

Warracknabeal Energy Park

Attachment A.2: Ecological Assessment



Final Report

Ecological Assessment: Warracknabeal Energy Park, Warracknabeal, Victoria

Prepared for

Warracknabeal Energy Park Pty Ltd

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Ecology and Heritage Partners Pty Ltd

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EXECUTIVE SUMMARY

Introduction

Ecology and Heritage Partners Pty Ltd was commissioned by Warracknabeal Energy Park Pty Ltd to undertake a suite of Ecological Assessment to determine the ecological values present within and inform the future ecological planning and legislative implications of the proposed Warracknabeal Energy Park, Victoria (the Project).

The purpose of the Ecological Assessment undertaken was to:

- Identify and characterise the vegetation on-site;
- Determine the presence (or likelihood thereof) of any significant flora and fauna species and/or ecological communities;
- Inform the design of the Project and to minimise the impacts of the Project on biodiversity;
- Address any implications under Commonwealth and State environmental legislation and policy; and,
- Support the submission of Project referrals under the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) and *Environment Effects Act 1978* (Victoria).

All ecological impacts presented in this report are based on the worst-case scenario, determined from the current infrastructure footprint. It is likely that impacts to ecological values will be reduced by some extent through the detailed design phase of the project.

Methods

The ecological field assessment program detailed in this report commenced in July 2020 and was completed in August 2022. The field assessments sought primarily to assess the extent and condition of native vegetation communities and potential flora and fauna habitat, with particular consideration given to significant ecological communities and species of conservation concern, such as threatened and migratory species. The survey program was designed to optimise the survey timing, methods and frequency to enable sampling of those flora and fauna species which occur seasonally.

Flora

Targeted surveys for the nationally significant Wimmera Rice-flower *Pimelea spinescens* subsp. *pubiflora*, Floodplain Rustyhood *Pterostylis cheraphila*, Slender Darling-pea *Swainsona murrayana* and Turnip Copperburr *Sclerolaena napiformis* were undertaken within areas of potential habitat along and adjacent to the infrastructure footprint.

Fauna

Fauna surveys included:

- Bird Utilisation Surveys;
- Microbat surveys using Anabat detector and Songmeter units; and,
- Golden Sun Moth *Synemon plana* targeted surveys.

Results

Flora

A total of five EVC’s; Ridged Plains Mallee (EVC 96), Plains Savannah (EVC 826), Low Rises Woodland (EVC 66), Plains Woodland (EVC 803) and Riverine Chenopod Woodland (EVC 103_61) were recorded within the Assessment Area. Table S1 details the results of the flora surveys and Figure 2 and Figure 3 show the location of mapped EVCs and surveyed flora.

No nationally significant flora species were confirmed within the Assessment Area during the targeted flora surveys. Three nationally significant ecological communities were mapped within the Assessment Area, including *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions, Natural Grasslands of the Murray Valley Plains* and *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions*.

Seven flora species listed as threatened under *the Flora and Fauna Guarantee Act 1988* (FFG Act) were recorded within the Assessment Area during the targeted surveys and biodiversity assessments, including Umbrella Wattle *Acacia oswaldii*, Weeping Myall *Acacia pendula*, Long Eryngium *Eryngium paludosum*, Hairy Tails *Ptilotus erubescens*, Swainsona-pea *Swainsona* sp., Buloke *Allocasuarina luehmannii* and Buloke Mistletoe *Amyema linophylla* subsp. *orientalis*.

One state significant ecological community, Semi-arid Northwest Plains Buloke Grassy Woodlands Community, was recorded within the Assessment Area.

Fauna

Low numbers of EPBC Act-listed Golden Sun Moth were recorded on two of the four surveys within the road reserve of Moloneys Road, near the intersection with Pullens Road, located on the southern boundary of the southern Project Area (Figure 5).

No additional national or State significant fauna were recorded within the Project Area.

Summary of Ecological Values

The desktop and field assessments identified several ecological features within the Project Area and surrounding landscape; and these are summarised below (Table S1).

Table S1. Summary of the ecological values within the Project Area.

Species diversity	A diverse assemblage of plants and animals, with 77 flora species (52 native and 25 exotic) and 72 fauna species recorded during the field surveys.
Native Vegetation	<p>Native vegetation mapped within the Project Area was represented by five EVCs:</p> <ul style="list-style-type: none"> o Ridged Plains Mallee (EVC 96) 213.3 hectares o Plains Woodland (EVC 803) 1.9 hectares; o Plains Savannah (EVC 826) 71.2 hectares; o Low Rises Woodland (EVC 66) 58.5 hectares; o Riverine Chenopod Woodland (EVC 103) 3.9 hectares <p>785 Scattered Trees; and</p> <p>1,747 Large Trees in patches of vegetation.</p>

Ramsar Wetlands	There are no Ramsar wetlands within or adjacent to the Project Area. The Lake Albacutya Ramsar site is located approximately 50 kilometres north of the Project Area (upstream).
Significant ecological communities	<ul style="list-style-type: none"> • Three EPBC Act-listed ecological communities were present: <ul style="list-style-type: none"> ○ <i>Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions</i>; ○ <i>Natural Grasslands of the Murray Valley Plains</i>; and, ○ <i>Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions</i>. • One State significant ecological community was present: <ul style="list-style-type: none"> ○ Semi-arid Northwest Plains Buloke Grassy Woodland Community.
Significant flora species	<p>The known occurrence of seven State significant flora species</p> <ul style="list-style-type: none"> • Buloke <i>Allocasuarina luehmannii</i>; • Buloke Mistletoe <i>Amyema linophylla</i> subsp. <i>orientalis</i>; • Hairy Tails <i>Ptilotus erubescens</i> • Long Eryngium <i>Eryngium paludosum</i> • Weeping Myall <i>Acacia pendula</i> • Umbrella Wattle <i>Acacia oswaldii</i> • Swainsona-pea <i>Swainsona</i> sp <p>The presence of several flora species ‘protected’ under the FFG Act in Family/genera Acacia, Asteraceae and Fabaceae.</p>
Significant fauna species	Seven individuals of the EPBC Act-listed Golden Sun Moth were recorded within the Project Area, on the far southern boundary. A total of 0.975 hectares of confirmed habitat was recorded, with no impacts to the mapped habitat proposed.

Legislative and Policy Implications

Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act - Commonwealth)

Any impacts to the EPBC Act-listed ecological communities may require a referral to the Commonwealth Environment Minister to determine if the project will have a significant impact any Matters of National Environmental Significance (MNES).

Based on the current impact footprint, a maximum area of 0.069 hectares of Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions community, 0.107 hectares of Natural Grasslands of the Murray Valley Plains community and 2.006 hectares of Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions community is proposed to be impacted. No impacts are proposed to the Golden Sun Moth habitat.

Environment Effects Act 1978 (Victoria)

The current impact footprint proposes to remove a maximum of 6.98 hectares of native vegetation patches. Based on an assessment of ecological thresholds, an EES is unlikely to be triggered by the Project based on ecological impacts alone as:

- None of the thresholds relating to any of the individual ecological criteria are likely to be exceeded; and,
- None of the thresholds relating to the combination of ecological criteria are likely to be exceeded.

It should be noted that Ecology and Heritage Partners' have not undertaken a detailed assessment of other non-ecological referral criteria detailed in DSE (2006).

Flora and Fauna Guarantee Act 1988 (FFG Act - Victoria)

One fauna species (Golden Sun Moth), seven flora species (Umbrella Wattle, Weeping Myall, Long Eryngium, Hairy Tails, Swainson-pea, Buloke and Buloke Mistletoe) and one ecological community (Semi-arid Northwest Plains Buloke Grassy Woodlands Community) listed as threatened under the FFG Act were recorded during the field surveys. Where impacts to these species or communities occur on private land, a permit under the FFG Act is not required. However, where impacts are proposed on public land, and FFG Act permit will be required. WestWind Energy should allow up to six weeks to receive an approved FFG Act permit from DELWP.

Planning and Environment Act 1987 (Victoria)

The Project Site is within Location 2, with 8.141 hectares of native vegetation proposed to be removed, comprising 6.98 hectares of native vegetation patches, 36 Large Trees in patches, and 24 scattered trees (12 Large and 12 Small Trees). As such, the permit application falls under the Detailed assessment pathway.

The offset requirement for native vegetation removal is 3.311 General Habitat Units and 48 Large Trees.

A planning permit from the DELWP Minister for Planning is required to remove, destroy or lop any native vegetation under Clause 52.17 and Clause 42.01 (ESO2) of the Yarriambiack Planning Scheme.

A permit is required under Clause 52.32 of the Planning Scheme to develop and use a Wind energy facility. The ecological application requirements are outlined in Section 6.5.1.

A permit will be referred to DELWP as a 'recommending authority' as the applications is being assessed under the Detailed Assessment pathway.

Implications relating to other legislation and policy are detailed in Section 4.

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1 INTRODUCTION

1.1 Background

Ecology and Heritage Partners Pty Ltd was commissioned by Warracknabeal Energy Park Pty Ltd (herein referred to as WAEPPPL) to undertake Ecological Assessment within the location of the proposed Warracknabeal Energy Park, Warracknabeal, Victoria. WAEPPPL are in the pre-planning stages of a proposal to develop a 211 turbine Wind Farm located within primarily privately-owned agricultural land surrounding the Warracknabeal township. This preliminary ecological assessment will be used to inform future planning and environmental applications for the Project.

The turbine model will be selected after the approvals process. For the purposes of the Ecological Assessment the following dimensions of likely future turbines has been provided by WestWind Energy:

- Rotor Diameter up to 200 meters;
- Overall WTG tip height up to 280 meters; and,
- Minimum blade to ground clearance of 50 meters.

The purpose of the Ecological Assessment undertaken was to:

- Identify and characterise the vegetation on-site;
- Determine the presence (or likelihood thereof) of any significant flora and fauna species and/or ecological communities;
- Inform the design of the Project and to minimise the impacts of the Project on biodiversity; and,
- Address any implications under Commonwealth and State environmental legislation and policy.

This report presents the results of the ecological assessment and discusses the potential ecological and legislative implications associated with the proposed development. The ecological impacts presented in this report are based on the worst-case scenario, determined from the current infrastructure footprint. It is likely that impacts to ecological values will be reduced by some extent through the detailed design phase of the project.

1.2 Project Area

The Project Area covers two general locations, north west and south west of Warracknabeal (Figure 1), known as the Northern and Southern sites respectively, and two easement corridors; one connecting the northern and southern sites, and one connecting the southern site to the existing Murra Warra Terminal Station.

The northern site covers an area of approximately 14,300 hectares and is bounded by Couzner Road in the north, Yarriambiack Creek in the east, and Rainbow Road to the south and west.

The southern site covers an area of approximately 7,200 hectares and is bounded by Cannum Five Chain Road in the north, Ailsa Wheat Road in the east, Blue Ribbon Road in the west and Moloneys Road in the south.

The Project Area is in the upper catchment of the Wimmera River, and comprises predominantly agricultural land (predominately cropping and some areas for grazing), with scattered dams, sheds and dwellings present.

The terrain is predominantly flat with some minimal fall to the south west. Yarriambiack Creek runs adjacent to the eastern border of the northern Project Area. One conservation reserve is in the northern Project Area, Willenabrina I86 Bushland Reserve. No reserves are located within the southern Project Area.

The surrounding land use is consistent with the Project Area, being predominantly agricultural with associated infrastructure with the exception of the Warracknabeal Township which is predominantly residential with supporting services and infrastructure.

The assessment considered the surrounding National and State Park and conservations areas, and potential impacts to these areas associated with the Project. No large conservation areas are located within close proximity of the Project Area. The nearest reserves are:

- Lake Hindmarsh – 25 kilometres
- Big Desert – 60 kilometres
- Little Desert – 40 kilometres
- The Grampians– 60 kilometres

According to the Department of Environment, Land, Water and Planning (DELWP) NatureKit Map (DELWP 2022a), the Project Area intersects both the Wimmera and Murray Mallee bioregions, and is located within the Wimmera Catchment Management Authority (CMA) and Yarriambiack municipality.

1.2.1 Assessment Area

All vegetation assessments and targeted flora surveys were confined to the Assessment Area within the broader study area. The Assessment Area refers to the general location of the proposed infrastructure footprint, based on the infrastructure footprint provided by the client and an additional buffer. Two versions of the infrastructure footprint were provided during the course of the ecological assessments, Version 3 and Version 8, and included all proposed permanent infrastructure locations (e.g. access roads, hardstands and underground cables) and construction buffers. To allow for adjustments to the infrastructure footprint, a 25 meter buffer either side of the infrastructure footprint was applied by Ecology and Heritage Partners, to capture the ecological values directly adjacent to the footprint.

Within the Assessment Area, targeted surveys were undertaken for significant flora species in areas of potential habitat. This predominately included roadsides where patches of native vegetation were present. Areas of private land within the Assessment Area were mostly disturbed and comprised of cropping land with occasional scattered trees or clusters of trees present, with no potential habitat for significant flora or fauna species present in the areas of private land.

The initial targeted flora surveys were undertaken in August 2021. Changes to the project layout required some additional areas to be surveyed due to the size of the Project increasing to be about twice as large as the original area. The additional surveys were completed in November 2021 and July/August 2022. The areas of suitable habitat surveyed during each targeted survey event are shown below (Figure 1). Specific methods for the targeted flora surveys are detailed in Section 2.5.

2 METHODS

2.1 Relevant Legislation

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

- *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- *Environment Effects Act 1978* (EE Act);
- *Flora and Fauna Guarantee Act 1988* (FFG Act);
- *Planning and Environment Act 1987* (P&E Act);
- *The Guidelines for the removal, destruction and lopping of native vegetation* (the Guidelines) (DELWP 2017);
- *Policy and Planning Guidelines for Development of Wind Energy Facilities in Victoria* (DELWP 2021);
- *Interim Guidelines for the Assessment of Potential Windfarm Impacts on the Brolga* (DSE 2012);
- *Yarriambiack Planning Scheme*; including,
 - Clause 52.17 Native Vegetation
 - Clause 52.32 Wind Energy Facility
- *Wildlife Act 1975* (Wildlife Act); and,
- *Catchment and Land Protection Act 1994* (CaLP Act).

2.2 Desktop Assessment

Relevant literature, online-resources and databases were reviewed to provide an assessment of flora and fauna values associated with the Project Area. The following information sources were reviewed:

- The DELWP NatureKit Map (DELWP 2022a) and Native Vegetation Information Management (NVIM) Tool (DELWP 2022b) for:
 - Modelled data for location risk, native vegetation patches, scattered trees and habitat for rare or threatened species; and,
 - The extent of historic and current Ecological Vegetation Classes (EVCs).
- EVC benchmarks (DELWP 2022c) for descriptions of EVCs within the relevant bioregion;
- The Victorian Biodiversity Atlas (VBA) for previously documented flora and fauna records within the project locality (DELWP 2022d);
- The Atlas of Living Australia (ALA) (ALA 2022) for assistance with the distribution and identification of flora species;

- BirdLife New Atlas Bird Data Extraction for significant birds within 20 kilometres of the Project Area (BirdLife Australia 2022);
- The Commonwealth Department of Climate Change, Energy, the Environment and Water (DCCEEW) Protected Matters Search Tool (PMST) for matters of National Environmental Significance (NES) protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) (DCCEEW 2022);
- Relevant listings under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act), including the latest Threatened (DELWP 2022e) and Protected (DELWP 2019) Lists;
- The online VicPlan Map (DELWP 2022f) to ascertain current zoning and environmental overlays in the Project Area;
- Aerial photography of the Project Area; and,
- Previous ecological assessments relevant to the Project Area used to inform the current report, including;
 - Preliminary Ecological Assessment for the Warracknabeal Energy Park (Northern Section). Ecology and Heritage Partners 2019.
 - Murra Warra Wind Farm: Flora and Fauna Assessment. Biosis 2016.

2.3 Field Assessment

The ecological field assessment program detailed in this report commenced in March 2020 and was completed in August 2022. The timing and effort utilised for each survey event is summarised in Table 1.

The field assessments sought primarily to assess the extent and condition of native vegetation communities and potential flora and fauna habitat, with particular consideration given to significant ecological communities and species of conservation concern, such as threatened and migratory species. The survey program was designed to optimise the survey timing, methods and frequency to enable sampling of those flora and fauna species which occur seasonally.

All areas of the proposed infrastructure footprint and immediate surrounds were subject to field assessments, with a particular focus on the areas likely to support native vegetation and habitat for significant ecological values as identified during initial site assessments completed by Ecology and Heritage Partners, and as part of the desktop assessment.

All fieldwork was carried out under the appropriate licences, including a Research Permit (1008283) and Scientific Procedures Fieldwork Licence (SPFL20005) issued by DELWP under the *Wildlife Act 1975*, and an Animal Research permit issued by the Wildlife and Small Institutions Animal Ethics Committee (05.17).

Further detail on the methodology used is provided in Sections 2.4, 2.5 and 2.6.

Table 1. Summary of Field Surveys.

Category	Survey dates	Survey Area	Resources
High-level baseline vegetation assessment to gain initial understanding of vegetation extent and condition	30 July 2020 – 2 August 2020	Version 01-03 Infrastructure Footprint	1 x ecologist
Habitat hectare and Large Tree assessments	28 February – 4 March 2022 4 – 8 April 2022 16 – 18 May 2022	Version 08-01 Infrastructure Footprint	2 x ecologists
Targeted surveys for Slender Darling-pea, Turnip Copperburr and Floodplain Rustyhood	8 – 16 November 2021	Spring Flora Survey Areas (Figure 1)	1 x ecologist
Targeted surveys for Wimmera Rice-flower	25 – 28 August 2021 26 – 29 July 2022 15 – 17 August 2022	Wimmera Rice-flower Survey Areas (Figure 1)	1 x ecologist
Targeted Golden Sun Moth surveys	30 November 2021 1, 6, 7, 13, 19, 20 December 2021	Golden Sun Moth Survey Areas (Figure 5)	2 x ecologists
Bird Utilisation surveys	31 March – 3 April 2020 3 – 8 August 2020 17 – 20 November 2020	Version 01-03 Infrastructure Footprint	2 x ecologists
	30 November – 3 December 2021 21 – 24 March 2022	Version 08-01 Infrastructure Footprint	
Microbat surveys	April 2020	Version 01-03 Infrastructure Footprint	2 x ecologists
	November 2021	Version 08-01 Infrastructure Footprint	

2.3.1 Biodiversity Assessment (including Habitat Hectare Assessment)

Given the size of the Project Area and the type and extent of the proposed infrastructure footprint (i.e. only a very small proportion of the Project Area is likely to be disturbed), vegetation surveys and targeted surveys primarily focused in areas within or adjacent to the potential infrastructure layout (i.e. the Assessment Area) (Figure 2). Native vegetation, scattered trees and large trees within 25 meters of each iteration of the infrastructure footprint were assessed to ensure that all indirect impacts of the project footprint alignments could be fully assessed.

The Biodiversity Assessment was conducted by ecologists accredited by DELWP in the habitat hectare methodology (DSE 2004a) to quantify the quality and extent of native vegetation values within the Assessment Area to identify flora and fauna habitat values, and to determine conditions with reference to findings of the desk-based assessment.

Native vegetation in the local area was investigated to aid in determining the pre-European vegetation within the Project Area. Ecological Vegetation Classes were determined with reference to DELWP pre-1750 and extant EVC mapping and their published descriptions (DELWP 2022c).

The Biodiversity Assessment sought primarily to assess the extent and condition of native vegetation communities and potential flora and fauna habitat, with particular consideration given to significant ecological

communities and species of conservation concern, such as threatened and migratory species (noting that targeted surveys were undertaken for significant flora and fauna species).

Native vegetation was classified in accordance with the definitions provided in Table 1, as defined in the Guidelines (DELWP 2017).

2.4 Removal, Destruction or Lopping of Native Vegetation (the Guidelines)

Under the *Planning and Environment Act 1987*, Clause 52.17 of the Yarriambiack Planning Scheme requires a planning permit to remove, destroy or lop native vegetation. The assessment process for the clearing of vegetation follows the Guidelines (DELWP 2017). The ‘Assessor’s handbook: Applications to remove, destroy or lop native vegetation’ (Assessor’s handbook) (DELWP 2018) provides clarification regarding the application of the Guidelines (DELWP 2017).

2.4.1 Assessment Pathway

The Guidelines manage the impacts on biodiversity from native vegetation removal using an assessment-based approach. Two factors – extent risk and location category – are used to determine the risk associated with an application for a permit to remove native vegetation. The location category (1, 2 or 3) has been determined for all areas in Victoria and is available on DELWP’s NVIM Tool (DELWP 2022b). Determination of assessment pathway is summarised in Table 2.

Table 2. Assessment pathways for applications to remove, destroy or lop native vegetation (DELWP 2017).

Extent		Location		
		1	2	3
Native Vegetation	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

Notes: For the purpose of determining the assessment pathway of an application to remove native vegetation the extent includes any other native vegetation that was permitted to be removed on the same contiguous parcel of land with the same ownership as the native vegetation to be removed, where the removal occurred in the five year period before an application to remove native vegetation is lodged.

2.4.2 Vegetation Assessment

Native vegetation (as defined in Table 3) is assessed using two key parameters: extent (in hectares) and condition. For the purposes of this assessment, both condition and extent were determined as part of the habitat hectare assessment.

Table 3. Determination of a patch of native vegetation (DELWP 2017).

Category	Definition	Extent	Condition
Patch of native vegetation	An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native; OR An 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 <i>Current Wetlands map</i> , available in DELWP systems and tools.	Measured in hectares. Based on hectare area of the native patch.	Vegetation Quality Assessment Manual (DSE 2004a). Modelled condition for <i>Current Wetlands</i> .
Large Trees	A native canopy tree with a Diameter at Breast Height (DBH) greater than or equal to the large tree benchmark for the relevant bioregional EVC.	Circumference measurement around a tree at 1.3 meters above ground level.	Defined by EVC benchmark and status (i.e. Large Tree in a Patch of Native Vegetation or Scattered Large Tree). Refer to Vegetation Quality Assessment Manual (DSE 2004a).
Scattered tree	A native canopy tree that does not form part of a native patch.	Measured in hectares. Each Large scattered tree is assigned an extent of 0.071 hectares (15m radius). Each Small scattered tree is assigned a default extent of 0.031 hectares (10 metre radius)	Scattered trees are assigned a default condition score of 0.2 (outside a patch).

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

Large Tree and Habitat Assessment

Large tree and habitat assessments were undertaken concurrently with the habitat hectare assessments to quantify the number of scattered trees and Large Trees within native vegetation.

Large Tree benchmarks relating to the EVCs present within the Assessment Area are summarised below (Table 4).

Table 4. Benchmark sizes for large trees within the Assessment Area.

EVC	Large Tree Benchmark	Large Tree DBH
Low Rises Woodland (EVC 66)	<i>Eucalyptus</i> sp.	≥ 60 cm
	<i>Allocasuarina</i> sp.	≥ 40 cm
	<i>Callitris</i> sp.	≥ 40 cm
Plains Woodland (EVC 803)	<i>Eucalyptus</i> sp.	≥ 60 cm
	<i>Allocasuarina luehmannii</i>	≥ 40 cm
Riverine Chenopod Woodland	<i>Eucalyptus largiflorens</i>	≥ 40 cm

EVC	Large Tree Benchmark	Large Tree DBH
Ridged Plains Mallee	<i>Eucalyptus</i> sp.	≥ 30 cm
	<i>Allocasuarina luehmannii</i>	≥ 40 cm
Plains Savannah	<i>Allocasuarina luehmannii</i>	≥ 40 cm
	<i>Callitris gracilis</i> subsp. <i>murrayensis</i>	≥ 40 cm

Note. DBH = Diameter at Breast Height (i.e. 1.3 metres above ground level).

2.4.3 Impact Avoidance and Minimisation

All applications to remove native vegetation must demonstrate the three-step approach of avoid, minimise and offset. This is a precautionary approach that aims to ensure that the removal of native vegetation is restricted to what is reasonably necessary, and that biodiversity is appropriately compensated for any native vegetation removal that is approved.

2.4.4 Offsets

Biodiversity offsets are required to compensate for the permitted removal of native vegetation. Offset obligations and offset site criteria are determined in accordance with the Guidelines (DELWP 2017) and are divided into two categories, being General Habitat Units (GHUs) and Species Habitat Units (SHUs) (Table 5).

Table 5. Definition of General Offset and Species Offset (DELWP 2017).

Offset type	
General offset	Required when the removal of native vegetation does not have a significant impact on any habitat for rare or threatened species. The offset value is presented as a unit of habitat (i.e. GHU).
Species offset	Required when the removal of native vegetation has a significant impact on habitat for rare or threatened species. Species offsets must compensate for the removal of that particular species' habitat. The offset value is presented as a unit of habitat (i.e. SHU).

The offset requirements for native vegetation removal are calculated by DELWP and presented in a Native Vegetation Removal (NVR) Report, which are based on the vegetation condition scores determined during the biodiversity assessment.

2.5 Targeted Flora Surveys

Targeted surveys for significant flora were undertaken within the Assessment Area where areas of suitable habitat occurred. Targeted surveys for Wimmera Rice-flower *Pimelea spinescens* subsp. *pubiflora* were undertaken within the Wimmera Rice-flower Survey Area and the Spring targeted surveys were undertaken within the Spring Flora Survey Area (Figure 1a and 1b).

2.5.1 Wimmera Rice-flower Surveys

Wimmera Rice-flower is a small shrub 5-50 centimetres tall which occurs on Buloke grasslands in the Wimmera region of Victoria. It is currently only known to occur in two discrete populations near Natimuk and Minyip (DEWHA 2009a).

Wimmera Rice-flower is closely related to Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens*, with the hairy outer surface on the flowers of Wimmera Rice-flower critical in distinguishing the two subspecies from each other (TSSC 2009).

The leaves are oval shaped and are generally no bigger than 10 millimetres long x 3 millimetres wide. In contrast to most other grassland species, Wimmera Rice-flower typically blooms in mid-winter. Between April and August, small creamy yellow flowers bloom profusely amongst the green leaves. As both Wimmera Rice-flower and Spiny Rice-flower blooms during the winter months, it is conspicuous amongst its surrounding vegetation and as such, surveys are recommended to be undertaken during this time.

Targeted flora surveys Wimmera Rice-flower were undertaken between 25 and 28 August 2021, 26 and 29 July 2022, and 15 and 17 August 2022 by a qualified botanist familiar with the identification of the species. Prior to undertaking the targeted surveys, a known population of Wimmera Rice-flower near Minyip and Natimuk were visited to assist with confirming the species morphological, habitat traits and to provide verification that the species was flowering (Plate 1; Plate 2). This provides evidence that the survey was conducted at a suitable time to maximise the likelihood of detection of the species within the Assessment Area.



Plate 1. Wimmera Rice-flower observed at the Natimuk reference site (Ecology and Heritage Partners Pty Ltd 25/08/2021).



Plate 2. Flowering Wimmera Rice-flower observed at the Minyip reference site (Ecology and Heritage Partners Pty Ltd 26/07/2022).

Undisturbed areas within the Targeted Survey Area provided potential habitat for the nationally significant Wimmera Rice-flower, and as such, the survey effort was directed towards relatively undisturbed roadside vegetation that supported a low cover of perennial grassy weeds, as well as woodland vegetation that supported a relatively undisturbed ground-layer with low biomass and/or cover of perennial grassy weeds.

Wimmera Rice-flower is known to be sensitive to regular disturbance (i.e. slashing, intensive grazing, ploughing), weed invasion and high levels of biomass (Carter and Walsh 2006). Areas subject to cropping, intensive grazing, or comprised native vegetation patches consisting of secondary grasslands, and/or patches that exhibited moderate to high levels of ground disturbance, and/or a high cover of invasive perennial weeds are generally not considered to support suitable habitat, and were excluded from the surveyed areas.

Areas of potential habitat within the Targeted Survey Area were traversed on foot at five meter transects, or as dictated by the biomass of existing grasses and weeds. Reliable line of sight was at least 2.5 metres either side of the surveyor to enable sufficient coverage of habitat between transects. The location of any EPBC Act-listed plants recorded during the targeted survey were documented with a differential GPS (dGPS) with sub-metre accuracy.

There is no specific survey methodology for this subspecies, but the survey method used is in accordance with the Significant Impact Guidelines for the closely related Spiny Rice-flower *Pimelea spinescens* subsp. *spinescens* (DEWHA 2009a).

2.5.2 Spring Flora Surveys

Targeted surveys for nationally significant flora were conducted by a qualified botanist between the 8 and 16 November 2021, focusing on all areas of public land within the Spring Flora Survey Area (Figure 1a and 1b). Areas of potential habitat were systematically traversed at approximately five-metre linear intervals. This survey method is in accordance with the flora survey guidelines detailed in the *Biodiversity Precinct Planning Structure Kit* (DSE 2010). Although the project area is not located within a prescribed Precinct Structure Plan, this survey method is best-practice for conducting surveys for those significant flora that do not have their own specific set of survey guidelines.

Surveys for significant orchid species were undertaken in accordance with the survey methods detailed in the Commonwealth of Australia's Survey Guidelines for Australia's Threatened Orchids (DoE 2013).

The Spring targeted flora surveys focused on three nationally significant flora species (Slender Darling-pea *Swainsona murrayana*, Turnip Copperburr *Sclerolaena napiformis* and Floodplain Rustyhood *Pterostylis cheraphila*) that were identified to have potential habitat present. Whilst these species were the focus of the surveys, any nationally significant flora opportunistically observed was recorded. Handheld GPS units were used to record the location of any significant species encountered.

The targeted spring flora surveys also documented the presence of FFG Act-listed and protected flora where incidentally observed.

2.6 Fauna Surveys

2.6.1 Golden Sun Moth

Golden Sun Moth typically occur in native grassland, grassy woodland, dominated by greater than 40% cover of Wallaby-grass, in particular *Rytidosperma* spp. (DSE 2004b), but may also inhabit areas dominated by Kangaroo Grass *Themeda triandra* (Endersby and Koehler 2006) and introduced grassland dominated by Chilean Needle-grass *Nassella neesiana* and other introduced species (A. Organ pers. obs.). Male flight is typically low, to about a metre above the ground, fast and can be prolonged, but they are generally not recorded flying more than 100 metres from suitable habitat (Clarke and O'Dwyer 1999). The male of this species generally flies between 11am and 3pm on calm, warm (over 20°C), sunny days.

Prior to European settlement, the Golden Sun Moth was widespread and relatively continuous throughout its range, inhabiting grassy open woodlands and grassland, although it now mainly inhabits small isolated sites (DSE 2004b). The species is threatened by habitat loss, disturbance and fragmentation due to agricultural expansion and urbanisation. Many populations are isolated and fragmented, impeding the ability of the

relatively immobile females to recolonise areas, thereby reducing the likelihood of genetic exchange (DSE 2004v). Such populations are therefore vulnerable as there is little likelihood of recolonisation in the event of a local extinction.

Targeted surveys were undertaken within areas of potential habitat located within the Assessment Area in publicly accessible land (i.e. road reserves) (Figure 4). Four survey events over a total of seven days were undertaken at each area of potential habitat during 2021 (Table 6). Only areas of potential habitat on public land that intersected the proposed infrastructure alignment were surveyed (+/- 50 metres either side).

Table 6. Golden Sun Moth Survey dates.

Survey #	Date
Survey #1	30 November – 1 December 2021
Survey #2	6 – 7 December 2021
Survey #3	13 December 2021
Survey #4	19 – 20 December 2021

Survey procedures followed those outlined in the *Significant Impact Guidelines for the Critically Endangered Golden Sun Moth* (DEWHA 2009b). The nearest known reference site for Golden Sun Moth is located at Nhill, within a dedicated reserve for the conservation of species, approximately 55 kilometres north west of the Project Area (DELWP 2022a). The following methods were followed:

- Surveys were conducted by ecologists experienced in the detection and identification of Golden Sun Moth;
- Each area of potential habitat was surveyed on four separate occasions, during the species’ confirmed flight season;
- The species was confirmed flying at known reference sites in north western Victoria through a review of the Golden Sun Moth diary circulated by the Ecological Consultants Association of Victoria around the period that the targeted surveys being undertaken (e.g. confirmed records on 23 November 2021 at Nhill, 28 November 2021 at Beaufort and 22 December 2021 at Ararat);
- The species was confirmed flying at a location in Stawell, located approximately 90 kilometres south east of the Project Area, on the 2, 10, 17 and 20 December 2021;
- Surveys were undertaken during weather conditions suitable for detecting the species. Male moths generally fly between 10am and 3pm on warm (over 20°C by 10am) days with minimal cloud cover and still conditions. However, if males are observed flying on site after 3pm or during moderately windy conditions surveys can continue until males are no longer observed flying; and,
- Surveys were conducted using parallel transects at distances prescribed by the Commonwealth (DEWHA 2009b) with observers walking or, where terrain permitted, driving in a car at < 10 km / hour (flying male moths can be readily seen from a vehicle) until moths are observed.

2.6.2 Bird Utilisation Surveys

Bird utilisation surveys are the most commonly used method for generating quantitative data on bird use of a potential wind farm site. The bird utilisation surveys for the Project were designed to comply with the

guidelines described in *AusWEA – Wind Farms and Birds: Interim Standards for Risk Assessment* (2005). According to these guidelines, bird utilisation surveys are undertaken to ascertain:

- The species composition of birds that use the Project Area;
- The frequency with which each of those species use the Project Area;
- The height at which each of these species fly in the Project Area; and,
- The distribution of these species across the landscape.

Bird utilisation surveys are a minimum requirement for proposed wind farm sites and are used to inform the design of higher-level investigations, if required. The total number of point counts was determined based on both the habitat conditions of the Project Area and the number of turbines proposed, in addition to any existing data that has already been collected (e.g. detailed significant species data).

Five bird utilisation survey events were undertaken (Table 7), with between eight and 12 fixed point count locations. Eight fixed point locations were used for the first three surveys, with an additional four sites added for the final two surveys due to the increased area of the infrastructure footprint (10 within the Project Area, and two outside the boundary) (Figure 4).

Table 7. Bird utilisation survey dates.

Survey #	Survey dates	No. sites	Infrastructure Footprint
Survey #1 (Autumn)	31 March – 3 April 2020	8	Version 01-03
Survey #2 (Winter)	3 – 8 August 2020	8	Version 01-03
Survey #3 (Spring)	17 – 20 November 2020	8	Version 01-03
Survey #4 (Summer)	30 November – 3 December 2021	12	Version 08-03
Survey #5 (Autumn)	21 – 24 March 2022	12	Version 08-03

AusWEA Wind Farms and Birds: Interim Standards for Risk Assessment

The Australian Wind Energy Association (AusWEA 2005) has developed interim standards for risk assessment of birds for wind farm developments in Australia. This document outlines the type of investigations required, the order in which they should be undertaken and a systematic approach for assessing risk of bird impact at wind farms. This process allows for more detailed studies should a potentially significant risk be identified during preliminary studies.

The AusWEA (2005) interim standards recommend three levels of investigations, with each level involving increasing levels of detail. These levels include:

- **Level 1** investigations provide an initial assessment of the risk of significant bird impacts from the operation of the proposed wind farm. Level One investigations involve a regional overview, review of existing data, an indicative bird utilisation survey and roaming surveys.
- **Level 2** investigations refine the risk assessment from the Level One investigation, using more intensive methods. Level Two investigations involve roaming surveys and risk modelling.

- **Level 3** investigations are initiated if the results of the Level Two investigations indicate a greater than low level of residual risk of significant bird impacts from the operation of the proposed wind farm. Level Three investigations involve population assessment and population viability analysis.

A Level One investigation was undertaken for the proposed wind farm development.

The interim standards also recommend consultation with the wind farm developer and key representatives of agencies that assess and approve development to:

- Agree on the issues, questions and objectives of bird impact risk assessment studies;
- Agree on the consequence and, where relevant, likelihood criteria that apply to the results of the studies; and,
- Where required, agree on the nature and effectiveness of mitigation measures.

Fixed Point Bird Counts

Two Zoologists, experienced in bird identification, undertook the fixed-point count surveys to the specifications outlined below. 10 × 42 binoculars were used to identify the bird to species, or for some species, generic level (e.g. non-calling Raven species).

The following was undertaken as part of the fixed-point bird counts:

- Twelve locations were established at which to undertake fixed point counts with two of these located outside of the Project Area. The locations chosen were to ensure that the entire Project Area was sampled and that a range of habitat types represented in that sample (Figure 4);
- The search radius from the point was at least 100 metres for small birds and up to 800 metres for large birds (e.g. birds of prey, waterbirds), or further, if accurate identification to species level was achievable, using prominent landmarks;
- The duration of each fixed-point count was 20 minutes;
- The height at which each bird flew through the survey area was estimated to the nearest 10 metres;
- The direction of flight of each bird was recorded to the nearest 45 degrees of the compass;
- Each point was surveyed at different times of day (e.g. early morning, late morning, early afternoon and late afternoon) to account for diurnal differences in bird activity; and,
- Each point was surveyed at least six times over the course of each survey period.

Incidental observations and roaming surveys

In addition to bird species recorded during the fixed-point count surveys, incidental observations of bird species were recorded while travelling between point counts and during other field-based activities. Birds seen adjacent to the Project Area were also recorded. No suitable habitat for wading birds or other waterbirds was observed within the Project Area.

Statistical Analyses

Species accumulation curves were generated from the point count data and is presented as graphs. This, along with a measure of completeness provides an overall account of the survey efficacy in predicting the species likely to occur within the Project Area.

Completeness follows the methods of Watson (2003) which is widely used in the manufacturing industry and ecology-based projects (Watson 2003) and is calculated as the actual richness (A) divided by the predicted richness (P) expressed as a percentage. The predicted species richness was calculated computed with the EstimateS 9.1.0 program, using the Michaelis–Menten richness estimator (MMMeans) using 1000 runs and estimates of 76, which uses the ratio of species seen once (singletons) to the species seen more than once (doubletons) to predict species richness (Raaijmakers 1987; Colwell *et al.*, 2004; Colwell 2013).

Observations of birds were classified, according to their flight height, into four categories:

- Ground;
- Below RSA (1–50 metres);
- Within RSA (between 51 - 280 metres); and,
- Above RSA (> 280 metres).

Analysis of the bird utilisation survey data is provided in Section 3.5.

2.6.3 Brolga Surveys

The Brolga assessment was undertaken in accordance with the requirements and method detailed in the *Interim Guidelines for the Assessment of Potential Windfarm Impacts on the Brolga* (DSE 2012).

