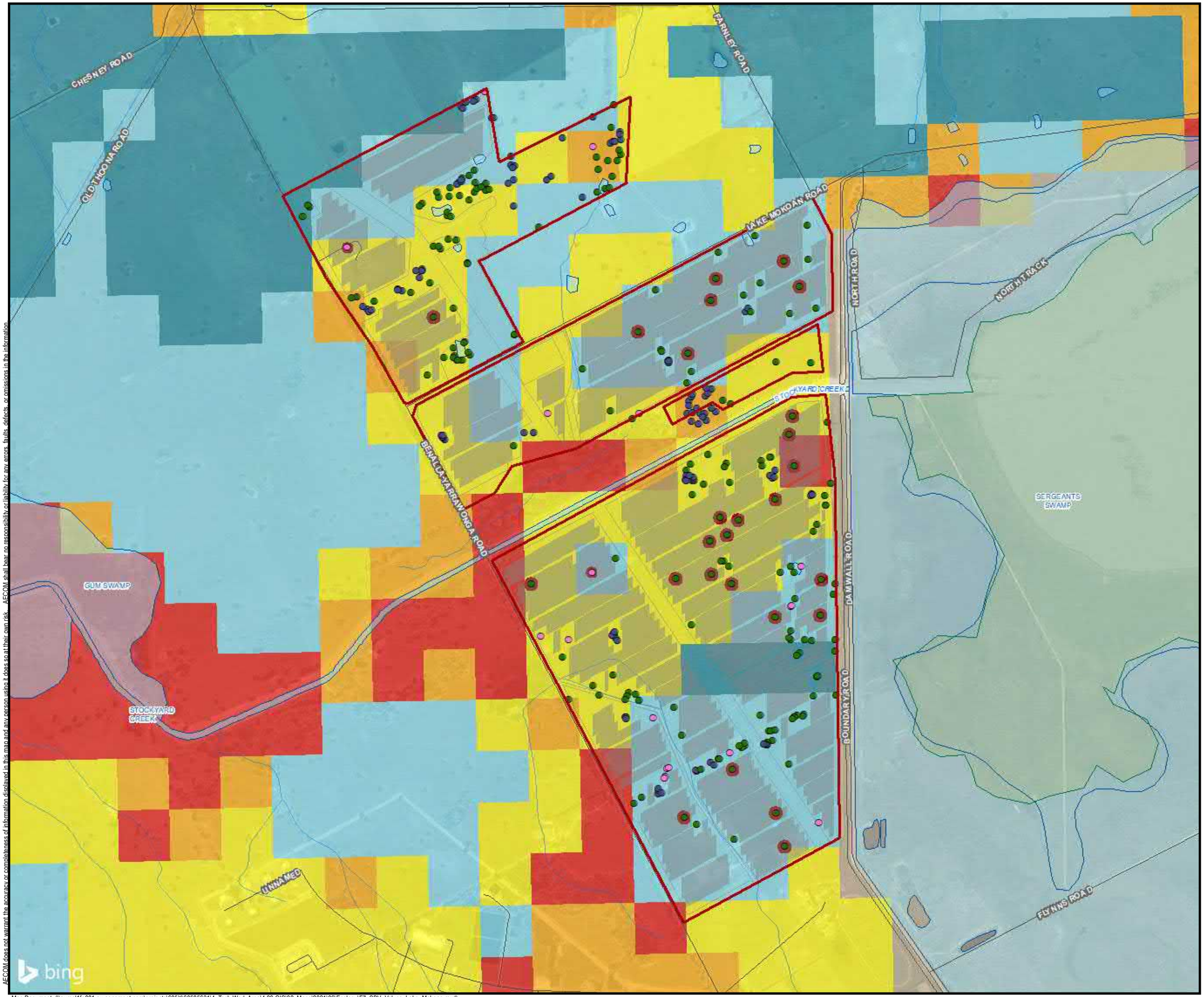
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 6

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\605856314. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F6_SLL_Habitat_Lake_Mokoan.mxd)



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LAST MODIFIED	brierej 18 JUN 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

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LEGEND

- Study Area
- Large Scattered Tree
- Large Tree in Patch
- Small Scattered Tree
- Solar Design Layout
- Watercourses
- Roadways
- Waterbodies
- Wetland
- Impacted Vegetation

Strategic Biodiversity Values

- 0.00 - 0.20
- 0.21 - 0.40
- 0.41 - 0.60
- 0.61 - 0.80
- 0.80 - 1.00

Strategic Biodiversity Values

South Energy

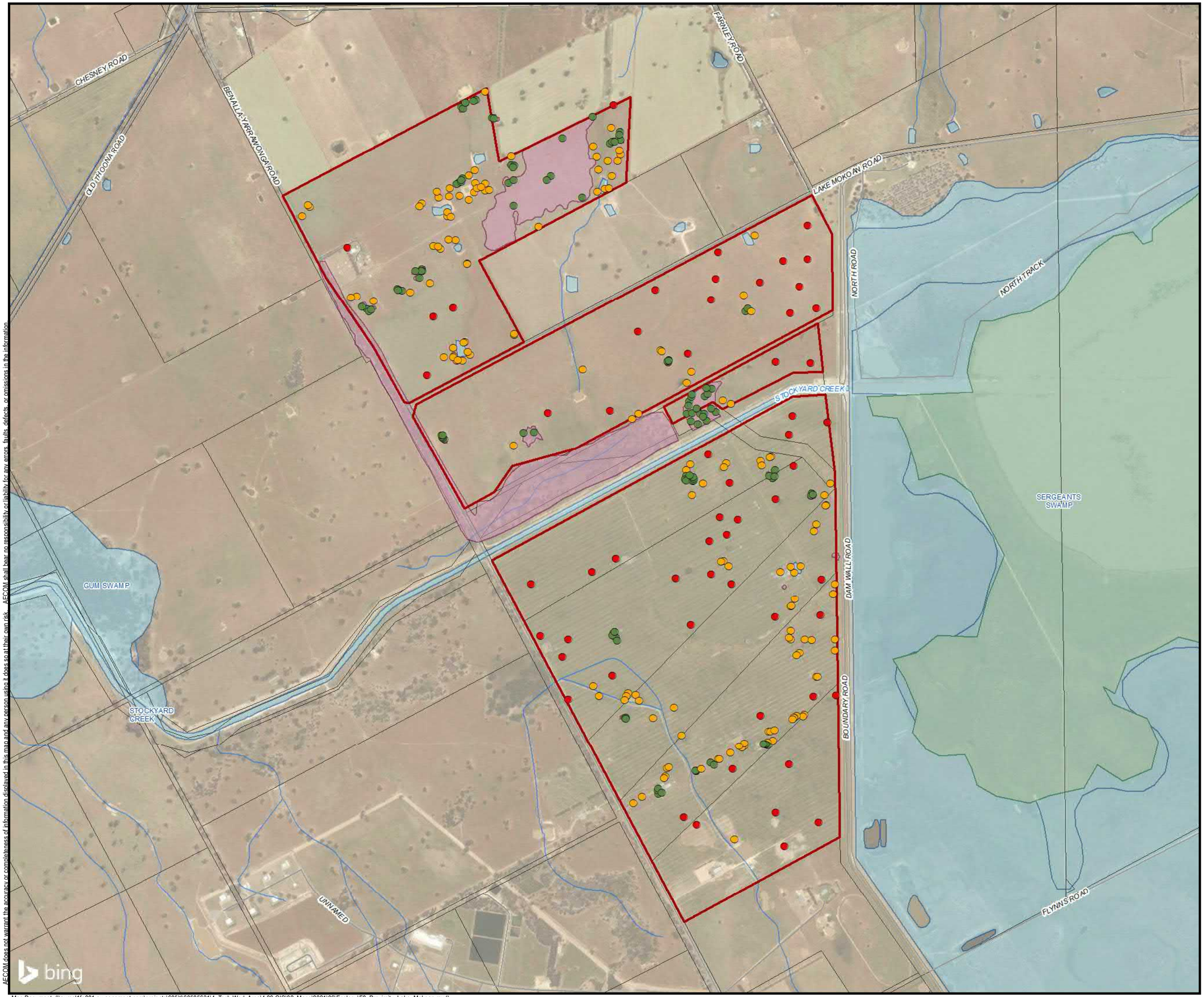
West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

7

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F7_SBV_Values_Lake_Mokoan.mxd)



PROJECT ID	60585631
CREATED BY	brierej
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Coordinate System: GDA 1994 MGA Zone 55

0 145 290 580

metres

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LEGEND

- Study Area

Tree Proximity Category

- 1
- 2
- 3
- Watercourses
- Roadways
- Habitat Zones
- Cadastre
- Waterbodies
- Wetland

Tree Proximity Analysis

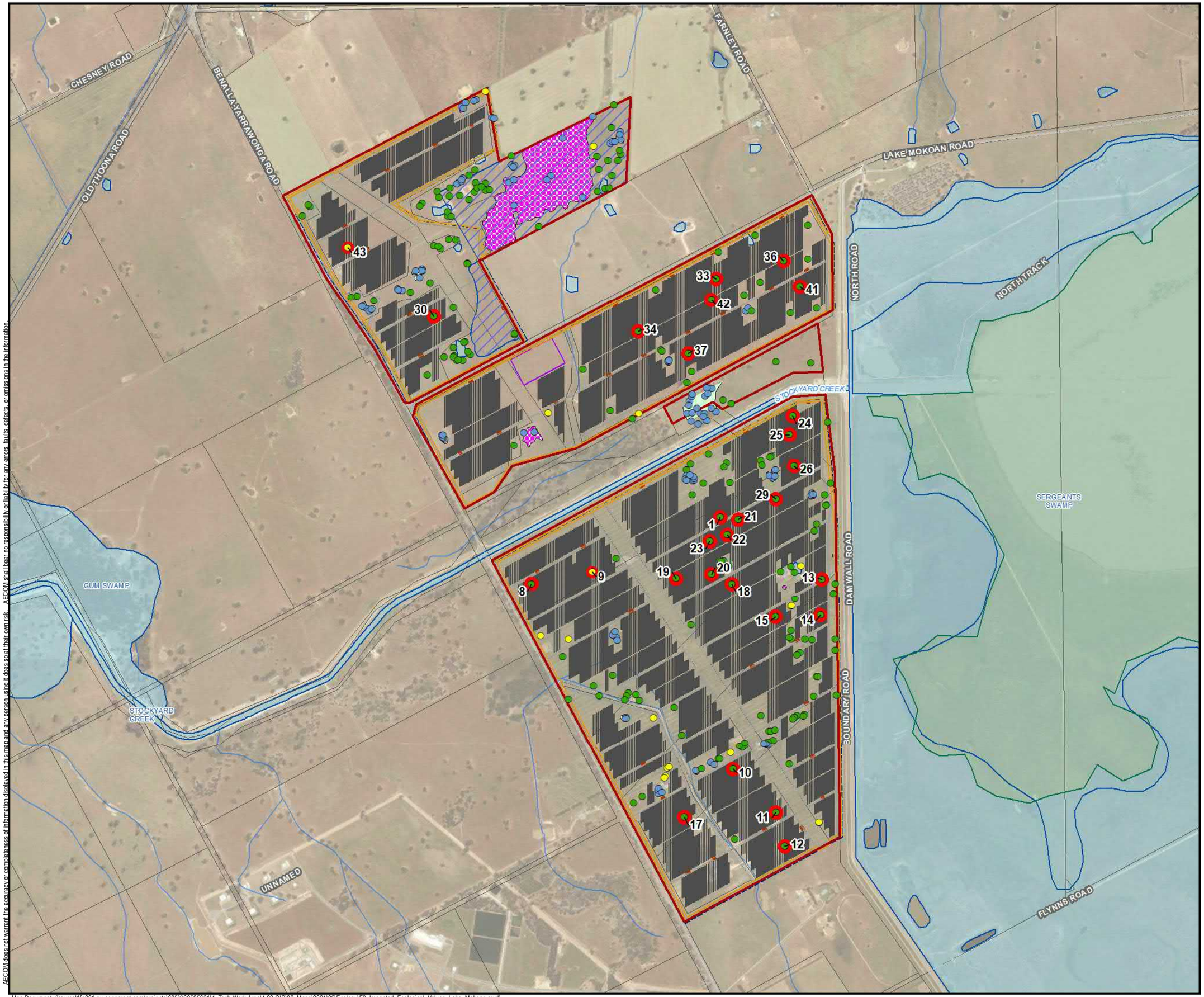
South Energy

Flora and Fauna assessment report
Benalla North Solar Farm

892 Benalla-Yarrawonga Rd,

Figure
8

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F8_Proximity_Lake_Mokoan.mxd)



PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 18 JUN 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Large Scattered Tree
- Large Tree in Patch
- Small Scattered Tree
- Solar Panels Layout
- Substation Laydown
- Internal Road
- Firebreak 10m
- Inverter
- Security Fence
- Watercourses
- Roadways
- Potential Habitat for Striped Legless Lizard
- Cadastre
- Waterbodies

Ecological Vegetation Classes

- 175 Grassy Woodland
- 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic
- 55 Plains Grassy Woodland
- 803 Plains Woodland
- Impacted Vegetation

Impacted Ecological Values

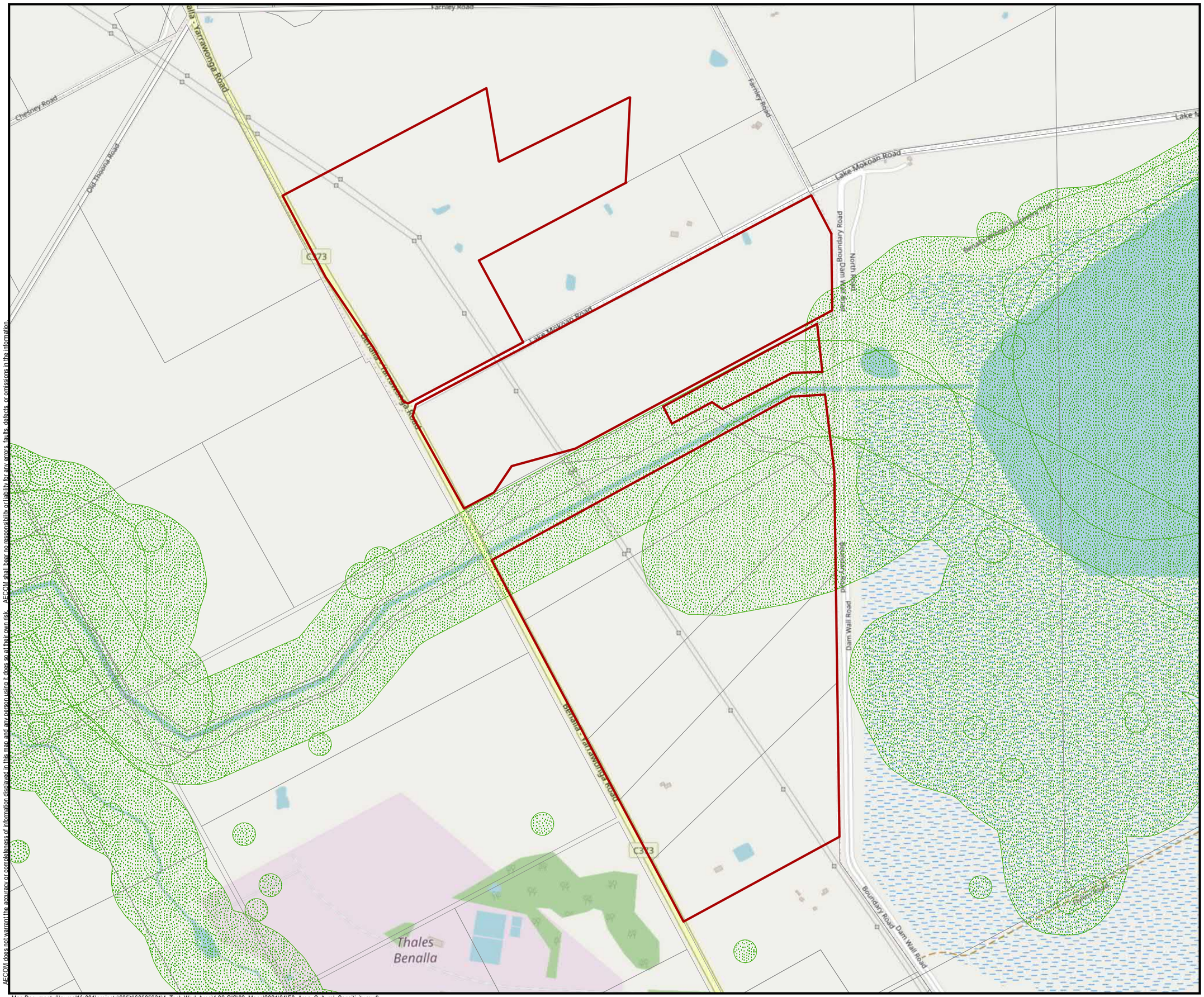
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure 9

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F9_Impacted_Ecological_Values_Lake_Mokoan.mxd)



PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 30 APR 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 125 250 500

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Areas of Aboriginal Cultural Heritage Sensitivity
- Cadastre

Areas of Aboriginal Cultural Heritage Sensitivity

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

10

Map Document: (\\aumel1fp001\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\04\F8_Area_Cultural_Sensitivity.mxd)

Attachment D – Photos of trees to be removed

Tree ID	Tree Removal No.	Species	Common Name	Photo
1	37	*Eucalyptus camaldulensis*	River Red Gum	
8	4	*Eucalyptus microcarpa*	Grey Box	
9	1	*Eucalyptus microcarpa*	Grey Box	

Tree ID	Tree Removal No.	Species	Common Name	Photo
10	5	*Eucalyptus microcarpa*	Grey Box	
11	6	Stag	Stag	
12	7	*Eucalyptus camaldulensis*	River Red Gum	

Tree ID	Tree Removal No.	Species	Common Name	Photo
13	8	*Eucalyptus camaldulensis*	River Red Gum	
14	R	*Eucalyptus microcarpa*	Grey Box	
15	10	*Eucalyptus camaldulensis*	River Red Gum	

Tree ID	Tree Removal No.	Species	Common Name	Photo
17	12	*Eucalyptus albens*	White Box	
18	13	*Eucalyptus camaldulensis*	River Red Gum	
19	14	*Eucalyptus camaldulensis*	River Red Gum	

Tree ID	Tree Removal No.	Species	Common Name	Photo
20	15	*Eucalyptus camaldulensis*	River Red Gum	
21	16	*Eucalyptus camaldulensis*	River Red Gum	
22	17	*Eucalyptus camaldulensis*	River Red Gum	

Tree ID	Tree Removal No.	Species	Common Name	Photo
23	18	*Eucalyptus camaldulensis*	River Red Gum	
24	19	*Eucalyptus camaldulensis*	River Red Gum	
25	20	*Eucalyptus microcarpa*	Grey Box	

Tree ID	Tree Removal No.	Species	Common Name	Photo
26	21	*Eucalyptus camaldulensis*	River Red Gum	
29	23	*Eucalyptus camaldulensis*	River Red Gum	
30	24	*Eucalyptus microcarpa*	Grey Box	

Tree ID	Tree Removal No.	Species	Common Name	Photo
33	26	*Eucalyptus microcarpa*	Grey Box	
34	27	Stag	Stag	
36	29	*Eucalyptus microcarpa*	Grey Box	

Tree ID	Tree Removal No.	Species	Common Name	Photo
37	30	*Eucalyptus microcarpa*	Grey Box	
41	34	*Eucalyptus microcarpa*	Grey Box	
42	35	*Eucalyptus microcarpa*	Grey Box	

Tree ID	Tree Removal No.	Species	Common Name	Photo
43	36	*Eucalyptus camaldulensis*	River Red Gum	

Attachment E – Access locations

Although a detailed flora and fauna assessment was not undertaken on roadsides of public road reserves (sealed or unsealed) adjacent to the study area, general observations were made of the presence of patches of native vegetation, Scattered Trees and other values. The selection of the location of access points was informed by this information. To confirm whether impacts on native vegetation would be avoided by placement of these access points in those locations, aerial imagery and Google Streetview was assessed at the proposed access points (existing and new as per Revision G) on 23 April 2021. The aerial imagery was reviewed by an ecologist to identify whether native vegetation may be impacted at those locations. An outline of the findings of this assessment is provided in the Table below.

Accessway	Vegetation description	Measures to avoid/minimise	Photo
Site entrance gate on Benalla-Yarrawonga Road, south of Stockyard Creek	One tree on the eastern side of Benalla-Yarrawonga Road.	No impacts to remnant vegetation adjacent to the Benalla-Yarrawonga Road is proposed. The accessway gate will be moved south of the tree by a >15 meters to support clear access to the site and any upgrades will be limited to a 5-metre-wide construction footprint.	 **Photo**: Proposed accessway has been moved south to avoid this tree
South-western site entrance gate on Benalla-Yarrawonga Road	The proposed accessway is located away from any roadside remnant vegetation. There are planted trees within the Project area	Proposed new accessway is located away from any roadside native vegetation and sufficient space is available to allow for construction of a 5-metre-wide accessway. No impacts to native vegetation.	 **Photo**: No roadside vegetation, internal trees assessed as part of the Project

Accessway	Vegetation description	Measures to avoid/minimise	Photo
Powerline easement	The proposed powerline easement is located away from any roadside native vegetation.	Powerline easement is located away from any roadside native vegetation and sufficient space is available to allow for construction of a 5-metre-wide accessway. No impacts to native vegetation.	 **Photo**: Eastern side of Benalla-Yarrawonga Road  **Photo**: West side of Benalla-Yarrawonga Road

Accessway	Vegetation description	Measures to avoid/minimise	Photo
Internal site entrance gates on Lake Mokoan road	The proposed accessways are located away from any roadside native vegetation. Scattered Trees are present and accessways will be sited to avoid impacts to Scattered Trees.	Proposed new accessways are located away from any roadside native vegetation and sufficient space is available to allow for construction of a 5-metre-wide accessway. No impacts to Scattered Trees on Lake Mokoan Road Benalla-Yarrawonga Road are proposed. The accessway gate will be adjusted to support clear access to the site and any upgrades will be limited to a 5-metre-wide construction footprint.	 **Photo:** Entrance on western side of site, proposed access gate on northern side of Lake Mokoan road  **Photo:** Entrance to substation, proposed access gate on southern side of Lake Mokoan road.

Accessway	Vegetation description	Measures to avoid/minimise	Photo
			 **Photo:** Entrance on western side of site, proposed access gate on southern side of Lake Mokoan road. Entrance to avoid Scattered Trees along Lake Mokoan road.

Appendix G

Role of Trees in Facilitating Landscape Connectivity

AECOM

892 Benalla Yarrawonga Development Pty Ltd (C/- South Energy)

14-May-2021

The Role of Trees in Facilitating Landscape Connectivity

A Spatial Analysis Approach for Solar Farm Design

The Role of Trees in Facilitating Landscape Connectivity

A Spatial Analysis Approach for Solar Farm Design

Prepared by

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ABN 20 093 846 925

14-May-2021

AECOM in Australia and New Zealand is certified to ISO9001, ISO14001 AS/NZS4801 and OHSAS18001.

Quality Information

Document The Role of Trees in Facilitating Landscape Connectivity

Ref

Date 14-May-2021

Prepared by Floora de Wit & Ben Roberts

Reviewed by Fiona Davies (Associate Director – Environment)

Revision History

Rev	Revision Date	Details	Authorised	
			Name/Position	Signature
A	22-April-2021	Draft	Ben Roberts Principal Ecologist	
A	14-May-2021	Final	Ben Roberts Principal Ecologist	

Table of Contents

Tree Proximity Analysis

1.0 Introduction

Habitat fragmentation is a key threatening process to biodiversity in south eastern Australia. Habitat fragmentation comprises four impact pathways - a reduction in habitat amount, an increase in the number of habitat patches, a decrease in the size of habitat patches, and an increase in the isolation of patches (Fahrig 2003).

Scattered trees play an important role in fragmented landscapes. They reduce the habitat patch isolation effect by acting as 'stepping-stones', particularly for bird, bat and arboreal mammal species. The avoidance of clearing habitat patches or scattered trees is crucial for the maintenance of habitat connectivity in a region. However, it is recognised that land development may require clearing of some patches in a landscape. Methods to describe habitat connectivity and the value of these patches are complex and vary depending on different species.

A review of Australian policies and legislation demonstrated significant inconsistencies between States regarding the recognised value of paddock trees, methods to measure this value, and levels of protection afforded to paddock trees.

This document synthesises information on the role that Large Trees in Patches (a surrogate for remnant vegetation patches) and scattered paddock trees play in providing habitat connectivity in a fragmented landscape. It also discusses ways of measuring habitat connectivity and critical distance thresholds between habitat features such as remnant patches, scattered paddock trees, dams and waterways for different fauna species. This information has been utilised to develop a set of spatial parameters to categorise Large Scattered Trees (LSTs) and Large Trees in Patches (LTPs) in relation to their perceived value as stepping-stones within the landscape.

The spatial parameters can be applied at a project-level to assess the value of trees for consideration in the project design phase. Design engineers for solar farms will be able to use tree retention values assigned to the respective tree categories to guide the solar farm layout.

2.0 Habitat Connectivity

Remnant patches of native vegetation in a heavily fragmented landscape provide crucial ecological functions (Law *et al.,* 2000; Carruthers *et al.,* 2004; Gibbons & Boak, 2002; Doerr *et al.,* 2010). The value of a patch accrues when fauna in the landscape use the patches to bring about connectivity (Beier & Noss, 1998). Connectivity in turn is relative to species dispersal ability and the characteristics of the inter-patch zone ('the matrix') (Fischer & Lindenmayer, 2007).

Structural connectivity of vegetation, i.e. areas with no gaps that significantly impede on fauna movement, is strongly correlated to species dispersal across landscapes (Beier & Noss, 1998; Doerr *et al.*, 2010). Linear corridors have a high structural connectivity thereby providing a higher connectivity across a landscape compared to scattered trees. Discontinuous corridors were found to provide medium habitat value, where width was strongly correlated to occupancy (Doerr *et al.*, 2010). Large, scattered trees provide "stepping stones" between these discontinuous corridors or patches of vegetation.

Connectivity also varies across landscapes. Patches within an urban landscape have a lower connectivity due to the higher resistance of the matrix. That is, fauna species have a lower dispersal threshold across urban areas compared to those in an agricultural landscape (e.g Baum *et al.,* 2004; Fischer & Lindenmayer, 2002; Hanspach *et al.,* 2012). Landscape connectivity may or may not accurately reflect connectivity for individual species. The ability of trees and patches to contribute to connectivity varies dependent on species characteristics (Forman, 1995; Beiyer & Noss, 1998). Corridors and stepping stones contribute to landscape connectivity but this might not be the case for all native species (Beier & Noss, 1998). As such, habitat connectivity can be assessed so that it represents the connectedness of patches of suitable habitat for a specific species or suite of species (Keitt *et al.,* 1997; Fisher & Lindenmayer 2007). This species-orientated approach requires considerable ecological input (dispersal thresholds, habitat selectiveness etc.), and must be supported by empirical evidence for it to be accurate (Radford *et al.,* 2005; Fischer & Lindenmayer, 2007).

Ecological connectedness can be measured by mathematical equations that allow for a quantitative assessment and can subsequently be used to produce connectivity maps (refer Figure 1 (a)). For example 'Graph Theory' has been successfully applied (e.g Keitt *et al.*, 1997; Van Langevelde, 2000; Rayfield *et al.,* 2011), whereby all patches are represented by a vertex. All vertices are connected by edges and reflect the distance between patches. This is suitable for application at a landscape scale and can be applied to different species dispersal thresholds to determine connectivity values of patches. The resulting graph would demonstrate the functional connectivity of a landscape.

Ecological connectivity can also be represented by more complex models that include network analysis or circuit analysis (Brandes & Erlebach, 2005). Network analysis considers the least-cost links between patches and can incorporate additional ecological characteristics of patches by assigning weights (Rayfield *et al.,* 2011; Liu *et al.*, 2018) (refer Figure 1 (b)). Circuit theory quantifies connectivity that responds positively to the presence of alternative pathways, connecting patches with multiple links (McRay, 2006; Braaker *et al.*, 2014) (refer Figure 1 (c)).

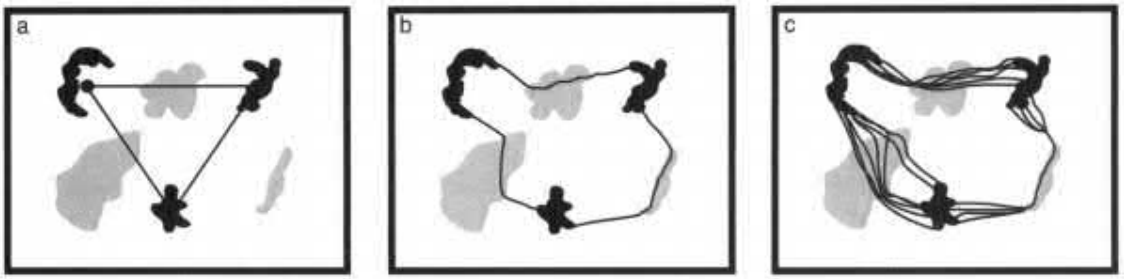

Figure 1 Methods of assessing habitat connectivity (sourced from Ray et al., 2011)

Representations of habitat connectivity that differ with respect to the amount of ecological information that they incorporate. Habitat patches (black polygons) are connected by links (black lines) that cross hospitable (grey) and inhospitable (white) matrix cover types. (a) A habitat graph connects patch centroids without incorporating a lot of spatial and ecological information about nodes and links. (b) A habitat network connects patch edges by least-cost links that incorporate information about matrix heterogeneity. Additional node and link attributes may also be included by assigning weights. (c) A habitat circuit connects patches with multiple links, thereby incorporating additional spatial information about the matrix.

3.0 Measuring Connectedness

Distance between trees and canopy cover are commonly used measures within habitat connectivity value assessments. Research is often focussed on demonstrating and defining the relationship of distance between trees and density of trees (i.e. canopy cover) to species richness and use of habitat. This section focusses on studies that incorporate a similar suite of species that are relevant to Victoria, including arboreal mammals, woodland birds, and bats.

The relationship of woodland bird species and patch size have been studied in Victoria, New South Wales and South Australia, all with similar outcomes. Fischer & Lindenmayer (2002) conducted empirical studies of bird use of paddock trees and remnant vegetation patches in New South Wales. Woodland birds were more likely to be found in remnant patches, whilst nectivores were more likely to be detected in trees more than 200 m from remnant patches. Open country species were correlated to larger isolated trees more than 200 m from the nearest woodland. The study demonstrated that both paddock trees and remnant patches of various sizes have a role to play in providing suitable woodland bird habitat.

Carruthers *et al.* (2004) investigated bird diversity and habitat preference in relation to canopy density in paddocks. Their findings found that 42 of the 45 species recorded in remnant vegetation were also observed in paddock trees. Diversity and abundance were correlated with tree density, however the study recognised the importance of isolated trees to wider species' habitat. Bird use of paddock trees were used by many birds, however their presence did not indicate how the tree was contributing to the value of the species' habitat.

Bennett & Ford (1997) looked at the relationship of woodland bird diversity by building a predictive model of populations relative to habitat availability, rainfall and temperature. The findings of the analysis suggested that at least 10% tree cover is required to maintain connectivity (Bennett & Ford,

1997). This is supported by Radford *et al.* (2005) who concluded that the distance of patches in a landscape was strongly correlated to species diversity within a patch. A threshold of species richness was identified where a significant reduction in species richness was observed in landscapes with less than 10% foliage cover. As a threshold level, anything below 10% would denote species extinction events (locally), therefore areas would need to support a higher habitat foliage cover to maintain viable populations.

The ability for sedentary woodland bird species to disperse was documented in Doerr *et al.* (2011). They determined functional connectivity to consist of trees no more than 200 m apart and larger remnant patches of no more than 2 km apart. The strength of this study lies in the catering for a bird species (commonly highly mobile) with the lowest dispersal range. The thresholds would therefore be applicable to a wider variety of more mobile species.

A study conducted by Le Roux *et al.* (2018) looked at the abundance of species, diversity, and community composition at isolated trees and how these varied in different landscapes (urban, agricultural etc) and the size of the tree. Their results were surprising, with no correlation between tree size with bat and trunk arthropods, yet a strong correlation with bird communities (refer Figure 2). This demonstrates that even small trees contribute to overall habitat complexity with the landscape.