There are no records of Brolga within the VBA (DELWP 2022d) within 30 kilometres of the Project Area, or in the Birdlife New Atlas (Birdlife 2022) within 20 kilometres of the Project Area. Further, the proposed windfarm footprint is located outside of the Victorian range of Brolga (as identified in DSE 2012).

The majority of Brolga sightings in the vicinity are located more than 50 kilometres from the Project Area. There are five historic records (between 1979 and 1996) of Brolga within 40 kilometres of the Project Area, situated to the south east around Horsham and Nhill.

Therefore, there were no triggers for a Level 1 survey as per the requirements of the *Interim Brolga assessment guidelines* (DSE 2012), and no Brolga surveys were undertaken as part of this assessment given the lack of suitable habitat within the Project Area for the species and absence of any nearby records.

No waterbodies which have the potential to support flocking or breeding habitat for Brolga were identified within the Project Area. The nearest water body which may provide potential habitat for Brolga is located approximately 25 kilometres to the west at Lake Hindmarsh.

In late 2020, DELWP published the *Brolga Assessment and Mitigation Standards for Wind Energy Facility Permit Applications* (DELWP 2020a) (Draft Brolga Standards). The Draft Brolga Standards were provided for public comment and to-date they have not been finalised or ratified. DELWP also published an explanatory document (DELWP 2020b) to accompany the Draft Brolga Standards. The intention is that a final Brolga Standard will be incorporated into planning schemes and will replace the Interim Brolga Guidelines.

At present, given that the Draft Brolga Standards have not been approved or finalised, current advice from DELWP to wind energy proponents has been that the Interim Brolga Guidelines continue to apply. As such, this Brolga assessment has been conducted as per the requirements and implications associated with the Interim Brolga Guidelines (DSE 2012).

2.6.4 Microbat Surveys

Bat surveys were undertaken in accordance with the *Survey guidelines for Australia's threatened bats* (DEWHA 2010). No significant bat species have previously been documented within the VBA (DELWP 2022d) within or in close proximity to the Project Area (Figure 7). As such, the purpose of the microbat survey was not to undertake targeted surveys for any specific species, but rather, to gain an understanding of the diversity of species that are likely to utilise habitat within and adjacent to the Project Area.

Two rounds of bat surveys were undertaken within the Project Area between 12 March and 2 April 2020, and 29 November and 21 December 2021. Six Song Meter SM4 (Wildlife Acoustics™) sound recorders were deployed during the March/April 2020 surveys and eight during the November/December 2021 surveys (Figure 4). Each survey period lasted 21 days.

The SM4's recorded audible sounds from 10kHz-55kHz which is the calling acoustic frequency for microbats. These instruments record the high frequency calls or echolocation, produced by the bats when they are in flight, and save these calls directly to a memory card. Different bat species produce distinguishable calls; therefore, detectors were used to identify the species present in a given area. It is important to note that although detectors may give an index of overall bat activity levels, they cannot be used to determine bat abundance, as the number of individuals making the calls is not known.

Bat detector locations were chosen based on geography and habitat type to capture a representative sample of the Project Area (Figure 4). Weller and Zabel (2002) found detectors placed at a height of 1.4 metres recorded 30% more calls than those placed on the ground. This method was adopted at all locations within the Project Area.

Call Analysis

Identification of bat calls were analysed by Rob Gratton from EcoAerial Consulting Services, a recognised expert in bat call analysis. All data was assessed for the calls of all bats, with a focus on the detection of any significant bats, such as Corben's Long-eared Bat *Nyctophilus corbeni*.

Call analysis involved the allocation of every data file to a species, and then counting the number of call records for each species. Results of the microbat call analysis is provided in Section 3.6 and Appendix 3.

2.7 Likelihood of Occurrence Assessment

Relevant biological databases, literature (listed in Section 2.1) and expert advice were used to identify all species records of national, State and regional conservation significance within 10 kilometres of the project area. The proximity, number, dispersion and date of known locality records (assuming over-dispersed and random patterns of locality records being more likely to occur in the project area) were considered to determine a species' likelihood of occurrence within the project area.

Additional factors also taken into consideration include:

- The known biogeographical distribution of the species;
- Underlying geology of existing locality records; and,
- Vegetation and habitat associations.

The decision guidelines for determining the likelihood of occurrence of flora and fauna species are presented in Table 8 and Table 9, respectively. The results of the likelihood of occurrence assessment for listed flora and fauna species are provided in Appendices 2.4 and 3.1, respectively.

Table 8. Decision guidelines for determining a flora species likelihood of occurrence within the wind farm development boundary.

Likelihood of occurrence	Decision guidelines
1 – Known occurrence	Recorded within the project area recently (i.e. within 10 years).
2 - High	Previous records of the species in the local vicinity; and/or, the project area contains areas of high-quality habitat.
3 – Moderate	Limited previous records of the species in the local vicinity; and/or, the project area contains some characteristics of the species’ preferred habitat.
4 – Low	Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a low likelihood of presence.
5 – Unlikely	No potential habitat and/or outside the species range.

Table 9. Decision guidelines for determining a fauna species likelihood of occurrence within the wind farm development boundary.

Likely presence or use of the project area	Decision guidelines
1 – Known occurrence	Recorded within the project area recently (i.e. within 10 years).
2 - High	Likely resident in the project area based on database records, or expert advice; and/or, recent records (i.e. within 10 years) of the species in the local area; and/or, the project area contains the species’ preferred habitat.
3 - Moderate	The species is likely to visit the project area regularly (i.e. at least seasonally); and/or, previous records of the species in the local area; and/or, the project area contains some characteristics of the species’ preferred habitat.
4 - Low	The species may visit the project area occasionally or opportunistically whilst en route to more suitable sites; and/or, there are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, the project area contains few or no characteristics of the species’ preferred habitat.
5 - Unlikely	No previous records of the species in the local area; and/or, the species may fly over the project area when moving between areas of more suitable habitat; and/or, out of the species’ range; and/or, no suitable habitat present.

2.8 Assessment Qualifications and Limitations

Data and information held within the ecological databases and mapping programs reviewed in the desktop assessment (i.e. VBA, PMST, Nature Kit Maps etc.) are unlikely to represent all flora and fauna observations within and surrounding the Project Area. It is therefore important to acknowledge that a lack of documented records does not necessarily indicate that a species or community is absent. Furthermore, a documented

record may indicate a species' presence in an area at a given point in time, but it generally does not offer information about how a species is making use of an area (e.g. foraging, nesting, dispersing). This can be important information when determining the potential impact of a proposed action on a threatened species.

The 'snapshot' nature of a biodiversity assessment meant that migratory, transitory or uncommon fauna species may have been absent from typically occupied habitats at the time of the field assessment. In addition, annual or cryptic flora species such as those that persist via underground tubers may also be absent. Nevertheless, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources is considered adequate to provide an accurate assessment of the ecological values present within the Assessment Area.

Ecological values identified were recorded using either a hand-held GPS (accuracy +/- 1 meter), a differential GPS (dGPS) with sub-metre accuracy or tablet (accuracy of +/-3 metres). Any nationally significant flora species observed were recorded with a dGPS, and state significant flora were recorded with either the dGPS, GPS or tablet, due to the incidental nature of the observations. All patches of native vegetation were mapped using the tablet and were limited by the quality of the aerial imagery available at the time of the assessment combined with accuracy of the tablet. Although this level of accuracy is adequate to provide an accurate assessment of the ecological values present within the Assessment Area, this data should not be used for detailed surveying purposes.

Generally, the level of risk posed by the limitations described below is low due to the level of effort and resources used to conduct multiple ecological surveys conducted to date between July 2020 and May 2022 throughout the Project Area. Limitations and assumptions relating to the survey effort for ecological values are detailed below.

2.8.1 Vegetation Surveys

The field assessments were undertaken over multiple seasons between 2020 and 2022 to maximise the likelihood of detection for patches of native vegetation, and significant flora and fauna species. As such, sufficient effort has been employed to determine the likelihood of significant species, and to accurately characterise the flora and faunal values present occurring within the Project Area.

Therefore, the terrestrial flora and fauna data collected during the field assessment and information obtained from relevant desktop sources provides an accurate assessment of the ecological values present within the Project Area.

The March 2023 amendment to the development footprint included several areas that fell outside of the native vegetation Assessment Area (as defined in Section 1.2.1), therefore the exact condition and extent of native vegetation in these areas is yet to be confirmed. The current extent of native vegetation and impact assessment within these areas is based off DEECA's modelled native vegetation data. Within the impact assessment, this includes impacts to 19 patches of modelled native vegetation, totalling an area of 0.5828 hectares. Further on-ground assessments will be completed to confirm the extent, condition and presence of any threatened flora and fauna within these areas prior to any impacts occurring.

2.8.2 *Bird Utilisation Surveys*

The fixed-point bird counts may have suffered from some biases because of the use of estimation in determining the distance of birds from the observer. Horizontal distances became increasingly difficult to judge as the distance between the observer and the bird increased.

Vertical distances were also difficult to judge, depending on structures and other landmarks that could be used as a reference. The higher the bird the greater the likelihood of error. In addition, this difficulty was not consistent across species, with small and large species biasing the results in unknown directions.

To attempt to overcome these potential errors, and to calibrate the estimations of the observers, at each point count 200 metres was measured to use as a reference for the estimations that followed. To calibrate height, a landmark of known height (such as wind anemometer tower, power-line poles etc.) was used as a reference point. Whilst these precautions alleviated some of the bias in this process, the height and distance data need to be interpreted in a cautious manner, given the probability of a high degree of error in the data-set.

A further bias in the data-set is the over-representation of large birds. As the distance between the observer and the bird increases, smaller species are increasingly likely to be overlooked. This effect is also likely to be exacerbated by weather conditions with overcast, windy or wet conditions having a negative impact on the detectability of some birds.

2.8.3 *General Limitations*

General ecological limitations associated with the ecological investigations include:

- The assessment of likelihood of occurrence is based on survey effort and results, background information and previous records compiled;
- Non-vascular flora (i.e. mosses, liverworts) were not recorded, although their presence is noted as part of the cover of native species in the definition of a patch of native vegetation;
- Ecological features identified during field assessments were recorded using hand-held GPS (accuracy +/- 1 meter), a differential GPS (dGPS) with sub-metre accuracy or tablet (accuracy of +/-3 metres). This level of accuracy is considered adequate to provide an accurate assessment of the ecological features present within the Project Area; however, this data should not be used for detailed surveying purposes; and,
- For cryptic and less abundant species that are known to, or that have the potential to use habitat resources within the Assessment Area as a resident or a visitor on a regular or infrequent basis, the precautionary principle has been applied when determining the likelihood of occurrence (i.e. the absence of a species during targeted surveys is not used as a reason for assuming the species is not present, or may use habitats within the Assessment Area, particularly where the species was/is known to occur within the locality, and the Assessment Area supports suitable habitats).

3 EXISTING ECOLOGICAL CONDITION

3.1 Vegetation Condition

Most of the landscape within the Project Area has been significantly modified for agricultural use, including cropping of cereals and grains. This has resulted in much of the native vegetation within areas of private land being removed, with most of the native vegetation restricted to linear road reserves or isolated clusters. Native scattered trees were common, retained by famers in paddocks or along sections of degraded road reserves. Limited areas of planted vegetation were present, generally near dwellings or dams.

A list of all flora species recorded during the field assessment are provided in Appendix 1.1.

3.1.1 Patches of Native Vegetation

Native vegetation in the Assessment Area is representative of five EVCs: Ridged Plains Mallee (EVC 96), Plains Savannah (EVC 826), Low Rises Woodland (EVC 66), Plains Woodland (EVC 803) and Riverine Chenopod Woodland (EVC 103_61). The presence of these EVCs is generally consistent with the modelled pre-1750s native vegetation mapping (DELWP 2022c).

A total of 348.8 hectares of native vegetation was mapped within the Assessment Area. An additional 0.5828 hectares was modelled to occur in areas located outside of the Assessment Area, but within the development footprint. A summary of the extent mapped of each EVC and the bioregional conservation status of each EVC is provided below (Table 10). Specific details relating to the observed EVCs are provided below.

Table 10. Summary of native vegetation mapped within the Assessment Area.

Ecological Vegetation Class	Bioregional Conservation Status	Mapped Extent	Number of Large Trees in patches
Ridged Plains Mallee EVC 96	Endangered	213.3 hectares	1597
Plains Savannah EVC 826	Endangered	71.2 hectares	66
Low Rises Woodland EVC 66	Endangered	58.5 hectares	59
Plains Woodland EVC 803	Endangered	1.9 hectares	4
Riverine Chenopod Woodland EVC 103_61	Endangered	3.9 hectares	31

Ridged Plains Mallee

Ridged Plains Mallee is described as an open mallee woodland to 10 meters tall, with a grassy understorey occurring on the plains of the Wimmera and Southern Mallee (DELWP 2022c).

Ridged Plains Mallee was the dominant EVC recorded within the Assessment Area, commonly observed in linear strips along road corridors (Plate 3). Most habitat zones were present in a similar condition, containing

a mallee eucalypt canopy with a grass and small shrub understorey. Common canopy species included Dumosa Mallee *Eucalyptus dumosa*, Bull Mallee *Eucalyptus behriana*, Red Mallee *Eucalyptus calycogona* and Black Mallee-box *Eucalyptus porosa*.

The understorey and ground layer varied slightly throughout the Assessment Area, but generally contained Feather Spear-grass *Austrostipa elegantissima*, Rough Spear-grass *Austrostipa scabra*, Hedge Saltbush *Rhagodia spinescens*, Desert Cassia *Senna artemisioides*, Sugarwood *Myoporum platycarpum*, New Holland Daisy *Vittadinia* spp., and Black Cotton-bush *Maireana decalvans* (Plate 4).



Plate 3. Moderate quality Ridged Plains Mallee located along Lah West Road in the Northern Project Area (Ecology and Heritage Partners Pty Ltd 01/03/2022).



Plate 4. High quality Ridged Plains Mallee understorey located on Hein Lane in the Northern Project Area (Ecology and Heritage Partners Pty Ltd 01/03/2022).

Plains Savannah

Plains Savannah is described as a structurally diverse vegetation community that can include vast open grassland areas or woodland areas (DELWP 2022c). Buloke *Allocasuarina luehmannii* and occasionally Slender Cypress-pine *Callitris gracilis* subsp. *murrayensis* dominate the canopy of the woodland components, with eucalypt notably absent (DELWP 2022c).

Plains Savannah was present in two structural forms within the Assessment Area, either as a Buloke woodland (Plate 5) or open grassland (Plate 6). Both structural forms contained similar vegetation in the understory and ground layer, commonly containing Spear-grass *Austrostipa* spp., Wallaby-grass *Rytidoperma* spp. Windmill Grass *Chloris truncata*, Grey Germander *Teucrium racemosum*, Prickly Starwort *Salsola tragus*, Wingless Bluebush *Maireana enchylaenoides*, Berry Saltbush *Atriplex semibaccata*, Variable Sida *Sida corrugata* and Quena *Solanum esuriale*. The occasional medium shrub was present, including Umbrella Wattle *Acacia oswaldii*, Desert Cassia and Tangled Lignum *Duma florulenta*.



Plate 5. High quality Plains Savannah located along Boundary Road in the Southern Project Area (Ecology and Heritage Partners Pty Ltd 06/04/2022).



Plate 6. A patch of Plains Savannah (treeless) along Rainbow Road within the Northern Project Area (Ecology and Heritage Partners Pty Ltd 01/03/2022).

Low Rises Woodland

Low Rises Woodland is characterised by a eucalypt woodland to 15 meters tall, occurring on elevated plains and low rises (DELWP 2022c). The understorey often contains a diverse shrub layer and grassy ground layer (DELWP 2022c).

Several habitat zones of Low Rises Woodland were mapped within the Assessment Area. These generally contained a canopy of Yellow Gum *Eucalyptus leucoxylon* (Plate 7) with a mixed understorey commonly including Weeping Pittosporum *Pittosporum angustifolium*, Sugarwood *Myoporum platycarpum*, Sweet Bursaria *Bursaria spinosa*, Wingless Bluebush, Spear-grass and Wallaby-grass (Plate 8).



Plate 7. A patch of Low Rises Woodland located along Exchange Road in the Northern Project Area (Ecology and Heritage Partners Pty Ltd 01/03/2022).



Plate 8. High quality Low Rises Woodland located along Ailsa Road in the Southern Project Area (Ecology and Heritage Partners Pty Ltd 06/04/2022).

Plains Woodland

Plains Woodland is characterised as an open woodland with a grassy or sedgy ground layer containing large inter-tussock spacing (DELWP 2022c). The soils can become waterlogged during rain events, being mainly silty, loamy or clay topsoils (DELWP 2022c).

Small sections of the Assessment Area were mapped to contain Plains Woodland, often where a canopy of Black Box *Eucalyptus largiflorens* was present on heavier clay soils. The understorey was present in moderate condition, with common species including Ruby Saltbush, Hedge Saltbush, Nodding Saltbush, Feather Spear-grass, Black Cotton-bush and Rough Spear-grass (Plate 9 and 10).



Plate 9. Plains Woodland along Batchie West Road in the Northern Project Area (Ecology and Heritage Partners Pty Ltd 03/03/2022).



Plate 10. Plains Woodland along Hood Lane in the Northern Project Area (Ecology and Heritage Partners Pty Ltd 03/03/2022).

Riverine Chenopod Woodland

Riverine Chenopod Woodland is described as a chenopod-dominated eucalypt woodland, to 15 meters tall (DELWP 2022c). It occurs on clay-loam soils that can become inundated during flood events, often waterlogged in winter and cracking dry soils in summer (DELWP 2022c).

The patches of Riverine Chenopod Woodland within the Project Area contained a canopy dominated by Black Box. The understorey was relatively open, but commonly included Tangled Lignum, Ruby Saltbush *Enchylaena tomentosa* var. *tomentosa*, Hedge Saltbush and Berry Saltbush.



Plate 11. A patch of Riverine Chenopod Woodland along Lah West Road within the Northern Project Area (Ecology and Heritage Partners Pty Ltd 01/03/2022).



Plate 12. Moderate quality Riverine Chenopod Woodland located west of Dunn Road in the Northern Project Area (Ecology and Heritage Partners Pty Ltd 06/04/2022).

3.1.2 Large Trees in Patches

A total of 1747 Large Trees (LTs) were present within the Assessment Area (Table 11; Figure 2). Most of these specimens were Bull Mallee, Dumosa Mallee and Black Box, with some areas dominated by Yellow Mallee or Square-fruit Mallee *Eucalyptus calycogona* subsp. *trachybasis* (Plate 13 and Plate 14).

Table 11. Large Trees within native vegetation patches recorded within the Assessment Area.

EVC	Large Tree Benchmark	Number of Large Trees recorded
Low Rises Woodland (EVC 66)	60 cm – <i>Eucalyptus</i> sp. 40 cm – <i>Allocasuarina</i> sp. 40 cm – <i>Callitris</i> sp.	<i>Eucalyptus behriana</i> - 20
		<i>Eucalyptus incrassata</i> - 4
		<i>Eucalyptus largiflorens</i> - 65
		<i>Eucalyptus leucoxylon</i> - 44
		<i>Eucalyptus oleosa</i> - 1
		<i>Eucalyptus</i> sp. – 1
		<i>Allocasuarina luehmannii</i> - 2
		Subtotal = 137
Plains Woodland (EVC 803)	60 cm – <i>Eucalyptus</i> sp. 40 cm – <i>Allocasuarina luehmannii</i>	<i>Eucalyptus largiflorens</i> - 6
		Subtotal = 6
Riverine Chenopod Woodland (EVC 103)	40 cm – <i>Eucalyptus largiflorens</i>	<i>Eucalyptus largiflorens</i> - 26
		<i>Eucalyptus leucoxylon</i> - 2
		<i>Eucalyptus porosa</i> - 1
		<i>Eucalyptus</i> sp. – 1
		<i>Allocasuarina luehmannii</i> - 1
Subtotal = 31		
Ridged Plains Mallee (EVC 96)	30 cm – <i>Eucalyptus</i> sp. 40 cm – <i>Allocasuarina luehmannii</i>	<i>Allocasuarina luehmannii</i> - 6
		<i>Eucalyptus behriana</i> - 671
		<i>Eucalyptus dumosa</i> - 276
		<i>Eucalyptus gracilis</i> - 2
		<i>Eucalyptus incrassata</i> - 124
		<i>Eucalyptus largiflorens</i> - 294
		<i>Eucalyptus leptophylla</i> - 1
		<i>Eucalyptus leucoxylon</i> - 3
		<i>Eucalyptus microcarpa</i> - 1
		<i>Eucalyptus oleosa</i> - 14
		<i>Eucalyptus porosa</i> - 3
		<i>Eucalyptus socialis</i> - 17
		<i>Eucalyptus calycogona</i> subsp. <i>trachybasis</i> - 85
		<i>Eucalyptus</i> sp. – 6
Subtotal = 1503		
Plains Savannah (EVC 826)	40 cm – <i>Allocasuarina luehmannii</i>	<i>Allocasuarina luehmannii</i> - 28

EVC	Large Tree Benchmark	Number of Large Trees recorded
	40 cm – <i>Callitris gracilis</i> subsp. <i>murrayensis</i>	<i>Eucalyptus behriana</i> - 23
		<i>Eucalyptus dumosa</i> - 2
		<i>Eucalyptus largiflorens</i> - 9
		<i>Eucalyptus leucoxylon</i> - 5
		<i>Eucalyptus porosa</i> - 3
		Subtotal = 70
Total		1747



Plate 13. Large Yellow Gum within Low Rises Woodland patch (Ecology and Heritage Partners Pty Ltd 03/03/2022).



Plate 14. Large Trees within Ridged Plains Mallee patch within the Project Area (Ecology and Heritage Partners Pty Ltd 03/03/2022).

3.1.3 Scattered Trees

A total of 785 scattered trees were recorded within the Assessment Area, which consisted of 436 large and 349 small scattered trees (Table 12; Figure 2). These trees would have once formed part of the EVC's recorded throughout the Assessment Area, primarily Ridged Plains Mallee, however, the understorey vegetation has been cleared largely for farming practices and contained introduced species (mainly sown crops) and the trees no longer formed a patch of native vegetation (Plate 15 and 16).

Table 12. Scattered Trees recorded within the Assessment Area.

Species	Large	Small	Total
<i>Allocasuarina luehmannii</i>	11	10	21
<i>Callitris gracilis</i>	0	1	1
<i>Eucalyptus behriana</i>	154	65	219
<i>Eucalyptus dumosa</i>	61	132	193
<i>Eucalyptus incrassata</i>	25	27	52
<i>Eucalyptus largiflorens</i>	135	28	163
<i>Eucalyptus leptophylla</i>	2	1	3

Species	Large	Small	Total
<i>Eucalyptus leucoxylon</i>	30	55	85
<i>Eucalyptus melliodora</i>	0	3	3
<i>Eucalyptus oleosa</i>	0	1	1
<i>Eucalyptus porosa</i>	1	1	2
<i>Eucalyptus socialis</i>	1	0	1
<i>Eucalyptus calycogona</i> subsp. <i>trachybasis</i>	10	22	32
<i>Eucalyptus</i> sp.	6	3	9
Total	785		



Plate 15. A large scattered stag recorded within the northern Assessment Area (Ecology and Heritage Partners Pty Ltd 03/03/2022).



Plate 16. Scattered small Dumosa Mallee within the Project Area (Ecology and Heritage Partners Pty Ltd 03/03/2022).

3.1.4 Introduced and Planted Vegetation

Areas not supporting native vegetation within the Assessment Area predominately comprised of cropped agricultural areas (Plate 17 and 18). Native vegetation was absent from these areas due to the intensive industrial scale of the agricultural land use. Remaining areas of the Assessment Area not mapped to contain native vegetation were dominated by exotic grasses and herbs, mainly Wild Sage *Salvia verbenaca*, Ox-tongue *Helminthotheca echioides*, Common Heliotrope *Heliotropium europaeum*, Wild Oat *Avena fatua*, Great Brome *Bromus diandrus* and Red Brome *Bromus rubens*.

Planted vegetation occurred in limited areas around residences and around dams, with Peppercorn *Schinus molle* a commonly planted species (Plate 19).

Noxious weeds, as defined under the CaLP Act, were present within the Assessment Area, including African Love-grass *Eragrostis curvula*, Horehound *Marrubium vulgare*, Bathurst Burr *Xanthium spinosum*, Caltrop *Tribulus terrestris*, African Box-thorn *Lycium ferocissimum*, Prickly Pear *Opuntia* sp. and Soursob *Oxalis pes-caprae*. African Box-thorn and Prickly Pear (Plate 20) are Weeds of National Significance (WoNS).



Plate 17. Cropped paddocks dominated private land within the Project Area (Ecology and Heritage Partners Pty Ltd 08/04/2022).



Plate 18. Degraded roadside within the Project Area dominated by exotic vegetation (Ecology and Heritage Partners Pty Ltd 08/04/2022).



Plate 19. Planted Peppercorn within a cropped paddock in the Northern Project Area (Ecology and Heritage Partners Pty Ltd 08/04/2022).



Plate 20. Prickly Pear recorded along Lah West Road in the Northern Project Area (Tree 9 on Figure 2) (Ecology and Heritage Partners Pty Ltd 08/04/2022).

3.2 Fauna Habitat

Most of the Assessment Area consisted of paddocks, which contained improved exotic pastures, likely to be used as a foraging resource by common generalist bird species that are tolerant of modified open areas. Other fauna habitat in the Assessment Area included areas containing scattered small and large predominantly mallee and eucalypt trees, and isolated woodlands patches.

3.2.1 Woodlands

Several small, isolated areas containing woodland vegetation are present in the Assessment Area. Woodlands vary in quality throughout the Assessment Area. However, in the context of extensive agricultural land use within privately owned land they are, overall, of high habitat value for native fauna. These remnants, which are generally limited to small patches on private land, as well as roadside vegetation are structurally and

floristically diverse and the vegetation cover provides habitat niches for a diversity of native fauna and important habitat connectivity in an otherwise highly modified landscape.

A variety of arboreal mammals, microbats, ground-dwelling mammals, woodland birds, reptiles and amphibians are likely to reside in, forage in, rely upon, regularly use and move through woodland vegetation within the Project Area. A high diversity of woodland bird species were observed within this vegetation type during the avian surveys. These areas support occasional hollow-bearing trees containing small hollows, providing habitat for small, hollow-dependent fauna including possums, microbats and hollow-nesting birds such as parrots and owls. Additionally, a high degree of canopy connectivity along roadside vegetation would enable arboreal mammals to move easily between trees.

3.2.2 *Scattered Trees*

The habitat value of scattered trees is dependent on the tree species, maturity and landscape context however, overall, they are of moderate value for native fauna.

Scattered trees in varying densities occur throughout the Assessment Area and provide an important resource for more mobile tree-dependent fauna. Many of the scattered eucalypts are relatively mature mallee trees, providing an array of small hollows, bark fissures and crevices. These are likely to be relied upon for shelter and nesting by a range of small, hollow-dependent fauna including parrots, microbats, possums, and owls. Scattered Buloke throughout the Assessment Area exhibited fewer signs of hollows, although several dead (Stag) Buloke were being used where limbs had dropped off and formed hollows in the trunk.

Scattered trees provide foraging habitat for insectivorous and nectivorous birds as well as vantage points and nesting areas for diurnal and nocturnal raptors and other non-hollow dependant species including Australian Magpie *Cracticus tibicen* and Australian Raven *Corvus coronoides*. These trees also provide stepping stones for more mobile fauna moving through the Assessment Area, enhancing landscape permeability for a wide range woodland birds, possums, reptiles, as well as predators such as raptors.

3.2.3 *Open Pasture / Crops*

The majority of the Project Area consists of paddocks which are either cropped or contain improved exotic pasture. Bird species which are tolerant of modified open areas are likely to use these areas, including foraging nocturnal and diurnal raptors. During the current suite of assessments, Black Kite *Milvus migrans*, Brown Falcon *Falco berigora* and Nankeen Kestrel *Falco cenchroides* were observed foraging in these areas. Common opportunist species including Australian Magpie, Australian Raven, Galah *Eolophus roseicapilla* and Red-rumped Parrot *Psephotus haematonotus* were also observed using this habitat during the field assessments.

3.2.4 *Habitat Connectivity*

On a broader landscape scale, the Project Area has been largely cleared of suitable fauna habitat. There are marginal habitat features that may provide connectivity between the Project Area and patches of higher quality habitat such as Morep Dam Bushland Reserve, Cat Swamp Bushland Reserve and Warracknabeal Streamside Reserve as well as woodland areas on private property.

Vegetated road reserves and creeklines, such as Exchange Road and Yarriambiack Creek may provide habitat corridors for a variety of woodland dependent species, including woodland birds, arboreal mammals, small

ground-dwelling mammals and reptiles. These linear corridors provide connectivity (via habitat corridors and stepping stones) for species across the broader landscape and within the Project Area.

Scattered trees within paddocks throughout the Project Area also act as ‘stepping stones’ as a means of connection for more mobile fauna, including birds, microbats and arboreal mammals.

Wildlife corridors and scattered connections of vegetation have numerous benefits to native fauna populations, particularly in modified landscapes where much of the surrounding vegetation is restricted to linear strips along roadsides or streams. They can, and often do constitute valuable habitat in their own right. Some of the key benefits of wildlife corridors associated with the maintenance of biodiversity on a local, and at a landscape level, include:

- Protection and ongoing maintenance of ecosystem functionality through the reduction of threatening processes (erosion, weed spread, hydrological alterations);
- Protection for populations of threatened species, or disturbance sensitive species (i.e. orchids) that may have been lost from the surrounding landscape;
- Provision of habitat (refuge, shelter, breeding opportunities) for a range of fauna either residing within corridors, or moving through the landscape;
- Maintenance of species richness and diversity;
- A source of seed dispersal for flora species sensitive to moderate levels of disturbance;
- Increased rate and facilitation for pollinator species including bees, butterflies, and birds (Townsend and Levey 2005);
- Immigration of animals to supplement declining populations, thus reducing the likelihood of local extinctions;
- Availability of habitat for reintroduction following extinction events;
- Prevention of demographic changes occurring in populations that may result from prolonged isolation from other populations of the same species by aiding gene flow, thus enhancement of genetic variation and prevention of inbreeding; and,
- Facilitating fauna movement through modified landscapes to more optimal habitats.

3.3 Bird Utilisation Surveys

3.3.1 Overview

Sixty-three (63) bird species were recorded, consisting of 3,846 individual sightings, during the fixed-point bird counts. Two other species were identified to the generic level (i.e. Raven and Parrot spp). Four introduced species were recorded: Common Blackbird *Turdus merula*, Common Starling *Sturnus vulgaris*, Eurasian Skylark *Alauda arvensis* and House Sparrow *Passer domesticus*. No nationally or state significant species were recorded within the Project Area.

The most frequently observed species were Australian Magpie *Gymnorhina tibicen* (recorded during 69% of surveys), Red-rumped Parrot *Psephotus haematonotus* (42%), Galah *Eolophus roseicapilla* (31%) and Singing Honeyeater *Lichenostomus virescens* (26%).

A total of 95.8% of bird observations made during the point counts were of individuals that were either on the ground or flying below the Rotor Swept Area. A further 3.6% did not have their height recorded as they were obscured from vision, while no birds were recorded flying above the Rotor Swept Area.

Birds observed flying at Rotor Swept Area (0.6%) include Australian Magpie, Australian Raven *Corvus coronoides*, Brown Falcon *Falco berigora*, Brown Songlark *Megalurus cruralis*, Cockatiel *Nymphicus hollandicus*, Common Starling *Sturnus vulgaris*, Eurasian Skylark, Nankeen Kestrel *Falco cenchroides*, Spotted Harrier *Circus assimilis*, Wedge-tailed Eagle *Aquila audax* and Whistling Kite *Haliastur sphenurus*. All species observed within the Rotor Swept Area were locally common birds and not nationally or State significant.

One species (Spotted Harrier) recorded during the bird utilisation surveys is defined as 'species of interest' as outlined in Lumsden *et al.* (2019).

A variety of other bird species were also recorded, including:

- Generalist bird species common in modified landscapes, such as open paddocks, including Noisy Miner *Manorina melanocephala*, Willie Wagtail *Rhipidura leucophrys* and Little Raven *Corvus mellori*;
- Woodland bird species using larger patches of native and non-native vegetation such as Rufous Whistler *Pachycephala rufiventris*, Red Wattlebird *Anthochaera carunculata*, Weebill *Smicrornis brevirostris* and White-browed Woodswallow *Artamus superciliosus*;
- Water bird species using dams in the Project Area including Australian Woodduck *Chenonetta jubata*, Pacific Black Duck *Anas superciliosa* and Pink-eared Duck *Malacorhynchus membranaceus*;
- Raptors foraging over paddocks and roadsides, including, Black-shouldered Kite *Elanus axillaris*, Brown Falcon, Nankeen Kestrel, Spotted Harrier, Wedge-tailed Eagle and Whistling Kite; and,
- Parrot species feeding on sowed crops and using large hollow-bearing gums, including Crimson Rosella *Platycercus elegans*, Eastern Rosella *Platycercus eximius*, Musk Lorikeet *Glossopsitta concinna*, and Mulga Parrot *Psephotus varius*.

Incidental observations recorded one additional species in the Project Area (Black Kite *Milvus migrans*) that was not recorded during point-counts.

3.3.2 Species Richness

The predicted species richness estimate for the point count surveys was 60 species, which converts to a completeness of over 100% and means that an additional 3-4 species were recorded relative to the predicted total number of species likely to occupy the Project Area. A greater number of actual species relative to predicted species is an indication that survey effort was very high and covered a range of conditions and seasons. The study appears to reach asymptote (or plateau) after approximately 200 surveys. The results show a clear relationship between effort and the number of species detected. The species accumulation curve is provided below in Graph 1.

3.3.3 Flight Heights

The following is based on turbine specifications of a maximum 280 metre tip height and minimum 50 metre ground clearance. Therefore, the Rotor Swept Area (RSA) is between 51 metres and 280 metres in height.

The majority of bird species observed (96%) during the point counts were either recorded on the ground or flying below the Rotor Swept Area (Table 10). Under 1% of bird species were in the Rotor Swept Area, consisting primarily of Wedge-tailed Eagle (3 individuals), Nankeen Kestrel (6) and Common Starling (3). This percentage is typical of surveys for wind farms located in areas characterised by open pasture based on our experience at similar wind farm projects. Bird point count survey locations were assigned to capture a representative sample of vegetation and habitat type. Given much of the Project Area comprises open paddocks, most bird point count survey locations are situated in these areas. However, several sites were situated to capture any woodland and waterbird habitats in the Project Area.

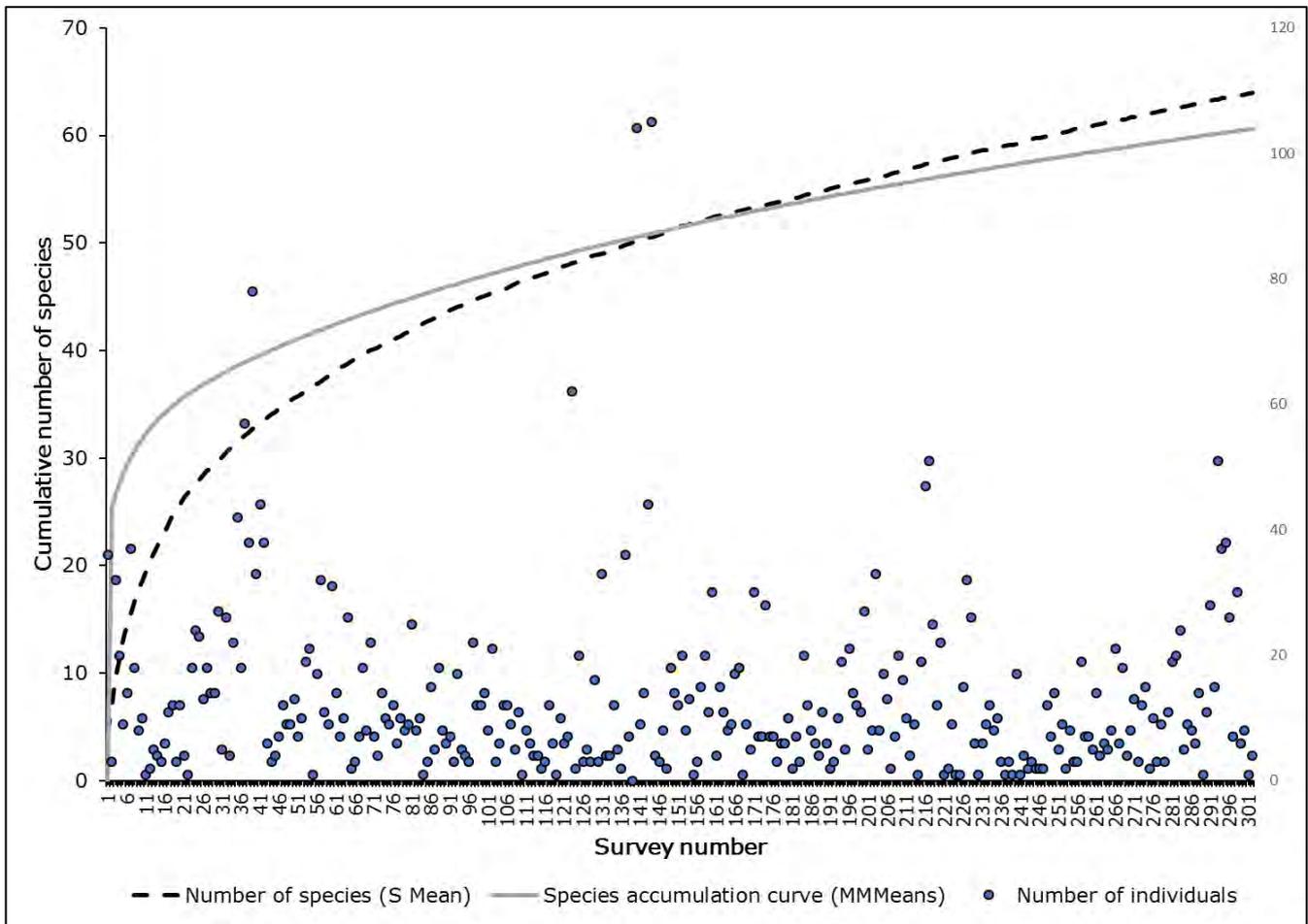
Wedge-tailed Eagles are likely to fly at and above Rotor Swept Area when foraging, while large parrots, although not recorded in the Rotor Swept Area during surveys, tend to fly in the Rotor Swept Area as they move daily between roosts and feeding areas. No significant wetlands are present in or near the Project Area evidenced by the fact that only three waterbird species were recorded during surveys (Pink-eared Duck, Australian Woodduck, and Pacific Black Duck). The Project Area was driven extensively and very few water birds likely to fly in the Rotor Swept Area were identified flying overhead.