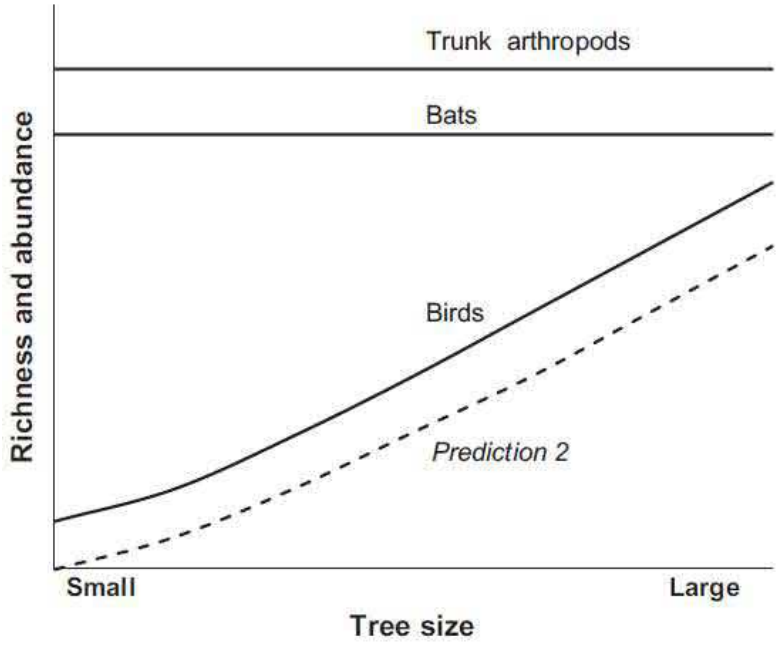

Figure 2 Relationship of tree size, trunk arthropods, bats and birds (Le Roux *et al.*, 2018)

The likelihood of occupancy of paddock trees by nocturnal mammals was investigated by Law *et al.* (2000). Their study found that both distance to and size of the nearest patch was strongly correlated to the likelihood of occupancy. Trees less than 800 m from remnant State Forest (>10 ha in size) significantly increased the likelihood of occupancy by nocturnal mammals. However, trees less than 800 m from an area smaller than 10 ha did not affect the probability of occupancy by nocturnal mammals. These types of studies are useful in providing the necessary ecological information to develop robust models of habitat use.

Bat activity in relation to scattered trees (<1 tree per ha) versus woodland blocks (>35 trees per ha) was investigated by Lumsden & Bennett (2004). Overall increased activity was shown to correspond with the category of dense scattered trees rather than the woodland blocks. Peak level of bat activity was found to be at 20-30 trees per ha. This can be partially attributed to optimal foraging opportunities which require sufficient space between trees for less-manoeuvrable species. Whilst it is improbable that a single scattered tree will provide all the resources necessary, the mobility of bats allows them to exploit multiple patches of habitat using these scattered trees.

Gliding marsupials (*Petaurus* spp.) and their use of isolated trees and small patches was studied by van der Ree *et al*., (2004). The threshold for this species was defined at 75 m, with 95% of species occurring in smaller patches and isolated trees that were within this threshold to the larger linear network in the landscape. This also corresponds with the maximum distance that they can glide through trees in a single movement.

As more studies are being conducted, and more information becomes available, it has become apparent that assessing habitat value is complex. Studies have shown that scattered trees, for example, provide disproportionate habitat benefits for biota relative to their size and availability (Carruthers *et al*., 2004; Le Roux et al, 2018). In areas where the smaller patches represent a significant proportion of the total foliage cover, the need for protection is even greater (Carruthers *et al.,* 2004; Gibbson & Boak, 2002). This demonstrates that previous notions of value may not be valid in heavily fragmented landscapes.

4.0 Scattered Tree Policies in Australia

The importance, level of protection and value assessment of scattered trees differs considerably across Australian States. This is not surprising considering the vast differences in land use, climate, and ecological value of the different States.

Western Australia (WA) offers no protection for scattered trees therefore no method for assessing trees is prescribed. WA legislation focusses on protecting threatened species habitat with little regard for maintaining connectivity. For scattered trees this means that unless they are in the modelled habitat for any of the three threatened Black Cockatoo species (Forest Red-tail *Calyptorhynchus banksii naso*, Carnaby *Calyptorhynchus latirostris* and/or Baudin's Black Cockatoo *Calyptorhynchus baudinii*), it is offered no level of protection. A Black Cockatoo habitat assessment would only consider trees with a diameter at breast height (DBH) of 50 cm or higher. It should be noted that Black Cockatoo habitat extends across the majority of southwest WA which is the area most affected by habitat fragmentation and clearing. Further to this, the vegetation clearing policy includes an exemption for landowners for clearing up to 5 ha per year.

Northern Territory (NT), similar to WA, offers no protection for scattered trees and no method for assessing trees or their value is prescribed. Clearing less than 1 ha of native vegetation is exempt from a clearing permit unless within particular 'zones' of land.

Victoria has a comprehensive framework for assessing all native vegetation including scattered trees. There are three pathways under which an application to remove native vegetation can be assessed; Basic, Intermediate or Detailed. The clearing of one or more large trees requires, as a minimum, an Intermediate level of assessment. Currently the assessment comprises the recording of all trees and their location, with no assessment of 'value' per se. The value of paddock trees and their method of assessment has recently been a source of contention in some local councils. Particularly when the Victorian Civil and Administrative Tribunal prevented a farmer from clearing 23 paddock trees enabling the farmer to improve agriculture outputs (Cullen, 2019). This case reflects local councils recognition of the importance of retaining scattered trees.

In New South Wales (NSW) clearing of scattered trees has been declared by the Minister for the Environment to be a routine agricultural management activity. Landowners can self-asses the requirement for clearing scattered trees without requiring a property vegetation plan (PVP) as outlined in relevant guidelines. Under these guidelines, scattered trees can be cleared without a permit (however the Local Land Services must be notified), if a tree falls into one of the following criteria:

- if it is an individual tree less than 80 cm DBH and is either located more than 50 m from the nearest living tree with a DBH greater than 20 cm or
- as part of a group of three or less trees within a distance of 50 m of one another that is more than 50 m from the next living tree with DBH greater than 20 cm.

South Australia (SA) have implemented a detailed quantitative method for assessing the value of scattered trees. The SA Scattered Tree Assessment Manual (NVC, 2017) describes a scoring system applicable to all trees. The method was derived from two studies conducted by Carruthers *et al.*, (2004) and Cutten & Hodder (2002).

Table 1 Scattered tree scoring system applicable in South Australia (NVC, 2017)

Attribute	Low Value (1 points)	Medium Value (2points)	High Value (3points)
Height Measured in metres	See (ii) Height above or refer to Appendix 5 & 7	See (ii) Height above or refer to Appendix 6 & 7	See (ii) Height above or refer to Appendix 6 & 7
Diameter Measured in centimetres at 1 m above the ground	Less than 20cm	20cm or more but less than 50cm	50cm or more
Health Based on % foliage dieback	Enter % Dieback for each tree		(Excel formula calculates the score)
Hollow entrances Small - 5cm or less diameter Medium > 5cm to <15cm Large 15cm or more	No hollows visible = 1 point	1-4 small or 1 medium visible	5+ small; 2+ medium; 1+ large; or 1-4 small and 1 medium visible
Suitability for threatened species For feeding, roosting, nesting, shelter etc	None (Common only)	1 Uncommon species (at regional, state or national level)	At least 2 Uncommon, or 1 or more Rare species (at regional, state or national level)
Density **(i.e. distance to nearest neighbours)** Distances measured from tree canopy edge to the nearest other tree canopy edge (Only consider plants 2 or more metres in height)	Widely separated • Tree more than 50 metres away from all other trees; or • Two trees less than 50m apart, but each more than 50m away from all other trees	Mid-densely separated • 3 or more trees each within 5 to 50m of at least 1 other tree in the group; or • Two trees less than 5m apart, with at least one being within 5 to 50m of at least one other tree	Close • 3 or more trees each within 5 metres of at least 1 other tree in the group
Proximity to native vegetation Distance from tree to block of native vegetation at least 1 hectare in area	200 metres or more from a block of native vegetation	Between 50 and 200m from a block of native vegetation	Within 50m of a block of native vegetation

5.0 Tree Assessment Method

Assessment of tree value has been designed based on one or more of the following components:

- **Threatened species utilisation assessment** – based on arbitrary assumptions on dispersal of threatened species that may utilise the area and proximity to 'core habitat' (e.g. Wood, 2016; NVC, 2017);
- **Total foliage cover** of a given patch – enables set criteria to be applied e.g. foliage cover not to reduce below 10% (determined as the critical threshold for species by Bennett & Ford, 1997). and Radford *et al.* (2005); and
- **Habitat complexity** – trees within proximity to one another, distance to waterbodies, rivers, corridors, remnant patches, elevation in landscape etc. (demonstrated by Law *et al*., 2000 and utilised in NVC, 2017).

An effective assessment method must consider local conditions, including fauna species occupation, their dispersal threshold, extent of habitat fragmentation in the landscape, and habitat features present in the local area. Ideally the assessment of tree value would be quantifiable and justifiable without being unnecessarily onerous or significantly increase resources required to complete the task. Ideally the process would utilise data already captured as part of ecological surveys.

Utilising information gained from the literature review in Section 2.0 and 3.0, spatial parameters have been developed to categorise Large Trees in Patches (LTP) and Large Scattered Trees (LSTs) based on their level of connectedness (i.e. Cat 1 = greater connectivity and Cat 3 = less connectivity). Spatial parameters were analysed using GIS-based tools to determine the tree retention category.

A set of tree retention rules have been developed for each spatial category to guide solar grid layout. LTPs and more connected LSTs provide increased habitat complexity and are desirable to a range of fauna species. Isolated trees also provide habitat value, but to fewer fauna groups.

Table 2 categorises LSTs and LTPs distance thresholds for various fauna groups along with a description of how to undertake the spatial analysis. Table 2 also lists the tree retention rules that have been developed to guide solar engineers to design solar farm layouts.

Table 2 Categories of trees as defined by specific spatial parameters and retention values.

Category	Description	Implementation	Retention rules	Rational
1	All remnant patches containing a canopy component within Habitat Hectare Assessment.	1. Identify all patches that have a value in the tree canopy component as informed by the Habitat Hectare score sheet.	Retain Category 1 trees.	Suitable habitat for bat species. Increased habitat complexity desirable for a range of fauna species.
2	Large Scattered Trees (LST) within 75 m of a remnant patch, two or more LST or other habitat feature(s).	1. Identify all patches that have a value in the tree canopy component as informed by the Habitat Hectare score sheet. Also identify other habitat features that occur within and adjacent to the assessment area including waterways and waterbodies. 2. Use this to conduct a proximity analysis of LST within 75m of habitat features and other LSTs.	Retain Category 2 trees.	75 m is the threshold for gliding marsupials.
3	LST >75 m from other LST or habitat feature and, is not in Category 2.	1. Identify all patches that have a value in the tree canopy component as informed by the Habitat Hectare score sheet. 2. Also identify other habitat features that occur within and adjacent to the assessment area including waterways and waterbodies. Use this to conduct a proximity analysis of LST greater than 75m of habitat features and other LSTs.	Retain up to 30% of Category 3 (trees >75 m from other LST or habitat features).	Suitable for woodland bird species. Less than 10% foliage cover in a landscape would result in a significant reduction in species richness.

Rules: Where a tree occurs within more than one category, assign tree to highest category.

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Appendix H

West Mokoan Solar Farm - Striped Legless Lizard Assessment

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Memorandum

To	DELWP Planning	Page	1
CC			
Subject	West Mokoan Solar Farm - Striped Legless Lizard assessment		
From	Karina Salmon and Sally Koehler		
File/Ref No.	60585631	Date	31-05-2021

1.0 Introduction

The West Mokoan Solar Farm is proposed as a 236-Megawatt solar farm project located between Benalla and Goorambat, approximately 10 km north-east of Benalla, Victoria (Figure 1). To date, preliminary and detailed ecology surveys have been completed to inform the design of the solar farm.

On 26 November 2020, the Hume Region of the Victorian Department of Land, Water and Planning (DELWP) issued a Request for Information (RFI) as part of the planning approvals process. One of the items within that RFI was consideration of whether habitat within the solar farm site is suitable for the nationally threatened Striped Legless Lizard *Delma impar* (SLL). An extract of Item 8a of the RFI is provided below for reference:

8a) Delma impar (Striped Legless Lizard).

- *Further consideration of Striped Legless Lizard is recommended as part of the ecological risk assessment for this proposal.*
- *There is a reasonable likelihood that Striped Legless Lizard may occur in low densities within the footprint of the proposed solar farm development. This is based on information, advice and consultation with local species experts.*
- *Threats to Striped Legless Lizard from the proposed solar farm development are likely to occur wherever there is disturbance of top-soil\ground layer- including earthworks, roading, construction, drainage and machinery\vehicle access.*
- *A specific concern is the potential impact of ground boring\trenching associated with the installation of the upright structures supporting each solar panel. These impacts occur at discreet points every few metres across the proposed panelling footprint. Cumulative degradation and disturbance to ground layer and fossorial fauna habitats are expected to occur.*
- *Little is known about the potential impacts of solar panels and the effects of prolonged shading and alteration of thermal microhabitat for grassland fauna. Being a diurnal ectotherm, it is considered reasonable to accept some level of negative impacts on Striped Legless Lizard if present from broad-scale installation of permanent shading structures.*

As part of collecting further information, targeted surveys or on-ground habitat assessment by an appropriately qualified species expert may be worth considering to further determine the level of risk

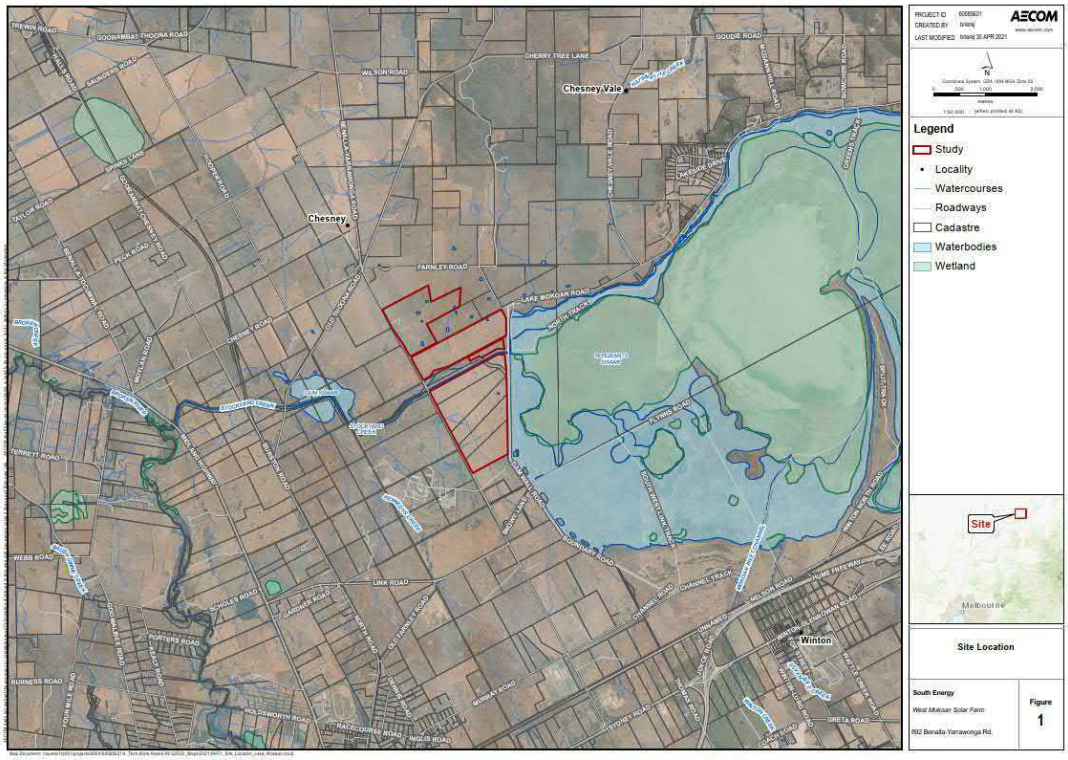


Figure 1 West Mokoan Solar Farm site

2.0 Purpose

The purpose of this memo is to present to DELWP the information collated to date in relation to the potential for Striped Legless Lizard to occur within the West Mokoan solar farm development site.

3.0 Background

The Striped Legless Lizard (Plate 1) is listed as vulnerable under the Commonwealth *Environment Projection and Biodiversity Conservation Act 1999* (EPBC Act) and listed as threatened under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act). The species is a grassland specialist. It is generally known to inhabit native grasslands and grassy woodlands that contain native tussock-forming grasses, but it can also persist in degraded grasslands and non-native grasslands that have historically been grazed or pasture improved (DSEWPaC, 2011). As a semi-fossorial species, Striped Legless Lizards use burrows and cracks as retreats, forage at the surface and construct simple burrows only for nesting purposes (Wu et al. 2015). Habitat requirements for the species include inter-tussock spaces, rock, fallen timber and other refuges such as animal burrows and soil cracks (Smith and Robertson, 1999).

Plate 1 Striped Legless Lizard *Delma impar*

Striped Legless Lizard is patchily distributed across south-eastern New South Wales, the Australian Capital Territory, north-east, central and south-west Victoria and south-eastern South Australia (DoEH, 2016). The modelled distribution of Striped Legless Lizard based on known records is presented by the Australian Government Species Profile and Threats Database (Figure 2).

Figure 2 Current Striped Legless Lizard modelled habitat distribution (Source: Australian Government Species Profile and Threats Database accessed 24 May 2021)

There are four genetically distinct lineages recognised across the species' geographical range (Figure 3). Those lineages are the South Australian and Victorian Wimmera group; south-west Victorian group (including Melbourne); eastern Victoria group; and the ACT and Monaro Plains group (TSSC, 2016).

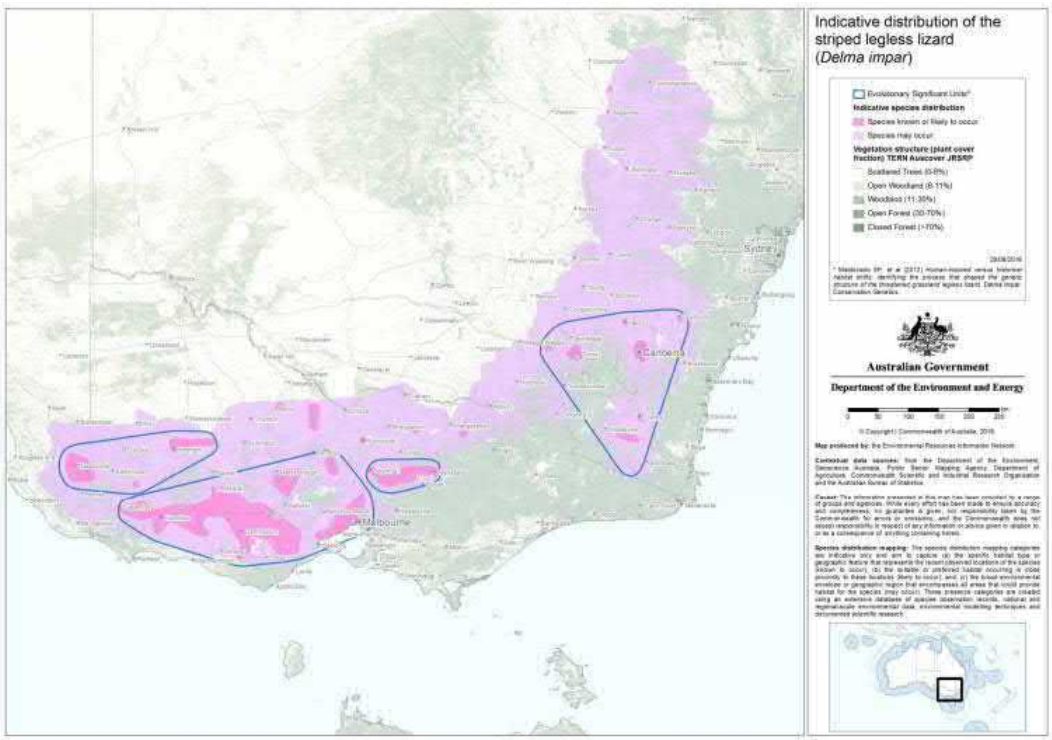
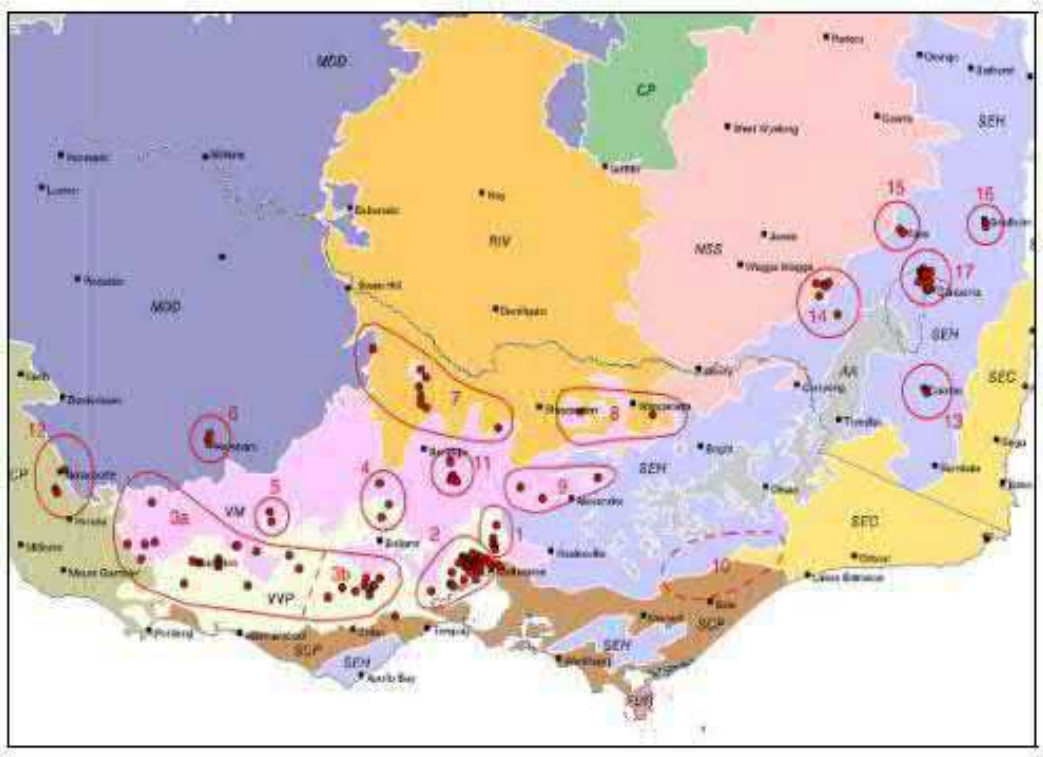


Figure 3 Striped Legless Lizard indicative distribution and geographic lineages (Source: TSSC, 2016)

Groups of populations (or metapopulations) across the species' geographic range have been divided into management clusters to assist with strategic conservation of the species. The clusters are deemed to be genetically unique and adapted to habitat characteristics of each region. As such, the national recovery plan requires each cluster to be conserved to guard against unpredicted events that could eliminate populations in a region (Smith and Robertson 1999). The management clusters are shown in Figure 4 overlaid with the Interim Biogeographic Regionalisation for Australia (IBRA Bioregions).



Key: RIV (orange) – Riverina, SHE (pale purple) – South East Highlands, WM (pink0 – Victorian Midlands, VVP (white) Victorian Volcanic Plains, NCP (green) – Naracoorte Coastal Plain, MDD (purple) – Murray Darling Depression.

Figure 4 Striped Legless Lizard distribution and management clusters overlaid with IBRA Bioregions (Robertson and smith, 2010)

Across Victoria, Striped Legless Lizard records are largely concentrated on the Victorian Volcanic Plains in association with native temperate grassland habitat. This grassland habitat is known as Plains Grassland Ecological Vegetation Class (EVC) which, prior to European settlement, was the dominant vegetation type that extended from west/north-west Melbourne to Portland. Fewer records of Striped Legless Lizard are known from north-east Victoria; however, there are scattered historical records for the species and two management clusters are recognised by Smith and Robertson (1999).

4.0 Striped Legless Lizard in north-eastern Victoria

Compared with the Victorian Volcanic Plain, the Striped Legless Lizard is seldom recorded in north-east Victoria with only a handful of records from the Goulburn Broken and North East catchments (management cluster 8 and cluster 9 in Figure 4). Due to the scarcity of records, the distribution and habitat requirements of the species is poorly known. The species is thought to be widely distributed in grassland and open grassy woodlands with sparse canopy cover throughout Seymour, Yea, Alexandra and Mansfield but it has also recently been recorded from Strath Creek and Broadford.

As a result of the limited knowledge of Striped Legless Lizard distribution in north-east Victoria, the Striped Legless Lizard in North East Victoria Project began in 2002 as a collaborative project between the Victorian Government, Goulburn Broken Catchment Management Authority, Upper Goulburn Landcare Network, Strathbogie Ranges Conservation Management Network and Trust for Nature.

According to the projects' website (Lobert, undated), the presence of Striped Legless Lizard in the north east catchment was only determined about 30 years ago with a few records around Wangaratta and Benalla. One of its Victorian strongholds is the upper Goulburn River catchment around Seymour, Yea, Alexandra and Mansfield. Prior to 2002, several specimens were found around Rushworth and Stewarton near Benalla in 1992, Bonnie Doon in 1995, Merton in 1995, Alexandra in 1999, and Yea in 2001. Since then there have been records from around Strath Creek and Broadford, and in the past five years there have been isolated detections around Greta West (2016), Woorgaree near Beechworth (2018), Whorouly South south-east of Wangaratta (2019), and Oxley (2020).

4.1 Victorian Biodiversity Atlas records

Figure 5 shows the location of records of Striped Legless Lizard from the Victorian Biodiversity Atlas (VBA) within the Goulburn Broken CMA and North East CMA. A larger version of this figure is also provided in Attachment 1.

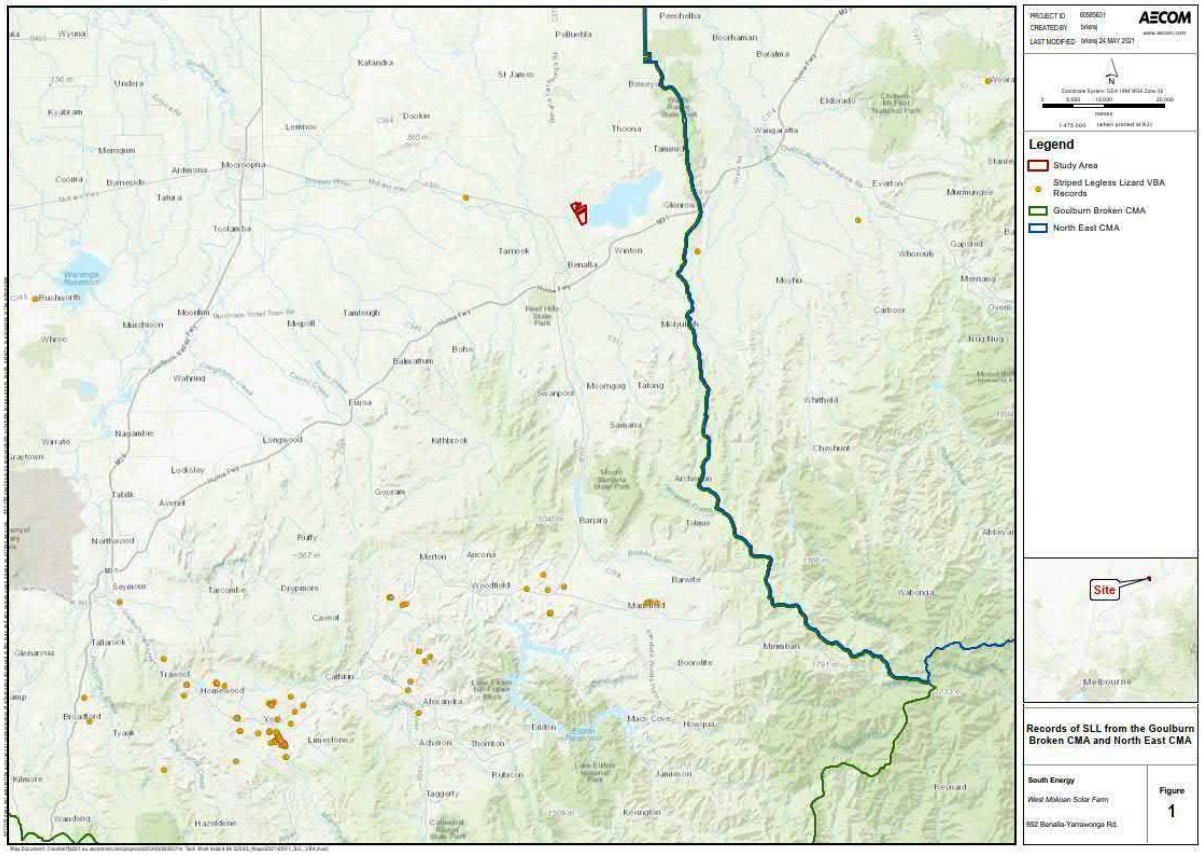


Figure 5 Victorian Biodiversity Atlas records of Striped Legless Lizard

4.2 Habitat importance modelling

Striped Legless Lizard habitat importance modelling in NatureKit (DELWP online tool) shows habitat is more closely associated with the Victoria's northern inland slopes and Central Victorian uplands than the Victorian Riverine bioregion (where the West Mokoan site is located).

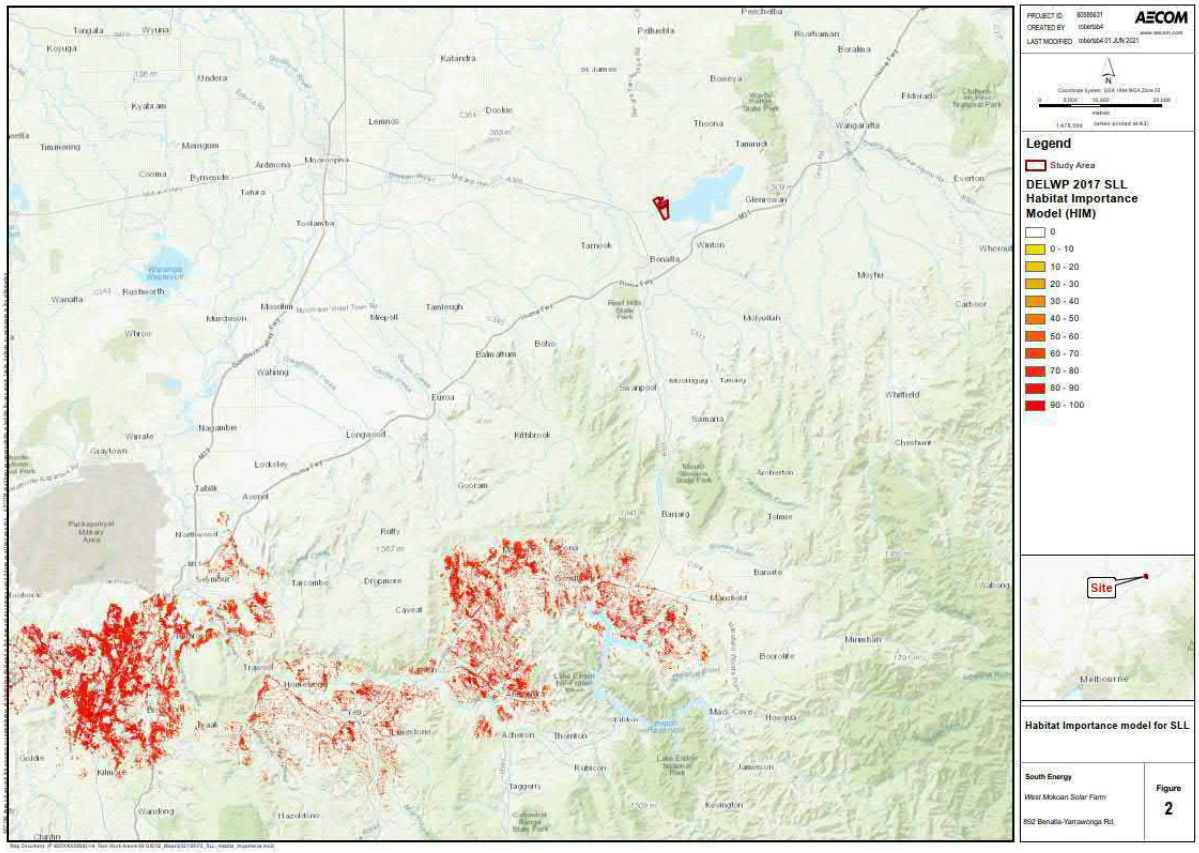


Figure 6 Habitat importance modelling for Striped Legless Lizard in north-east Victoria

4.3 Bioregions, topography, geology, and soils

GIS analysis was undertaken to determine whether there was a pattern in the location of records associated with Victorian Bioregions, topography, geology and soils in north-eastern Victoria. The figures produced (see Attachment 1) suggest the following:

- Victorian Bioregions (Figure 7)
    - Most records are within the Central Victorian Uplands (CVU) Bioregion, others are on the edge of the CVU and Highlands – Northern Fall (HNF) Bioregion.
    - Occasional records are located in the Victorian Riverine Bioregion; the record to the west of the West Mokoan site and the most recent record not yet on the VBA was from Oxley, south-east of Wangaratta.
- Topography (Figure 8)
    - The records appear to be associated with the lower slopes or areas with slight elevations where not at the base of taller hills/mountains.
- Geology (Figure 9)
    - Most records are located in Colluvial and Palaeozoic sediments.
    - Some records are on the boundary between Granite or Colluvial and Alluvium
    - Occasional records (those in the Victorian Riverine Bioregion described above) are associated with Alluvium.
- Soils (Figure 10)
    - All records are located in non-sodic soil areas, or on the margins of sodic soils.