Generally, non-passerine birds such as raptors, wetland/waterbirds and parrots have flight characteristics that make them prone to collisions with wind turbines. These species are usually larger, less mobile, occur in flocks (particularly parrots) and forage in more open areas. Some minor changes in local distribution and abundance of these species may be expected as a consequence of ongoing operation of the turbines, and although these impacts are not expected to be significant and minimal in line with the stated AusWEA (2005), collision potential and post construction monitoring should be established to further assess the impact of the project on bird species and populations.

A summary of species recorded during point count surveys and associated flying heights against Rotor Swept Area is provided in Table 13 and Table 14 and Graph 2.

Table 13. Summary of birds recorded at the varying flight heights.

Flight Height	# of birds	% of birds
Height not recorded	137	3.6%
Ground (0 metres)	673	17.5%
Below RSA (1-50m)	3013	78.3%
RSA 51-280m)	23	0.6%
Above RSA (>280m)	0	0.0%



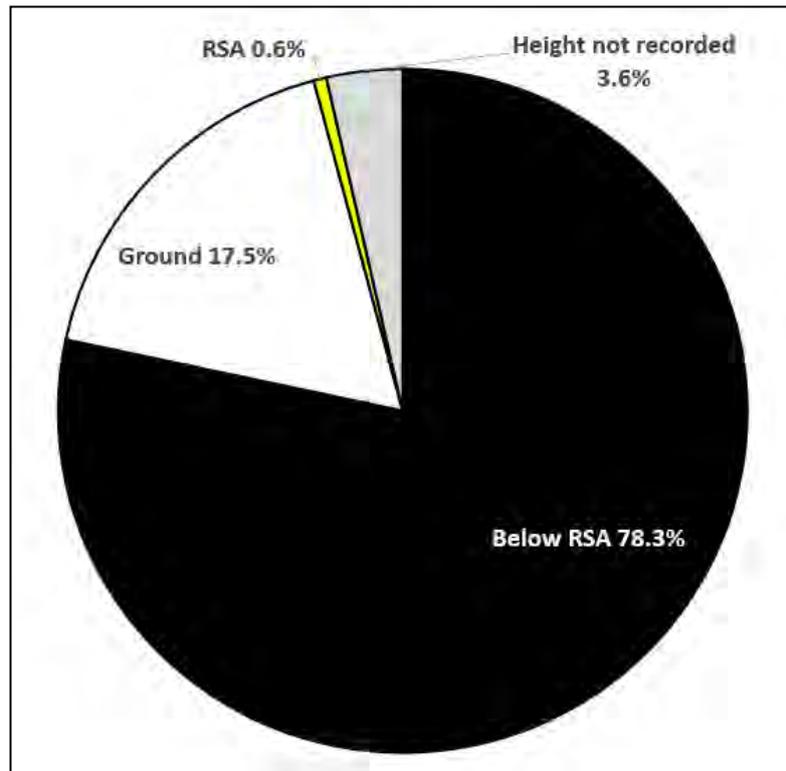
Graph 1. Species accumulation curve across the entire survey period.

Source: Species accumulation curve produced using EstimateS (Colwell 2013).

3.3.4 Raptors

Three Wedge-tailed Eagles, six Nankeen Kestrels, a Whistling Kite and a Spotted Harrier were observed flying in the Rotor Swept Area. In addition, several raptors species were observed in or near the Project Area, including Black-shouldered Kite, Black Kite, and Brown Falcon. Based on the results of the bird utilisation surveys, the proposed wind farm footprint may be located within the territory of at least 1-2 pairs of Wedge-tailed Eagles. While five observations of Wedge-tailed Eagle were recorded during surveys, some of these records may be the same individual. Wedge-tailed Eagles are known to occupy a territory of approximately 30-40 square kilometres (Hatton *et al.* 2014). Given the Project Area is approximately 200 square kilometres, at least 1-2 resident pairs, as well as several juveniles in spring and summer, are likely to occupy the Project Area.

Raptors in general accounted for a low percentage (<1%) of birds recorded within and adjacent to the wind farm during the bird surveys.



Graph 2. Percentage of birds recorded below (RSA), at rotor swept area (RSA) height (51 – 280 metres), during the survey period. Note no species were recorded above RSA, although several parrot and raptor species are likely to utilise heights within and above RSA.

Table 14. Bird species and flight heights recorded during Point Count Surveys (excluding incidental records).

Species	Height not observed	Ground	Below RSA	RSA	Total
Australasian Pipit	0	40	44	0	84
Australian Magpie	31	233	233	1	498
Australian Raven	3	25	58	2	88
Australian Wooduck	0	0	2	0	2
Black Kite	0	1	0	0	1
Black-faced Cuckoo-shrike	0	1	14	0	15
Black-shouldered Kite	0	0	21	0	21
Blue Bonnet	0	0	20	0	20
Brown Falcon	0	5	7	1	13
Brown Songlark	1	5	6	1	13
Brown Treecreeper	0	12	31	0	43
Brown-headed Honeyeater	0	0	11	0	11
Buff-rumped Thornbill	0	0	2	0	2
Chestnut-rumped Thornbill	0	0	28	0	28
Cockatiel	0	0	1	3	4

Species	Height not observed	Ground	Below RSA	RSA	Total
Common Blackbird	0	0	2	0	2
Common Starling	15	72	779	3	869
Crested Pigeon	2	10	84	0	96
Crimson Rosella	1	0	2	0	3
Eastern Rosella	0	4	91	0	95
Eurasian Skylark	6	34	46	1	87
Galah	11	19	238	0	268
Grey Butcherbird	0	0	1	0	1
Grey Shrike-thrush	1	0	0	0	1
Horsefield's Bronze-Cuckoo	0	1	0	0	1
House Sparrow	0	20	277	0	297
Laughing Kookaburra	0	1	1	0	2
Little Corella	0	0	1	0	1
Little Raven	16	5	72	0	93
Long-billed Corella	0	1	0	0	1
Magpie-lark	1	0	1	0	2
Mulga Parrot	0	0	18	0	18
Musk Lorikeet	0	0	5	0	5
Nankeen Kestrel	0	1	25	6	32
Noisy Miner	12	29	24	0	65
Pacific Black Duck	0	0	1	0	1
Parrot sp.	0	0	2	0	2
Pied Butcherbird	0	2	3	0	5
Pink-eared Duck	0	0	20	0	20
Purple-backed Fairywren	0	0	2	0	2
Raven sp.	0	0	5	0	5
Red Wattlebird	0	2	3	0	5
Red-browed Finch	0	0	10	0	10
Red-rumped Parrot	17	45	524	0	586
Rufous Whistler	0	1	0	0	1
Shy Heathwren	0	1	1	0	2
Silvereye	0	2	11	0	13
Singing Honeyeater	10	20	95	0	125
Spiny-cheeked Honeyeater	1	0	1	0	2
Spotted Harrier	0	0	1	1	2
Striated Pardalote	1	17	25	0	43

Species	Height not observed	Ground	Below RSA	RSA	Total
Stubble Quail	0	5	0	0	5
Superb Fairy-wren	1	2	0	0	3
Tree Martin	0	0	7	0	7
Wedge-tailed Eagle	0	0	2	3	5
Weebill	0	8	29	0	37
Welcome Swallow	0	0	2	0	2
Whistling Kite	0	0	0	1	1
White-browed Woodswallow	0	5	0	0	5
White-fronted Chat	0	0	11	0	11
White-plumed Honeyeater	3	0	18	0	21
White-winged Chough	0	21	14	0	35
Willie Wagtail	4	10	22	0	36
Yellow Thornbill	0	0	9	0	9
Yellow-rumped Thornbill	0	13	50	0	63

Note. Ground – 0 metres; Below RSA – 1-50 metres; RSA 51 - 280 metres; Above RSA > 280 metres.

3.4 Microbat Surveys

3.4.1 Desktop Review

The database search of the VBA (DELWP 2022d) contained records for one microbat species: White-striped Freetail Bat *Tadarida australis*, within a 20 kilometre radius of the Project Area. No significant bat species have previously been recorded within 10 kilometres of the Project Area (DELWP 2022d).

3.4.2 Bat Survey Results

A minimum of eight native bat species were detected during the bat surveys, including Southern Free-tailed Bat *Ozimops planiceps*, White-striped Freetail Bat *Tadarida australis*, Inland Broad-nosed Bat *Scotorepens balstoni*, Gould's Wattled Bat *Chalinolobus gouldi*, Chocolate Wattled Bat *Chalinolobus morio* and Little Forest Bat *Vespadelus vulturnus* (Table 15 and 16). A maximum of up to ten native bat species were recorded when calls that could not be identified to species level are considered.

Nocturnal and Bat detector surveys were undertaken across the Project Area over a minimum 21-night period in March/April 2020 and November 2021. No calls or call complexes may be attributed to a significant species. Several other calls detected during surveys could not be identified to species level and were assigned to one of two call complexes: Forest Bat spp. *V. Regulus* / *V. vulturnus*; Nyctophilus spp. *Nyctophilus geoffroyi* / *Nyctophilus gouldi*. If present, Gould's Long-eared Bat *Nyctophilus gouldi* would be at the edge of its known range.

Nine of the ten possible microbat species recorded within the Project Area are considered to have a moderate to high risk of collision due to their flight behaviour. White-striped Freetail Bat is particularly at risk, having recorded the highest number of collision incidents from a sub-sample of turbines across 15 Victorian Wind

Energy Facilities between 2003 and 2018 (ARI 2019). Species recorded that are not a collision risk include Inland Broad-nosed Bat, which is considered very unlikely to fly at Rotor Swept Area height as the species rarely flies above 15 metres or tree canopy height (Churchill 2008).

All bat species recorded in the Project Area (including call complex level) that have a moderate to high risk of collision are not significant species at a Commonwealth or State level, with stable populations and widespread distribution.

Table 15. Bat species detected across the Project Area during 2020 bat surveys.

Site-*	BS-01	BS-02	BS-05	BS-06	BS-07	BS-08
Number of Detections	2,180	2,974	4,150	3,440	3,097	4,124
Species						
White-striped Freetail Bat <i>Tadarida australis</i>	✓	✓	✓	✓	✓	✓
Gould's Wattled Bat <i>Chalinolobus gouldi</i>	✓	✓	✓	✓	✓	✓
Inland Broad-nosed Bat <i>Scotorepens balstoni</i>	✓	✓	✓	✓	-	✓
Southern Freetail Bat <i>Ozimops planiceps</i>	✓	✓	✓	✓	✓	✓
Chocolate Wattled Bat <i>Chalinolobus morio</i>	✓	✓	✓	✓	✓	✓
Little Forest Bat <i>Vespadelus vulturnus</i>	✓	✓	✓	✓	✓	✓
Not identified to species level						
Forest Bat spp. <i>V. Regulus</i> / <i>V. vulturnus</i>	✓	✓	✓	✓	✓	✓
Nyctophilus spp. <i>Nyctophilus geoffroyi</i> / <i>Nyctophilus gouldi</i>	✓	✓	✓	✓	-	-

Note: * See Figure 4 for locations

Table 16. Bat species detected across the Project Area during 2021 bat surveys.

Site*	BS-01	BS-02	BS-03	BS-04	BS-05	BS-06	BS-07	BS-08
Number of Detections	8,237	10,451	7,972	6,295	6,888	4,351	7,594	4,774
Species								
White-striped Freetail Bat <i>Tadarida australis</i>	✓	✓	✓	✓	✓	✓	✓	✓
Gould's Wattled Bat <i>Chalinolobus gouldi</i>	✓	✓	✓	✓	✓	✓	✓	✓
Inland Broad-nosed Bat <i>Scotorepens balstoni</i>	✓	-	✓	-	✓	✓	✓	✓
Southern Freetail Bat <i>Ozimops planiceps</i>	✓	✓	✓	✓	✓	✓	✓	✓
Chocolate Wattled Bat <i>Chalinolobus morio</i>	✓	✓	✓	✓	✓	✓	✓	✓
Little Forest Bat <i>Vespadelus vulturnus</i>	✓	✓	✓	✓	✓	✓	✓	✓
Not identified to species level								

Site*	BS-01	BS-02	BS-03	BS-04	BS-05	BS-06	BS-07	BS-08
Forest Bat spp. <i>V. Regulus</i> / <i>V. vulturinus</i>	✓	✓	✓	✓	✓	✓	✓	✓
Nyctophilus spp. <i>Nyctophilus geoffroyi</i> / <i>Nyctophilus gouldi</i>	✓	✓	✓	✓	✓	✓	✓	✓

Note: * See Figure 4 for location.

3.5 Nationally Significant Features

3.5.1 Flora

Four nationally significant flora species previously recorded within 10 kilometres of the Project Area (DELWP 2022d) (Figure 6). The PMST nominated an additional six nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2022) (Figure 6; Appendix 1.2).

Targeted surveys for nationally significant flora were undertaken over several survey events, in August 2021, November 2021, July 2022 and August 2022. The surveys focused on four key species that were considered to have the highest likelihood of occurrence within the Project Area (Table 17). None of the key species were found in the Assessment Area during targeted surveys.

Table 17. Nationally significant flora with the highest likelihood of occurrence within the Project Area

Scientific Name	Common Name	Description	Likelihood of occurrence*
Critically Endangered			
<i>Pimelea spinescens</i> subsp. <i>pubiflora</i>	Wimmera Rice-flower	Small shrub to approx. 30 centimetre, stems spinescent. Small yellow flowers appear in June – July. Occurs in Buloke Woodlands, with past records south of the Project Area (e.g. Minyip).	Unlikely. Targeted surveys undertaken between 25 and 27 August 2021, 26 and 29 July 2022, and 15 and 17 August 2022 within all areas of public land within the Targeted Survey Area that contained suitable habitat. No individuals observed during targeted surveys.
Endangered			
<i>Sclerolaena napiformis</i>	Turnip Copperburr	Spreading subshrub to 50 cm long. Fruiting perianth hard with 5 – 6 spines. Fruits Nov – May. Past records occur south of the Project Area near Marnoo in grasslands.	Unlikely. Targeted surveys undertaken between 8 and 16 November 2021 within all areas of public land within the Targeted Survey Area and Additional Area that contained suitable habitat. No individuals observed during targeted surveys. The nearest past records occur south east of the Project Area, between Horsham and Donald.
Vulnerable			
<i>Pterostylis cheraphila</i>	Floodplain Rustyhood	Herb to 25 cm tall. 1 – 7 flowered, mostly dark red-brown. Flowers Oct – Nov. Known to occur near Dimboola and Murtoa on sandy loam and cracking silty soils.	Negligible. Targeted surveys undertaken between 8 and 16 November 2021 within all areas of public land within the Project Area that contained suitable habitat. No individuals observed during targeted surveys.

Scientific Name	Common Name	Description	Likelihood of occurrence*
<i>Swainsona murrayana</i>	Slender Darling-pea	Herb to 25 cm tall, leaves 5 – 10 cm long. Pink/purple petals, 3-11 flowers per raceme. Flowers Aug – Nov. Past records near Project Area in Riverine Chenopod Woodland and Low Rises Woodland EVCs.	Moderate. Targeted surveys undertaken between 8 and 16 November 2021 within all areas of public land within the Project Area that contained suitable habitat. No individuals observed during targeted surveys however non-flowering individuals of <i>Swainsona</i> sp. were observed along Boundary Road where the exact species could not be confirmed. Local past records on Langleys Road, Warracknabeal.

Note: * Post survey effort.

Wimmera Rice-flower Targeted Surveys

The August 2021, July 2022 and August 2022 targeted surveys focused on Wimmera Rice-flower, with areas of suitable habitat surveyed for the species. Suitable habitat within the Assessment Area included patches of Ridged Plains Mallee, Plains Savannah and Low Rises Woodland, where a moderate to high quality understorey was present (i.e. not dominated by weeds and/or highly disturbed). No Wimmera Rice-flower were observed within the surveyed area despite the presence of suitable habitat.

Although Wimmera Rice-flower were not recorded, several species of Heath Rice-flower *Pimelea phyllicoides*, Gaunt Rice-flower *Pimelea stricta*, Smooth Rice-flower *Pimelea glauca* and Cured Rice-flower *Pimelea curviflora* were recorded along roadsides. These species are relatively common and are not State or nationally significant.

Spring Flora Targeted Surveys

The November 2021 targeted surveys focused on Slender Darling-pea, Turnip Copperburr and Floodplain Rustyhood. Areas of suitable habitat were surveyed within the Version 8 infrastructure footprint, which included all patches of native vegetation mapped within the Assessment Area where a moderate to high quality understorey was present (i.e. not dominated by weeds and/or highly disturbed).

No Turnip Copperburr, Slender Darling-pea, or Floodplain Rustyhood were observed within the proposed infrastructure footprint (i.e. impact area).

Several individuals of *Swainsona* sp. were observed within patches of Ridged Plains Mallee along Boundary Road outside of the proposed impact area (Figure 3I). The individuals were not flowering at the time observed, therefore assessment to species level was not possible. No other *Swainsona* sp. individuals were observed within the Assessment Area.

Additional Nationally Significant Flora

No additional nationally significant flora species were recorded within the Assessment Area during the targeted surveys or biodiversity assessments. Many of the nationally significant flora species in the broader region are associated with sandy soils and restricted to higher quality remnant vegetation patches within State Forests or National Parks (e.g. Little Desert National Park, Barrett State Forest), or prefer saline habitats near salt lakes (e.g. Pepper-cress species). The likelihood of any additional nationally significant flora occurring

within the Infrastructure Footprint is considered low due to the modification of potential habitats, and lack of records in close proximity (i.e. outside of the species known range) (Appendix 1.2).

3.5.2 Fauna

Two nationally significant fauna species (White-throated Needletail *Hirundapus caudacutus* and Growling Grass Frog *Litoria raniformis*) have previously been recorded within 10 kilometres of the Project Area (DELWP 2022d) (Figure 7). The PMST nominated an additional 14 nationally significant species which have not been previously recorded but have the potential to occur in the locality (DCCEEW 2022) (Figure 7; Appendix 2.1).

Of the 16 nationally significant fauna species that have previously been recorded, or are predicted to occur within the locality, the following species were considered to have the highest likelihood of occurrence within the Wind Farm Development Footprint (Table 18).

Table 18. Nationally significant fauna with the highest likelihood of occurrence.

Species	Suitable habitat within the Project Area	Closest known records
Grey Falcon <i>Falco hypoleucos</i>	Potential to use all areas of the Wind Farm Development Boundary including woodlands and open grasslands or mallee.	Historic record. Approximately 30 kilometres north.
Painted Honeyeater <i>Grantiella picta</i>	May use the small patches of dry open forests and woodlands situated throughout the Project Area.	Approximately 22 kilometres northeast.
White-throated Needletail	Potential to use all areas of the Wind Farm Development Boundary including woodlands and open grasslands or mallee.	Historic record. Approximately 20 kilometres west.
Regent Parrot <i>Polytelis anthopeplus monarchoides</i>	Woodland and mallee ecosystems within the Project Area.	Historic record. Approximately 15 kilometre northwest. Known population located 50 kilometres north.
Golden Sun Moth	Woodland/grassland with a ground layer comprising a cover of at least 20% wallaby-grass	Species detected within the Project Area.

Significant Bird Species

No impacts to critical habitat and minimal impacts to foraging habitat are proposed to the above significant bird species based on the current infrastructure footprint.

Golden Sun Moth Surveys

Most of the Project Area is highly modified for agriculture purposes and does not provide suitable habitat for Golden Sun Moth due to the low cover of suitable native grass species such as wallaby grass, and absence of preferred exotic species such as Chilean Needle-grass.

Targeted surveys were focused on areas of potential habitat for Golden Sun Moth within the Version 8 infrastructure footprint. These areas were predominantly located within roadside vegetation where there has generally been less disturbance (i.e. grazing, pasture improvement, fertiliser usage). These areas were deemed to contain the highest quality habitat for the species due to the higher abundance of native grasses, where the cover of Wallaby-grass was at least 20%, which is the generally accepted cover threshold acknowledged to support preferred habitat for the species (DEWHA 2009b).

Low numbers of Golden Sun Moth were recorded on two of the four surveys within the road reserve of Moloneys Road, near the intersection with Pullens Road, located on the southern boundary of the southern Project Area (Table 19; Figure 4). This section of road reserve supported a mixture of native and exotic pasture, with a moderate cover of wallaby-grass and spear-grass present. Although several other areas supported the presence of Wallaby-grass, no additional Golden Sun Moth were identified during the surveys.

The limited dispersal ability of Golden Sun Moth means that this area of confirmed habitat is effectively isolated (i.e. separated by more than 200 metres from other areas of habitat) (DEWHA 2009b) and the surrounding areas are therefore unlikely to be naturally recolonised.

Despite the presence of Wallaby-grass in some patches or native vegetation, or within pasture, habitat quality was considered sub-optimal for the species due to the relatively low coverage of preferred native grass species and ground cover generally consisting of less than 10% wallaby-grass. Further, most areas considered as unsuitable habitat showed clear signs of recent agricultural disturbance (i.e. soil ripping/ploughing).

Where Golden Sun Moth were present, moderate quality habitat in the form of scattered wallaby-grass is present along the length of much of the northern side of the Moloneys Road road reserve.

Table 19. Golden Sun Moth Survey Results 2021.

Date	Temperature (C°) at start of surveys	Wind	Days Since Rain	# GSM
30 Nov -1 Dec-21	27.8 / 28.2	6 NW	6	2
6-7 Dec-21	22.0 / 22.4	10 NE	10	0
13 Dec-21	27.9	10 NW	17	5
19-20 Dec-21	21.3 / 22.1	8 SW	4	0

Migratory Species

Migratory species are protected under the EPBC Act if they are listed under the following agreements:

- Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention);
- China Australia Migratory Bird Agreement (CAMBA);
- Japan Australia Migratory Bird Agreement (JAMBA); or the
- Republic of Korea Australia Migratory Bird Agreement (ROKAMBA).

The VBA (DELWP 2022d) indicates that one migratory bird species has been historically recorded within the project locality, White-throated Needletail (Appendix 2.1). The study area would not be classed as ‘important habitat’ for Migratory species as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DoE 2013). The proposed wind farm is not located between, or in close proximity to, either migratory bird feeding areas, or important, regularly used, feeding and roosting sites, hence the likelihood of migratory birds moving through the study area when moving between wetlands in the local area is low.

While it is possible that small numbers of migratory birds could fly over the site during migration, it has been well documented that shorebirds typically fly between 0.5 and six kilometres in elevation during migration, well above the tip of the proposed turbines (Williams *et al.* 1981; Piersma *et al.* 1990; Tulp *et al.* 1994). Owing to these factors, it is considered that the likelihood of migratory bird mortality through turbine collisions is low and that the proposed wind farm is unlikely to have a significant impact on any migratory species.

3.5.3 Ecological Communities

Six nationally listed ecological communities are predicted to occur within 10 kilometres of the Project Area (DCCEEW 2022). Of these, three were recorded within the Assessment Area. A summary of the occurrence of each nationally significant ecological community is provided below (Table 20).

Table 20. Summary of nationally significant ecological communities with the potential to occur within the Project Area.

Nationally Significant Ecological Community	Listing Status	Status within Project Area		Total extent within Assessment Area
<i>Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions</i>	Endangered	Present	Recorded in higher quality areas of Plains Savannah where a Buloke canopy was present.	31 hectares
<i>Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia</i>	Endangered	Not recorded	Key associated species not recorded within Project Area as dominate canopy species (only several Grey Box observed)	N/A
<i>Mallee Bird Community of the Murray Darling Depression Bioregion</i>	Endangered	Not recorded	Key associated species not recorded within Project Area	N/A
<i>Natural Grasslands of the Murray Valley Plains</i>	Critically Endangered	Present	Recorded in higher quality areas of Plains Savannah where a tree canopy was absent (i.e. grassland)	9.2 hectares
<i>Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions</i>	Critically Endangered	Present	Recorded in moderate to higher quality patches of Ridged Plains Mallee throughout the Project Area	164 hectares
<i>White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland</i>	Critically Endangered	Not recorded	Key associated species not recorded within Project Area	N/A

Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions

The *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* (herein referred to as Buloke Woodlands) ecological community includes a number of closely-related woodland communities in which Buloke is usually the dominant or co-dominant tree. This community in the Riverina and Murray-Darling Depression Bioregions occurs from south-eastern South Australia through north-western and northern central Victoria into south central New South Wales.

The Buloke Woodlands community has suffered a considerable reduction in distribution since European settlement, largely due to extensive clearing for agriculture and grazing by domestic stock, native and feral herbivores. Buloke Woodlands now exist as a patchy, highly fragmented, mostly highly degraded, community across much of its former range. Remnants persist on roadsides, private land and some public land including several parks and reserves (Cheal *et al.* 2011).

There are no detailed condition thresholds that define the Buloke Woodlands ecological community. As such, the determination as to which patches qualified for this community was made using the description of the community detailed in the National Recovery Plan for the community (Cheal *et al.* 2011), and Flowchart 1 and Flowchart 2 from the guide to assessing and identifying the Grey Box community as this contains some

preliminary thresholds that relate to the presence of threatened grasslands and grassy woodlands (DSEWPaC 2012).

A total of 31 hectares of the Buloke Woodlands community was mapped within or directly adjacent to the Assessment Area, which comprised 17 patches of Plains Savannah. The assessed patches ranged in size between 0.19 hectares and 9.18 hectares. The community was primarily observed in wide road reserves, containing an open canopy of Buloke, with a diverse understorey of small shrubs, herbs and grasses. The largest areas within the Assessment Area that supported Plains Woodland included a patch located at the intersection of Rainbow Road and Jeparit-Warracknabeal Road (PS10, Figure 2e), patches located near the intersection of Cannum Five Chain Road and Borung Highway (PS68, PS72, Figure 2m), patches located along Ailsa Road (PS75, Figure 2o) and patches located along Boundary Road (PS501, PS503, PS504, Figure 2l).

Patches that failed to qualify as the Buloke Woodland community did so due to either:

- the cover of native perennial grasses being less than 10% as detailed in Flowchart 1 of DSEWPaC (2012). These patches usually comprised a Buloke overstorey with a ground layer dominated almost entirely by introduced pasture species, with only scattered native grasses present as well as herbs; or,
- there were fewer than eight perennial native species in the mid and ground layers (as per Flowchart 2 of DSEWPaC [2012]).

Natural Grasslands of the Murray Valley Plains

Natural Grasslands of the Murray Valley Plains are characterised by vegetation communities dominated by grasses and herbs, and generally lacking woody plants. Within the Project Area, the nationally significant ecological community corresponds with mapped areas of Plains Savannah and Plains Grassland, where some of the habitat zones meet the condition thresholds of the community (noting that not all zones qualify). The condition thresholds for the community are outlined below (TSSC 2012).

- Occurs within the Riverina Bioregions and the Wimmera Plains of the Murray Darling Depression Bioregion;
- Typically occurs on a landscape of flat alluvial lowland plains with heavy-textured grey, brown and red clays;
- Dominated by a range of perennial grasses and/or forbs or co-dominated by small shrubs; and,
- Trees and large shrubs (>1 meter tall) are generally absent to sparse (<10% projective foliage cover) for emergent trees and shrubs.

A total of 9.2 hectares of Natural Grasslands of the Murray Valley Plains was mapped within the Assessment Area that met the above listing criteria, which comprised of 12 patches of Plains Savannah (treeless). The assessed patches ranged in size between 0.18 hectares to 1.5 hectares, commonly recorded in higher quality road reserves, such as Rainbow Road and Boundary Road.

Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions

Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions (hereby referred to as Plains Mallee Box Woodlands) is listed as critically endangered under the EPBC Act as of June 2021. The community is characterised by a canopy of Mallee Box eucalyptus, such as Black Mallee Box *Eucalyptus porosa* or Bull Mallee *Eucalyptus behriana*, however can include other mallee species

in the canopy (e.g. Dumosa Mallee), if other attributes of the community are consistent (i.e. understorey condition and species diversity) (TSSC 2020). Native saltbush shrubs are a common characteristic in the understorey along with a ground layer of native tussock grasses and herbs (TSSC 2020).

Ridged Plains Mallee is identified as the EVC that corresponds most closely with the Plains Mallee Box Woodland community (TSSC 2020). Ridged Plains Mallee was the dominant EVC recorded within the Assessment Area, common in both the northern and southern Project Area along roadsides. All patches of Ridged Plains Mallee mapped within the Assessment Area were assessed against the key diagnostic characteristics for the nationally significant ecological community to identify which patches met the description for listing as the ecological community (Table 21).

A total of 110 patches of Plains Mallee Box Woodlands were recorded within the Assessment Area, with all patches of the community corresponding with patches of Ridged Plains Mallee that met the condition thresholds. All patches that met the thresholds were assessed as high quality – Class A, due to meeting three or more of the patch condition or context indicators and having a minimum patch size of at least 0.5 hectares (TSSC 2020).

Areas within the Assessment Area containing large or notably high-quality patches of Plains Mallee Box Woodlands included vegetation along Hein Lane (Figure 2h), Ailsa Road (Figure 2n and 2o), Boundary Road (Figure 2l), Borung Highway (Figure 2m and 2n) and Cannum Five Chain Road (Figure 2m).

Table 21. Key diagnostic characteristics for the Plains Mallee Box Woodlands ecological community (TSSC 2020):

Key Diagnostic Characteristic	Characteristic met?	
Occurs within the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions	Yes	All patches within the Murray Darling Depression Bioregion (IBRA V7, DoE 2012).
Occurs on near-level plains or occasionally on gently sloping terrain surrounding and within run-on landscape depressions. Soils are variable but typically duplex, with clay loam or sandy clay loam topsoils	Yes	Gradual undulating landscape with sandy clay loam soils
Primary diagnostic species particular to this community are the dominance of the box-barked eucalypt species or other mallee species where understorey and landscape characteristics are consistent with the community description	Yes	Bull Mallee dominated a number of patches, or patches were dominated by Dumosa Mallee or Square-fruit Mallee, with the occasional Bull Mall or Black Mallee Box present.
Mature tree canopy is usually 5-10 meters tall, sparse to open	Yes	The tree canopy was dominated by mallee eucalypt averaging 5-8 meters tall
Small tree or large shrub layer may be present, but typically sparse (<5% cover). Medium shrub layer may be present (<10% cover)	Yes	Generally open canopy, with varying shrub layer present in patches.
Distinctive low to decumbent chenopod sub-shrub layer can be a key feature	Yes	Chenopods were common in all patches of Ridged Plains Mallee, with common species including Ruby Saltbush, Berry Saltbush, Hedge Saltbush, Black Cotton Bush, Wingless Bluebush, Copperburr and Prickly Saltwort.
Ground layer may be dominated by tussock grasses	Yes	Spear-grass, Wallaby-grass, Windmill Grass and Dark Nineawn-grass were common in all patches that qualified for listing
Spinifex <i>Triodia</i> spp. absent/not dominant	Yes	No Spinifex was recorded within the Assessment Area

Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia

Vegetation within the Assessment Area did not meet the condition thresholds that defines this ecological community (DSEWPac 2012). Grey Box were recorded in low numbers within the Assessment Area, however were never the dominant canopy species (>50%) within a patch of native vegetation, with the vegetation predominately comprising mallee eucalypts (i.e. Dumosa Mallee, Bull Mallee, Square-fruit Mallee).

Mallee Bird Community of the Murray Darling Depression Bioregion

No bird species representative of the Mallee Bird Community of the Murray Darling Depression Bioregion (based on Table 1.1 of the community Conservation Advice [TSSC 2021]) were recorded within the Project Area during the bird utilisation surveys. As a result, the community was not considered to be present within the Project Area.

White Box – Yellow Box – Blakely’s Red Gum Grassy Woodland and Derived Native Grassland

Vegetation within the Assessment Area did not meet the condition thresholds that define this ecological community due to the absence of the key indicator species for the ecological community within the Assessment Area (White Box, Yellow Box and/or Blakely’s Red Gum) (DEH 2006).

3.5.4 Other Matters of NES

The Assessment Area does not support any other features corresponding to matters of NES protected under the EPBC Act (e.g. World or National Heritage Areas, Ramsar Wetlands). The nearest Ramsar wetland is Lake Albacutya, located approximately 50 kilometres upstream of the Project Area.

3.6 State Significant Features

3.6.1 Flora

Thirty State significant flora species within 10 kilometres of the Project Area (DELWP 2022d) (Appendix 1.2).

Seven FFG Act-listed flora species were recorded within the Assessment Area during the targeted surveys and biodiversity assessments, Umbrella Wattle *Acacia oswaldii*, Weeping Myall *Acacia pendula*, Long Eryngium *Eryngium paludosum*, Hairy Tails *Ptilotus erubescens*, Swainsona-pea *Swainsona* sp., Buloke (Plate 21) and Buloke Mistletoe *Amyema linophylla* subsp. *orientalis* (Table 22).

Within Victoria, Weeping Myall is known to two main areas, one near Warracknabeal and the other near Echuca. The limited natural occurrence (i.e. remnant) of Weeping Myall highlights the significance of the individuals within the Assessment Area.

A total of 10 FFG Act protected flora species were incidentally recorded within the Assessment Area during the targeted surveys and Biodiversity Assessment, including Satin Everlasting *Helichrysum leucopsideum*, New Holland Daisy *Vittadinia* spp., Common Nardoo *Marsilea drummondii*, Scaly Buttons *Leptorhynchos squamatus* subsp. *squamatus* (Plate 22), Gold-dust Wattle *Acacia acinacea*, Grey Mulga *Acacia brachybotrya*, Wattle *Acacia* spp., Smooth Cassinia *Cassinia complanata*, Pimelea Daisy-bush *Olearia pimeleoides* and Mint-bush *Prostanthera* sp. Of the above, New Holland Daisy was common throughout the Assessment Area.

Table 22. State significant flora species recorded within the Assessment Area (listed by FFG Act conservation status).

Scientific Name	Common Name	Description	Location
Critically Endangered			
<i>Acacia oswaldii</i>	Umbrella Wattle	Medium to large shrub, flowering between November – January. Widespread distribution throughout north western Victoria.	Scattered throughout the Assessment Area, mainly in patches of Ridged Plains Mallee or Plains Savannah.
<i>Acacia pendula</i>	Weeping Myall	Tree to 12 metres high with long pendulous branches. Occurs in two isolated populations, near Warracknabeal and Echuca.	Limited records, with one dense stand observed at the intersection of Hein Lane and Rainbow Road and individual plants scattered in low numbers elsewhere.
<i>Allocasuarina luehmannii</i>	Buloke	Small to medium tree, 5-15 metres tall, flowering September – November. Widespread distribution in northern and north western Victoria, and west of Melbourne.	Scattered throughout the Assessment Area, mainly in patches of Plains Savannah with a tree component.
<i>Amyema linophylla</i> subsp. <i>orientalis</i>	Buloke Mistletoe	Parasitic aerial shrubs, main host plant is Buloke. Flowers January – April. Widespread distribution in northern Victoria where Bulokes occur.	Often observed within high quality patches of Plains Savannah where Buloke were present (preferred host plant).
<i>Ptilotus erubescens</i>	Hairy Tails	Small to medium herb with a deep taproot, and several unbranched stems ending in the flower spike. Flowers November – February. Occurs in grassland and woodland vegetation types in northern and western Victoria.	Scattered in low numbers within high quality patches of Ridged Plains Mallee and Plains Savannah patches (e.g. along Ailsa Road, Boundary Road and junction of Rainbow Road/Jeparit-Warracknabeal Road).
Endangered			
<i>Eryngium paludosum</i>	Long Eryngium	Medium to tall herb with distinct bluish-purple flowering head. Flowers October – January. Relatively limited distribution between Warracknabeal and Numurkah.	Several individuals (<5) recorded along Boundary Road in Ridged Plains Mallee patch
<i>Swainsona</i> sp.	Swainson-pea	Herb within the Fabaceae (legume) family, generally spring flowering. Of the species that have the potential to occur within the Project Area, the general distribution is in northern or north western Victoria, with each species varying in range and population size.	Several individuals (<20) recorded along Boundary Road in Ridged Plains Mallee patch. Plants not flowering at time of observation so species identification not achievable.



Plate 21. FFG Act-listed Buloke recorded within patches of Plains Savannah within the Assessment Area (Ecology and Heritage Partners Pty Ltd 03/03/2022).



Plate 22. FFG Act protected Scaly Buttons recorded within patches of Plains Savannah within the Assessment Area (Ecology and Heritage Partners Pty Ltd 08/04/2022).

3.6.2 Fauna

Twelve State significant fauna species within 10 kilometres of the Project Area (DELWP 2022d) (Appendix 2.1).

No State significant fauna were observed within Assessment Area. Based on habitat present within the Assessment Area, the landscape context and the proximity of previous records, some State-significant fauna species such as Black Falcon *Falco subniger*, Little Eagle *Hieraaetus morphnoides*, Hooded Robin *Melanodryas cucullate* and Australasian Shoveler *Spatula rhynchotis* may occasionally use or opportunistically pass through the Project Area when moving between areas of more suitable habitat (Appendix 2.1).

3.6.3 Ecological Communities

One State significant ecological community (Semi-arid Northwest Plains Buloke Grassy Woodlands Community) was recorded within the Assessment Area. This community corresponds with the woodland habitat zones of Plains Savannah mapped within the Project Area, where Buloke was present, with approximately 31 hectares present within the Assessment Area.

Although there are several areas of Plains Savannah dominated by a Buloke overstorey, the FFG Act community aligns with patches that comprised a scattered shrub layer, most often consisting of species including Variable Sida *Sida corrugata*, Nodding Saltbush *Einadia nutans* and New Holland Daisy *Vittadinia* sp. and a ground layer comprising perennial native grasses including Wallaby-grass, Spear-grass and Windmill Grass. These patches exhibit the diversity and structure detailed in the description of the community (DELWP 2022g) and tend to align with the patches of the nationally significant *Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions* ecological community. All other patches of native vegetation lack the structure or diversity of the community, due to either a lack of a Buloke canopy or degraded understorey condition.

While the Victorian Mallee Bird Community had the potential to occur within the Assessment Area, this listed community was not present due to the lack of bird species present associated with the community. The description for the community lists an assemblage of 20 native bird species that characterise the community (DELWP 2022g). Of these 20 species, only one species was recorded during the bird utilisation surveys, Brown-headed Honeyeater (Table 15).

4 REMOVAL, DESTRUCTION OR LOPPING OF NATIVE VEGETATION (THE GUIDELINES)

The below section assesses the proposed development footprint for the project. It is anticipated that changes to the layout through the planning and development process may require future updates to this section. The current impact assessment is based off the impact footprint provided by WestWind on 22 March 2023 (File name: DataSupply_230223_WorksFootprint_v08-08).

The vegetation impacts and offset requirements presented in this section are assumed to be the worst-case scenario and may be reduced through further detailed design works undertaken for the project. The current intention is to inform the potential implications under the EE Act and EPBC Act.

It should be noted that no offsite impacts (i.e. swept paths, transport impacts) have been assumed at this stage. Further, a portion of the updated development footprint is located outside of the native vegetation Assessment Area, and DEECA's modelled native vegetation extent and condition scores have been used to determine the potential impacts within these areas. Site assessments will be undertaken at a later date to confirm the extent and condition of native vegetation in these areas following the habitat hectares methodology.

4.1 Avoid and Minimise Statement

The Project Area is located within a landscape that has largely undergone historic native vegetation removal for agricultural use (primarily crops). As a result, much of the impact footprint will be located within areas void of native vegetation.

The main impacts to native vegetation will result from access requirements and ancillary works associated with the project. Several factors have been considered when addressing the avoid and minimise aspects of the Project. This included:

- The extent and condition of the native vegetation proposed to be removed;
- Number of Large Trees present within the proposed impact area;
- Bioregional Conservation Status (BCS) of the EVC proposed to be impacted;
- Presence of modelled habitat for rare or threatened species;
- Strategic Biodiversity Value (SBV) score; and,
- Any strategic planning processes that apply to the Project Area.

The BCS of all EVCs within the Assessment Area are listed as endangered. This means that it was not possible to avoid impacts to EVCs that are listed as endangered over EVCs with a lower conservation status. The focus was therefore on minimising impacts to higher quality patches of vegetation, such as those that contain a high diversity of native plants, contribute to a larger patch of native vegetation or support significant ecological values (e.g. EBPC Act ecological communities).

The Strategic Biodiversity Value (SBV) score is a ranking system created by DELWP to determine a locations complementary contribution to Victoria's biodiversity, relative to other areas across the state (DELWP 2022b). The ranking is on a scale between 0 (low contribution) and 1 (high contribution) and can be viewed using

DELWPs Native Vegetation Information Management (NVIM) system (DELWP 2022b). Vegetation impacts within areas that have high SBV scores will generally trigger higher offset requirements, due to the SBV score being a factor in the calculation of offset requirements. It is recommended to avoid areas that have a high SBV score.

Prior to determining the proposed impact area, the baseline vegetation mapping completed in July/August 2020 was provided to WestWind to gain an understanding of the general location of native vegetation within the Project Area. This data was used to help inform the more detailed layout and provided initial opportunities to avoid and minimise impacts to key areas of native vegetation, which then lead to the creation of a more refined infrastructure footprint and the completion of the detailed habitat hectare assessments.

The avoid and minimise statement will capture key decisions around the removal and retention of native vegetation as the project progresses. The intention is to clearly describe why any native vegetation proposed to be removed cannot feasibly be retained without undermining the objectives of the project. The final impact report for the project should clearly summarise any avoidance or minimisation of impacts to native vegetation considered during the decision-making process and state the final proposed impacts to native vegetation and offset requirements.

The current impact footprint is the result of several updates, where the layout has been modified to reduce impacts to native vegetation. All ecological assessments were completed prior to determining the impact footprint, and the spatial data of the ecological assessment used to inform the general layout of the energy park. The current impact footprint assumes the maximum impact to native vegetation expected and includes 15 metre buffer within the impact footprint to account for slight amendments to the final layout, such as micro siting of access roads to avoid scattered trees.

4.2 Vegetation Proposed to be Removed

The study area is within Location 2, with 8.141 hectares of native vegetation proposed to be removed, comprising a total of 6.98 hectares of native vegetation patches, 36 Large Trees in patches, and 24 scattered trees (12 Large and 12 Small Trees). As such, the permit application is assessed under the Detailed Assessment Pathway (Table 23).

Condition scores for vegetation proposed to be removed are provided in Appendix 1.2.

Table 23. Removal of Native Vegetation (the Guidelines) (DELWP 2017).

Assessment pathway	Detailed
Location Category	2
Total Extent (past and proposed) (ha)	8.141
Extent of past removal (ha)	0.00
Extent of proposed removal (ha)	8.141
Large Trees (scattered and in patches) to be removed (no.)	48
Small scattered trees to be removed (no.)	12
EVC Conservation Status of vegetation to be removed	Endangered

4.3 Offset Targets

The offset requirement for native vegetation removal is 3.311 General Habitat Units and 48 Large Trees.

A summary of proposed vegetation losses and associated offset requirements is presented in Table 24 and the EnSym scenario report is presented in Appendix 4.

Table 24. Offset Targets.

General Offsets Required	3.311
Large Trees	48
Vicinity (catchment/council)	Wimmera CMA / Yarriambiack
Minimum Strategic Biodiversity Value*	0.249

*The minimum Strategic Biodiversity Value is 80% of the weighted average score across habitat zones where a General offset is required.

4.4 Offset Strategy

According to DELWPs Native Vegetation Offset Register (DELWP 2022h), there are four offset sites within the Wimmera CMA or Yarriambiack region that can be used to satisfy the General Habitat Unit and Large tree offset requirements.

An offset register search statement identifying the relevant offsite sites is provided in Appendix 5.

5 POTENTIAL IMPACTS

Likely impacts associated with the project footprint and operation of the proposed renewable energy project are discussed in the following sections.

5.1 Construction Related Impacts

In the absence of suitable mitigation measures, construction-related impacts are likely to include:

- The introduction and spread of weeds and soil pathogens due to on-site activities;
- Disturbance to wildlife from increased human activity and noise during construction; and,
- Indirect impacts on adjacent areas if construction activities, erosion and drainage are not appropriately managed.

The study area is located within a relatively flat farmland landscape with interspersing ephemeral drainage lines which are unlikely to hold water for any length of time. Where possible, access tracks should be located in cleared paddocks or along existing roads. There are likely to be some impacts to native vegetation, primarily as a result of the access requirements to the proposed wind farm, through widening of existing roads to facilitate access and egress.

The potential construction related impacts are generally considered to be low provided a Construction Environment Management Plan is prepared to ensure the protection of retained vegetation prior to, and during construction, as well as control the spread of weeds and pathogens.

5.2 Operational Impacts

There are likely to be bird and bat mortalities as a result of turbine collision and barotrauma associated with the operation of the wind farm.

5.2.1 Birds

The primary focus of the impacts of wind farms on birds is related to collision with wind turbines (Kuvlesky *et al.* 2007), although collision with powerlines associated with wind farms has also been recorded (Janss and Ferrer 2000; Kuvlesky *et al.* 2007). However, wind farms have the potential to directly and indirectly impact birds and other taxa in other ways as well. For example, in Europe, displacement through habitat loss is considered the main detrimental effect of wind farms on avian abundance (Kuvlesky *et al.* 2007). This effect has been shown to manifest itself on both grassland birds that use habitat under the wind turbines (Leddy *et al.* 1999) and birds of prey that are frequently encountered within RSA (Farfán *et al.* 2009), although it is likely to affect all bird species to some extent. This effect is likely to occur because of the noise, movement and human disturbance associated with wind turbines (Leddy *et al.* 1999). This type of research has not been conducted in Australia, therefore the impact that this type of disturbance will have on Australian grassland birds is not well known.

The impact of increased bird mortality as a result of collisions with wind turbines or powerlines will affect different species in different ways. Affected species that are short-lived, with high annual reproduction rates, are likely to be able to absorb this additional mortality with little impact to their overall population size at a

regional or national level (Chamberlain *et al.* 2006). By contrast, affected species that are long-lived, slowly reproducing species are more vulnerable to this type of additive mortality and may be less able to maintain viable population sizes when faced by such stresses (Sæther and Bakke 2000).

Given that raptors are long-lived and are a slowly reproducing species, they are distributed in low densities compared to other birds, and are therefore exposed to increased risk of local population declines. The loss of a single breeding individual could potentially adversely impact the local population. However, it is well known based on published literature that certain raptors adapt their behaviour in the presence of wind turbines (Farfán *et al.* 2009), although detailed avoidance rates for most species worldwide is not known (Chamberlain *et al.* 2006). Particular raptor species have been identified as being 'of concern' due to their proneness to collision with operational wind turbines, although these species do appear to become conditioned to the presence of wind turbines after an extended period of time, and adjust their foraging behaviour to avoid wind turbines (i.e. up to 99% avoidance rates for most species).

Less than 1% of observations made during the bird utilisation surveys conducted by Ecology and Heritage partners were of birds within, or above, RSA (Table 16). Further, it cannot be assumed that all the birds observed within the study area will collide with the wind turbines, as birds are known to adapt their behaviour in the presence of wind turbines to avoid an obstacle, such as a wind turbine, in their flight path (Farfán *et al.* 2009).

Overseas studies have shown that even collision-prone bird species avoid collisions with wind generators on most occasions (Winkelman 1992a; 1992b; Still *et al.* 1995). A range of avoidance rates of bird species from overseas studies range from 100% to 98% (Winkelman 1992a; Still *et al.* 1995). In Australia, three avoidance rates are commonly used when calculating collision risk of birds at wind farms: 95%, 98% and 99%. Avoidance rates in Australia have previously been recorded at the Codrington Wind Farm in Victoria, where birds have regularly exhibited 100% avoidance of turbines.

Despite the specific composition of the birds observed using RSA, it is likely that other species recorded during both the fixed-point count and incidental surveys will occasionally fly within RSA and a varying degree of mortality is likely to be expected for these species. Of importance with regards to assessing the risk of turbine collision are those birds that are threatened on a regional, state or national level.

However, given the low proportion of bird flights within the RSA, the abundance of those species most likely to fly within this area, the high level of avoidance behaviour exhibited by many species of birds, buffers around the limited areas of high quality habitat and the predominantly low quality habitat that comprises the rest of the study area it is unlikely that the operation of the proposed wind farm will have a significant impact on the avifauna of the region.

Ongoing monitoring of bird populations and mortalities at the wind farm, once built, would be required to ensure that bird mortality is at a low level. This will take the form of a Bird and Avifauna Management (BAM) Plan (Section 7).

5.3 Potential Impacts on Bats

Bats are susceptible to mortality caused by wind turbines (Arnett 2005; Bearwald *et al.* 2008, Kunz *et al.* 2007). In some habitats both a high number of individuals and species are struck by wind turbines, especially those bat species that undertake large scale annual migrations (Kunz *et al.* 2007; Kuvlesky *et al.* 2007; Cryan and

Barclay 2009). Furthermore, bats may be attracted to wind turbines following vortices created by the blade tips and have been observed investigating all parts of the turbine (Horn *et al.* 2008; Cryan and Barclay 2009). There is also potential for bats to die as a result of barotrauma caused by changes in pressure produced by the rotating turbines (Bearwald *et al.* 2008, Cryan and Barclay 2009).

To date little scientific data has been published regarding the impact of existing wind farms on Australian bat species. Carcass surveys undertaken as part of the Studland Bay and Bluff Point Wind Farms in Tasmania revealed that the majority of the carcasses were Gould's Wattled Bat (a high-flying, open-air foraging species) with the remaining being *Vespadelus* spp. (Hull and Cawthen 2012). A carcass survey within the small scale (two turbine) Hepburn Wind Farm detected a single White-Striped Freetail Bat mortality (Bennett 2012).

Collisions with turbine blades are understood to be the most frequent interaction causing mortality or injury, although the cause of these collisions is poorly known. General observations to date indicate that bats do not typically collide with turbine towers, transmission structures, guy wires, or meteorological towers (i.e. stationary structures); however current understanding of how and why bats come into contact with turbines is lacking. This is due to the limited ability to observe how bats behave at night around these structures as they move across the landscape between patches of vegetation and during foraging activities (MNR 2007, Horn *et al.* 2008a).

There are four main factors that contribute to bat mortality at wind farm sites:

- Bat species and abundance in the area;
- Season (i.e. time of year) and weather conditions (e.g. clear, warm nights with low wind). Such factors are likely to influence the level of bat activity and thus mortality at wind farms (MNR 2007);
- Habitat/landscape features in the area (e.g. migration routes, forested ridges, and hibernacula/swarming sites may be important features). High levels of bat activity have been documented in forested ridge habitats, and areas where the woodland patches have been cleared for wind turbine placement also offer attractive foraging habitat for some species of bats. Edges of remnant woodlands and scattered remnant trees in paddocks provide favourable foraging areas where bats can easily capture airborne insect prey, creating areas of concentrated bat activity (Barclay 1985; Lumsden and Bennett 2000, 2005; Kunz *et al.* 2007, Horn *et al.* 2008a); and,
- The number of turbines contained within the wind farm.

5.3.1 *Bats Species in the Study Area*

The majority of species previously recorded or predicted to occur within the study area are likely to focus their foraging activities in forested areas, around patches of vegetation and scattered remnant trees, at or below canopy height. The Project Area lacks waterbodies and largely supports highly modified agricultural paddocks, which is likely to limit foraging activity.

Species that use more open areas, such as the Lesser Long-eared Bat *Nyctophilus geoffroyi*, generally fly close to the ground (less than five metres high) when in these areas (Churchill 1998). Bat species that typically fly high are at the highest risk of flying within the RSA and suffering mortality from barotrauma or collision. Of the species likely to occur, the White-striped Freetail Bat is known to fly at height (50 metres or above) (Churchill 1998), and therefore this species is considered to be at highest risk of blade collisions and barotrauma. However, the potential impacts to White-striped Freetail Bat and other bats during operation of

the wind farm are expected to be low due to the RSA height (50 metres – 280 meters) and the location of turbines in a cleared landscape, some distance from significant woodland habitats and large trees that would be favoured for foraging by most bat species.

5.4 Cumulative Biodiversity Impacts

The largest impact to biodiversity in the locality and encompassing bioregion is likely to have stemmed from increased European settlement around the 1940s and the subsequent land clearance for agriculture. The Wimmera and Murray Mallee bioregions are one of Victoria's most cleared bioregions, with native vegetation extent being greatly reduced in areas of private area (VEAC 2011). Future disturbance associated with human activities in these bioregions is likely to be associated with ongoing agricultural activities and development.

The impacts from the project must be considered together with the biodiversity impacts that have resulted from historic and predicted future human disturbances.

In addition to cumulative impacts associated with construction of the Warracknabeal Energy Park, operational activities have the potential to lead to incremental and cumulative impacts (e.g. barrier effects, changes to bird/bat behaviour etc.). Nearby operating wind farms within the vicinity of the study area include:

- Murra Warra Wind Farm (under construction) – 99 turbines located approximately 15 kilometres south of the Project Area; and,
- Wimmera Plains Energy Facility (under construction) - 52 turbines located approximately 30 kilometres south of the study area.

The operation of the proposed Warracknabeal Energy Park is unlikely to significantly increase cumulative pressures within the broader landscape due to the development footprint being located in a setting within a predominantly cleared and uniform landscape, outside the likely common distribution range of key species potentially impacted by wind farm developments (e.g. Brolga, Southern Bent-wing Bat, migratory shorebirds).

Despite this, ongoing monitoring of bird populations following commissioning of the Project will enable the proponent to identify and mitigate cumulative impacts as other renewable energy projects are brought on-line.

5.5 The Impact of Climate Change

Climate change is likely to have an impact on both the flora and fauna of the Project Area. There has been recent speculation about the movement of wetlands south as the interior of Australia becomes increasingly arid. This conjecture is not supported by empirical data and it is likely that changes in Australia's climate will have unpredictable impacts on Australia's biodiversity, including birds (Pittock 2003). Changes that have already occurred as a result of the effect of climate change on birds include changes to distribution, phenology, morphology and physiology, behaviour, and abundance and population dynamics (Chambers *et al.* 2005).

As climate change is better understood it may be that developments such as wind farms need to be mindful of the impacts of this phenomenon, however at present, this is not possible. It should also be noted that wind farms are a 'clean' energy source with relatively very low carbon emissions.

6 LEGISLATIVE AND POLICY IMPLICATIONS

6.1 *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)

The EPBC Act establishes a Commonwealth process for the assessment of proposed actions (i.e. project, development, undertaking, activity, or series of activities) that are likely to have a significant impact on matters of national environmental significance (NES), or on Commonwealth land. An action, unless otherwise exempt, requires approval from the Commonwealth Environment Minister if it is considered likely to have an impact on any matters of NES. A summary of potential impacts to matters of NES is provided in Table 25.

Table 25. Potential impacts to matters of NES.

Matter of NES	Potential Impacts
World Heritage properties	No. The proposed action will not impact any properties listed for World Heritage.
National Heritage places	No. The proposed action will not impact any places listed for national heritage.
Ramsar wetlands of international significance	The nearest wetland of international importance is Lake Albacutya, located approximately 50 kilometres upstream of the Project Area. The proposed development will not impact any wetlands of international significance.
Threatened species and ecological communities	<p>One nationally significant fauna species (Golden Sun Moth) was recorded within the Assessment Area (Section 3.5).</p> <p>Three nationally significant ecological communities were recorded within the Assessment Area (Section 3.8.3):</p> <ul style="list-style-type: none"> • 9.2 hectares of Natural Grasslands of the Murray Valley Plains; • 31 hectares of Buloke Woodlands of the Riverina and Murray-Darling Depression Bioregions • 164 hectares of Plains Mallee Box Woodlands of the Murray-Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions
Migratory and marine species	<p>There is no marine habitat within the Project Area and the Project Area would not be classed as an 'important habitat' as defined under the EPBC Act Policy Statement 1.1 Principal Significant Impact Guidelines (DoE 2013), in that it does not contain:</p> <ul style="list-style-type: none"> • Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; • Habitat utilised by a migratory species which is at the limit of the species range; or, • Habitat within an area where the species is declining. <p>It is considered that the likelihood of migratory bird mortality through turbine collisions is low and that the proposed wind farm is unlikely to have a significant impact on any migratory species</p>
Commonwealth marine area	The proposed action will not impact any Commonwealth marine areas.
Nuclear actions (including uranium mining)	The proposed action is not a nuclear action.
Great Barrier Reef Marine Park	The proposed action will not impact the Great Barrier Reef Marine Park.
Water resources impacted by coal seam gas or mining development	The proposed action is not a coal seam gas or mining project.

6.1.1 Implications

The following implications are based on the current impact assessment and area anticipated to be the maximum impact to each recorded MNES. Further impact minimisation demonstrated via micro siting of infrastructure will be undertaken during the detailed design phase of the project.

Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions

A total of 164 hectares of Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ecological community was recorded within the Assessment Area.

Based on the current impact footprint, there is a proposed impact to 2.006 hectares of Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ecological community to accommodate the project infrastructure and associated construction buffers.

Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions

A total 31 hectares of Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions ecological community was recorded within the Assessment Area.

Based on the current impact footprint, there is a proposed impact to 0.069 hectares to accommodate the project infrastructure and associated construction buffers.

Natural Grasslands of the Murray Valley Plains

A total of 9.2 hectares of Natural Grasslands of the Murray Valley Plains ecological community was recorded within the Assessment Area.

Based on the current impact footprint, there is a proposed impact to 0.107 hectares to accommodate the project infrastructure and associated construction buffers.

Significant Impact Assessment

Of the three nationally significant ecological communities recorded within the study area, two are listed as Critically Endangered (Natural Grasslands of the Murray Valley Plains and Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions) and one is listed as Endangered (Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions).

An assessment of the impact footprint against the significant impact guidelines for Critically Endangered and Endangered ecological communities (DoE 2013) is provided below in Table 26.

Table 26. Assessment against the Significant Impact Guidelines for Endangered or Critically Endangered Ecological Communities:

Significant Impact Guidelines 1.1 – Significant Impact Criteria for Endangered or Critically Endangered Ecological Communities			
Significant impact Criteria	Comment		
	PMBW	BWRMDDB	NGMVP
1. Reduce the extent of an ecological community.	<p>The proposed action will result in a reduction in extent of the ecological community, with the proposed removal of a maximum of 2.006 hectares out of more than 100 hectares of the community estimated to occur in the broader locality. The 2.006 hectares is located within road reserves, present as linear corridors. Most of the impacted 2.006 hectares is due to assumed impacts within the buffer areas associated with the construction of access tracks.</p>	<p>31 hectares of Buloke Woodland was mapped within 17 patches of Plains Savannah, and of this, 0.069 hectares is proposed to be impacted.</p> <p>The impact occurs to one patch of Plains Savannah, PS504, and reduces the habitat zone from 1.149 hectares down to 1.08 hectares.</p>	<p>A total of 9.2 hectares of the ecological community was mapped within 12 patches of Plains Savannah within the Assessment Area, and of that 0.107 hectares is proposed to be impacted.</p> <p>This impact is split across four patches of Plains Savannah, with each impacted patch still retaining a larger portion of the native vegetation. For example, habitat zone PS25 is 0.912 hectares in size, and has an impact of 0.062 hectares. The other impacted PS patches include PS16, PS27 and PS502.</p>
	<p>Impacts to the ecological communities cannot be entirely avoided due to the requirement to construct infrastructure associated with the Project. Impacts have been reduced from previous versions of the construction footprint to minimise vegetation impacts along the entire alignment, with a particular focus on retaining as much of the EPBC Act-listed ecological community as practically possible.</p>		
2. Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines.	<p>The overall PMBW community is present within several road reserves and is surrounded by a modified agricultural landscape. The 2.006 hectares proposed to be removed occurs within road reserves already impacted by the presence of made roadways and agricultural paddocks, and is comprised of a number of small impacts throughout the impact area, totalling 2.006 hectares, opposed to one larger area of removal. Although access roads will be constructed through some road reserves, it is not considered that the community will be fragmented, or result in its ecological function significantly altered as a</p>	<p>The impacted patch of Buloke Woodland occurs along Boundary Road, where the northern edge of the patch is slightly impacted from the turning area allocated to vehicles entering boundary road from a proposed access road to the north.</p> <p>The patch is not fragmented as a result of this impact, but it narrowed by approximately 4 meters along the top section that borders the existing gravel road.</p> <p>Further refinements to the development footprint may allow entire avoidance of this patch, as the</p>	<p>Of the four impacted patches that support NG, two patches are proposed to be fragmented to allow for the creation of access roads and appropriate turning widths.</p> <p>The two fragmented patches include PS16 and PS502. PS16 will be fragmented to allow for turning access from access track running adjacent to Rainbow Road into Exchange Road in the northern section of the Project Area.</p>

Significant Impact Guidelines 1.1 – Significant Impact Criteria for Endangered or Critically Endangered Ecological Communities			
	<p>result of the proposed action due to the small nature of impact at each location within the construction footprint.</p> <p>As such, the proposed action will not likely result in increased fragmentation of the ecological community, given that only small, discrete areas of the community in an already fragmented landscape is proposed for removal.</p>	<p>current construction footprint allows for 15 meter buffers from the edge of proposed impact areas.</p>	<p>PS502 will be fragmented to allow for an Access Road linking turbines that crosses north/south across Boundary Road.</p> <p>No fragmentation will occur to patches PS25 and PS27, where the impacts are restricted to the edges of the patches, adjacent to Rainbow Road. There is an opportunity to avoid impacts to these patches entirely through further revision of the impact footprint.</p>
<p>3. Adversely affect habitat critical to the survival of an ecological community.</p>	<p>The proposed action is not likely to adversely affect the long-term survival of the ecological communities, given that the majority of the mapped area of each community within the Assessment Area are being avoided by the proposed action (Figure 2).</p>		
<p>4. Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.</p>	<p>The proposed action will result in the removal of surface soil within the development footprint required to construct access and install reticulation. Soil and rock removal will only be taken to the extent necessary to level the ground to facilitate construction works. Soil will not be stockpiled outside of the activity area and will be reinstated as soon as possible.</p> <p>Given the small, localised nature of works within the impact areas supporting the ecological communities and the existing presence of the roads, groundwater levels, water drainage patterns and nutrient loads are unlikely to be affected by the proposed action.</p>		
<p>5. Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.</p>	<p>The overall functionality of each impacted community will not be affected by the proposed action. This is due to the small, localised nature of the proposed impacts to each community, the existing roads located within and adjacent to the location of each community, as well as the retention of the remainder of the communities adjacent to the infrastructure footprint.</p>		
<p>6. Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to:</p>	<p>The overall quality of the ecological community is not likely to be affected by the proposed action. The community is present within existing road reserves and nature reserves in the broader region, and the creation of additional access roads and reticulation resulting in a potential impact to each nationally significant ecological community that are present immediately adjacent to existing carriageways will not cause a substantial reduction in the quality or integrity of the remaining ecological communities.</p>		

Significant Impact Guidelines 1.1 – Significant Impact Criteria for Endangered or Critically Endangered Ecological Communities	
<p>a. assisting invasive species, that are harmful to the listed ecological community, to become established or;</p>	<p>Appropriate management of the construction process and machinery will be used to ensure that any weed species, pollutants and/or pathogens are not inadvertently spread into areas supporting the ecological communities.</p>
<p>b. causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.</p>	
<p>7. Interfere with the recovery of an ecological community.</p>	<p>The proposed action is not likely to interfere with the ecological processes or recovery of the ecological communities, due to the retention of larger, adjacent patches of the ecological communities.</p>

Note: PMBW = Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions, BWRMDDB = Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions, NGMVP = Natural Grasslands of the Murray Valley Plains

Implications

A significant impact may result to the *Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions* ecological community based on the assessment against the significant impact criteria for Endangered or Critically Endangered ecological communities. The assessment identified that the ecological community is likely to be reduced in its extent and fragmented in sections, with up to 2.006 hectares proposed to be removed.

A significant impact is unlikely to result to either the *Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions* or *Natural Grasslands of the Murray Valley Plains* ecological community due to the minimal impact currently proposed to each community, and potential opportunity to avoid each community entirely through further refinement of the infrastructure footprint.

Golden Sun Moth

A total of 0.975 hectares of confirmed habitat for Golden Sun Moth was recorded along Moloneys Road, in the far south of the Project Area where a low number of Golden Sun Moth were observed flying. No impacts are proposed to the Golden Sun Moth habitat, with only overhead powerlines occurring in this area.

6.1.2 Implications

The following implications are based on the current preliminary impact assessment and are considered to be conservative. Further impact minimisation will be demonstrated via micro siting of infrastructure during the detailed design phase of the project.

Based on the Preliminary Impact Assessment, there is a proposed impact of up to 2.006 hectares of the Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ecological community, 0.107 hectares of the Natural Grasslands of the Murray Valley Plains ecological community and 0.069 hectares of the Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions ecological community.

No nationally significant flora were recorded within the Assessment Area.

Based on the current impacts to the Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ecological community and the presence of other MNES that are marginally impacted or have the potential to be impacted, a referral under the EPBC Act to the Commonwealth Environment Minister is recommended.

6.2 Environment Effects Act 1978 (Victoria)

The *Environment Effects Act 1978* (EE Act) provides for assessment of proposed actions that can have a significant effect on the environment via the preparation of an Environment Effects Statement (EES). A project with potential adverse environmental effects that, individually or in combination, could be significant in a regional or State context should be referred. Actions that may be referred for an EES decision are discussed in Table 27.

The following implications are based on the current preliminary impact assessment and are considered to be conservative. Further impact minimisation will be demonstrated via micro siting of infrastructure during the detailed design phase of the project.

Table 27. Referral criteria under the EE Act (DSE 2006).

Referral criteria	Potential Impacts
Individual potential environment effects	
Individual types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:	

Referral criteria	Potential Impacts
<p>Potential clearing of 10 hectares or more of native vegetation from an area that:</p> <ul style="list-style-type: none"> • is of an EVC identified as endangered by DELWP in accordance with Appendix 2 of Victoria’s Native Vegetation Management – A Framework for Action (DSE 2002); • is of Very High conservation significance (as defined in accordance with Appendix 3 of Victoria’s Native Vegetation Management – A Framework for Action (DSE 2002); or, • is not authorised under an approved Forest Management Plan or Fire Protection Plan 	<p>No.</p> <p>A total area of 6.98 hectares of native vegetation patches are proposed to be impacted. This comprises:</p> <ul style="list-style-type: none"> • 6.98 hectares of native vegetation from five endangered EVCs: <ul style="list-style-type: none"> ○ 0.8066 hectares of LRW; ○ 0.0731 hectares of PW; ○ 1.0999 hectares of PS; ○ 4.9491 hectares of RPM; and, ○ 0.0551 hectares of RCW. • 4.1999 hectares of native vegetation of Very High conservation significance EVCs: <ul style="list-style-type: none"> ○ 0.4532 hectares of LRW; ○ 0.0539 hectares of PW; ○ 0.4347 hectares of PS; and, ○ 3.2581 hectares of RPM.
<p>Potential long-term loss of a significant proportion (1-5 percent depending on the conservation status of the species) of known remaining habitat or population of a threatened species within Victoria</p>	<p>Unlikely.</p> <p>Several threatened flora species and one threatened fauna species were recorded within the Assessment Area. These species all have a widespread distribution range, and the removal of individuals within the Assessment Area is unlikely to result in a long-term loss of a significant proportion of known remaining habitat or population of these species within Victoria.</p>
<p>Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in ‘A Dictionary of Important Wetlands in Australia’</p>	<p>No.</p> <p>The Project Area is not listed under the Ramsar Convention or in ‘A Dictionary of Important Wetlands in Australia’.</p>
<p>Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long time</p>	<p>Highly unlikely. Yarriambiack Creek runs along the eastern side of the northern Project Area, however is outside of the Project Area and is unlikely to be impacted. No other aquatic, estuarine or marine ecosystems are present within the Project Area.</p>
<p>Potential extensive or major effect on the health, safety or well-being of a human community, due to emissions to air or water or chemical hazards or displacement of residents</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>
<p>Potential greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>
<p>A combination of potential environmental effects</p> <p>A combination or two or more of the following types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:</p>	
<p>Potential clearing of 10 hectares or more of native vegetation, unless authorised under an approved Forest Management Act or Fire Protection Plan</p>	<p>No. The current impact footprint proposes to remove a maximum of 6.98 hectares of native vegetation patches.</p>

Referral criteria	Potential Impacts
<p>Potential extensive or major effects on landscape values of regional importance, especially where recognised by a planning scheme overlay or within or adjoining land reserved under the <i>National Parks Act 1975</i></p>	<p>Unlikely.</p> <p>The Project Area is not within or adjoining a National Park.</p> <p>An Environmental Significance Overlay – Schedule 2 (ESO2) <i>Highway Environs Protection</i> applies to the Borung Highway in the southern section of the Project Area and along Rainbow Road in the northern section of the Project Area. ESO2 seeks to protect the vegetative corridors along the road reserves for their biodiversity and landscape amenity values.</p> <p>Any works proposed within these road corridors must consider the decision guidelines listed in the ESO.</p>
<p>Matters listed under the FFG Act:</p> <ul style="list-style-type: none"> • Potential loss of a significant area of a listed ecological community; • Potential loss of a genetically important population of an endangered or threatened species; • Potential loss of critical habitat; or, • Potential significant effects on habitat values of a wetland supporting migratory birds. 	<p>One threatened flora species, Weeping Myall, has a limited distribution within Victoria. The Warracknabeal population is one of the two main localities that support the species. A total of 36 individuals were recorded within the Assessment Area, and none are proposed to be impacted based on the current construction footprint.</p> <p>One ecological community, Semi-arid Northwest Plains Buloke Grassy Woodlands Community, was recorded within the Assessment Area within areas of moderate to high quality Plains Savannah containing a Buloke canopy and native understorey. A total of 0.069 hectares is proposed to be impacted based on the current construction footprint. This impact is not considered to be a significant area of the ecological community, with over 30 hectares recorded during the detailed vegetation assessment within the Assessment Area.</p> <p>No loss of any other genetically important populations of an endangered or threatened species, loss of critical habitat or significant effects on habitat values of a wetland supporting migratory birds is likely to occur as a result of the Project.</p>
<p>Potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short or long term</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>
<p>Potential extensive or major effects on beneficial uses of waterbodies over the long term due to changes in water quality, streamflows or regional groundwater levels</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>
<p>Potential extensive or major effects on social or economic well-being due to direct or indirect displacement of non-residential land use activities</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>
<p>Potential for extensive displacement of residences or severance or residential access to community resources due to infrastructure development</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>
<p>Potential significant effects on the amenity of a substantial number of residents, due to extensive or major, long-term changes in visual, noise and traffic conditions</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>
<p>Potential exposure of a human community to severe or chronic health or safety hazards over the short or long term, due to emissions to air or water or noise chemical hazards or associated transport</p>	<p>Unknown.</p> <p>Outside the scope of this report.</p>

Referral criteria	Potential Impacts
Potential extensive or major effects on Aboriginal cultural heritage	Unknown. Outside the scope of this report.
Potential extensive or major effects on cultural heritage places listed on the Heritage Register of the Archaeological Inventory under the <i>Heritage Act 1995</i> .	Unknown. Outside the scope of this report.

6.2.1 Implications

Based on an assessment of ecological thresholds, a recommendation to refer the project under the EE Act is unlikely to be triggered by the Project based on ecological impacts alone as:

- None of the thresholds relating to any of the individual ecological criteria are likely to be exceeded; and,
- None of the thresholds relating to the combination of ecological criteria are likely to be exceeded.

It should be noted that Ecology and Heritage Partners' have not undertaken a detailed assessment of other non-ecological referral criteria detailed in DSE (2006).

6.3 Flora and Fauna Guarantee Act 1988 (Victoria)

The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' threatened and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (e.g. within road reserves, drainage lines and public reserves/parks). An FFG Act permit is generally not required for removal of species or communities on private land, or for the removal of habitat for a listed terrestrial fauna species. However, the *Flora and Fauna Guarantee Amendment Act 2019* came into effect on 1 June 2020 and now applies the FFG Act to Crown land and private/freehold land that is managed by a public authority.

6.3.1 Implications

Seven FFG Act-listed flora species, 10 FFG Act-protected flora species and one FFG Act-listed fauna species was recorded within the Assessment Area. In addition, one FFG Act-listed ecological community was recorded within the assessment area. Details on the specific species and ecological community is provided in Section 3.6.

Any proposed impacts to the flora species and ecological community that occur on public land will trigger the requirement to apply for an FFG Act permit. WestWind Energy should allow up to six weeks to receive an approved FFG Act permit from DELWP.

6.4 Planning and Environment Act 1987 (Victoria)

The *Planning and Environment Act 1987* outlines the legislative framework for planning in Victoria and for the development and administration of planning schemes. All planning schemes contain native vegetation provisions at Clause 52.17, which requires a planning permit to remove, destroy or lop native vegetation, unless an exemption at Clause 52.17-7 of the Victoria Planning Provisions applies.

In addition to Clause 52.17, Wind Energy Facility proposals require a permit under Clause 52.32.

6.4.1 Local Planning Scheme

The Project Area is located within the Shire of Yarriambiack. The following zoning and overlays apply (DELWP 2022d):

- Farming Zone (FZ)
- Bushfire Management Overlay (BMO) (small section on Boundary Road)
- Environmental Significance Overlay – Schedule 2 (ESO2)

Environmental Significance Overlay – Schedule 2 *Highway Environs Protection*

One Environmental Significance Overlay – Schedule 2 (ESO2), applies to areas of the Project Area. ESO2 seeks the protection of native vegetation and habitat along highway corridors, due to the importance these corridors provide to biodiversity in the broader landscape. Much of the surrounding private land has historically been cleared of native vegetation, with narrow bands remaining along the road corridors often supporting high quality fragments of local biodiversity.

Within the Project area, ESO2 covers sections of the Borung Highway and Rainbow Road. Any proposed impacts to native vegetation in areas covered by the ESO must review the environmental objectives and consider the decision guidelines listed under the ESO.

Clause 52.32 – Wind Energy Facility

A permit is required under Clause 52.32 of the Yarriambiack Shire Planning Scheme to use and develop a wind energy facility.

- Site and context analysis ecological application requirements in relation to the site:
 - Existing vegetation types, condition and coverage (see Section 3.1);
 - The landscape of the site (see Section 1.2);
 - The impact of the proposal on any species listed under the FFG Act or EPBC Act (see Section 3.5, Section 3.6 and Section 4); and,
 - Any other notable features, constraints or other characteristics of the site.
- Site and context analysis ecological application requirements in relation to the surrounding area:
 - Direction and distances to significant conservation and recreation areas, and water features (see Section 1.2);
 - Sites of flora and fauna listed under the FFG Act or EPBC Act, including significant habitat corridors, and movement corridors for these fauna (See Section 3);
 - National Parks, State Parks, Coastal Reserves and other land subject to the *National Parks Act 1975* (see Section 1.2);
 - Land declared a Ramsar wetland as defined under section 17 of the EPBC Act (see Section 4.1.1); and,

- Bushfire risks.
- Design response ecological application requirements:
 - A rehabilitation plan for the site;
 - A description of how the proposal responds to any significant landscape features for the area identified in the planning scheme;
 - An assessment of the impact of the proposal on any species (including birds and bats) listed under the EPBC Act or FFG Act (see Section 4 and Section 5) (further details to be provided once final infrastructure footprint is provided); and,
 - An environmental management plan including any rehabilitation and monitoring requirements.

6.4.2 *Removal, Destruction or Lopping of Native Vegetation (the Guidelines)*

The State Planning Policy Framework and the decision guidelines at Clause 52.17 (Native Vegetation) and Clause 12.01 require Planning and Responsible Authorities to have regard for ‘Guidelines for the removal, destruction or lopping of native vegetation’ (Guidelines) (DELWP 2017). Where the clearing of native vegetation is permitted, the quantity and type of vegetation to be offset is determined using methodology specified in the Guidelines. The primary objective of the regulations is ‘*no net loss in the contribution made by native vegetation to Victoria’s biodiversity*’.

6.4.3 *Implications*

The Project Site is within Location 2, with 8.141 hectares of native vegetation proposed to be removed, comprising 6.98 hectares of native vegetation patches, 36 Large Trees in patches, and 24 scattered trees (12 Large and 12 Small Trees). As such, the permit application falls under the Detailed assessment pathway.