This information suggests that the species is predominantly recorded in areas of slight elevation with non-sodic soils and Colluvial, Palaeozoic sediment and Granite geology.

They are less likely to be found in the Victorian Riverine Bioregion and areas with Alluvium geology, although there are two exceptions (Stewarton and Oxley). Most records within the Victorian Riverine Bioregion are found on near the border with another bioregion or geological formation which may suggest elevation influences the occurrence of the species.

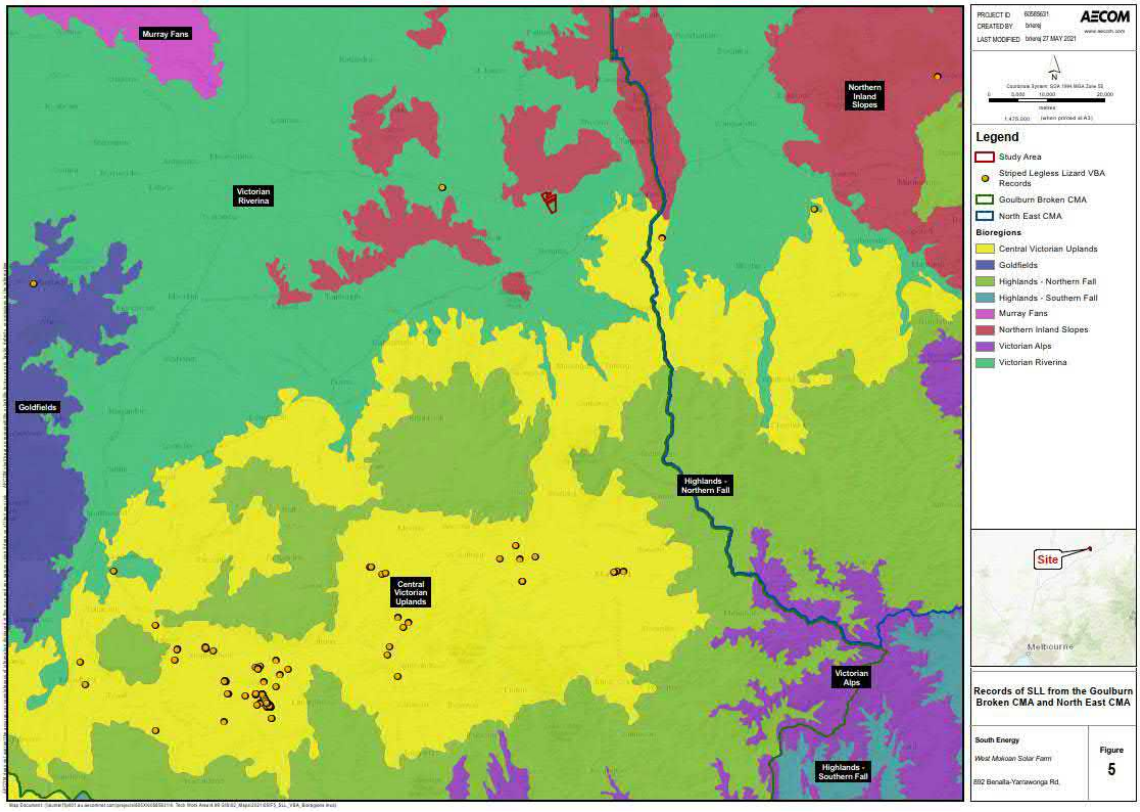


Figure 7 VBA records of Striped Legless Lizard & Victorian Bioregions (north-east Victoria)

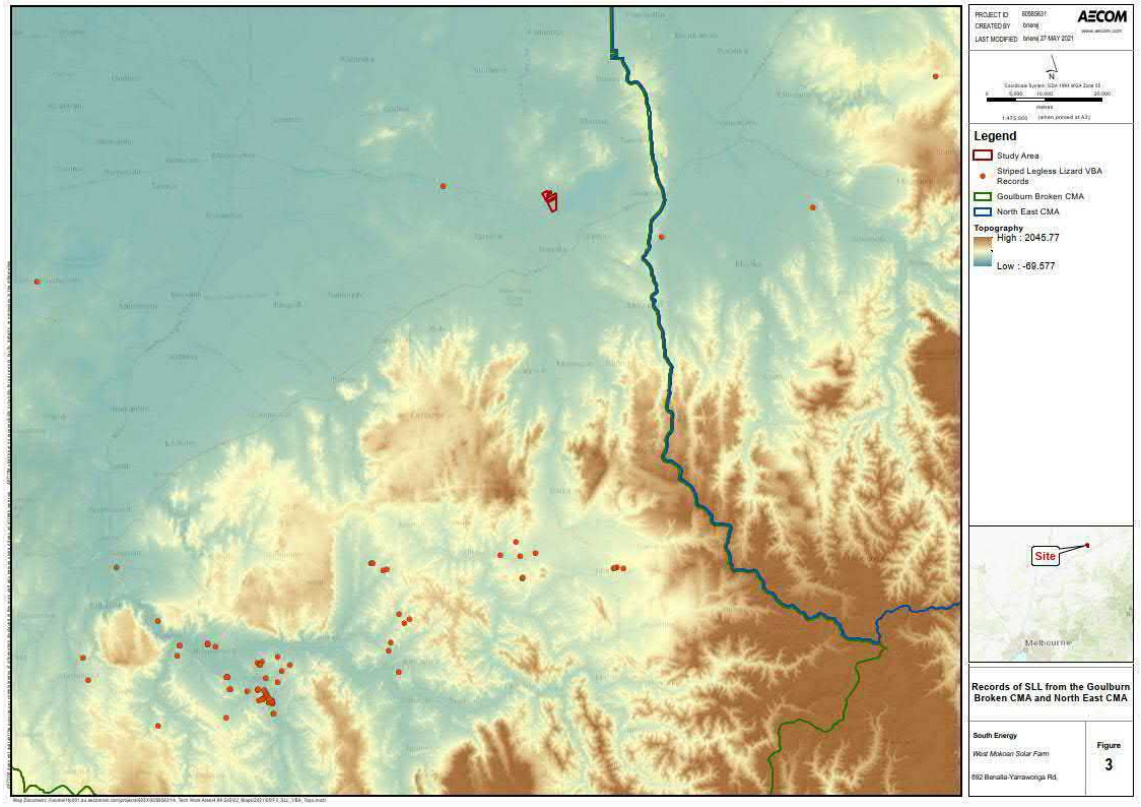


Figure 8 VBA records of Striped Legless Lizard & topography (north-east Victoria)

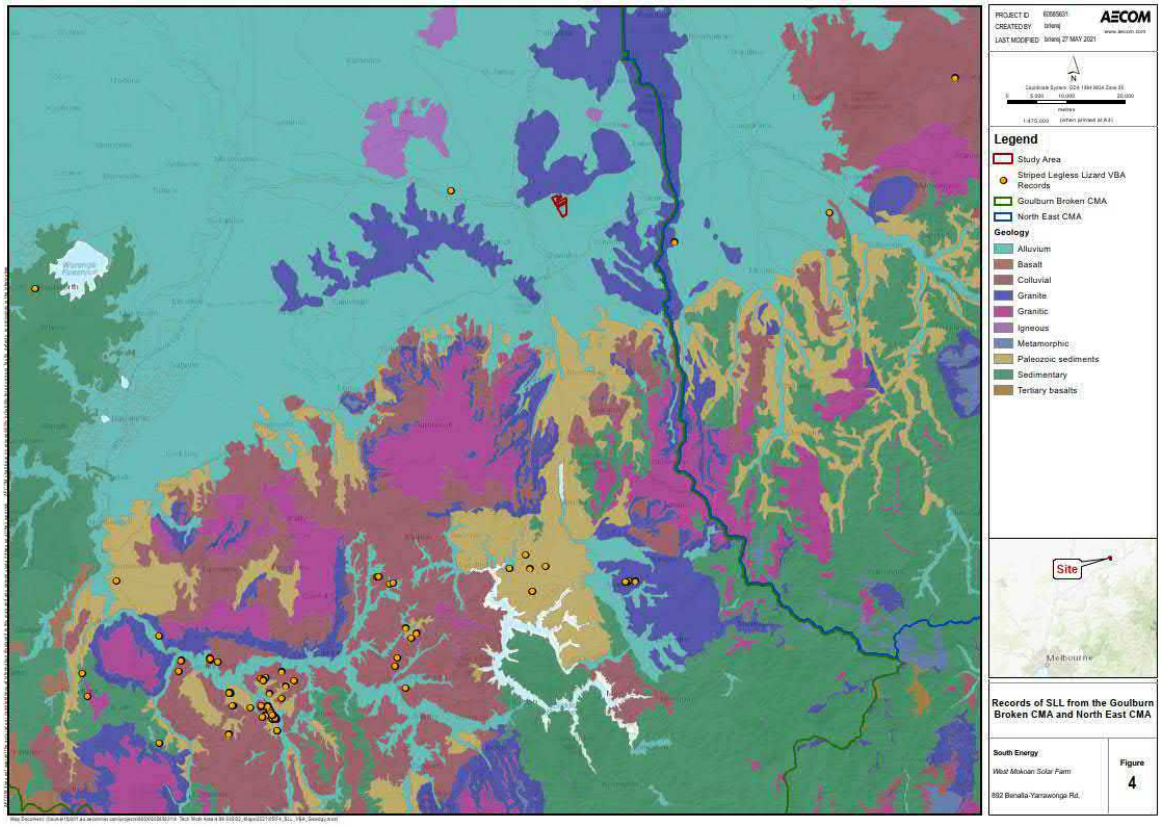


Figure 9 VBA records of Striped Legless Lizard & geology (north-east Victoria)

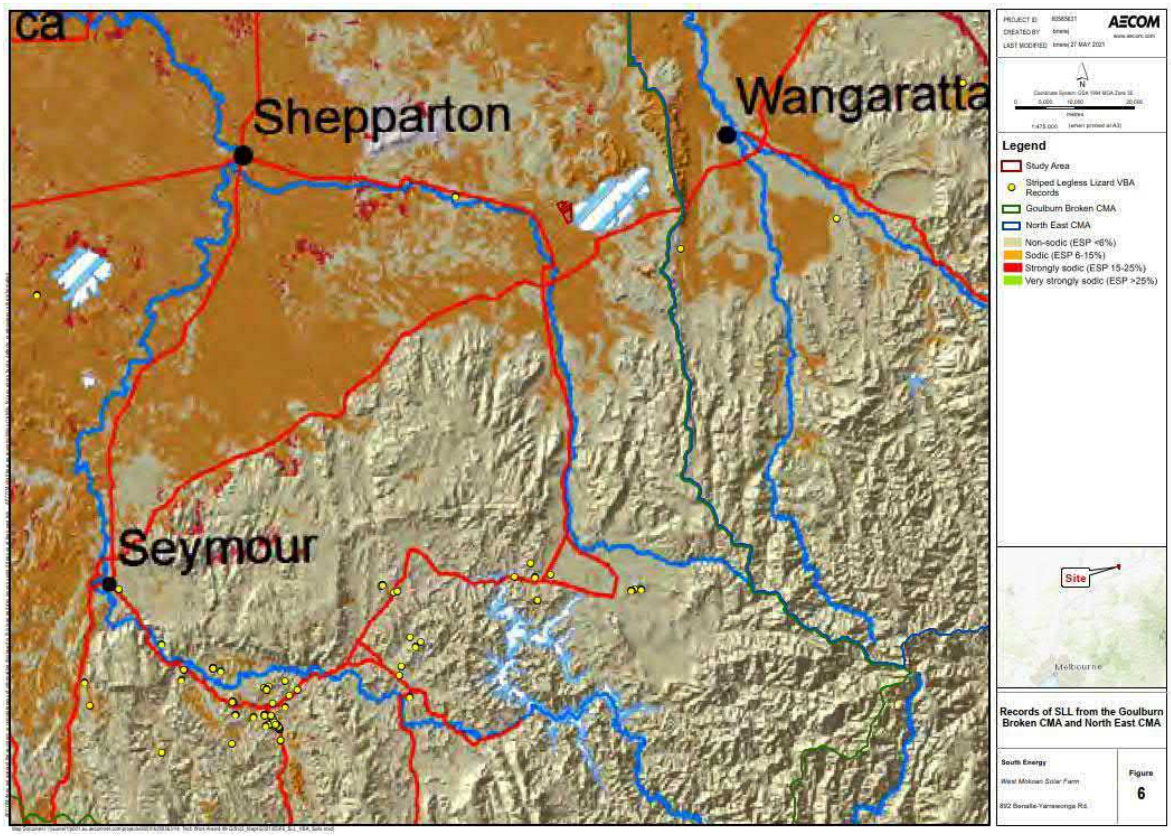
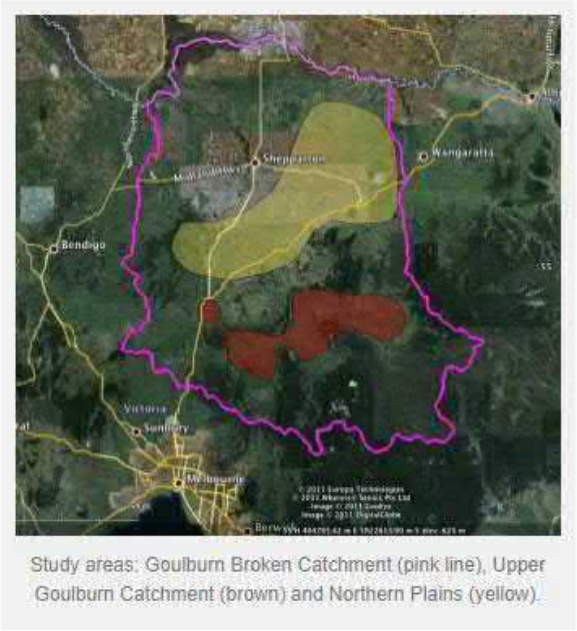


Figure 10 VBA records of Striped Legless Lizard & soils (north-east Victoria)

4.4 Survey effort SLL north-east project

The Project has conducted active searches across 537 ha of the Goulburn Broken CMA (Figure 11) including 55 field-searches conducted between 2002 and 2011 (Figure 13). Searches focussed on management cluster 9 (Upper Goulburn Catchment) on private land ranging from 1 ha to 30 ha in size.

During 2009 to 2011, the project's focus shifted to examine parts of the 'Northern Plains' of the Goulburn Broken Catchment (roughly north of the Hume Hwy). The searches focused on areas in proximity to historic or anecdotal records and where suitable habitat was identified.

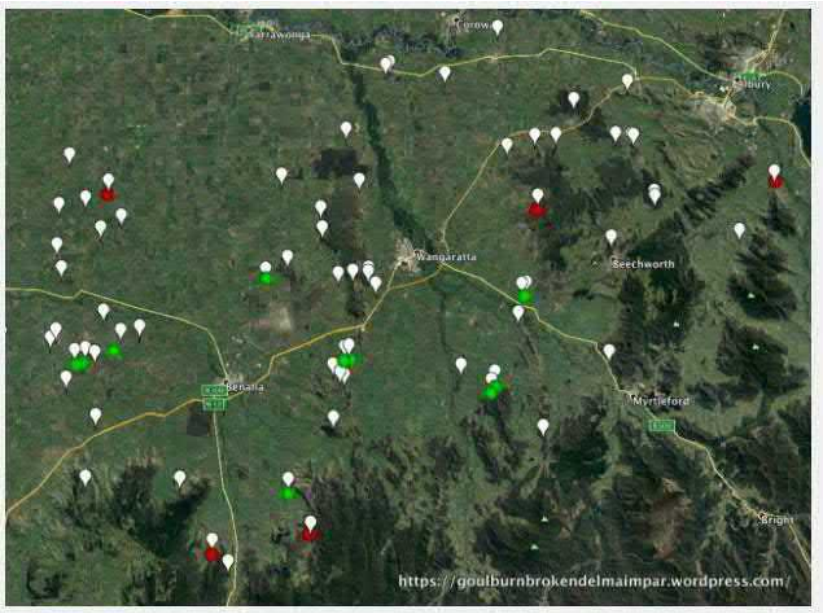


Study areas: Goulburn Broken Catchment (pink line), Upper Goulburn Catchment (brown) and Northern Plains (yellow).

Figure 11 Study area of the north east SLL project (extract from Lobert, undated)

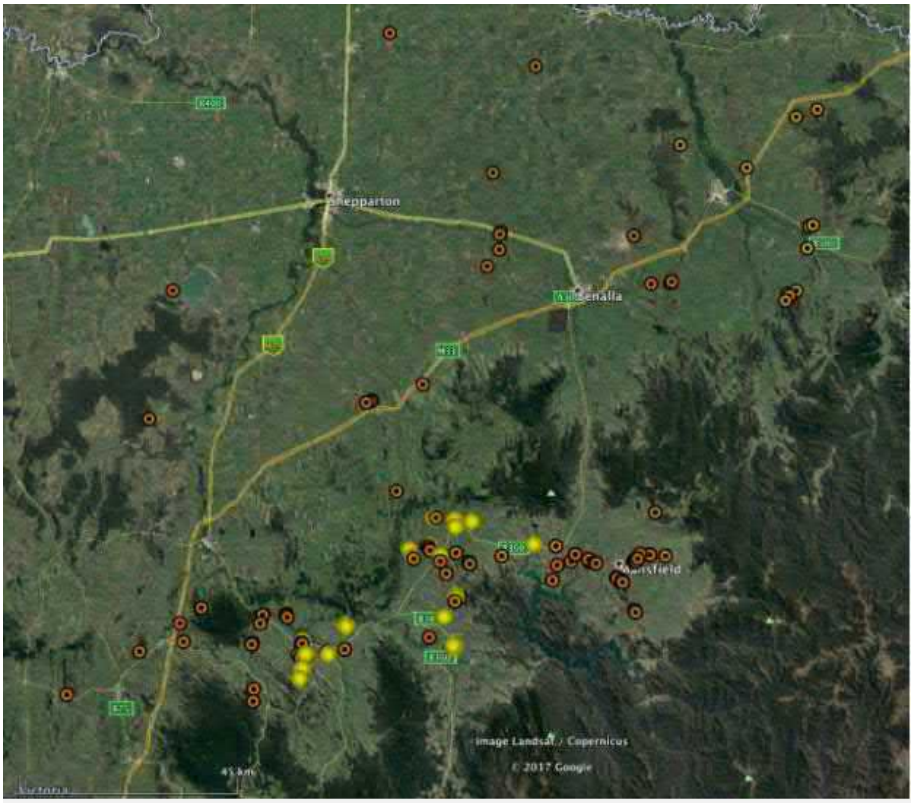
Within the study area, works by the north-east Striped Legless Lizard group appears to have focused on conducting searches for the species on the slopes and uplands rather than low lying areas. Figure 12 is an extract of landowners approached for survey as part of the program.

Striped Legless Lizards have been found in a variety of locations in the north-east. Habitat has included grazed paddocks adjacent to forested areas and creeklines, grazed paddocks on slopes and ridges and paddocks dominated by pasture grasses and other weeds.



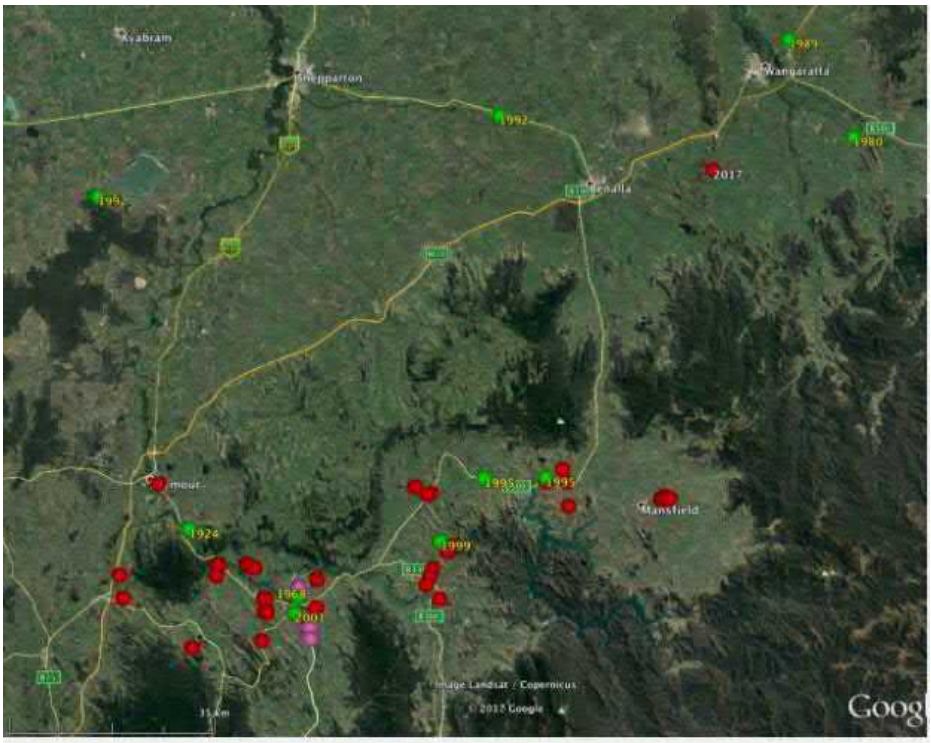
Legless lizard records collected during this survey: red= Delma sp., green= Delma inornata, Olive Legless Lizard

Figure 12 Sites (in white) identified to approach to conduct SLL surveys (Source: Lobert, undated)



Site visits & searches in the Cluster 8 & 9 areas. Survey effort varied considerably between sites. Yellow= tile monitoring sites in the Upper Goulburn.

Figure 13 Areas searched by the north east SLL project (Source: Lobert, undated)



Striped Legless Lizard records from Clusters 8 and 9: green= historic records (& date), red= records from this project, pink= North-South Pipeline records.

Figure 14 Locations where SLL have been recorded (Source: Lobert undated)

4.5 Striped Legless Lizard records near West Mokoan

Around the West Mokoan solar farm there are two records on the VBA from within ~20 kilometres of the site (Figure 5). One VBA record is from 1992 on private land near Stewarton approximately 18 km from the site. The other record is from 2017 on private land located at Greta West approximately 20 km east of the site. These VBA records are associated with Valley Grassy Forest EVC and Plains Woodland EVC respectively based on DELWP 2005 EVC mapping.

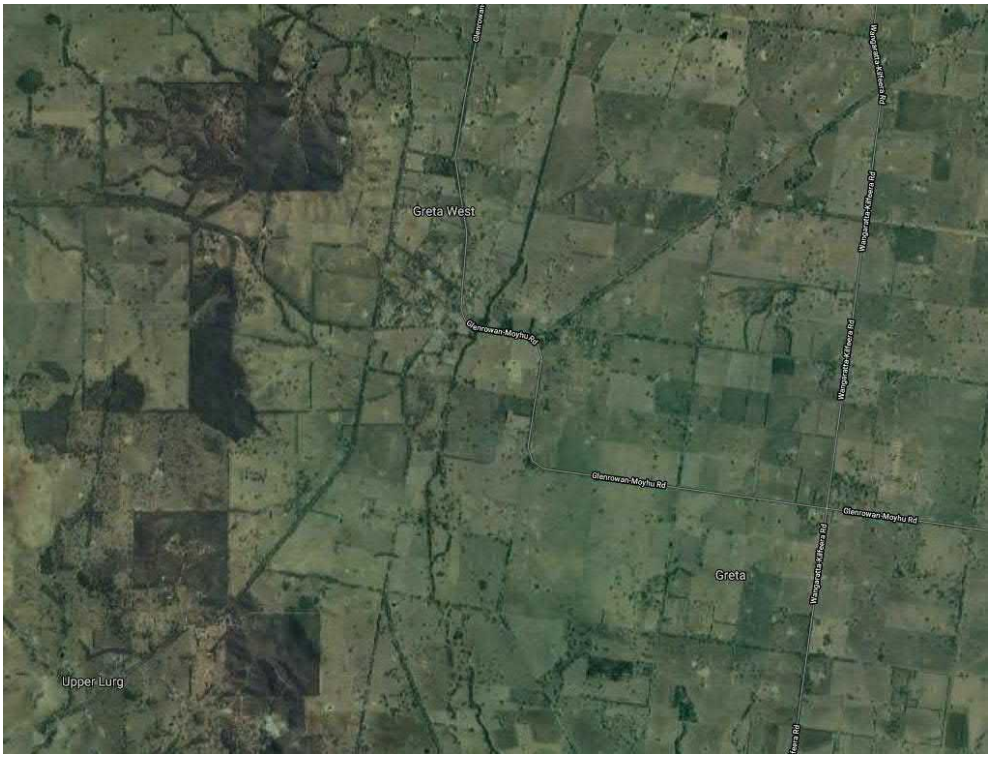
A recent record of Striped Legless Lizard from Oxley in 2020 is the most recent record from north-east Victoria. This incidental record was from a highly modified site adjacent to the King River.

Assuming the VBA records are located with reasonable accuracy, it appears from aerial imagery (see below) that the Oxley, Greta West and Stewarton records are from similar floodplain habitat which is atypical for Striped Legless Lizard. These records add to the uncertainty about the habitat requirements for the species in the north-east.

Stewarton - Broken River valley

Source: Google Maps

Greta West – Fifteen Mile Creek valley



Source: Google Maps

Oxley – King River valley

Source: Google Maps

Whorouly South – south-east of Wangaratta

The area of the Whorouly South record in the Northern Plains part of the north-east Striped Legless Lizard project study area is more akin to situations where the species has been found around Yea on slopes of the foothills (Plate 2). The site is described as a grazing paddock with a good cover of mainly native grasses and with plenty of rocks and fallen timber to search under. The Whorouly South site is an additional location to those documented in the VBA.

Source: Google Maps

Plate 2 Habitat at Whorouly South, south-east of Wangaratta **(Source: Lobert undated**)

5.0 Striped Legless Lizard habitat at West Mokoan

The West Mokoan site is described as northern land parcel (north of Stockyard Creek) and southern land parcel (south of Stockyard Creek). The northern land parcel is divided by Lake Mokoan Road.

5.1 Habitat assessment

A targeted habitat assessment for Striped Legless Lizard was completed in December 2020 and January 2021 to identify areas of potential suitable habitat for the species within West Mokoan solar farm study area. Targeted habitat assessments were undertaken by a DELWP qualified VQA-assessor accompanied by a zoologist with extensive experience with SLL habitat assessments.

Features used to identify potential Striped Legless Lizard habitat was the presence of lowland native grassland and grassy woodland EVCs which support scattered eucalypts and areas supporting a complex structure of grass tussocks (native or introduced). The presence of grass tussocks with inter-tussock spaces, soil cracks, rocks, fallen timber/debris and evidence of ploughing was also noted. Striped Legless Lizard are known to occur at sites subject to a history of grazing and pasture improvement but are less likely to occupy sites that have been subject to major disturbance such as ploughing.

Most of the West Mokoan solar farm site has been modified through agricultural land use that varies in intensity. There is evidence that the site has been subject to heavy grazing including soil compaction, pugging and camp effect around the base of trees. The friable soil (clay loam sand) is likely resist the formation of cracks and crevices required by the species. No rock or woody debris (other than branches underneath trees) was observed as potential shelter sites.

Portions of the site were identified as potential habitat (Figure 15).

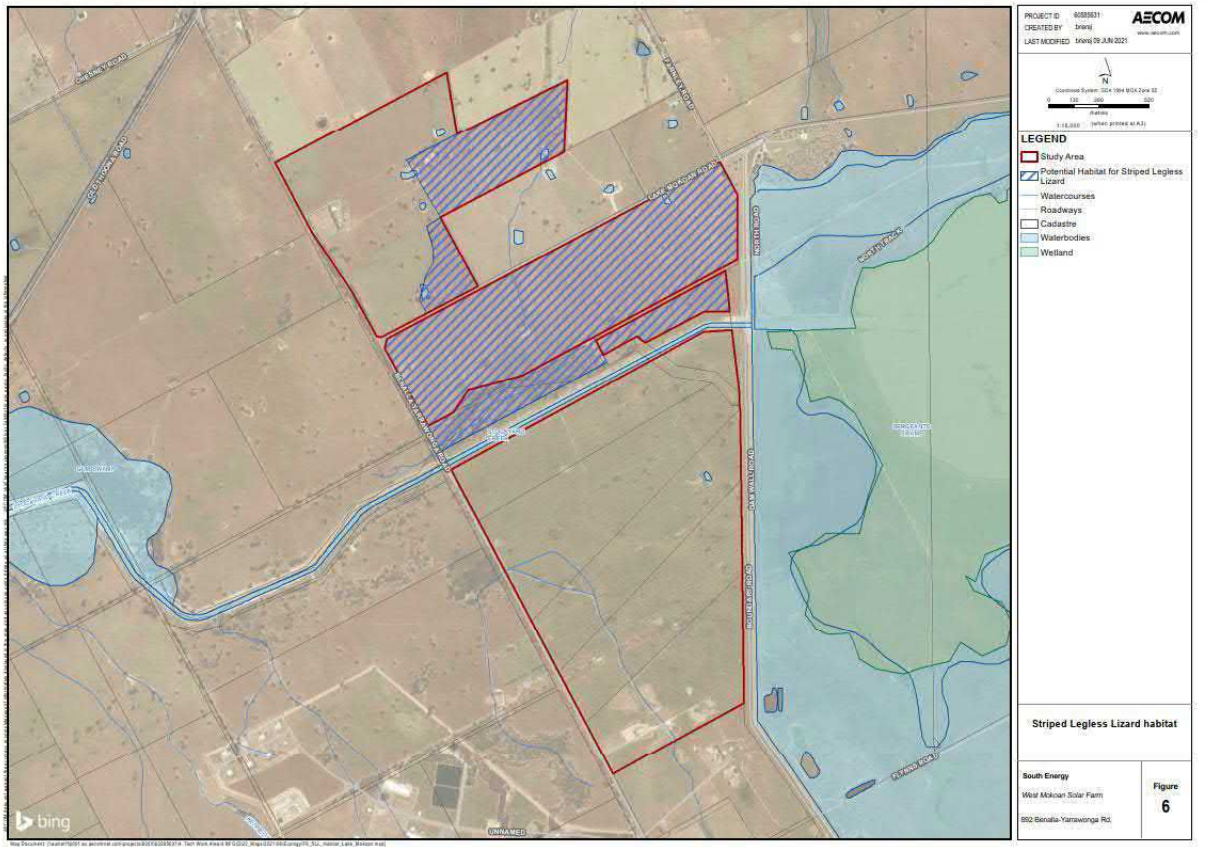


Figure 15 Potential habitat for Striped Legless Lizard at West Mokoan based on habitat assessment

Potential habitat comprised:

- Areas north of Lake Mokoan Road which supported a relatively consistent cover (>25% cover) of native grasses dominated by Wallaby Grass *Rytidosperma* spp., inter-tussock spaces, and had been grazed but did not appear to have been cropped in the recent past provide potential habitat for Striped Legless Lizard (Plate 3).

Plate 3 Native grass north of Lake Mokoan Road (to be retained)

- Non-native pasture south of Lake Mokoan Road and north of Stockyard Creek that had been grazed but not cropped and could not be fully discounted as potential habitat (Plate 4). The paddock is dominated by Toowoomba Canary-grass *Phalaris aquatica* which is a non-tussock forming species which usually persists in damper environments. Usually the absence of tussock grass structure would reduce the consideration of this area as potential habitat, however, Striped Legless Lizard has been observed in areas of Phalaris associated with native grassland (S. Koehler, pers. obs.) therefore this area warranted further consideration.

Plate 4 Non-native grassland (pasture) south of Lake Mokoan Road, north of Stockyard Creek

The largest land parcel to the south of Stockyard Creek is intensively farmed (ploughed and cropped) and was considered unsuitable for Striped Legless Lizard (Plate 5).

Plate 5 Cropped area south of Stockyard Creek (unsuitable)

Areas of potential Striped Legless Lizard habitat north of Lake Mokoan Road are to be retained. Areas south of Stockyard Creek are cropped and prone to flooding and are therefore not considered further.

The area which does require further consideration is the paddock between Lake Mokoan Road and Stockyard Creek. Superficially, the potential for the species to occur could not be ruled out during the habitat assessment based on visible habitat characteristics alone. As such, information relating to soils, topography and hydrology of the site was considered to build a profile of the site to inform whether Striped Legless Lizard could occur (Section 5.2).

5.2 Findings of geotechnical, surface water and hydrology assessments

AECOM has conducted geotechnical, surface water and hydrology and hydraulic modelling for the West Mokoan solar farm site (AECOM 2019; 2020a; 2020b). The findings of these studies are collated below to describe the site topography, drainage, geological setting and soils. This information has been used to develop a profile of conditions of the site and provides another level of insight into whether the areas identified as potential habitat during the habitat assessment could actually support Striped legless Lizard.

Soil conditions in particular are likely to be an important determinant of occurrence given the semi-fossorial habit of the species, Striped Legless Lizards use burrows and cracks as retreats and construct simple burrows for nesting.

5.2.1 Topography

The topography of the site is characterised by the low relief Shepparton Formation alluvial landform (AECOM 2019; Figure 16). The site exhibits a slight overall gradient fall with the northern land parcel gently sloping from north to south and the southern land parcel sloping generally from south to north (AECOM 2019, 2020a). The Winton Wetland Overflow Channel (also known as Stockyard Creek) represents the local low point between the northern and southern parcels of the site (AECOM 2019).