The offset requirement for native vegetation removal is 3.311 General Habitat Units and 48 Large Trees.

A planning permit from the DELWP Minister for Planning is required to remove, destroy or lop any native vegetation under Clause 52.17 and Clause 42.01 (ESO2) of the Yarriambiack Planning Scheme.

A permit is required under Clause 52.32 of the Planning Scheme to develop and use a Wind energy facility. The ecological application requirements are outlined in Section 6.5.1.

A permit will be referred to DELWP as a ‘recommending authority’ as the applications is being assessed under the Detailed Assessment pathway.

6.5 Policy and Planning Guidelines – Development of Wind Energy Facilities in Victoria

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

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

6.5.1 Implications

Impacts on flora and fauna species and habitats as a result of wind energy facilities and associated infrastructure can be minimised through facility placement and design measures at the project planning stage. Minimisation of impacts to native vegetation patches, scattered trees, and significant impacts to environmental values at the site can be further achieved by focusing construction and other project activity in agricultural areas.

An Environmental Management Plan (EMP) will be required to detail how the site will be managed throughout the life of the Project, and across all environmental components. The EMP should include a bat and avifauna management plan (DELWP 2021). The project must consider impacts on birds and bats, which are known to collide with wind turbines. Research by the Arthur Rylah Institute has improved knowledge of wind turbine impact on bats and birds (DELWP 2020a), and DELWP is developing risk assessment and mitigation guidelines specifically for Brolga, Southern Bent-wing Bat, Red-tailed Black Cockatoo, Black Falcon and White-bellied Sea Eagle (DELWP 2020b).

6.6 Catchment and Land Protection Act 1994 (Victoria)

Seven weeds listed as noxious under the *Catchment and Land Protection Act 1994* were recorded during the assessment, African Love-grass, Horehound, Bathurst Burr, Caltrop, African Box-thorn, Prickly Pear and Soursob.

Similarly, there is evidence that the Assessment Area is currently occupied by several pest fauna species listed under the CaLP Act, including European Rabbit *Oryctolagus cuniculus* and Red Fox *Vulpes vulpes*. A Weed and/or Pest Management Plan may be required.

6.7 Wildlife Act 1975 and Wildlife Regulations 2013 (Victoria)

The *Wildlife Act 1975* (and associated *Wildlife Regulations 2013*) is the primary legislation in Victoria providing for protection and management of wildlife. Authorisation for habitat removal may be obtained under the *Wildlife Act 1975* through a licence granted under the *Forests Act 1958*, or under any other Act such as the *Planning and Environment Act 1987*. Any persons engaged to remove, salvage, hold or relocate native fauna during construction must hold a current Management Authorisation under the *Wildlife Act 1975*, issued by DELWP.

7 MITIGATION MEASURES

Recommended measures to mitigate impacts upon terrestrial values present within the Project Area may include:

- Minimise impacts to native vegetation and habitats through construction and micro-siting techniques, including fencing retained areas of native vegetation. If indeed necessary, trees should be lopped or trimmed rather than removed;
- All contractors should be aware of ecologically sensitive areas to minimise the likelihood of inadvertent disturbance to areas marked for retention. Native vegetation (areas of sensitivity) should be included as a mapping overlay on any construction plans;
- Tree Protection Zones (TPZs) should be implemented to prevent indirect losses of native vegetation during construction activities (DSE 2011). A TPZ applies to a tree and is a specific area above and below the ground, with a radius 12 x the Diameter at Breast Height (DBH). At a minimum standard a TPZ should consider the following:
 - A TPZ of trees should be a radius no less than two metres or greater than 15 metres;
 - Construction, related activities and encroachment (i.e. earthworks such as trenching that disturb the root zone) should be excluded from the TPZ;
 - Where encroachment is 10% or more of the total area of the TPZ, the tree should be considered as lost and offset accordingly (unless an arboricultural report specifies otherwise);
 - Directional drilling may be used for works within the TPZ without being considered encroachment. The directional bore should be at least 600 millimetres deep;
 - The above guidelines may be varied if a qualified arborist confirms the works will not significantly damage the tree (including stags / dead trees). In this case the tree would be retained, and no offset would be required; and,
 - Where the minimum standard for a TPZ has not been met an offset may be required.
- Removal of any habitat trees or shrubs (particularly hollow-bearing trees or trees/shrubs with nests) should be undertaken between February and September to avoid the breeding season for most fauna species. If any habitat trees or shrubs are proposed to be removed, this should be undertaken under the supervision of an appropriately qualified zoologist to salvage and translocate any displaced fauna. A Fauna Management Plan may be required to guide the salvage and translocation process;
- Where possible, construction stockpiles, machinery, roads, and other infrastructure should be placed away from areas supporting native vegetation and Large Trees; and,
- As indigenous flora provides valuable habitat for indigenous fauna, it is recommended that any landscape plantings that are undertaken as part of the proposed works are conducted using indigenous species sourced from a local provenance, rather than exotic deciduous trees and shrubs.

8 RECOMMENDATIONS

Based on the quality and extent of ecological values known to, or likely to occur, it is recommended that WestWind Energy:

- Review the current proposed impacts to EPBC Act-listed ecological communities to determine if any further avoidance or minimisation can be achieved, such as in areas that only marginally clip the edges of a patch (further details in Table 26);
- Prior to construction, develop a Construction Environmental Management Plan (CEMP) with specific management actions to mitigate against potential impacts to areas of ecological value;
- Develop a Weed Management Plan, which should be incorporated into the CEMP; and,
- Before commencement of construction, the preparation of a Bat and Avifauna Management Plan to the satisfaction of the Responsible Authority, in consultation with the DELWP. When approved, the BAM Plan must be endorsed by the responsible authority. The BAM Plan must include:
 - a) A strategy for managing and mitigating bird and bat strike arising from the wind energy facility operation. The strategy must include procedures for the regular removal of carcasses likely to attract raptors to areas near wind turbines;
 - b) A procedure for addressing significant impacts of birds and bat populations caused by the wind farm. This procedure must provide that the operator of the wind energy facility immediately investigates the possible causes of any significant impacts on bird and bat populations, and thereafter designs and implement measures to mitigate those impacts in consultation with the responsible authority and DELWP;
 - c) A monitoring period of at least two years to record, by species, any bird and bat strikes; and,
 - d) A strategy to manage and/or monitor the wind farm beyond the designated period depending upon the results of the monitoring period referred to above. The strategy must include provisions to take account of any changes to weather patterns during the initial two-year monitoring period.

9 FURTHER REQUIREMENTS

Further requirements associated with development of the Project Area, as well as additional studies or reporting that may be required, are provided in Table 28.

Table 28. Further requirements associated with development of the Project Area.

Relevant Legislation	Implications	Further Action
<i>Environment Protection and Biodiversity Conservation Act 1999</i>	<p>The Preliminary Impact Assessment results in a proposed impact of up to 2.006 hectares of the Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ecological community, 0.107 hectares of the Natural Grasslands of the Murray Valley Plains ecological community and 0.069 hectares of the Buloke Woodlands of the Riverina and Murray Darling Depression Bioregions ecological community.</p> <p>No nationally significant flora were recorded within the Assessment Area.</p> <p>A referral under the EPBC Act to the Commonwealth Environment Minister is recommended. based on the current impacts to the Plains Mallee Box Woodlands of the Murray Darling Depression, Riverina and Naracoorte Coastal Plain Bioregions ecological community and the presence of other MNES that are marginally impacted or have the potential to be impacted.</p>	Based on the current proposed impacts, prepare and submit an EPBC Act referral if a significant impact may occur.
<i>Environment Effects Act 1978</i>	<p>Based on the current review of ecological impacts associated with the proposed development, it is unlikely that an EES will be triggered based on ecological impacts alone as:</p> <ul style="list-style-type: none"> • None of the thresholds relating to any of the individual ecological criteria are likely to be exceeded; and, • None of the thresholds relating to the combination of ecological criteria are likely to be exceeded. 	No recommendation to refer under the EE Act (based on ecological criteria alone).
<i>Flora and Fauna Guarantee Act 1988</i>	<p>The FFG Act is the primary legislation dealing with biodiversity conservation and sustainable use of native flora and fauna in Victoria. Proponents are required to apply for an FFG Act Permit to 'take' threatened and/or protected flora species, listed vegetation communities and listed fish species in areas of public land (e.g. within road reserves, drainage lines and public reserves/parks).</p> <p>Seven FFG Act-listed flora species, seven FFG Act-protected flora species and one FFG Act-listed fauna species, was recorded within the Assessment Area. In addition, one FFG Act-listed ecological community was recorded within the assessment area. Details on the specific species and ecological community is provided in Section 3.9.</p> <p>Any proposed impacts to the flora species and ecological community that occur on public land will trigger the requirement for an FFG Act permit.</p>	Where impacts are proposed on public land (i.e. road reserves), an FFG Act permit will be required.
<i>Planning and Environment Act 1987</i>	A planning permit from the Responsible Authority required to remove, destroy or lop any native vegetation under Clauses 42.01 (ESO2), 52.17 and 52.32 of the Planning Scheme.	Prepare and submit a Planning Permit application.

Relevant Legislation	Implications	Further Action
<i>Catchment and Land Protection Act 1994</i>	Seven weed species and two pest species listed under the CaLP Act were recorded within the Assessment Area. To meet requirements under the CaLP Act, listed noxious weeds and/or pests should be appropriately controlled throughout the Assessment Area.	A Weed and Pest Management Plan is likely to be required to be incorporated in the Environment Management Plan prepared for the project
<i>Wildlife Act 1975</i>	Any persons engaged to conduct salvage and translocation or general handling of terrestrial fauna species must hold a current Management Authorisation.	Ensure wildlife specialists hold a current Management Authorisation.

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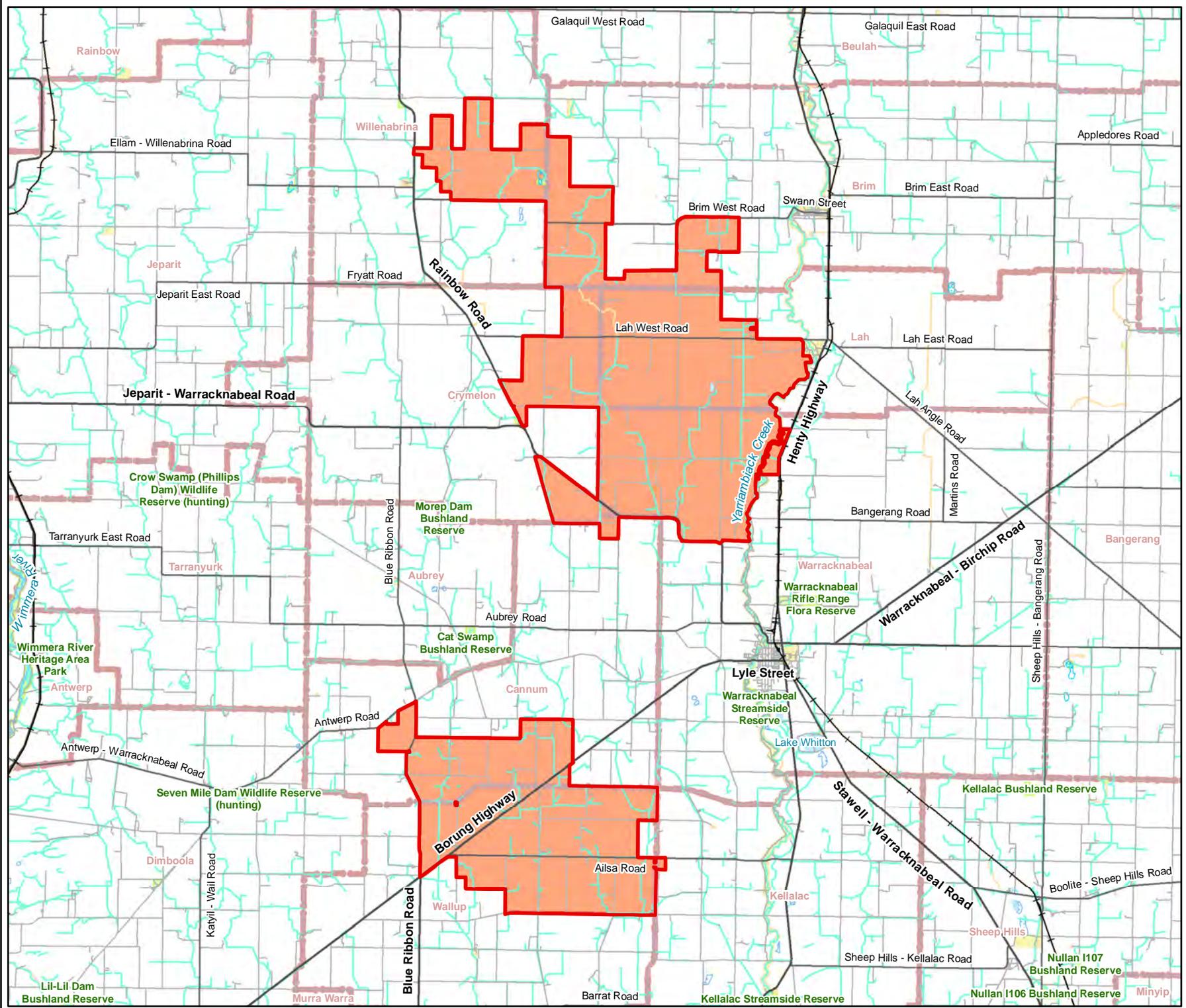
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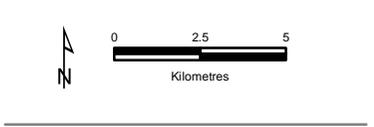


Legend

- Project Area
- Railway
- Major Road
- Collector Road
- Minor Road
- Proposed Road
- Minor Watercourse
- Major Watercourse
- Permanent Waterbody
- Land Subject to Inundation
- Wetland/Swamp
- Parks and Reserves
- Crown Land
- Localities



Figure 1 Overview
 Location of the Project Area
Ecological Assessments for the Warracknabeal Energy Park



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12811_Fig01_StudyArea 5/12/2022_melslv

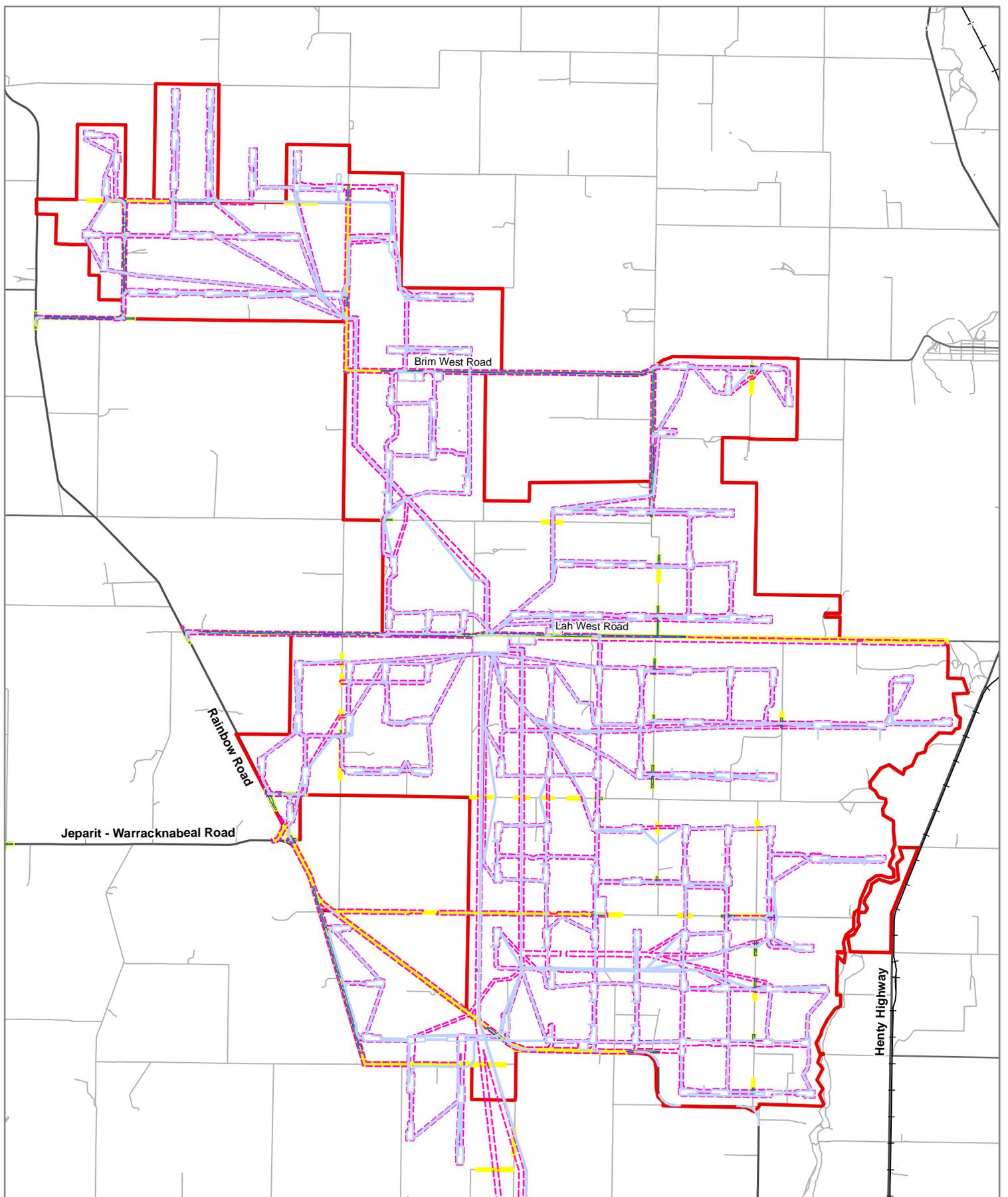


Figure 1a
Surveyed Areas - Northern Site
Ecological Assessments for the Warracknabeal Energy Park

- Legend**
- Project Area
 - Works footprint (V08-06)
 - Surveyed Areas**
 - Habitat Hectare Vegetation Survey Areas
 - Spring Flora Survey Area
 - Wimmera Rive-flower surveys



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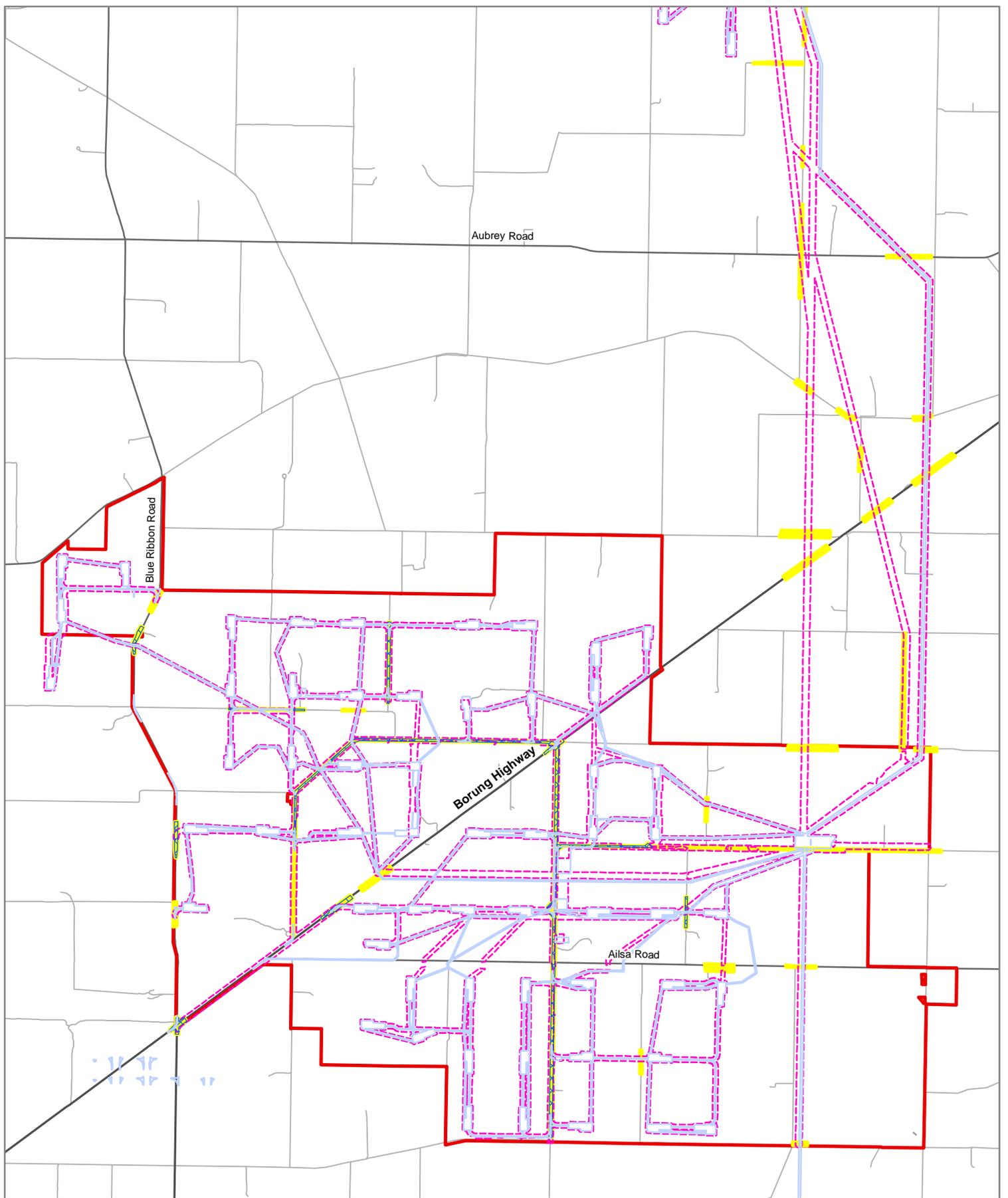
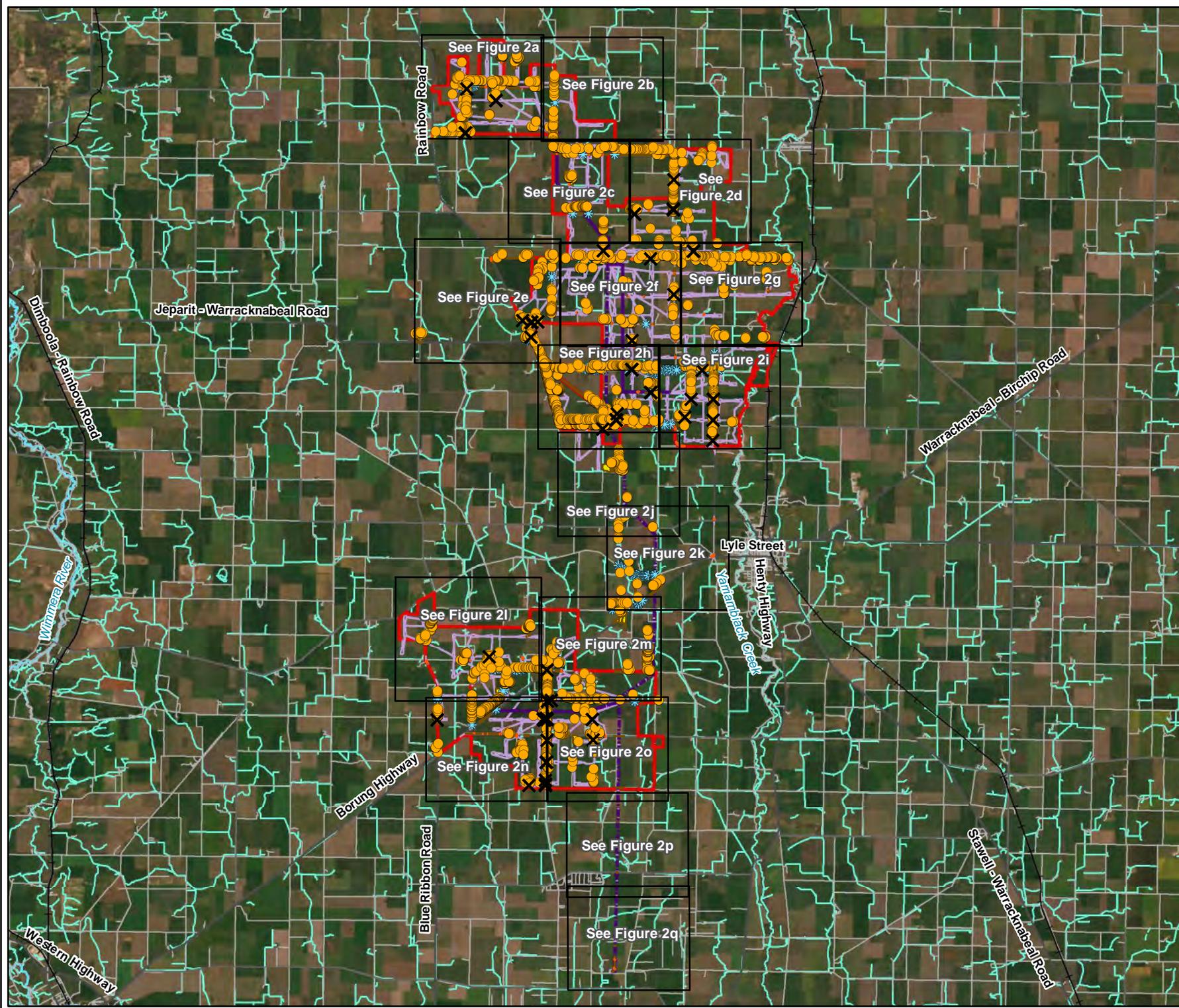


Figure 1b
Surveyed Areas - Southern Site
Ecological Assessments for the Warracknabeal Energy Park

- Legend**
- Project Area
 - Works footprint (V08-06)
 - Surveyed Areas**
 - Habitat Hectare Vegetation Survey Areas
 - Spring Flora Survey Area
 - Wimmera Rive-flower surveys



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- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - Surveyed trees
 - X Tree - direct impact
 - ✳ Threatened flora
 - Native vegetation
 - Impacted vegetation

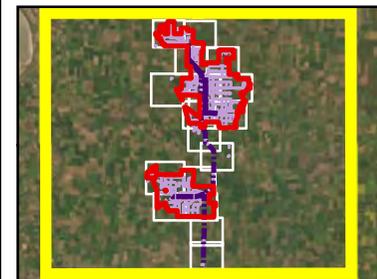
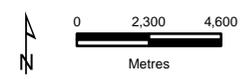


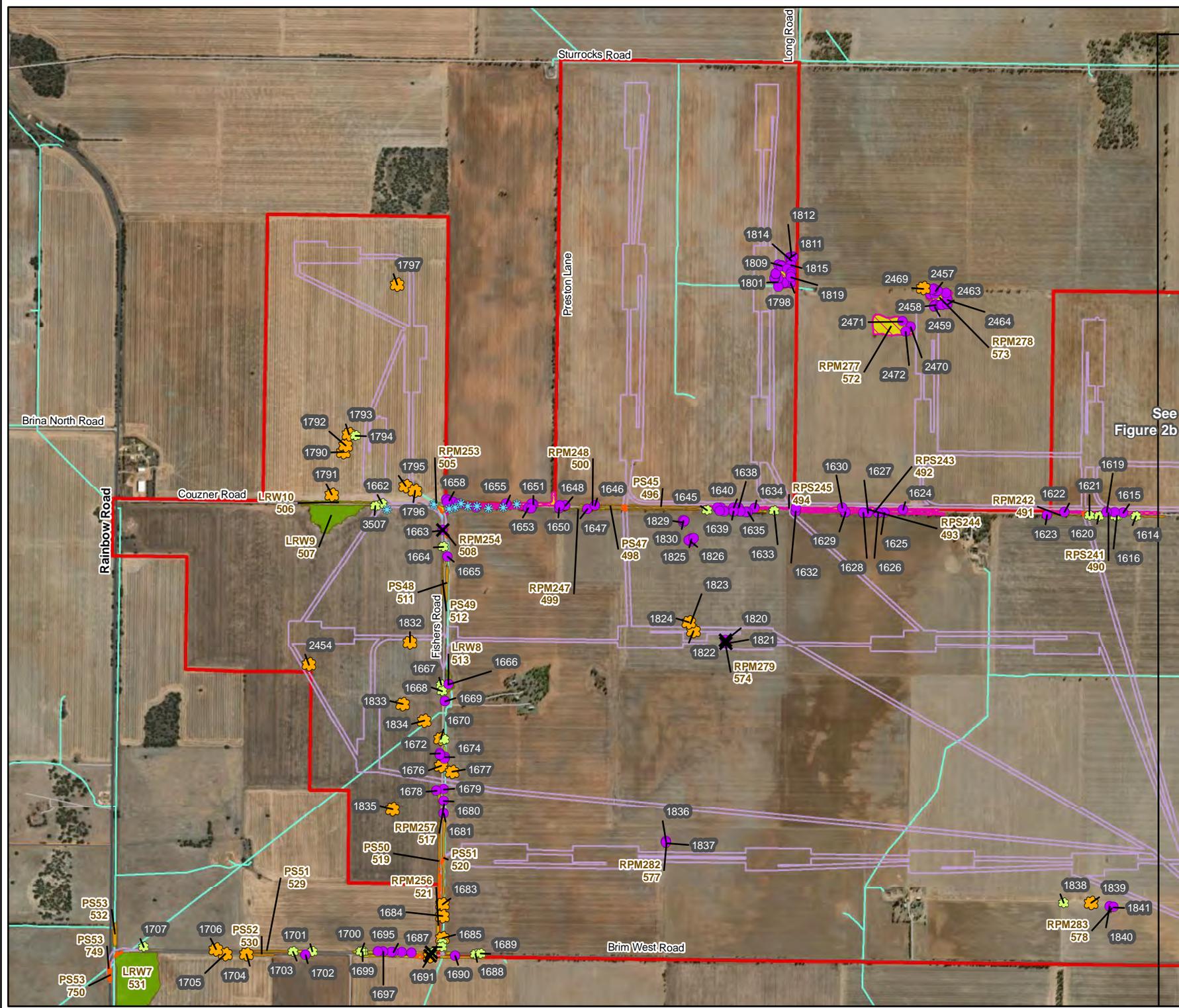
Figure 2 Overview
Ecological features
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:240,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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- Legend**
- Study Area
 - Works footprint (v08-08)
 - ✿ Scattered Large Tree
 - ✿ Scattered Small Tree
 - Large Tree in patch
 - ✕ Tree - direct impact
 - ✿ Threatened flora
- Ecological Vegetation Classes**
- Low Rises Woodland (EVC 66)
 - Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Plains Mallee

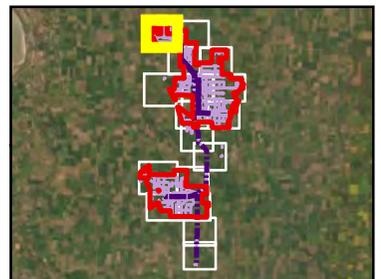
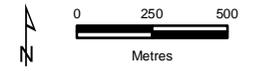


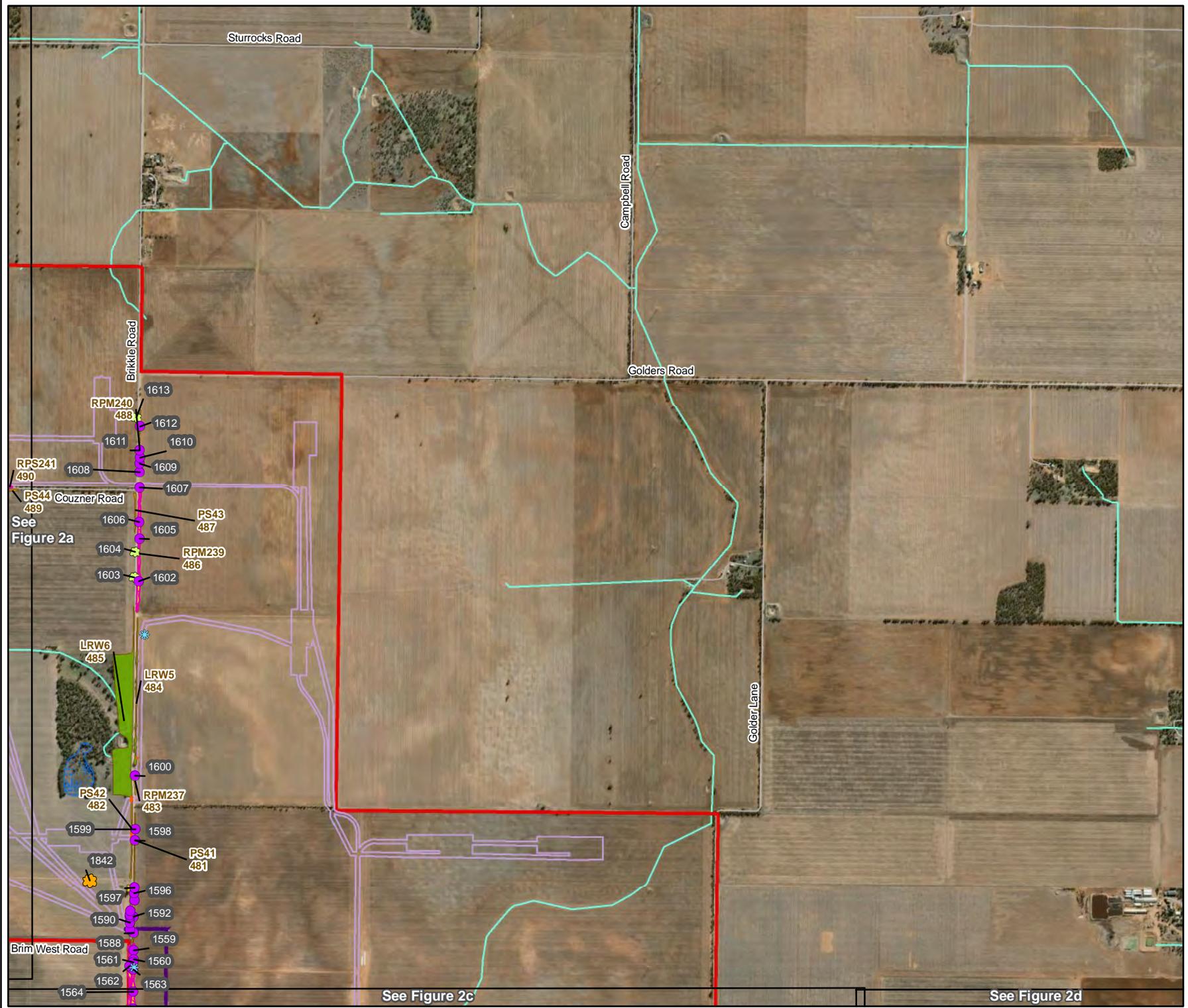
Figure 2a
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - Current Wetlands
 - ★ Scattered Large Tree
 - ★ Scattered Small Tree
 - Large Tree in patch
 - ★ Threatened flora
- Ecological Vegetation Classes**
- Low Rises Woodland (EVC 66)
 - Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Plains Mallee

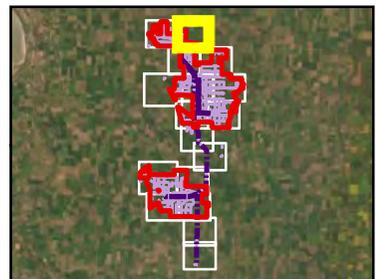
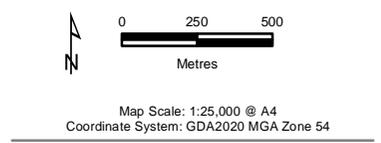
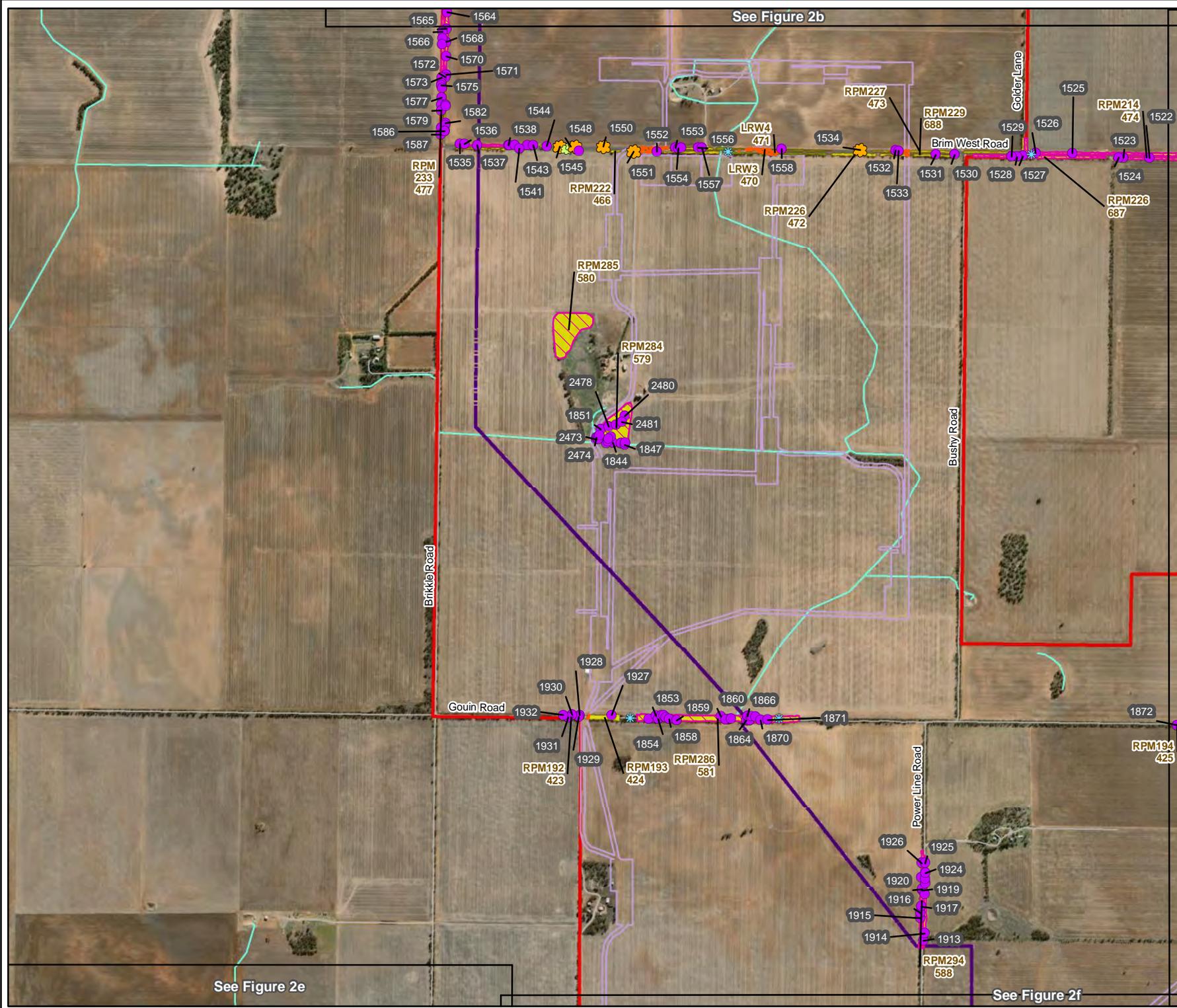


Figure 2b
Ecological features
Ecological Assessment for the Victorian Renewable Energy Park



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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melsley



- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - Scattered Large Tree
 - Scattered Small Tree
 - Large Tree in patch
 - ★ Threatened flora
- Ecological Vegetation Classes**
- Low Rises Woodland (EVC 66)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Plains Mallee

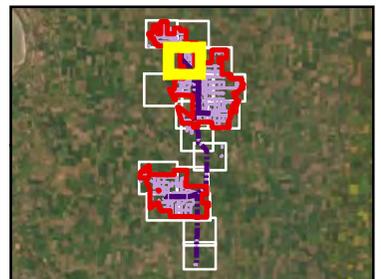
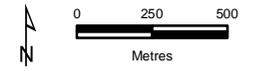


Figure 2c
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park

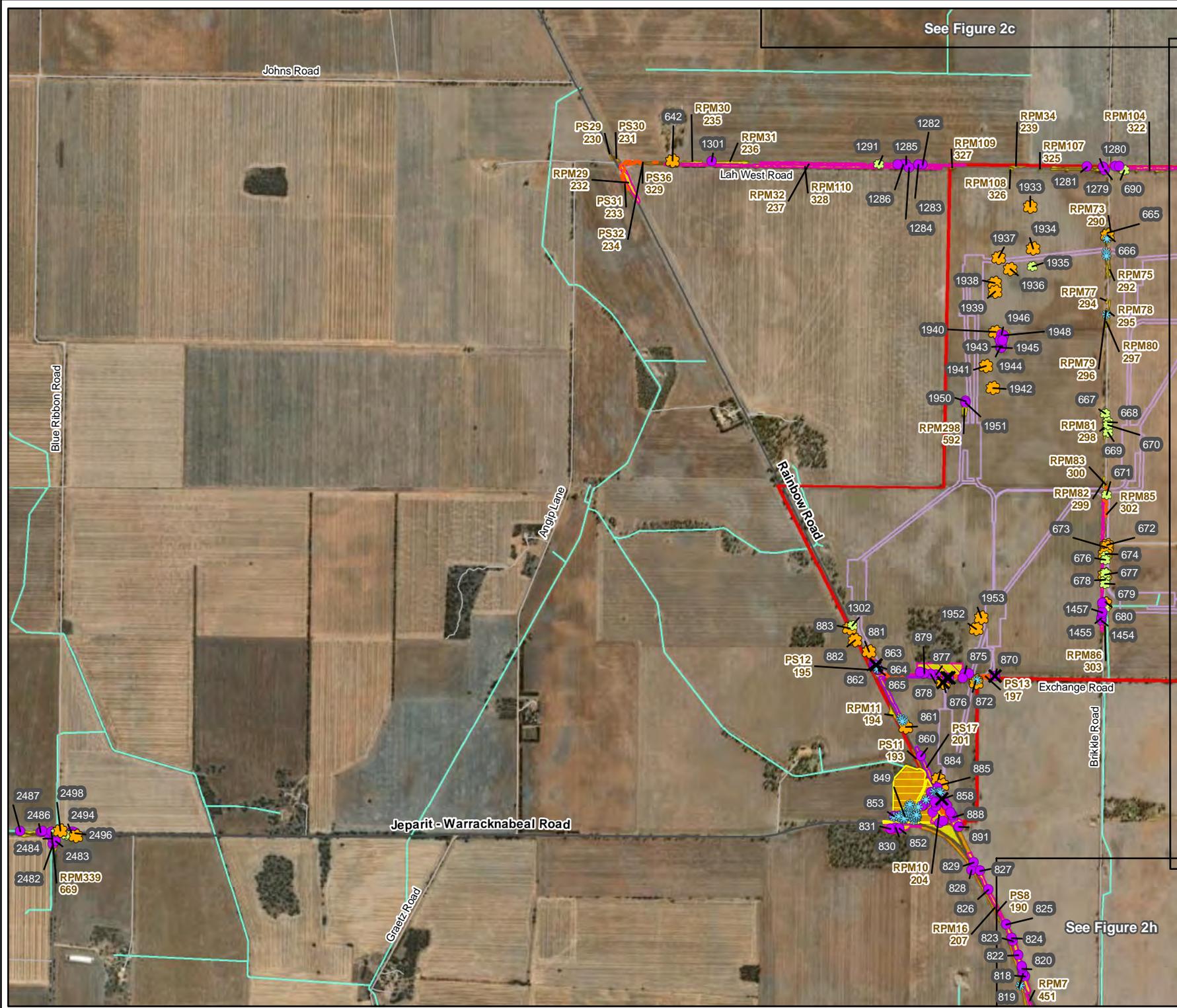


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- Legend**
- Study Area
 - Works footprint (v08-08)
 - Scattered Large Tree
 - Scattered Small Tree
 - Large Tree in patch
 - ✕ Tree - direct impact
 - ✱ Threatened flora
- Ecological Vegetation Classes**
- Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Buloke Woodland
 - Natural Grassland
 - Plains Mallee

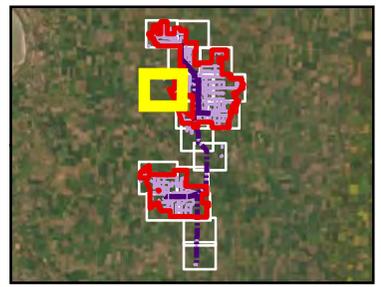
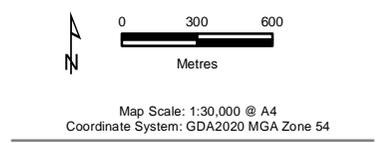
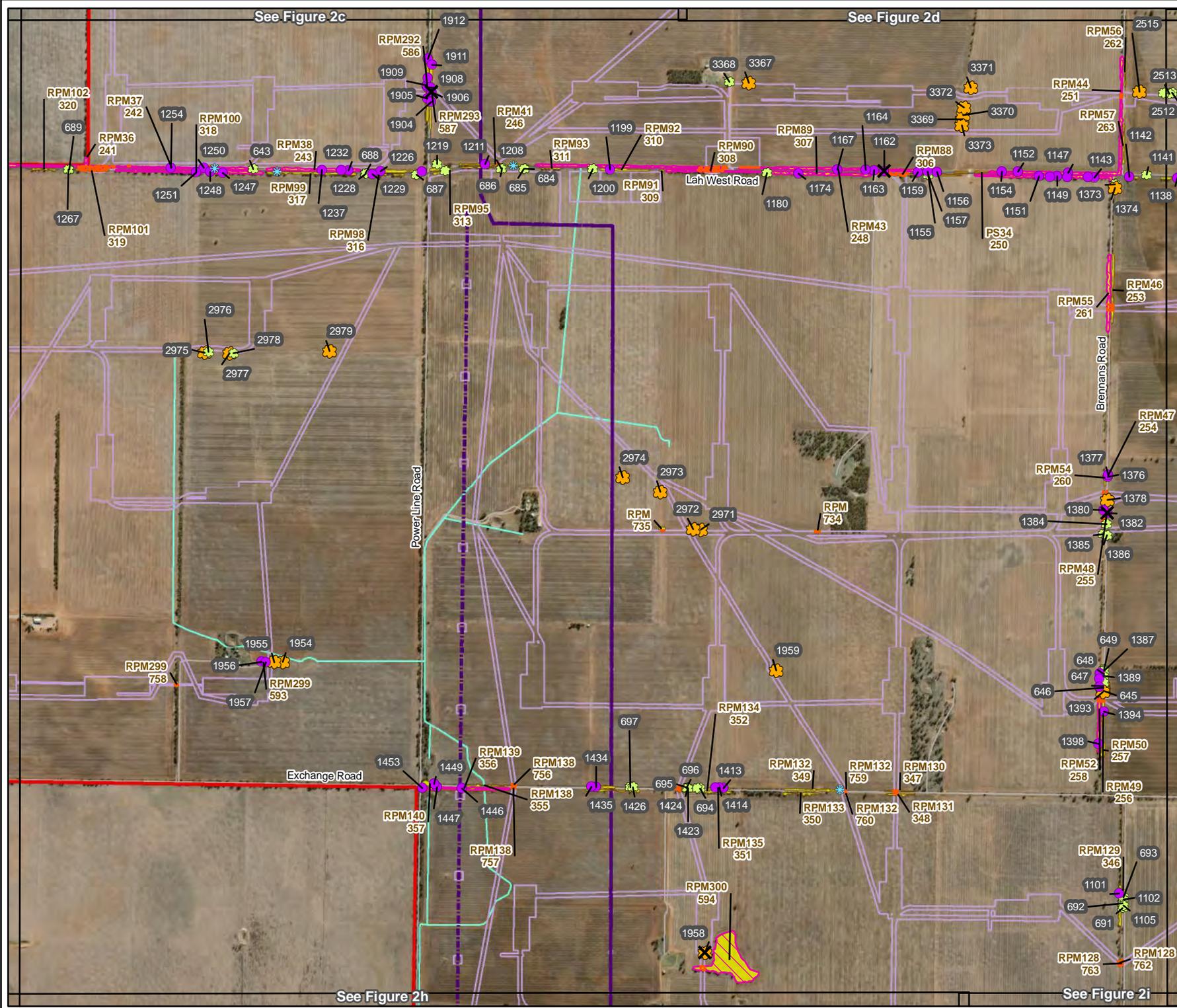


Figure 2e
Ecological features
Ecological Assessments for the Warracknabeal Energy Park



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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melslv



- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - ✿ Scattered Large Tree
 - ✿ Scattered Small Tree
 - Large Tree in patch
 - ✕ Tree - direct impact
 - ✿ Threatened flora
- Ecological Vegetation Classes**
- Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Plains Mallee

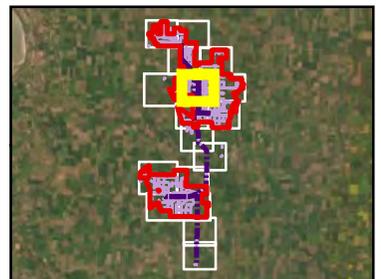


Figure 2f
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park

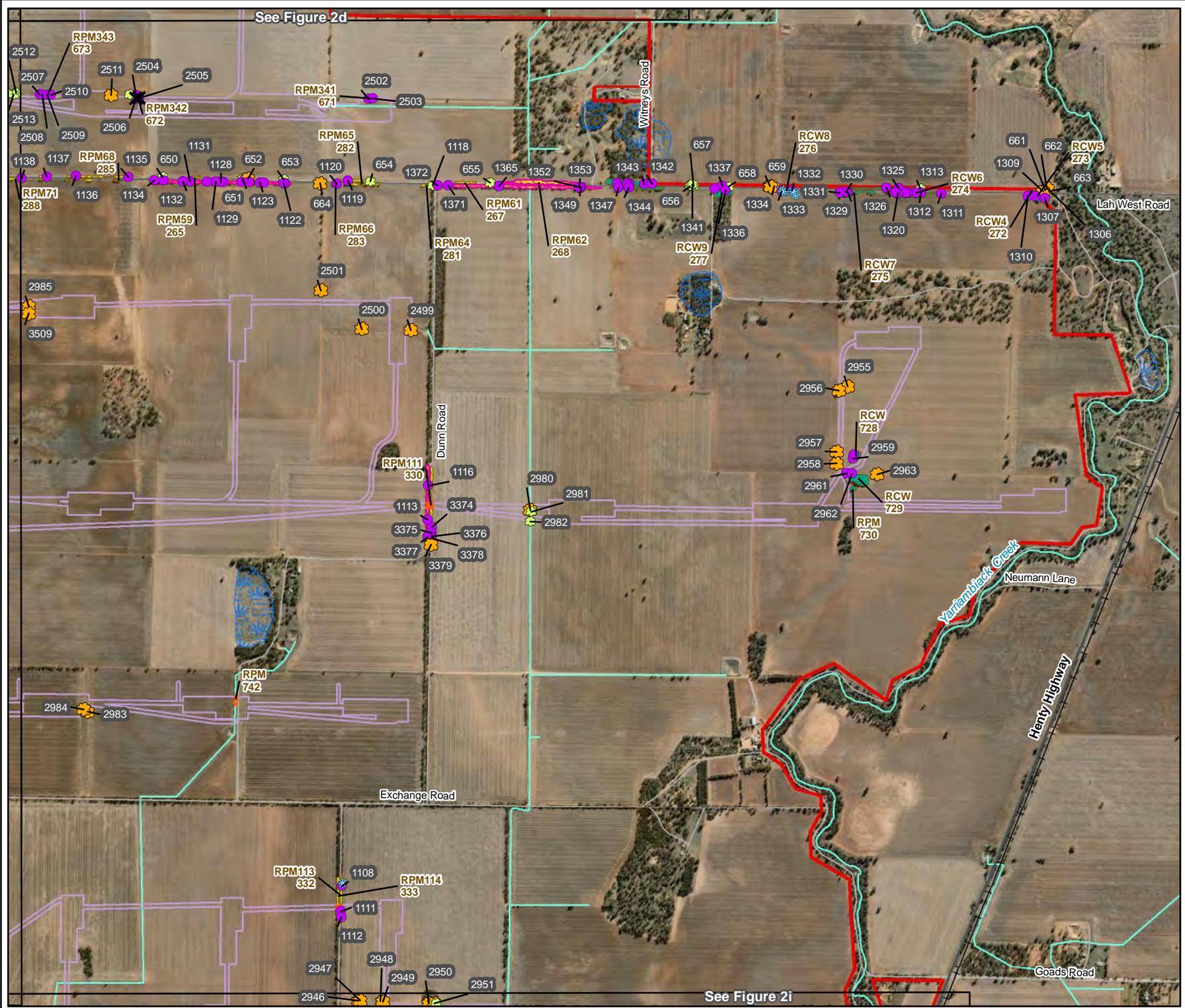
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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melslv



- Legend**
- Study Area
 - Works footprint (v08-08)
 - Current Wetlands
 - ✿ Scattered Large Tree
 - ✿ Scattered Small Tree
 - Large Tree in patch
 - ✕ Tree - direct impact
 - ✿ Threatened flora
- Ecological Vegetation Classes**
- Ridged Plains Mallee (EVC 96)
 - Riverine Chenopod Woodland (EVC 103)
 - Impacted vegetation
- EPBC Act communities**
- Plains Mallee

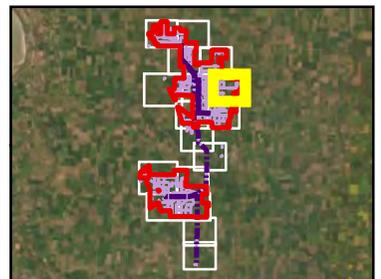
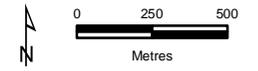


Figure 2g
Ecological features
Ecological Assessments for the Vandenbrink Coal Energy Park

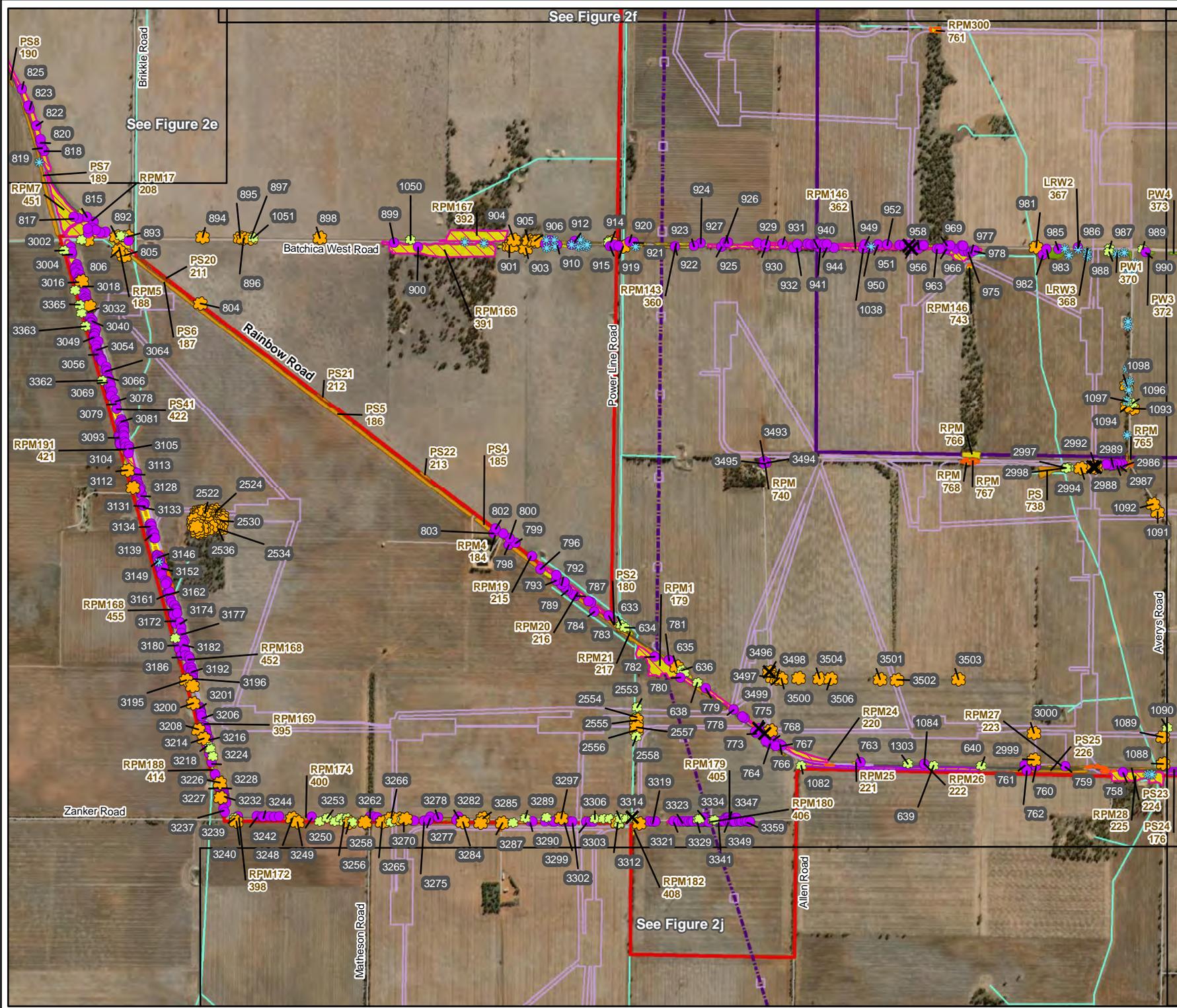


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Legend

- Study Area
- Works footprint (v08-08)
- HV Power lines
- Scattered Large Tree
- Scattered Small Tree
- Large Tree in patch
- ✕ Tree - direct impact
- ✪ Threatened flora

Ecological Vegetation Classes

- Low Rises Woodland (EVC 66)
- Plains Savannah (EVC 826)
- Plains Woodland (EVC 803)
- Ridged Plains Mallee (EVC 96)

Impacted vegetation

- Impacted vegetation

EPBC Act communities

- Buloke Woodland
- Natural Grassland
- Plains Mallee

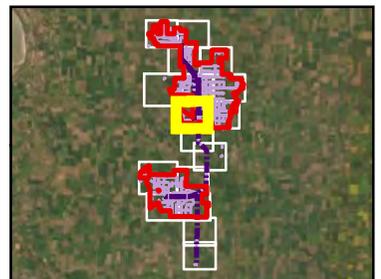


Figure 2h
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park

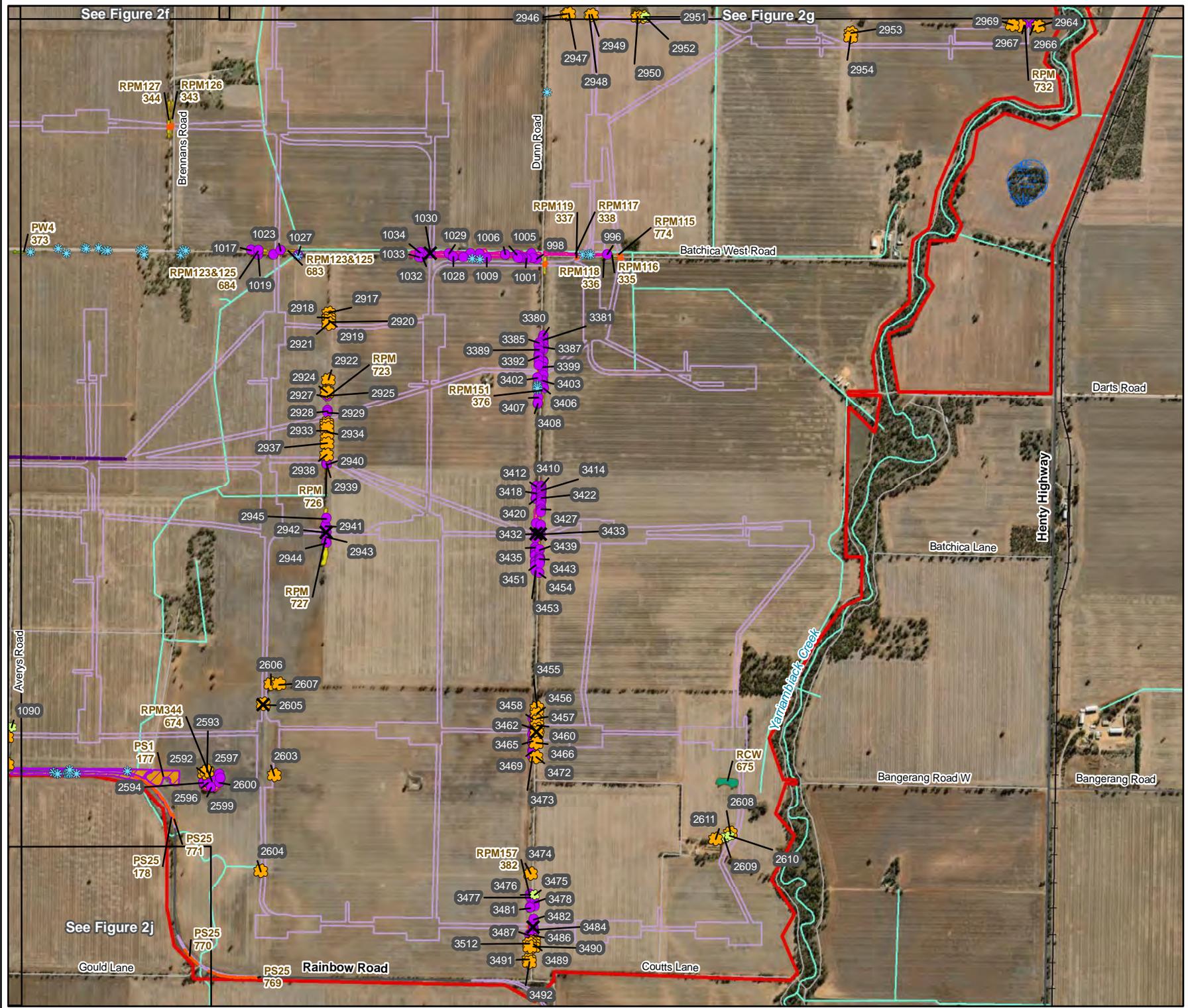
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Map Scale: 1:25,000 @ A4
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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melsley



- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - Current Wetlands
 - Scattered Large Tree
 - Scattered Small Tree
 - Large Tree in patch
 - ✕ Tree - direct impact
 - ✱ Threatened flora
- Ecological Vegetation Classes**
- Plains Savannah (EVC 826)
 - Plains Woodland (EVC 803)
 - Ridged Plains Mallee (EVC 96)
 - Riverine Chenopod Woodland (EVC 103)
 - Impacted vegetation
- EPBC Act communities**
- Natural Grassland
 - Plains Mallee

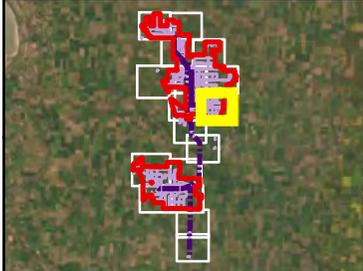


Figure 2i
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park

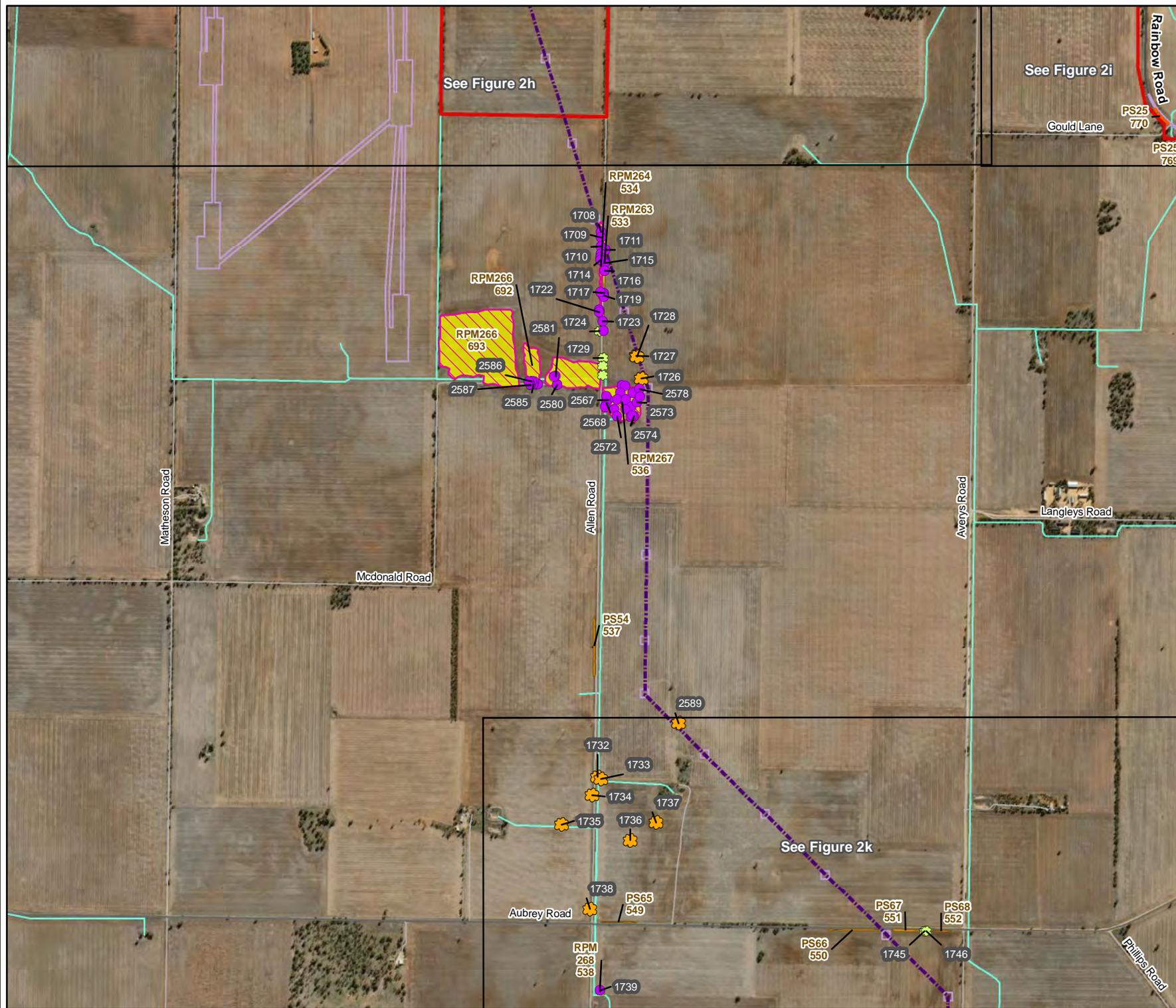
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Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melslv



- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - ★ Scattered Large Tree
 - ★ Scattered Small Tree
 - Large Tree in patch
- Ecological Vegetation Classes**
- Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Plains Mallee

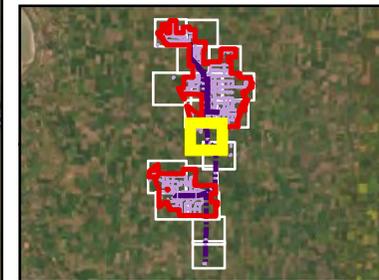
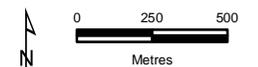


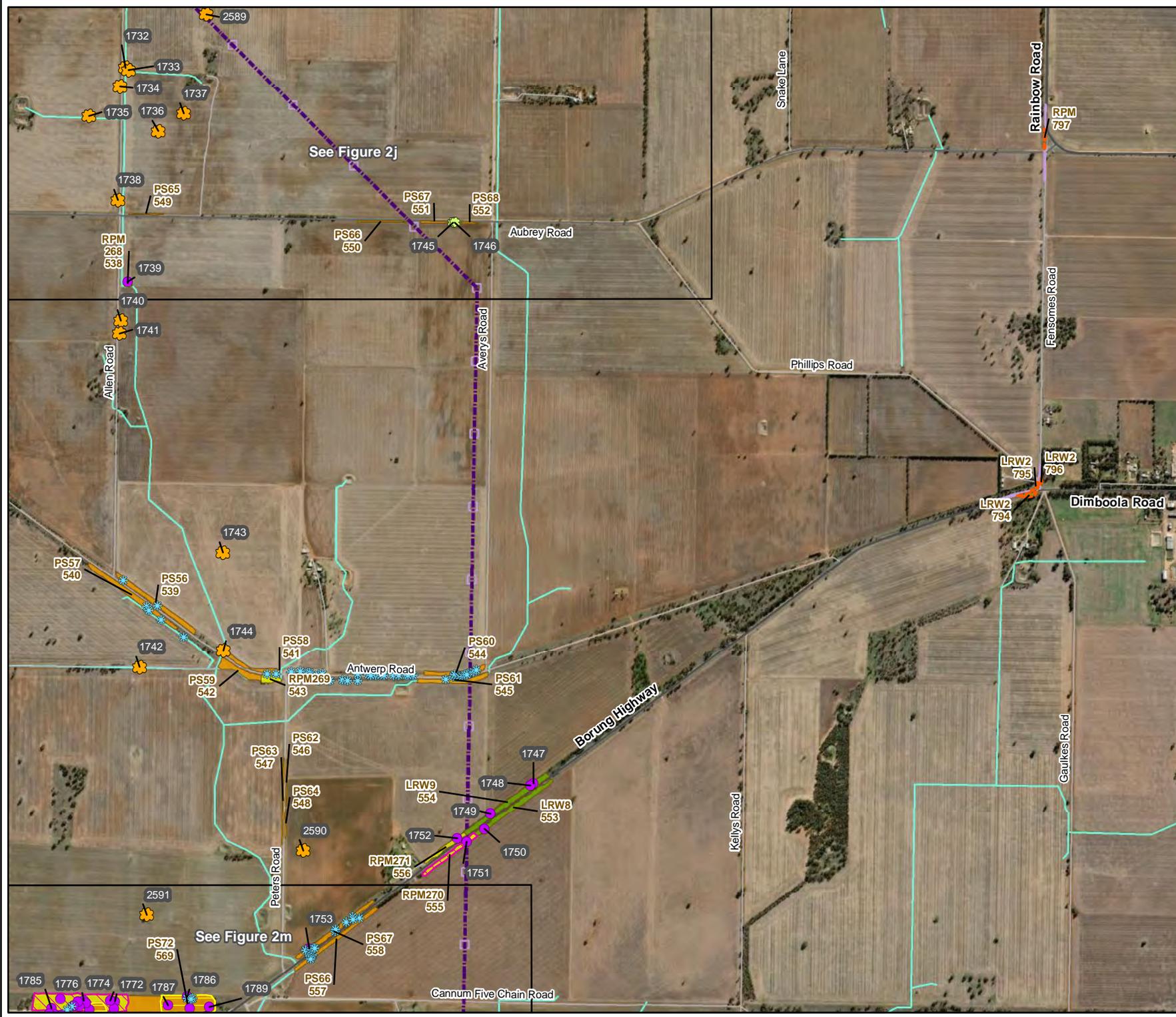
Figure 2j
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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Legend

- Works footprint (v08-08)
- HV Power lines
- Scattered Large Tree
- Scattered Small Tree
- Large Tree in patch
- Threatened flora

Ecological Vegetation Classes

- Low Rises Woodland (EVC 66)
- Plains Savannah (EVC 826)
- Ridged Plains Mallee (EVC 96)
- Riverine Chenopod Woodland (EVC 103)

EPBC Act communities

- Buloke Woodland
- Plains Mallee

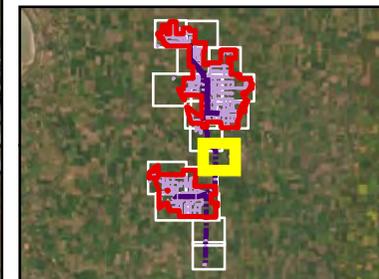


Figure 2k
Ecological features
Ecological Assessment for the Victorian Renewable Energy Park

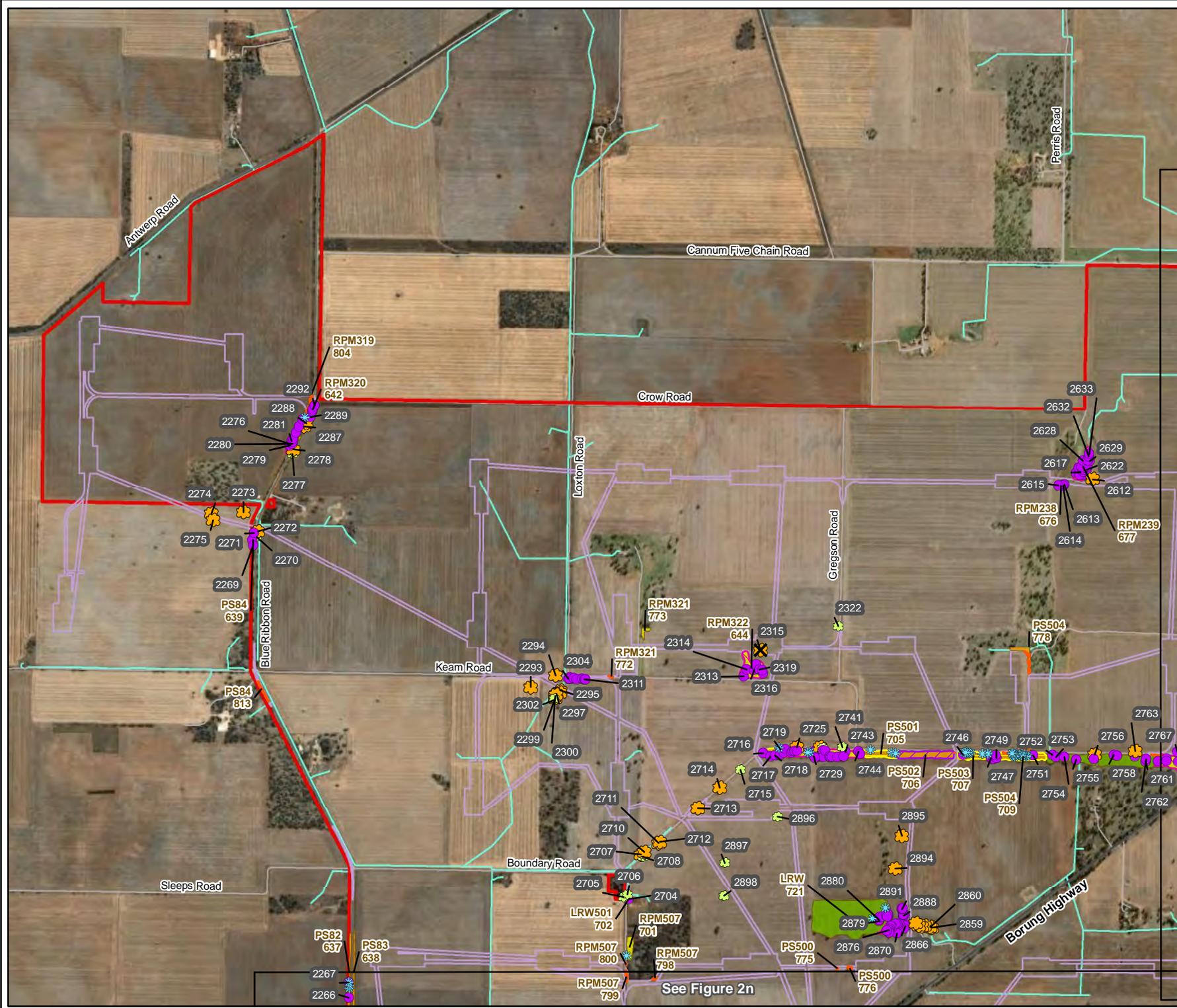
0 250 500
 Metres

Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melslv



- Legend**
- Study Area
 - Works footprint (v08-08)
 - ✿ Scattered Large Tree
 - ✿ Scattered Small Tree
 - Large Tree in patch
 - ✕ Tree - direct impact
 - ✿ Threatened flora
- Ecological Vegetation Classes**
- Low Rises Woodland (EVC 66)
 - Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Buloke Woodland
 - Natural Grassland
 - Plains Mallee