Site elevations range from approximately 173 mAHD (metres Australian Height Datum) to approximately 160 mAHD.

The northern land parcel contains several water features including constructed drains, natural channels and nine farm dams. Two dams in the centre of the site, are connected by a channel (AECOM 2020a). The southern parcel has a number of drainage features including a drainage easement that runs through the lower south western portion.

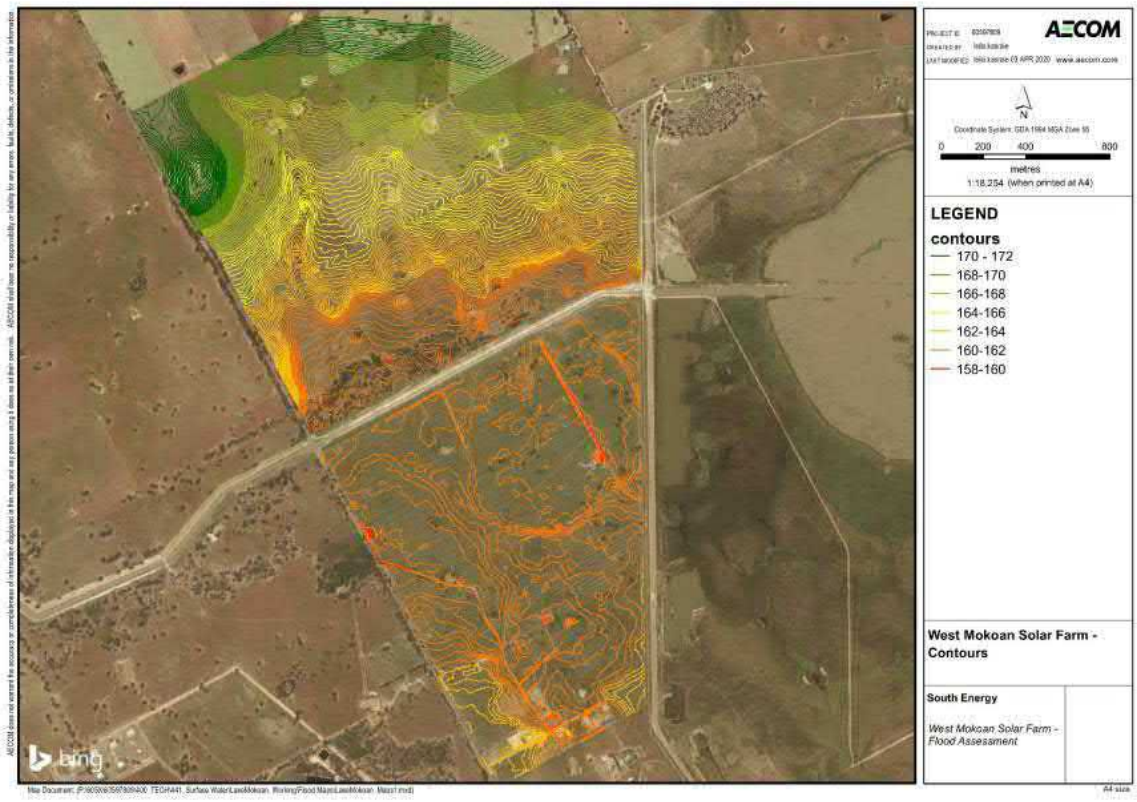


Figure 3 Site topography extracted from survey data in the northern and southern land parcel

Figure 16 Site topography at West Mokoan (Extract from AECOM 2019).

5.2.2 Drainage/hydrology

The site is dissected by Stockyard Creek which links Sergeant's Swap with Gum Swamp and the Broken River (Figure 17).

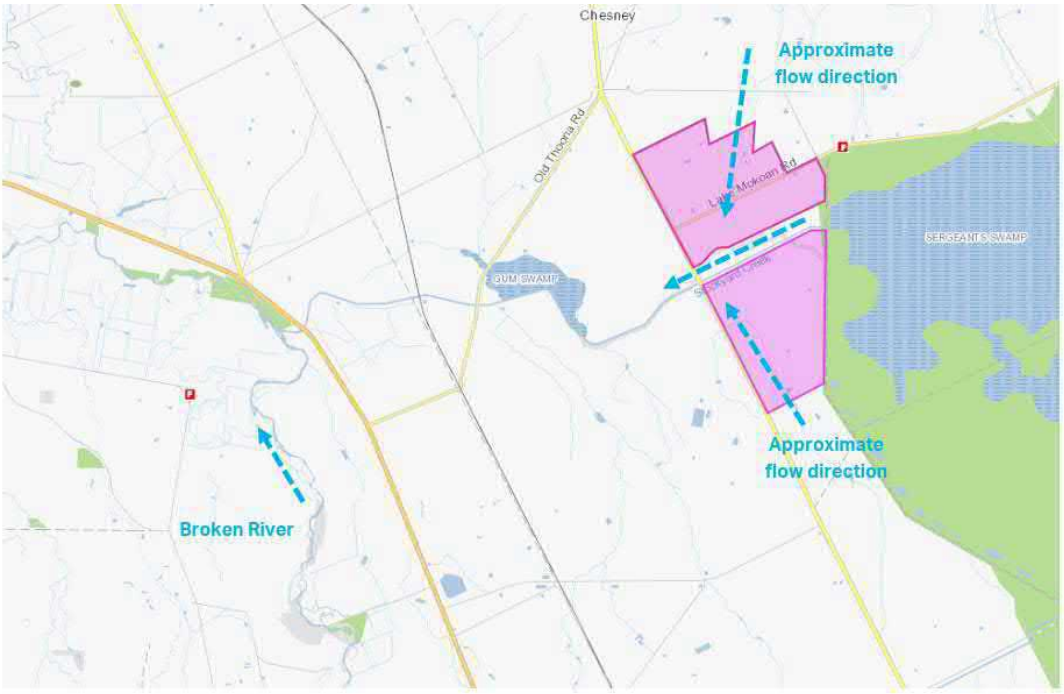


Figure 2 Site context and proximity to Broken Creek, Stockyard Creek and Winton Wetlands Reserve (Source, MapShareVic – DELWP 2019)

Figure 17 Site topography at West Mokoan (Extract from AECOM 2020a).

The site contains a number of water features including constructed drains, natural channels and farm dams. There are several unnamed shallow, low relief ephemeral drainage lines on the site. Other than Stockyard Creek and the Winton Wetlands there are no major water bodies in the vicinity of the site. Several farm dams occur within the site which are generally oval or rectangular and range from 30 to 75m in length. Evidence suggests it is likely the farm dams have been in use for many years; the embankments are worn down to a varying degree due to effects of weathering and long-term trafficking by cattle.

The site is not subject to a Land Subject to Inundation Overlays (LSIO) or Floodway Overlay (FO) based on DELWPs 'Mapshare' and 'VicPlan' mapping portals. However, the hydrological and hydraulic assessment and modelling conducted for the site indicates that areas within the northern land parcel are subject to inundation for a 1% Annual Exceedance Probability (AEP) flood event extent and critical duration (or length of time a 1 in a 100 year storm takes to inundate an area; Figure 18) and flood depth (Figure 19).

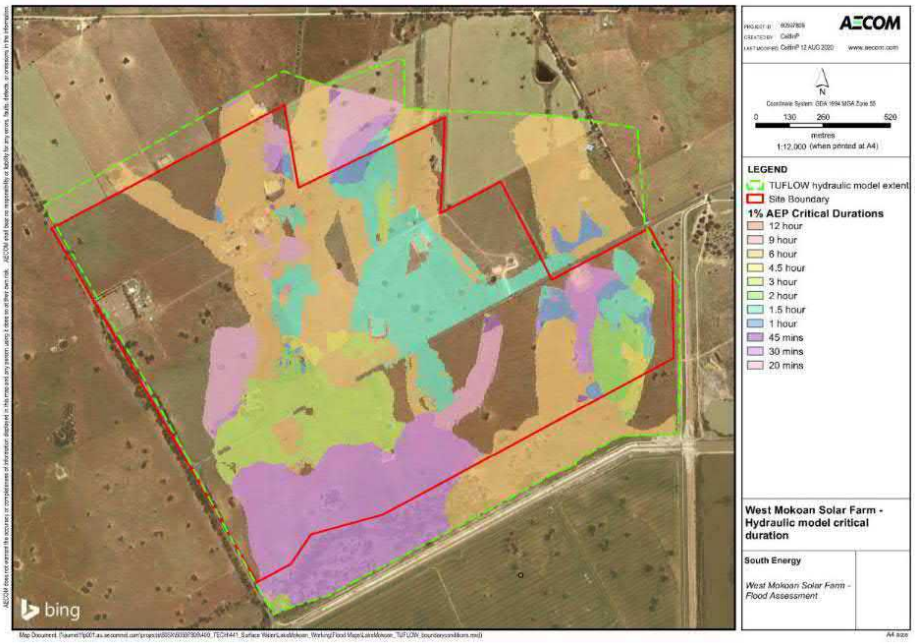


Figure 18 1% AEP durations at West Mokoan (Extract from AECOM 2020b).

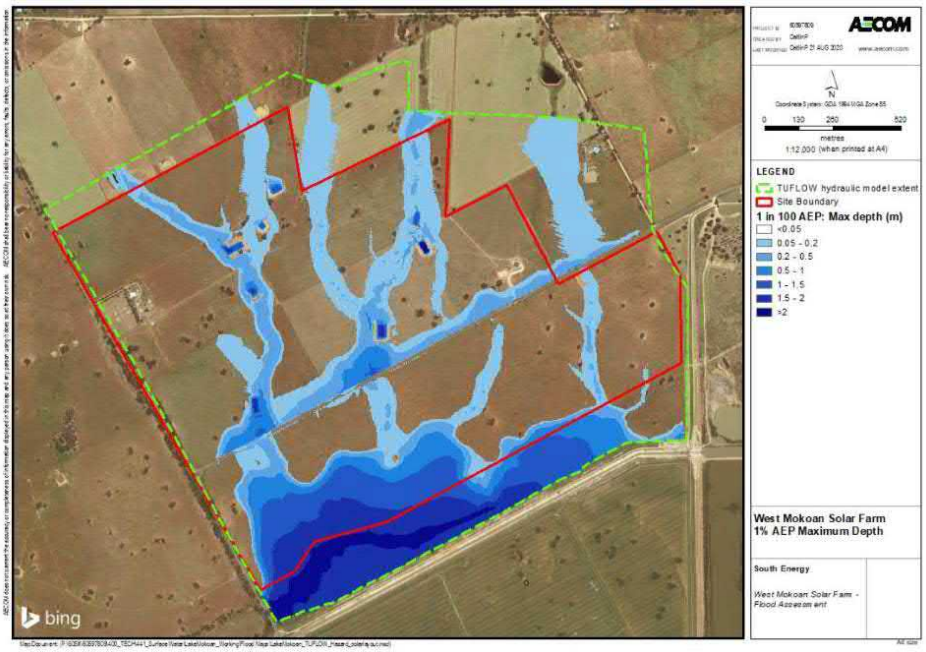


Figure 19 1 in 100 AEP max depth (m) at West Mokoan north of Stockyard Creek (Extract from AECOM 2020b).

The southern land parcel is inundated with 1% AEP flood with areas adjacent to Stockyard Creek and low-lying land in the north east of the parcel inundated with more than 1.5 m flood depth.

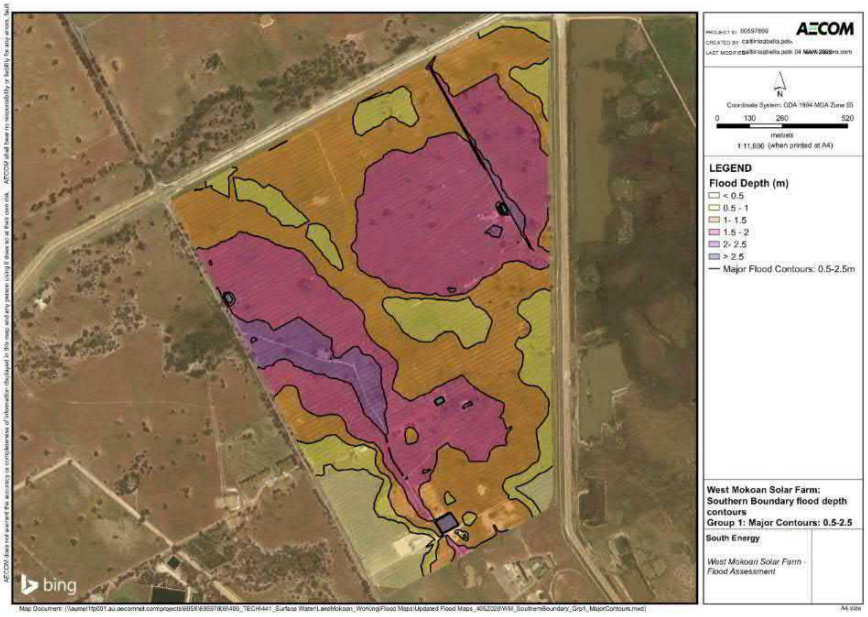


Figure 20 1 in 100 AEP max depth (m) at West Mokoan south of Stockyard Creek (Extract from AECOM 2020b).

The Goulbourn Broken Catchment Management Authority (GBCMA) 1% Flood Level Contour Atlas identifies an area of Urban Floodway Zone (UFZ) encroaching the southern land parcel, as well as the southern portion of the northern land parcel. *AECOM sought clarification on the extent of the UFZ from GBCMA on 30 July 2019. The GBCMA responded the same day stating that the Flood Atlas includes water bodies that look like UFZ and that there was no area of UFZ around or over the Winton Wetlands Reserve.*

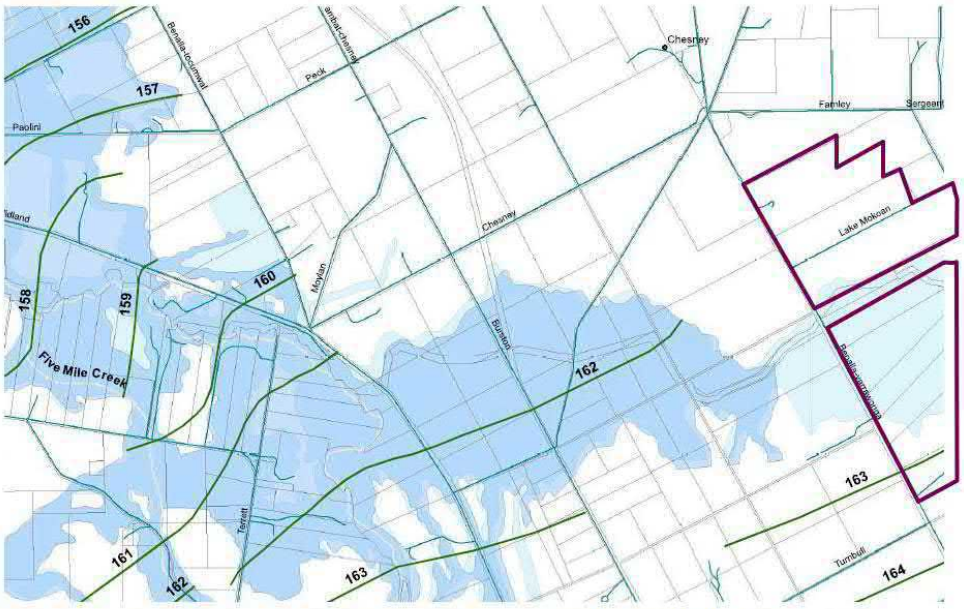


Figure 5 Floodway Overlay zone (blue), Urban Floodway Zones (light blue) and 1%AEP Flood depth contours (Source: GBCMA)

Figure 21 Floodway zones at West Mokoan (Extract from AECOM 2020b).

5.2.3 Geology/soils

The site is primarily located in an area comprising Quaternary age (<2.6 Million years) fluvial and lacustrine sediments of the Shepparton Formation (Geological Survey of Victoria 1:250,000 series 'Wangaratta' map sheet). This formation is generally associated with extensive prior stream networks, floodplains and colluvium and typically comprises flood plain clays, silts, channel sands and minor gravel (AECOM 2019).

A discrete area (geological inlier) in the north of the site comprises extensive quartz rich Pinnak Sandstone deposits associated with Ordovician age Adaminaby Formation (Geological Survey of Victoria 1:100,000 series 'Dookie' map sheet).

Figure 22 Geological setting at West Mokoan (Extract from AECOM 2019).