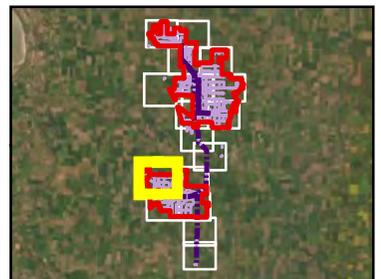
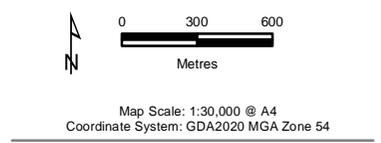
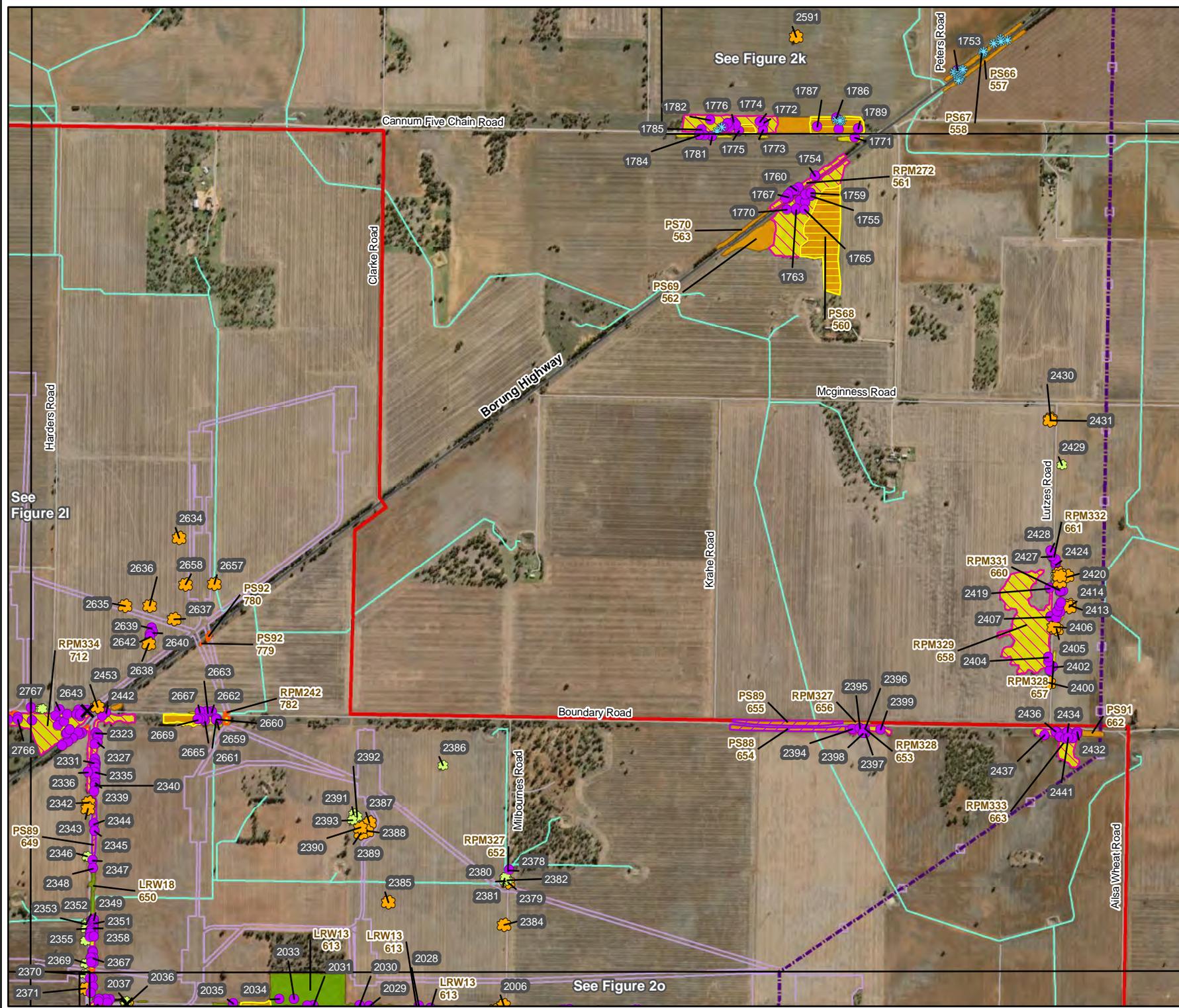


Figure 21
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park



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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melsley



- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - ✿ Scattered Large Tree
 - ✿ Scattered Small Tree
 - ✿ Large Tree in patch
 - ✕ Tree - direct impact
 - ✿ Threatened flora
- Ecological Vegetation Classes**
- Low Rises Woodland (EVC 66)
 - Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Buloke Woodland
 - Natural Grassland
 - Plains Mallee

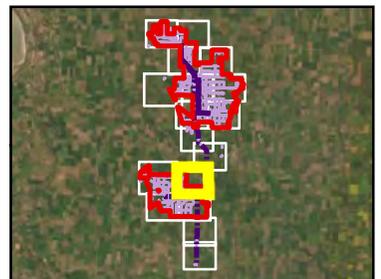
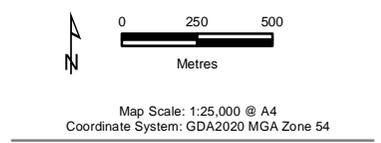
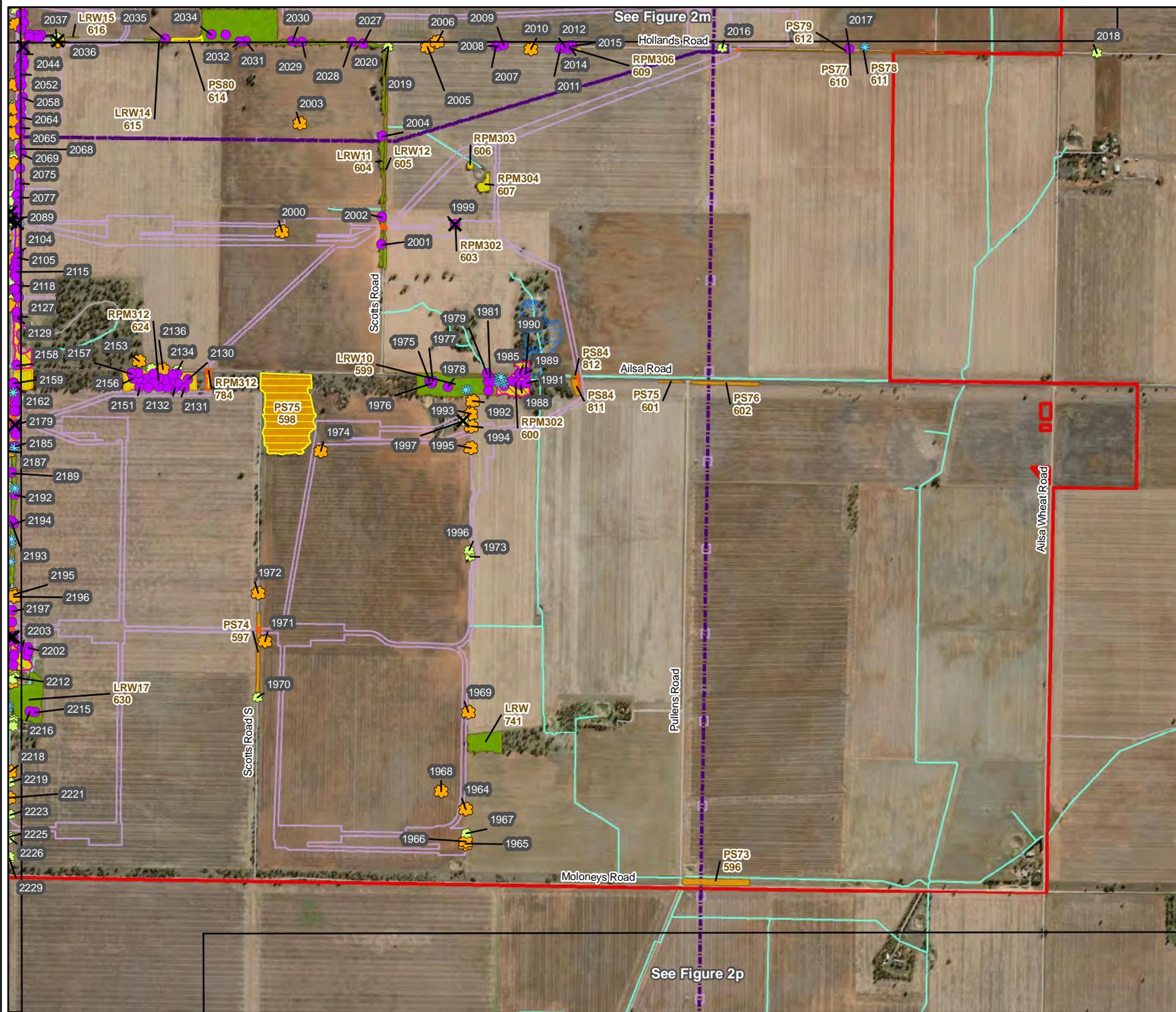


Figure 2m
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park



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12811_Fig02_EcoFeat_MB_G20.23/03/2023_melslv



- Legend**
- Study Area
 - Works footprint (v08-08)
 - HV Power lines
 - Current Wetlands
 - Scattered Large Tree
 - Scattered Small Tree
 - Large Tree in patch
 - ✕ Tree - direct impact
 - ★ Threatened flora
- Ecological Vegetation Classes**
- Low Rises Woodland (EVC 66)
 - Plains Savannah (EVC 826)
 - Ridged Plains Mallee (EVC 96)
 - Impacted vegetation
- EPBC Act communities**
- Buloke Woodland
 - Natural Grassland
 - Plains Mallee
 - Plains Mallee HQ

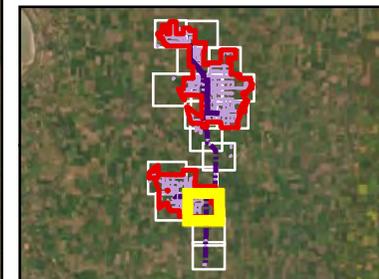
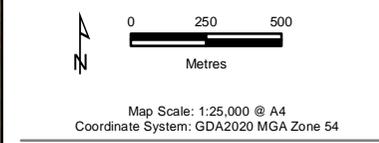
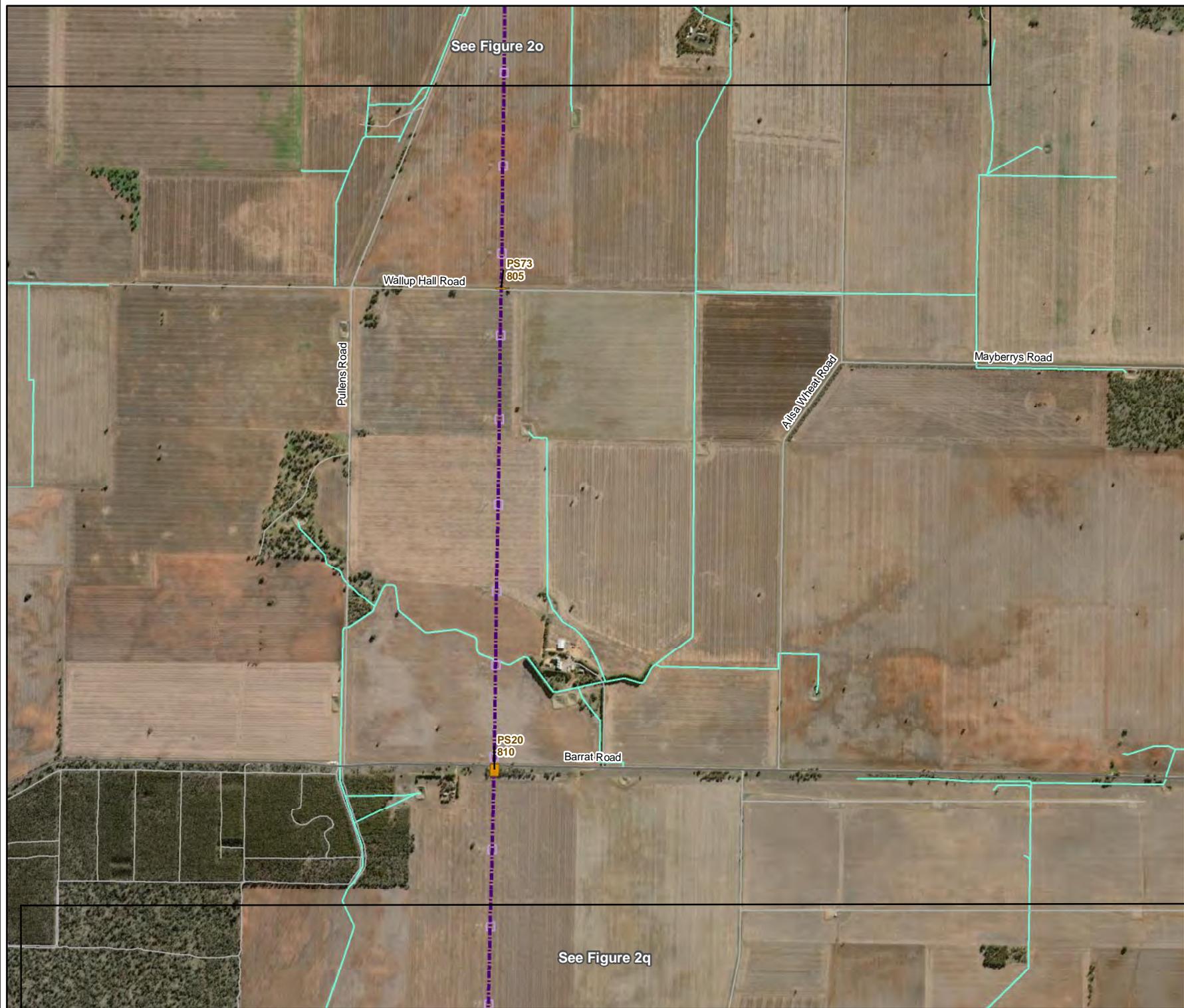


Figure 2o
Ecological features
Ecological Assessment for the Victorian Renewable Energy Park



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



- Legend**
- Works footprint (v08-08)
 - HV Power lines
- Ecological Vegetation Classes**
- Plains Savannah (EVC 826)

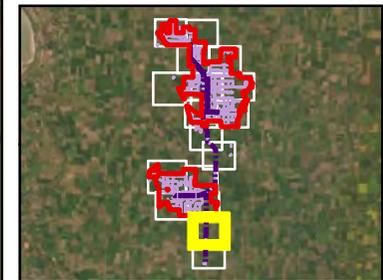
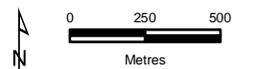


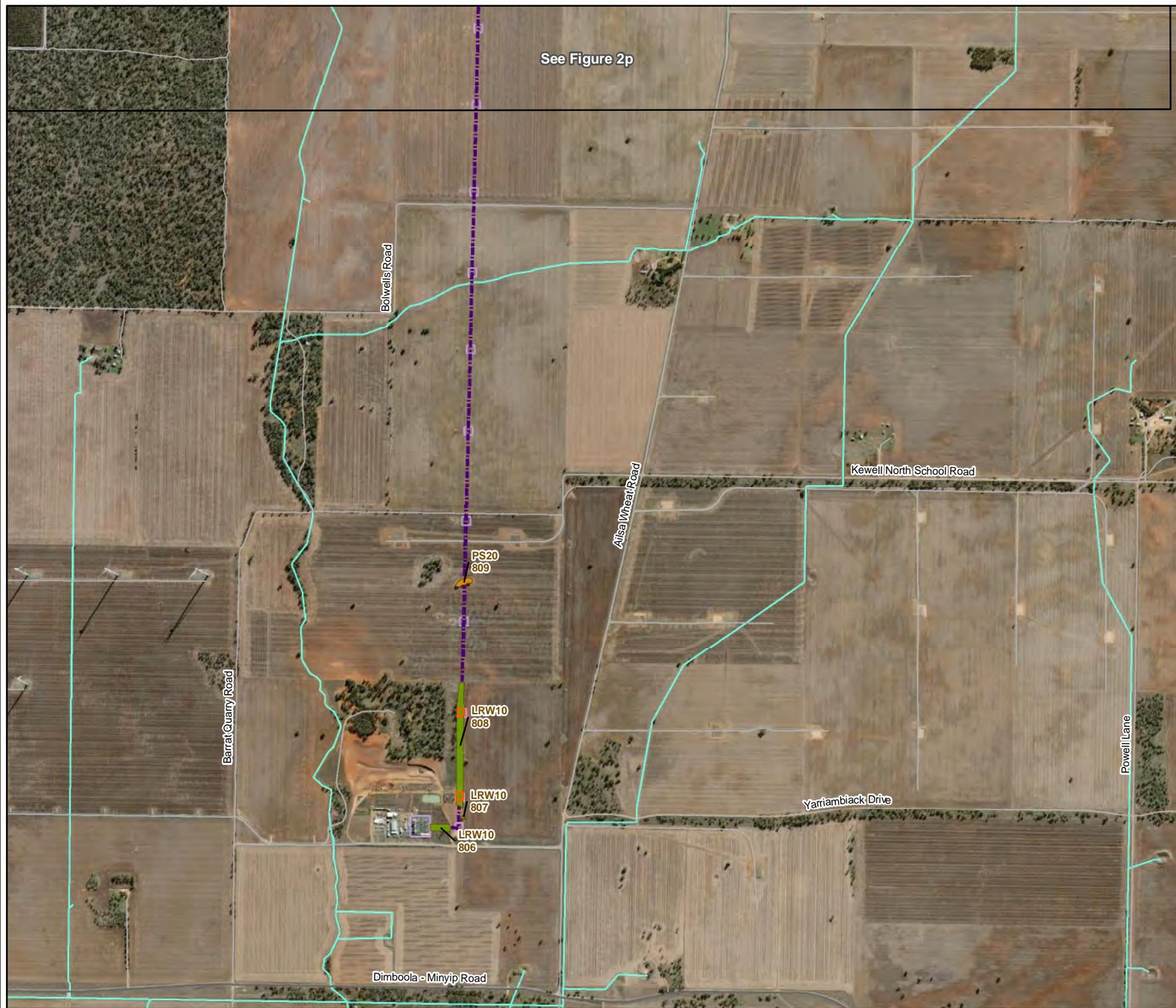
Figure 2p
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



Legend

-  Works footprint (v08-08)
-  HV Power lines
- Ecological Vegetation Classes**
-  Low Rises Woodland (EVC 66)
-  Plains Savannah (EVC 826)
-  Impacted vegetation

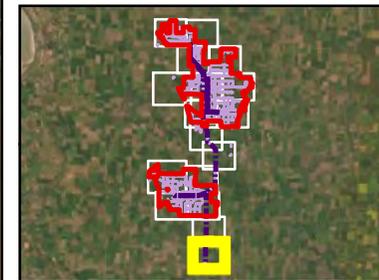
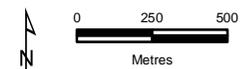


Figure 2q
Ecological features
Ecological Assessments for the Victorian Renewable Energy Park

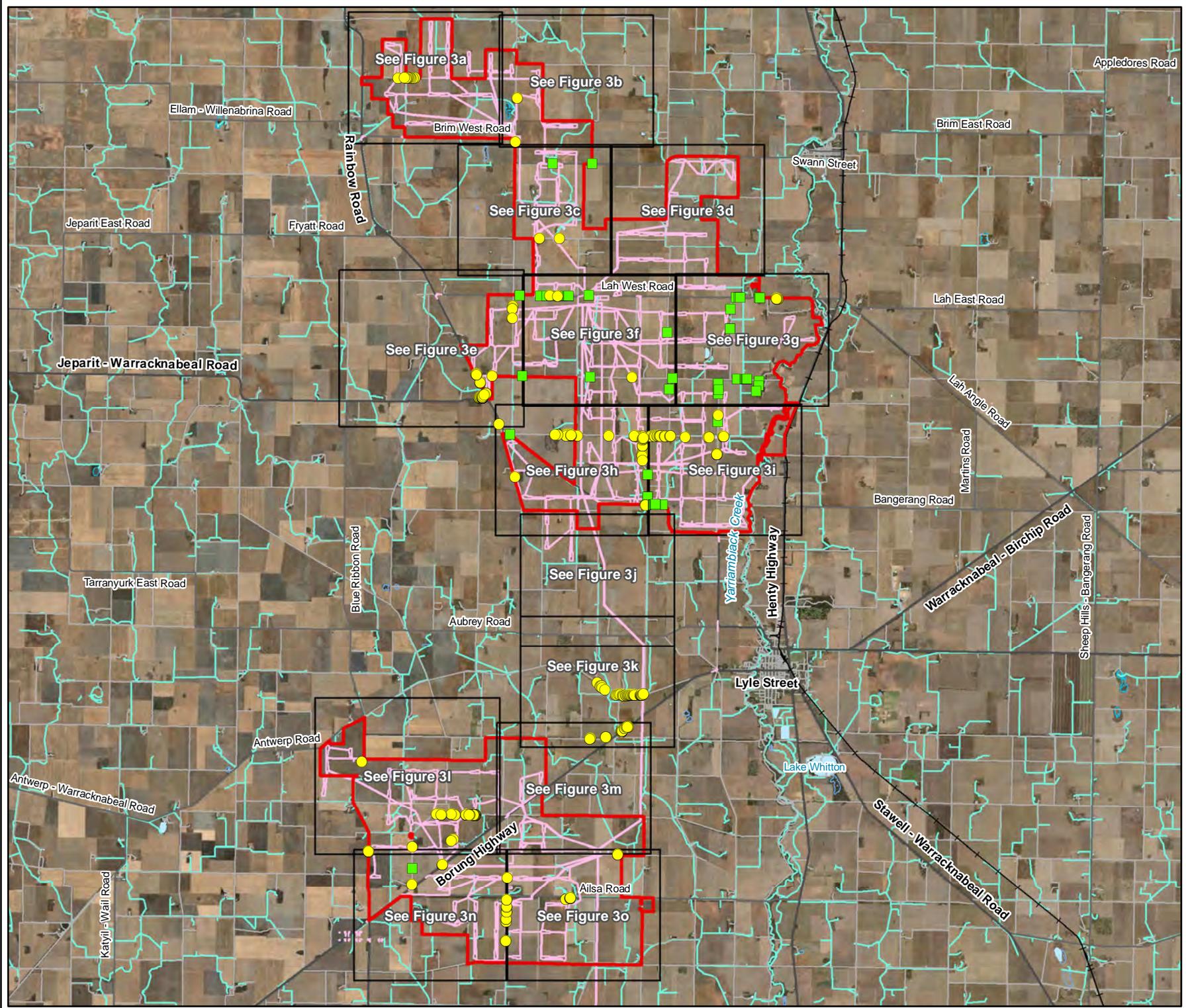


Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

12811_Fig02_EcoFeat_MB_G20.23/03/2023_melsley



Legend

- Study Area
- Works footprint (V08-06)

Flora survey results

- FFG Act Listed Flora species
- FFG Act Protected Flora species

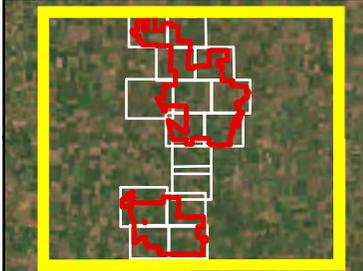


Figure 3 Overview
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park

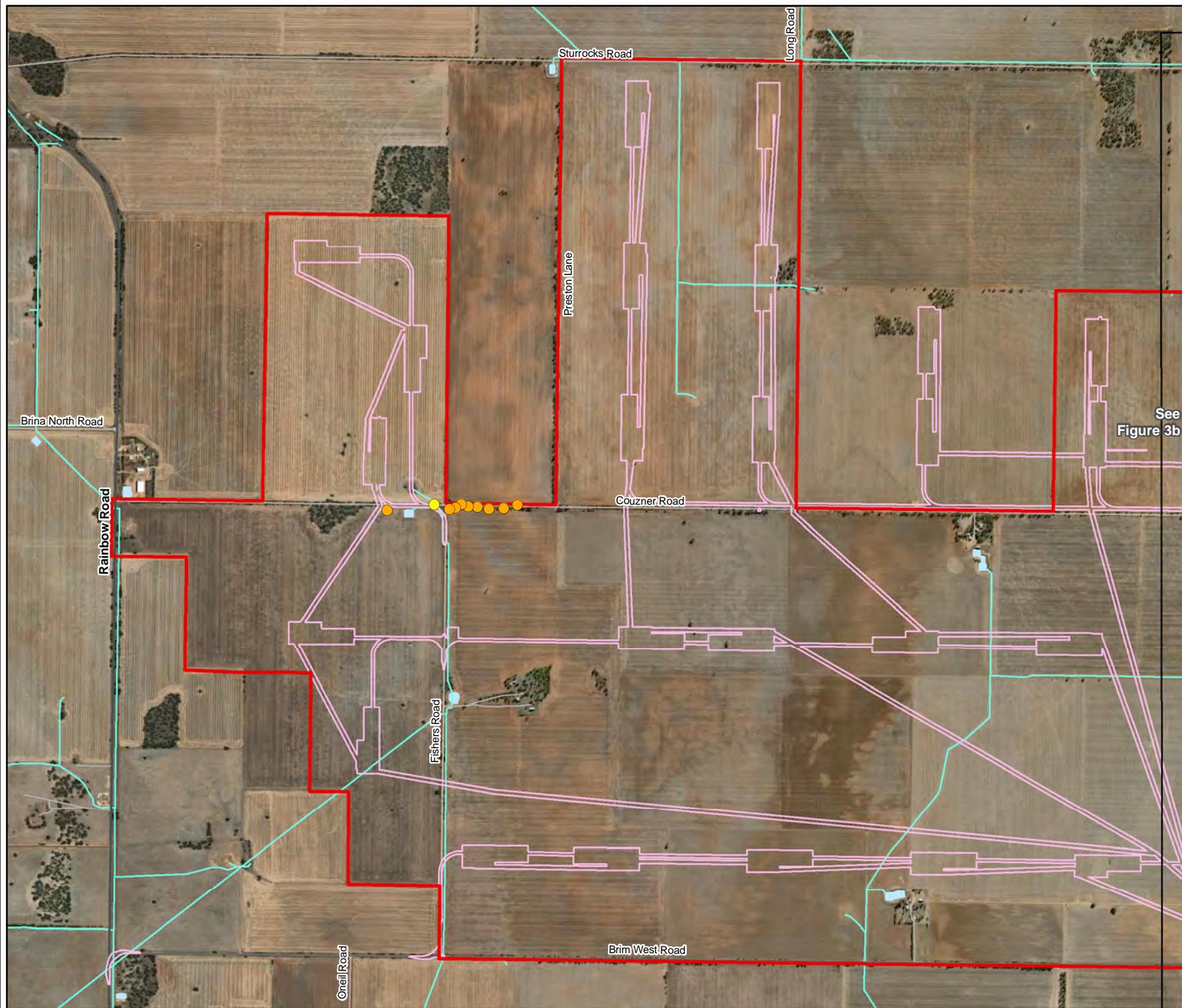
0 1,800 3,600
Metres

Map Scale: 1:190,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melslv



Legend

- Study Area
- Works footprint (V08-06)
- Flora survey results**
- FFG Act Listed Flora species**
- *Acacia oswaldii*
- *Allocasuarina luehmannii*

See
Figure 3b

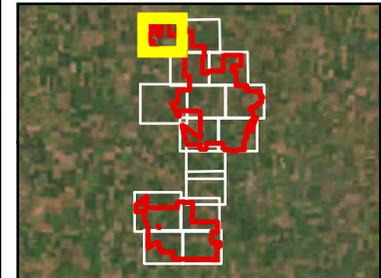
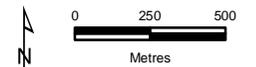


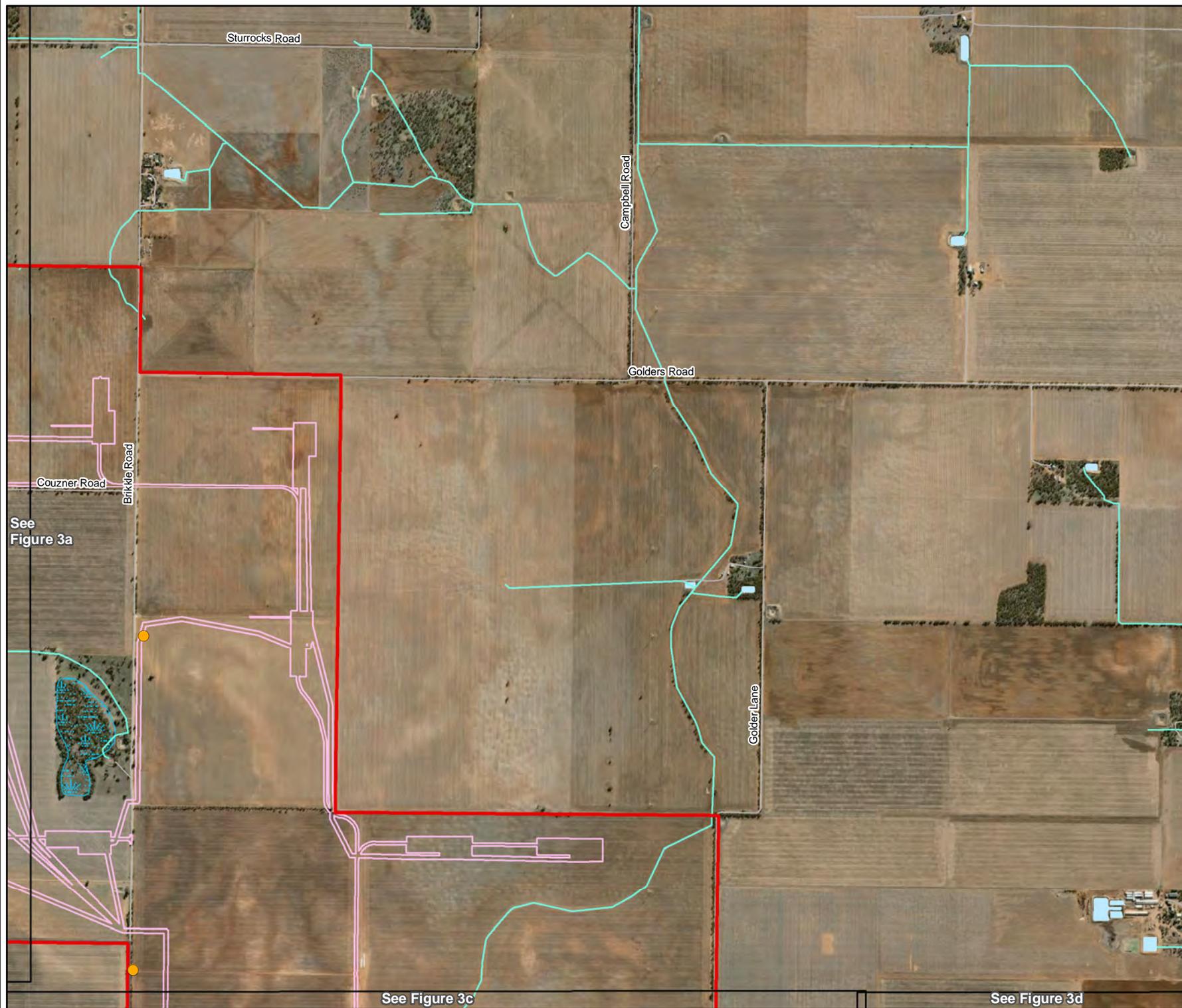
Figure 3a
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.
 12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



- Legend**
- Study Area
 - Works footprint (V08-06)
- Flora survey results**
- FFG Act Listed Flora species
- *Acacia oswaldii*

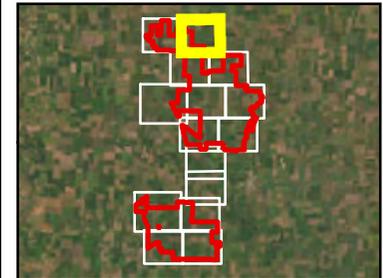
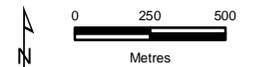


Figure 3b
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park

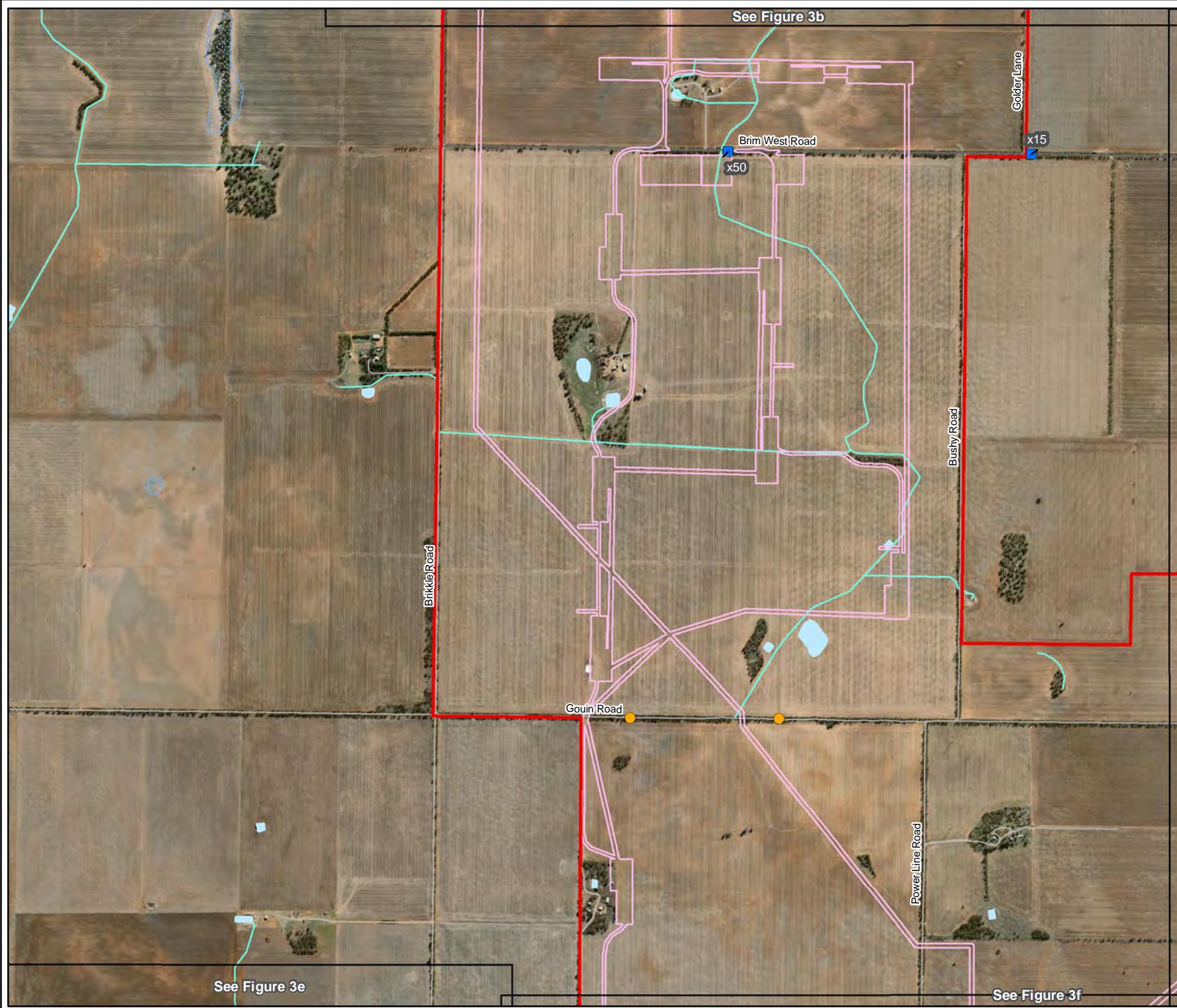


Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



- Legend**
- Study Area
 - Works footprint (V08-06)
- Flora survey results**
- FFG Act Protected Flora species
- *Helichrysum leucopsideum*
- FFG Act Listed Flora species
- *Acacia oswaldii*

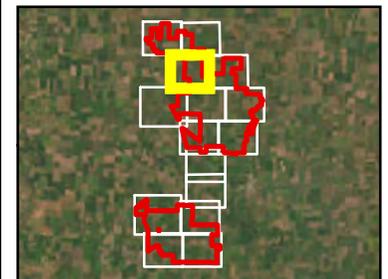
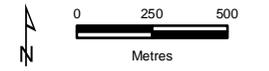


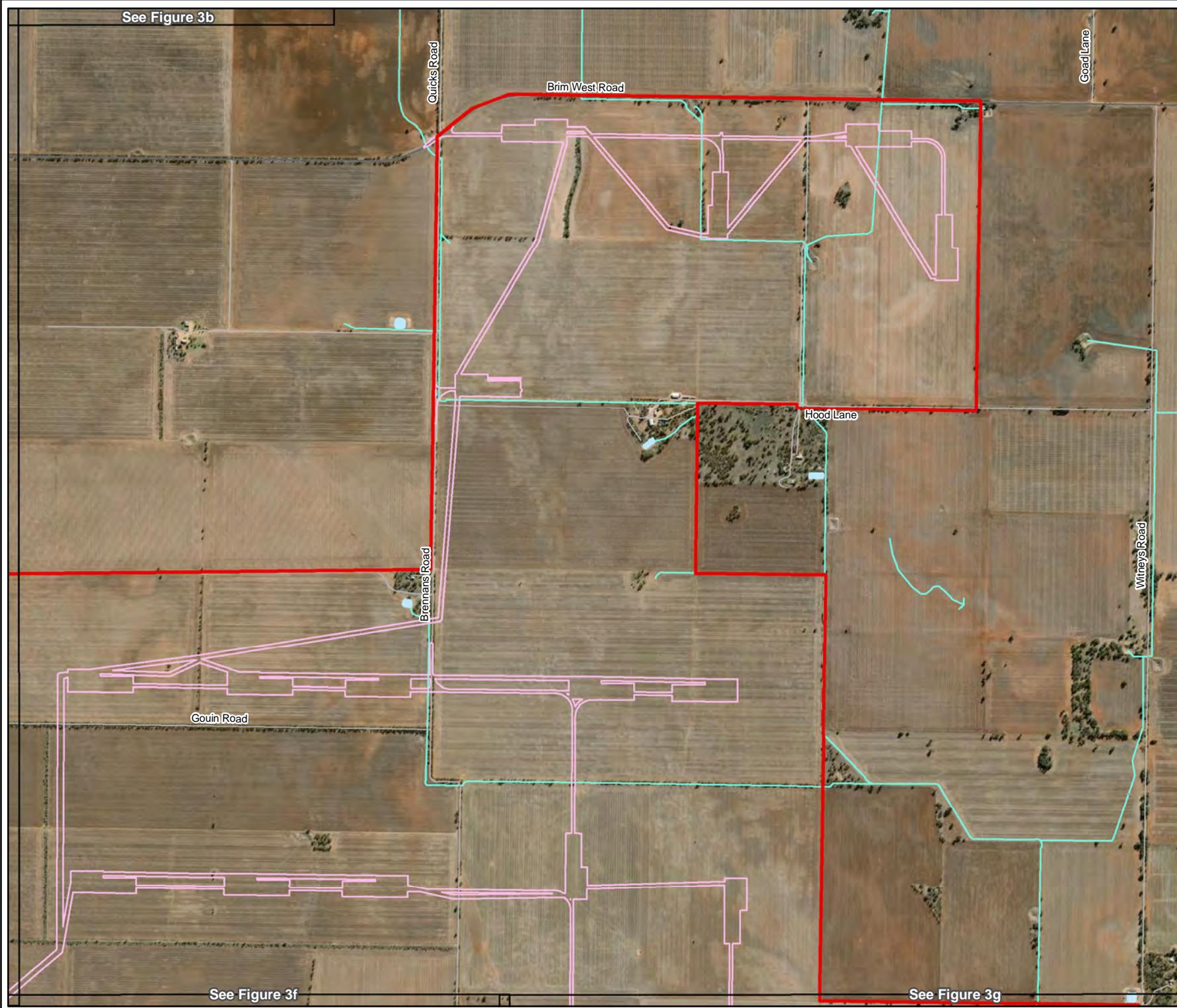
Figure 3c
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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 12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