Soils

Materials exposed along farm dam embankments were observed to be a dry, friable silty/sandy clay. In some sections of the dam embankments, a covering of fine to medium grained, red-brown ferruginous gravel was observed (AECOM 2019).

Sodic soils, a soil with exchangeable sodium greater than 6%, could be present onsite based on a review of Victorian Resources Online (VRO) maps which have been compiled from previous soil and land surveys over the past 50 years and provide generalised maps at a regional scale (Figure 10).

Sodic soils typically occur on broad, flat landscapes with poor drainage. Sodic soils are susceptible to dispersion (collapse of structure which causes the soil to slump, clog soil pores and become denser) and waterlogging (AECOM 2019).

Ground conditions

The clays are likely to be reactive and therefore prone to shrink and swell with wetting and drying. Cracking of the exposed ground surfaces was observed, indicating potential for shrink-swell activity. No surface rock was observed but shallow rock may be present in the slightly elevated area adjacent to Benalla-Yarrawonga Road in the north-west of the site.

5.3 Conservation Covenant area

A 5.92 hectare area outside the West Mokoan Solar Farm site is the subject of a Conservation Covenant with Trust for Nature. The parcel is located to the south of the northern land parcel between the Overflow Channel and the meandering course of Stockyard Creek. A management plan has been developed for the property (Brennan, 2018).

According to Brennan (2018), the property consists of Gilgai Plain Woodland/Wetland Mosaic EVC which is an endangered EVC on the Victorian Riverina bioregion. The vegetation comprises an overstorey dominated by Grey Box *Eucalyptus macrocarpa* and River Red Gum *Eucalyptus camaldulensis* with a native understorey that lacks shrubs other than regenerating eucalypts.

Historically, the property was grazed and evidence of pugging suggested overgrazing at the time of change in ownership in 1997. In 2004 the parcel was fenced, and the area has been strategically grazed since to avoid long-term damage. Significant flooding has occurred on several occasions including 1939, 1993 (the most significant event) and 2020, but no fire events have passed through (Brennan, 2018).

Bush-stone Curlew *Burhinus grallarius* (FFG Act listed) was reported as being a common occurrence in the covenant area 20 years ago by the property owner (Brennan, 2018). The management plan contains a fauna species list compiled of records from 2003, 2016 and 2018. Numerous reptile species have been observed within the property, including the Lace Monitor *Varanus various* (endangered in Victoria) but no members of the Pygopodidae family (i.e. legless lizards) were documented.

6.0 Discussion - is the area able to support Striped Legless Lizard?

This section provides a discussion of the likelihood of occurrence of Striped Legless Lizard in areas of suitable habitat to be impacted by the project. This assessment of likelihood has been made on a weight of evidence approach based on site characteristics outlined in Section 5. Areas of potential Striped Legless Lizard habitat north of Lake Mokoan Road are to be retained and are not discussed further. Areas south of Stockyard Creek are cropped and prone to flooding and are also not considered further.

The area which does require further consideration is the paddock between Lake Mokoan Road and Stockyard Creek. Superficially, the potential for the species to occur could not be ruled out during the habitat assessment based on visible habitat characteristics alone. However, information relating to bioregion, other records, soils, topography and hydrology all contribute to a profile of the site which suggests that there is a low likelihood that Striped Legless Lizard would occur.

The findings of the geotechnical, surface water and hydrology assessments in relation to topography, drainage and soils suggest that area generally is low-lying, at risk of flooding, and is likely to support sodic, dispersive soils. The area is dominated by Toowoomba Canary-grass (a non-tussock forming species which is generally an indicator of wetter conditions), lacks surface rock (refuge) and is currently grazed. Information on the Conservation Covenant area immediately to the south of the northern parcel of the site suggests that prior to 1997 grazing was intensive based on evidence of pugging. This anecdotal evidence can be extended across the entire land parcel which was fenced to exclude stock and protect the woodland area. The presence of pugging also supports the assessment that the area is low lying and subject to water logging.

In addition, aerial imagery and the site topography (Figure 16) indicate that the Winton Wetlands basin would have extended over the site historically. The wetlands are now separated from the site by the dam and Dam Wall Road.

The tolerance of Striped Legless Lizard to waterlogging, sodic and dispersive (dense) soils is not documented in the literature and may not yet have been studied in detail. However, as a semi-fossorial species, logic suggests that the combination of soil conditions (dispersive soils which are likely to fill any soil cracks that form) plus the location of the site in the overall topography of the region (i.e. a wetland basin) and long history of agricultural land uses substantially reduces the likelihood the area historically would have supported the species.

Striped Legless Lizards are less likely to be found in the Victorian Riverine Bioregion and Alluvium geology, although there are the two exceptions of river floodplains at Stewarton and Oxley. Local site conditions for those two locations associated with are unknown but are anticipated to represent slightly higher ground on a river floodplain with rivers contained within incised channels (Broken River and King River) compared with the low-lying landscape on the edge of a wetland basin that represents the West Mokoan Solar Farm site. There are no apparent ‘islands’ or elevated areas in the paddock south of Lake Mokoan Road that may function as a refuge for the species during wetter periods.

Although the criteria for determining site selection for the Striped Legless Lizard in the North East Project are unknown, the area within which the West Mokoan Solar Farm site is located appears to be in a gap in areas approached for survey (Figure 12). This suggests the project did not regard the lowland agricultural setting to be suitable for survey.

In summary, the very low elevation, topography and association with a wetland basin, the modelling of areas subject to inundation (and therefore waterlogged soils), the likely occurrence of sodic, dispersive soils and the absence of observations of Striped or Olive Legless Lizards from the adjacent Conservation Covenant area suggest there is a low likelihood of Striped Legless Lizard occurring within the proposed area of impact. The distribution of properties identified for survey by the Striped Legless Lizard of North East Victoria project support this likelihood assessment.

Figure 23 Potential occurrence of Striped Legless Lizard

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Attachment 1 – Large format version of key figures

Figure 5 Victorian Biodiversity Atlas records of Striped Legless Lizard

Figure 7 VBA records of Striped Legless Lizard & Victorian Bioregions (north-east Victoria)

Figure 8 VBA records of Striped Legless Lizard & topography (north-east Victoria)

Figure 9 VBA records of Striped Legless Lizard & geology (north-east Victoria)

Figure 10 VBA records of Striped Legless Lizard & soils (north-east Victoria)

Figure 15 Potential habitat for Striped Legless Lizard at West Mokoan based on habitat assessment

Figure 23 Striped Legless Lizard Habitat within West Mokoan Solar Farm

PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 24 MAY 2021

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Coordinate System: GDA 1994 MGA Zone 55

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Legend

- Study Area
- Striped Legless Lizard VBA Records
- Goulburn Broken CMA
- North East CMA

Records of SLL from the Goulburn Broken CMA and North East CMA

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

5

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\05\F1_SLL_VBA.mxd)

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LAST MODIFIED	brierej 27 MAY 2021

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Coordinate System: GDA 1994 MGA Zone 55

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metres

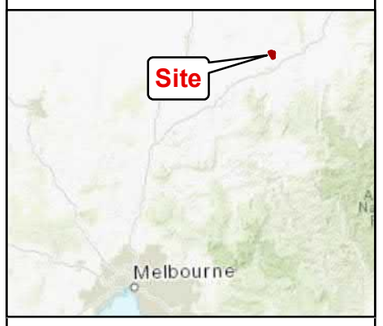
1:475,000 (when printed at A3)

Legend

- Study Area
- Striped Legless Lizard VBA Records
- Goulburn Broken CMA
- North East CMA

Bioregions

- Central Victorian Uplands
- Goldfields
- Highlands - Northern Fall
- Highlands - Southern Fall
- Murray Fans
- Northern Inland Slopes
- Victorian Alps
- Victorian Riverina



Records of SLL from the Goulburn Broken CMA and North East CMA

South Energy *West Mokoan Solar Farm* 892 Benalla-Yarrawonga Rd,	**Figure** 7

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\605856314\4. Tech Work Area\4.99 GIS\02_Maps\2021\05\F5_SLL_VBA_Bioregions.mxd)

PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 27 MAY 2021

AECOM
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Coordinate System: GDA 1994 MGA Zone 55

0 5,000 10,000 20,000

metres

1:475,000 (when printed at A3)

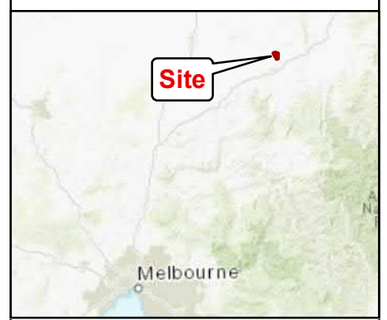
Legend

- Study Area
- Striped Legless Lizard VBA Records
- Goulburn Broken CMA
- North East CMA

Topography

High : 2045.77

Low : -69.577



Records of SLL from the Goulburn Broken CMA and North East CMA

South Energy *West Mokoan Solar Farm* 892 Benalla-Yarrawonga Rd,	**Figure** 8

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\05\F3_SLL_VBA_Topo.mxd)

PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 27 MAY 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 5,000 10,000 20,000

metres

1:475,000 (when printed at A3)

Legend

- Study Area
- Striped Legless Lizard VBA Records
- Goulburn Broken CMA
- North East CMA

Geology

- Alluvium
- Basalt
- Colluvial
- Granite
- Granitic
- Igneous
- Metamorphic
- Paleozoic sediments
- Sedimentary
- Tertiary basalts

Records of SLL from the Goulburn Broken CMA and North East CMA

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

9

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\05\F4_SLL_VBA_Geology.mxd)

PROJECT ID	60585631
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Coordinate System: GDA 1994 MGA Zone 55

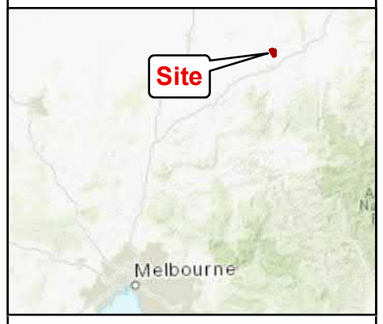
0 5,000 10,000 20,000

metres

1:475,000 (when printed at A3)

Legend

- Study Area
- Striped Legless Lizard VBA Records
- Goulburn Broken CMA
- North East CMA
- Non-sodic (ESP <6%)
- Sodic (ESP 6-15%)
- Strongly sodic (ESP 15-25%)
- Very strongly sodic (ESP >25%)



Records of SLL from the Goulburn Broken CMA and North East CMA

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

10

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\05\F6_SLL_VBA_Soils.mxd)

PROJECT ID 60585631
CREATED BY brierej
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Coordinate System: GDA 1994 MGA Zone 55

0 130 260 520

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Potential Habitat for Striped Legless Lizard
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

CHESNEY ROAD
OLD THOONA ROAD
FARNLEY ROAD
LAKE MOKOAN ROAD
NORTH ROAD
NORTH TRACK
BENALLA-YARRAWONGA ROAD
STOCKYARD CREEK
SERGEANTS SWAMP
DAM WALL ROAD
BOUNDARY ROAD
FLYNNS ROAD
GUM SWAMP
STOCKYARD CREEK
KENNEDY
UNNAMED

bing

Potential habitat for Striped Legless Lizard at West Mokoan Solar Farm based on habitat assessment

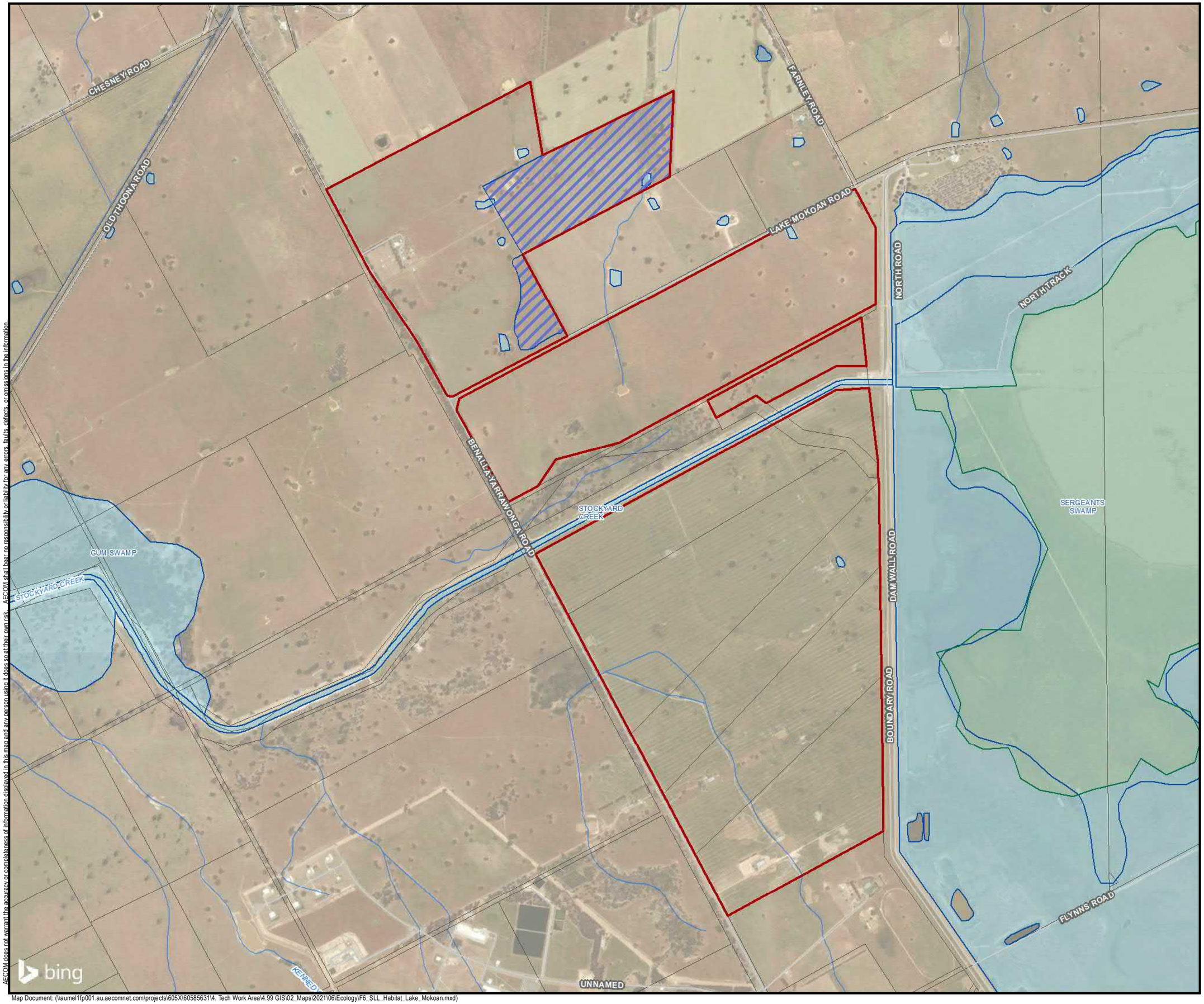
South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure
15

Map Document: (\\aumel1fp001.au.aecomnet.com\projects\605X\60585631\4. Tech Work Area\4.99 GIS\02_Maps\2021\06\Ecology\F6_SLL_Habitat_Lake_Mokoan.mxd)



PROJECT ID	60585631
CREATED BY	brierej
LAST MODIFIED	brierej 18 JUN 2021

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Coordinate System: GDA 1994 MGA Zone 55

0 130 260 520

metres

1:15,000 (when printed at A3)

LEGEND

- Study Area
- Potential Habitat for Striped Legless Lizard
- Watercourses
- Roadways
- Cadastre
- Waterbodies
- Wetland

Striped Legless Lizard Habitat within West Mokoan Solar Farm

South Energy

West Mokoan Solar Farm

892 Benalla-Yarrawonga Rd,

Figure

23

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Attachment 2 – Site photos

Attachment 2 – Site photos

North of Stockyard Creek

North of Lake Mokoan Road

March 2019 – North of Lake Mokoan Road

July 2019 – North of Lake Mokoan Road

December 2020 – North of Lake Mokoan Road

December 2020 – North of Lake Mokoan Road

December 2020 – North of Lake Mokoan Road

December 2020 – North of Lake Mokoan Road

January 2021 – North of Lake Mokoan Road

January 2021 – North of Lake Mokoan Road

January 2021 – North of Lake Mokoan Road

January 2021 – North of Lake Mokoan Road

January 2021 – North of Lake Mokoan Road

South of Lake Mokoan Road

December 2020 – south of Lake Mokoan Road

December 2020 – south of Lake Mokoan Road

January 2021 – south of Lake Mokoan Road

January 2021 – south of Lake Mokoan Road

South of Stockyard Creek

July 2019 – south of Stockyard Creek

December 2020 – South of Stockyard Creek

January 2021 – South of Stockyard Creek