- Legend**
- Study Area
 - Works footprint (V08-06)

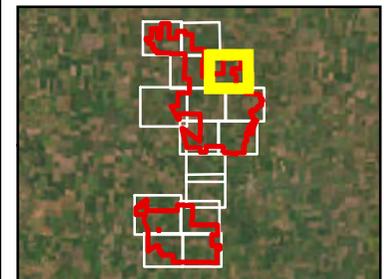
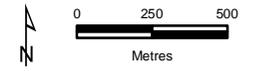


Figure 3d
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park

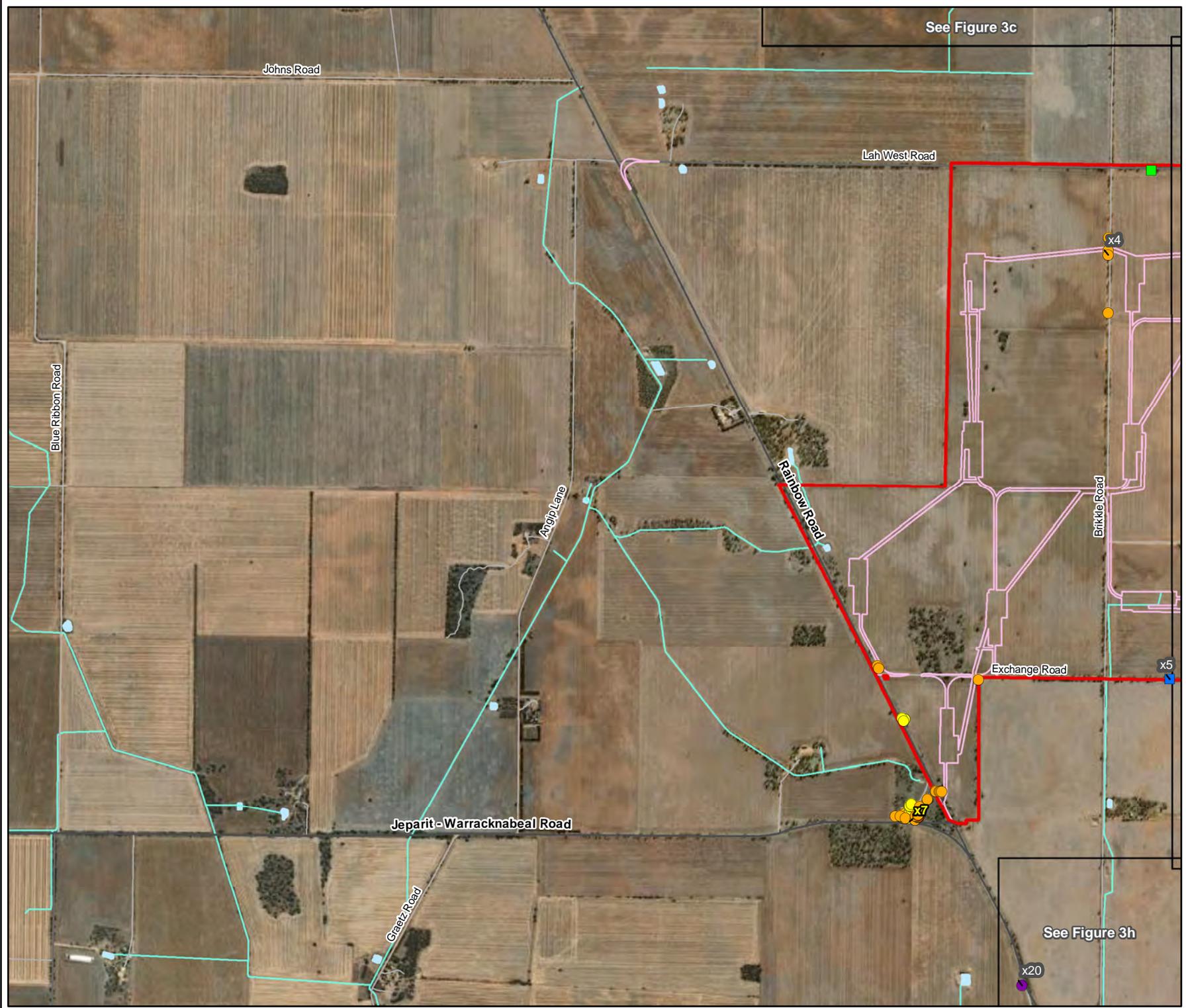


Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



- Legend**
- Study Area
 - Works footprint (V08-06)
- Flora survey results**
- FFG Act Protected Flora species
- *Acacia spp.*
 - *Helichrysum leucopsideum*
- FFG Act Listed Flora species
- *Acacia oswaldii*
 - *Acacia pendula*
 - *Allocasuarina luehmannii*
 - *Amyema linophylla subsp. Orientalis*
 - Allocasuarina luehmannii*

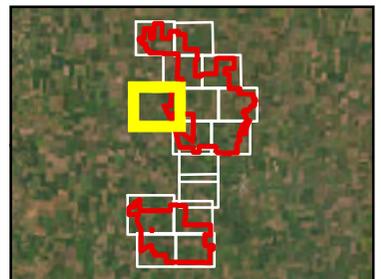
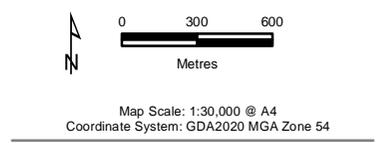
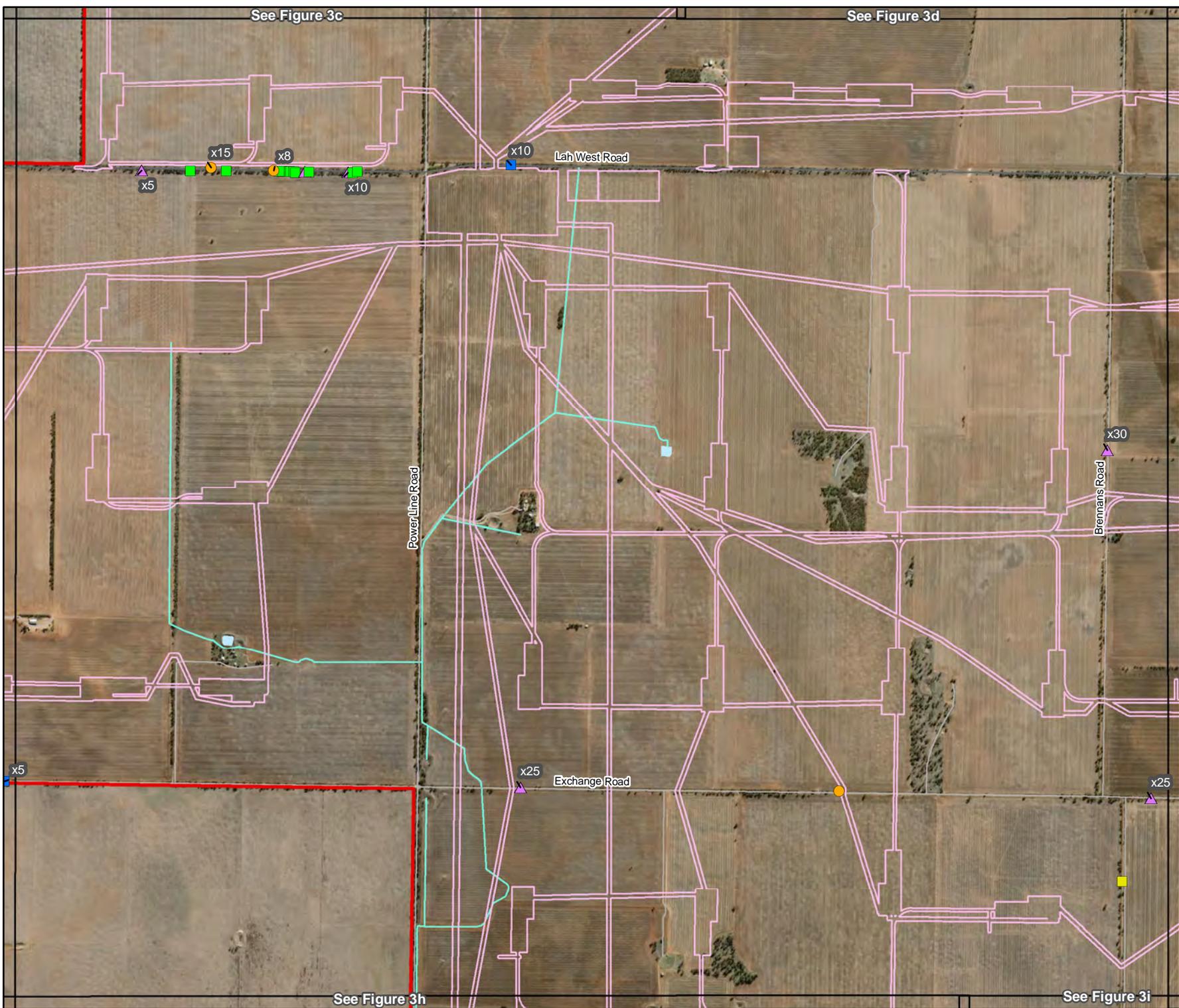


Figure 3e
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



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12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



- Legend**
- Study Area
 - Works footprint (V08-06)
- Flora survey results**
- FFG Act Protected Flora species
- *Acacia spp.*
 - *Cassinia complanata*
 - *Helichrysum leucopsideum*
 - ▲ *Vittadinia gracilis*
- FFG Act Listed Flora species
- *Acacia oswaldii*

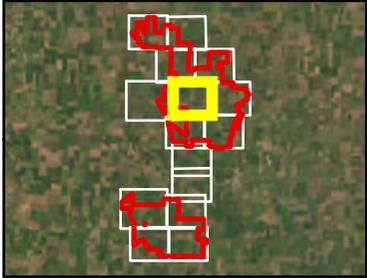
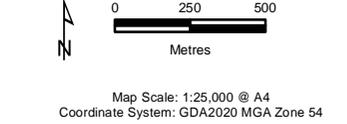
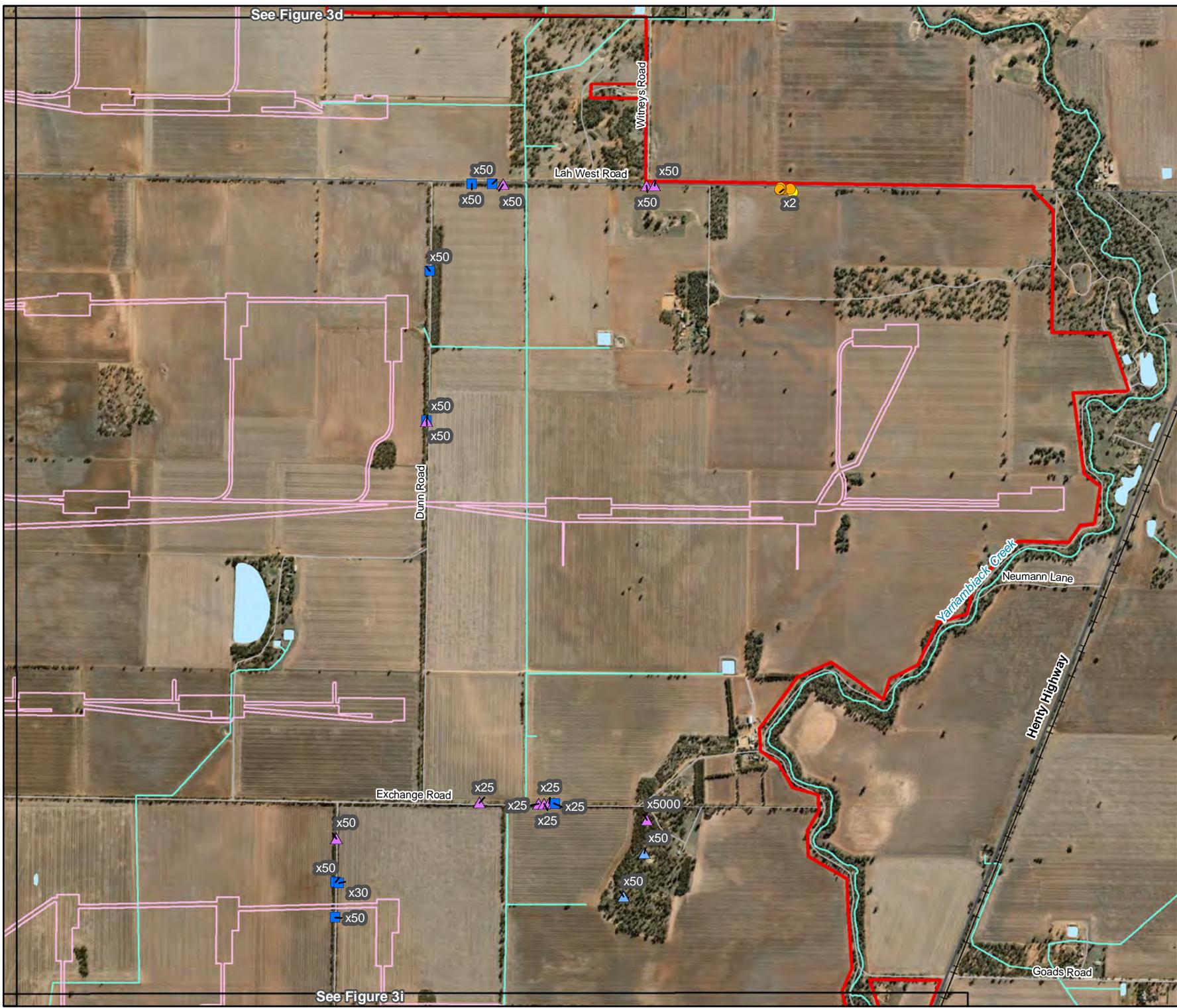


Figure 3f
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



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12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



See Figure 3d

See Figure 3i

Legend

- Study Area
- Works footprint (V08-06)
- Flora survey results**
- FFG Act Protected Flora species**
- *Helichrysum leucopsideum*
- ▲ *Prostanthera spp.*
- ▲ *Vittadinia gracilis*
- FFG Act Listed Flora species**
- *Acacia oswaldii*
- *Allocasuarina luehmannii*

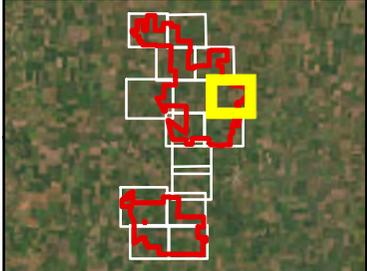


Figure 3g
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park

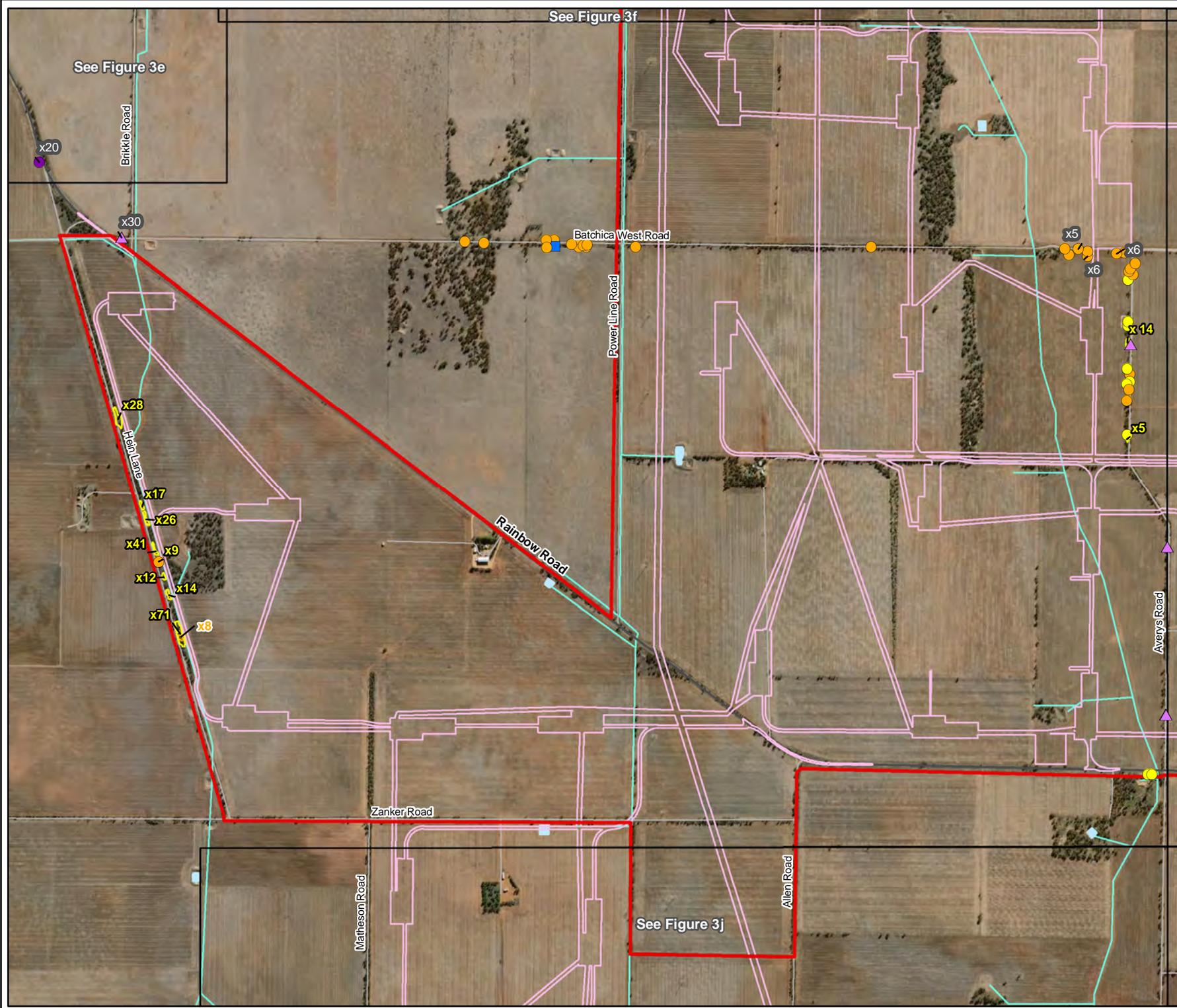
0 250 500
 Metres

Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



- Legend**
- Study Area
 - Works footprint (V08-06)
- Flora survey results**
- FFG Act Protected Flora species**
- *Helichrysum leucopsideum*
 - ▲ *Olearia pimeleoides*
 - ▲ *Vittadinia gracilis*
- FFG Act Listed Flora species**
- *Acacia oswaldii*
 - *Acacia pendula*
 - *Allocasuarina luehmannii*
- Acacia oswaldii*
- Allocasuarina luehmannii*

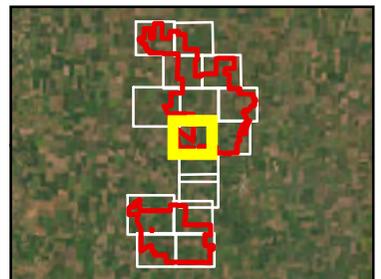
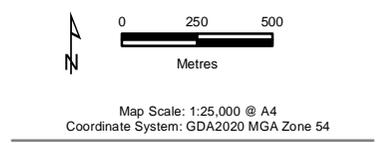
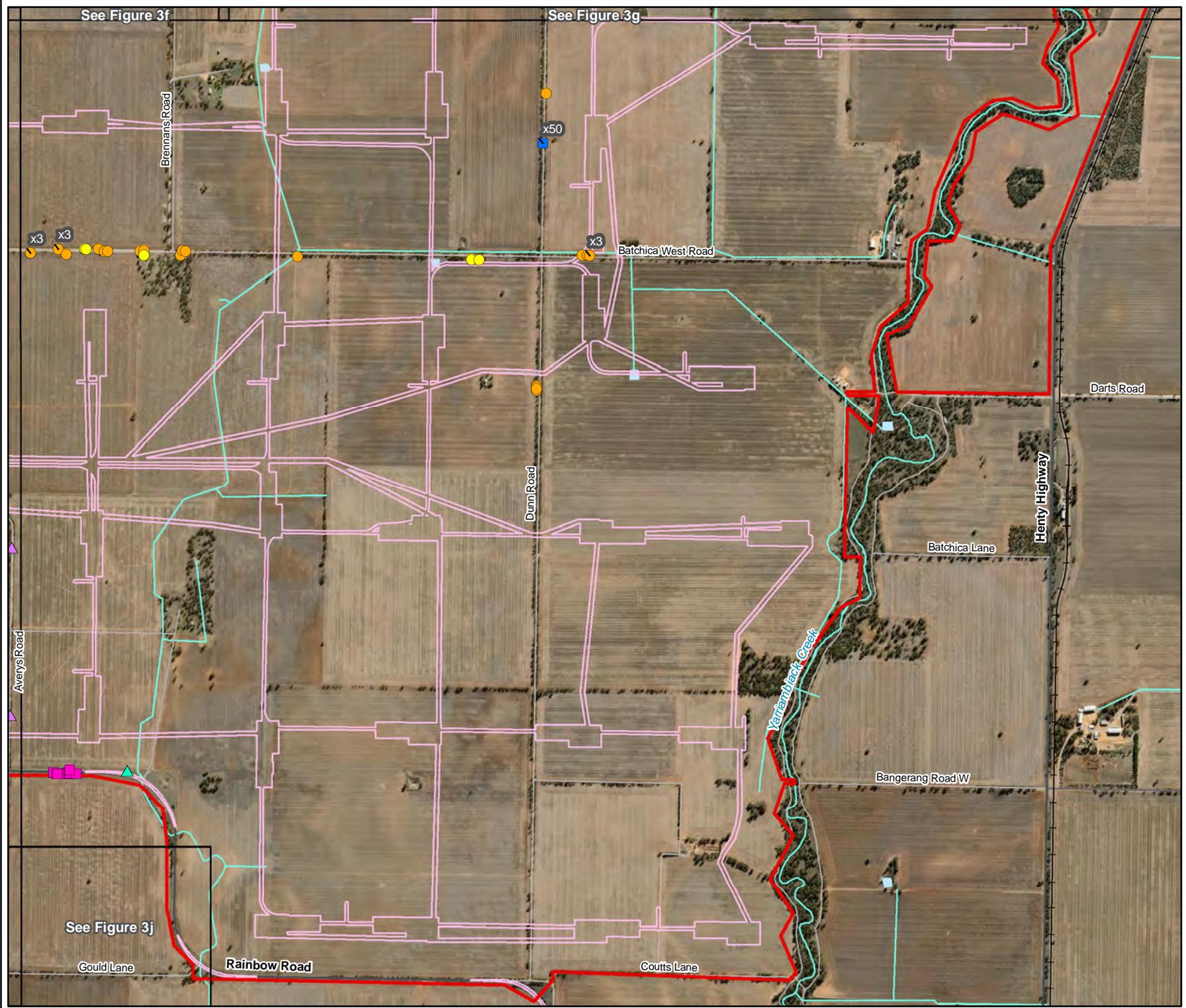


Figure 3h
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



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12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsjv



Legend

- Study Area
- Works footprint (V08-06)

Flora survey results

FFG Act Protected Flora species

- *Helichrysum leucopsideum*
- *Leptorhynchos spp.*
- ▲ *Olearia pimeleoides*
- ▲ *Vittadinia gracilis*
- ▲ *Vittadinia spp.*

FFG Act Listed Flora species

- *Acacia oswaldii*
- *Allocasuarina luehmannii*

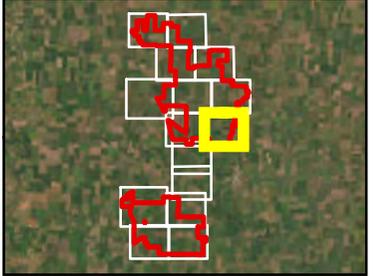


Figure 3i
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park

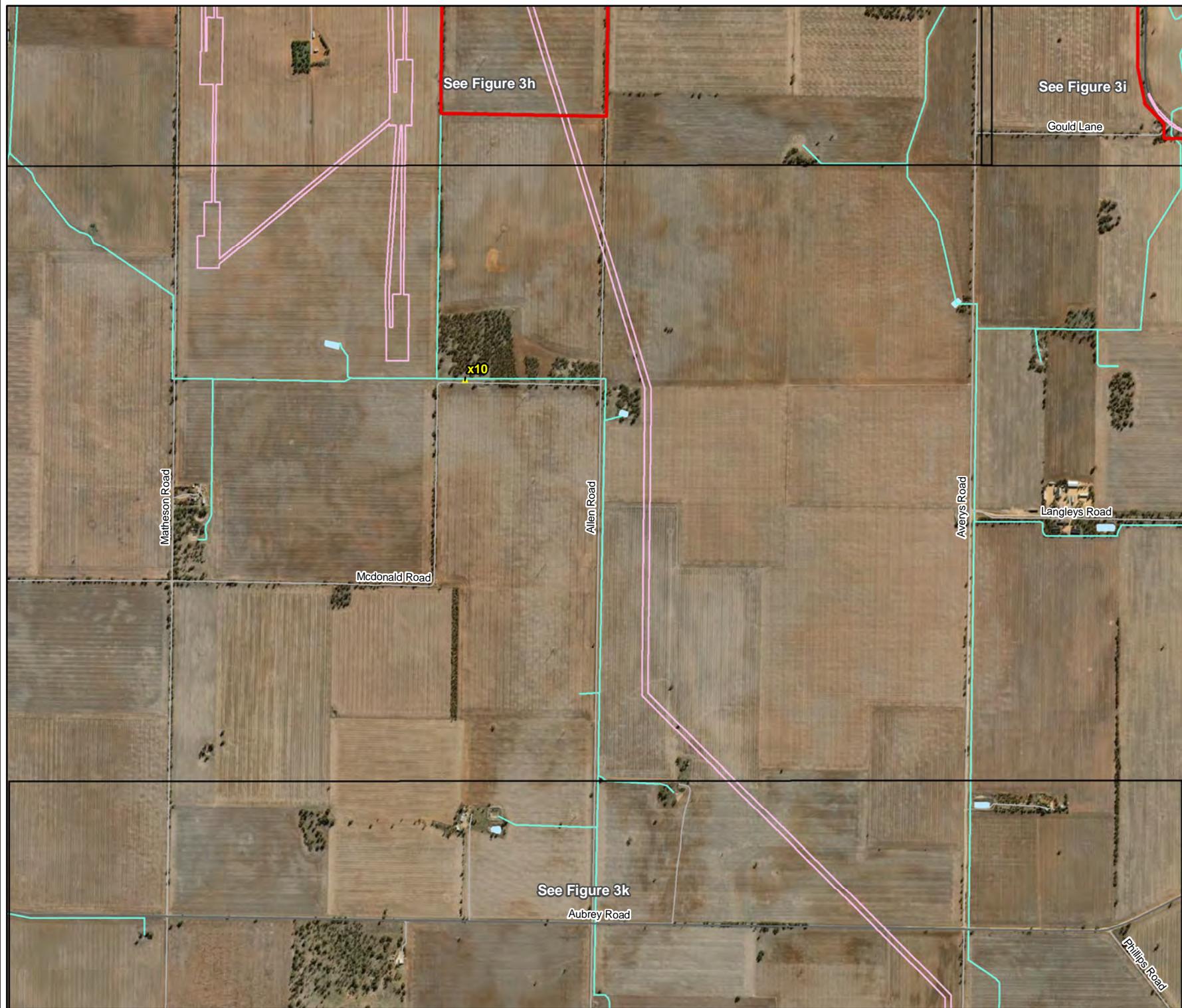
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Metres

Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



- Legend**
- Study Area
 - Works footprint (V08-06)
 - Allocasuarina luehmannii*

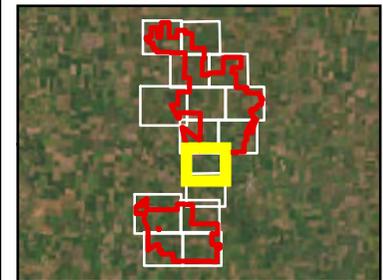
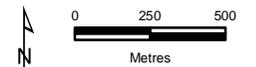


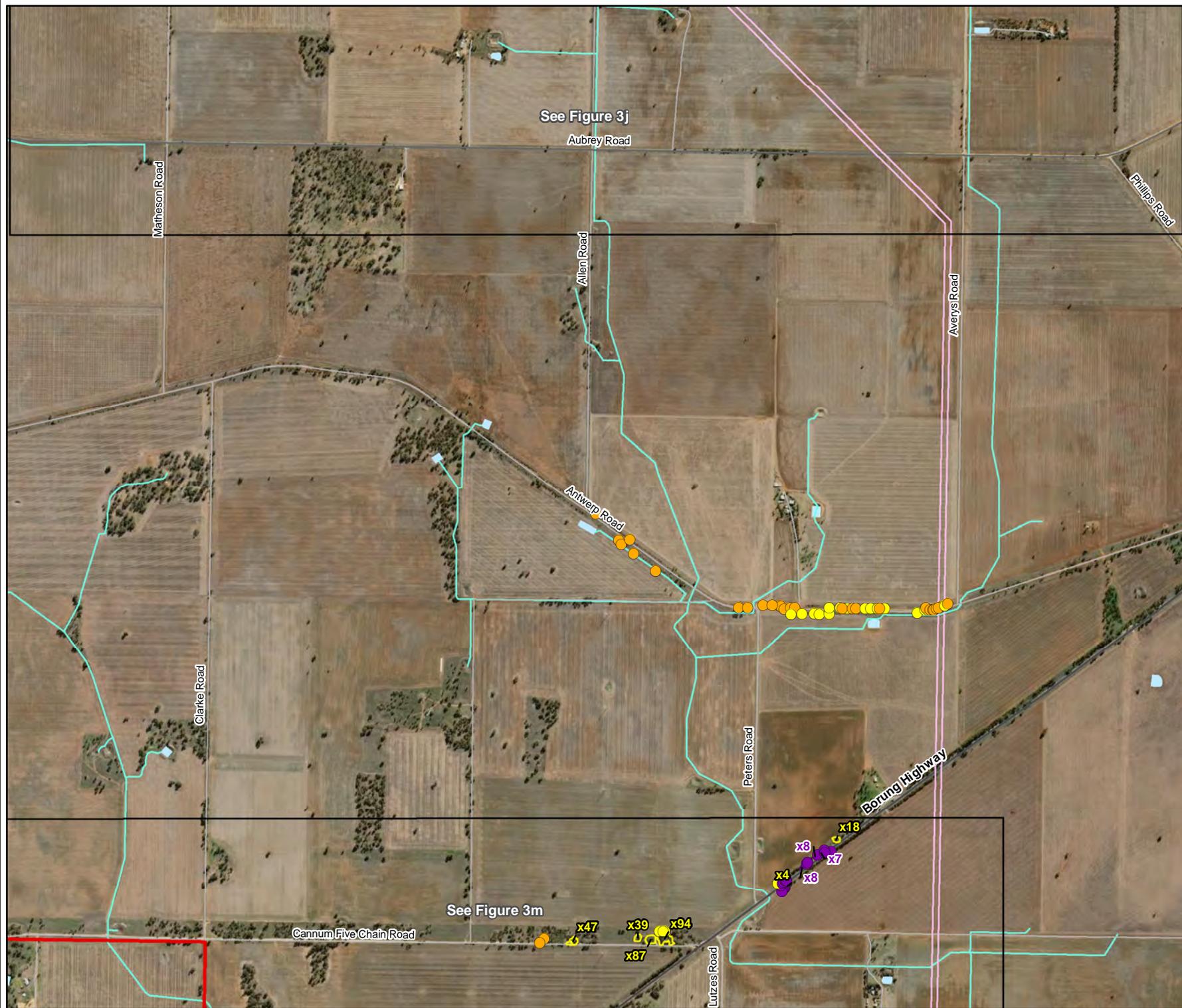
Figure 3j
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



Legend

- Study Area
- Works footprint (V08-06)

Flora survey results

FFG Act Listed Flora species

- *Acacia oswaldii*
- *Acacia pendula*
- *Allocasuarina luehmannii*
- Acacia pendula*
- Allocasuarina luehmannii*

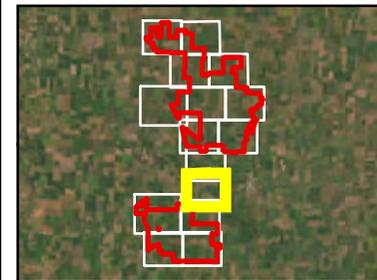
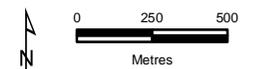


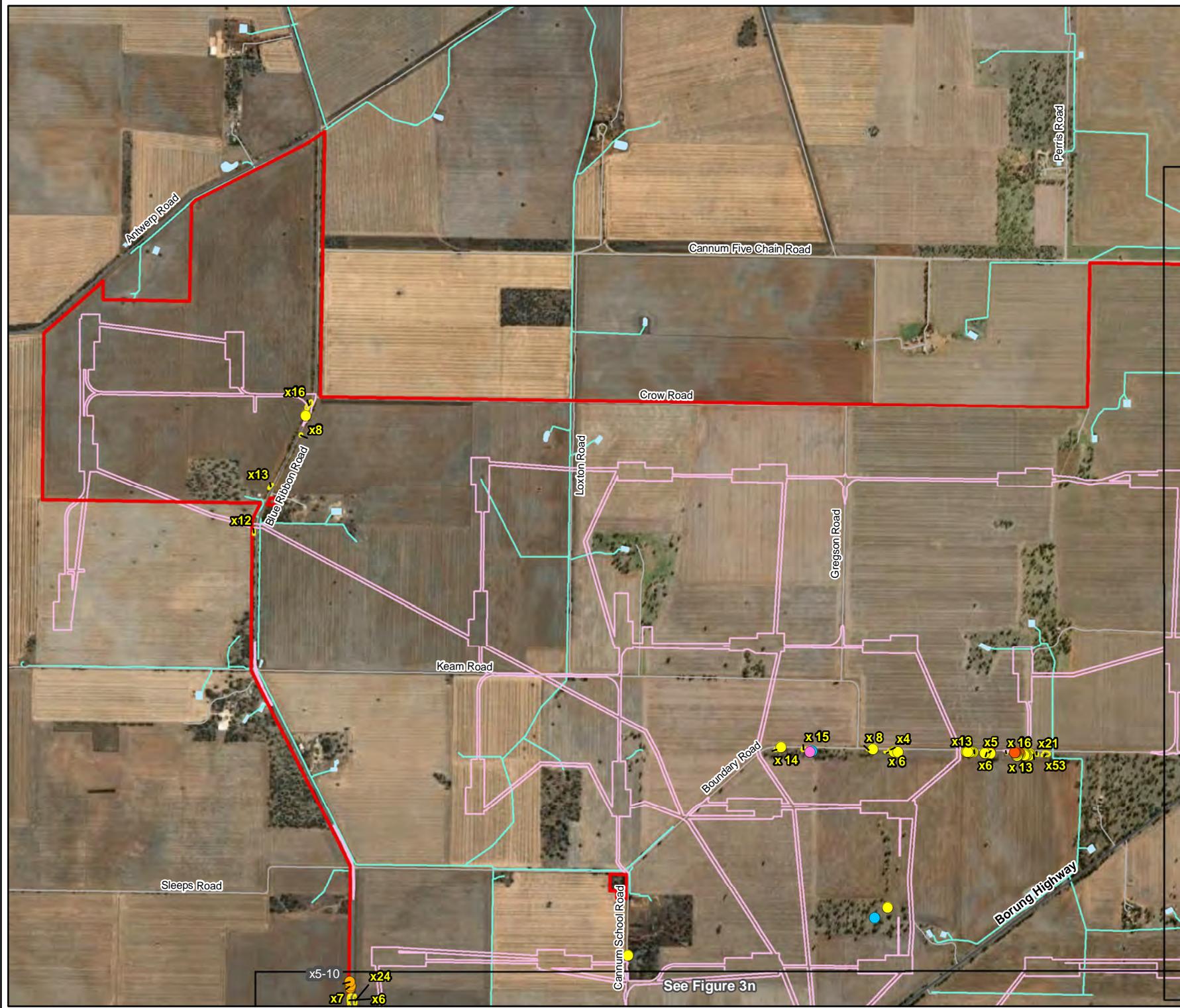
Figure 3k
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.



Legend

- Study Area
- Works footprint (V08-06)

Flora survey results

FFG Act Listed Flora species

- *Acacia oswaldii*
- *Allocasuarina luehmannii*
- *Amyema linophylla* subsp. *Orientalis*
- *Eryngium paludosum*
- *Swainsona* spp.

Allocasuarina luehmannii

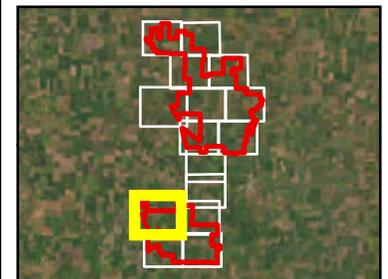
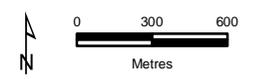


Figure 3l
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park

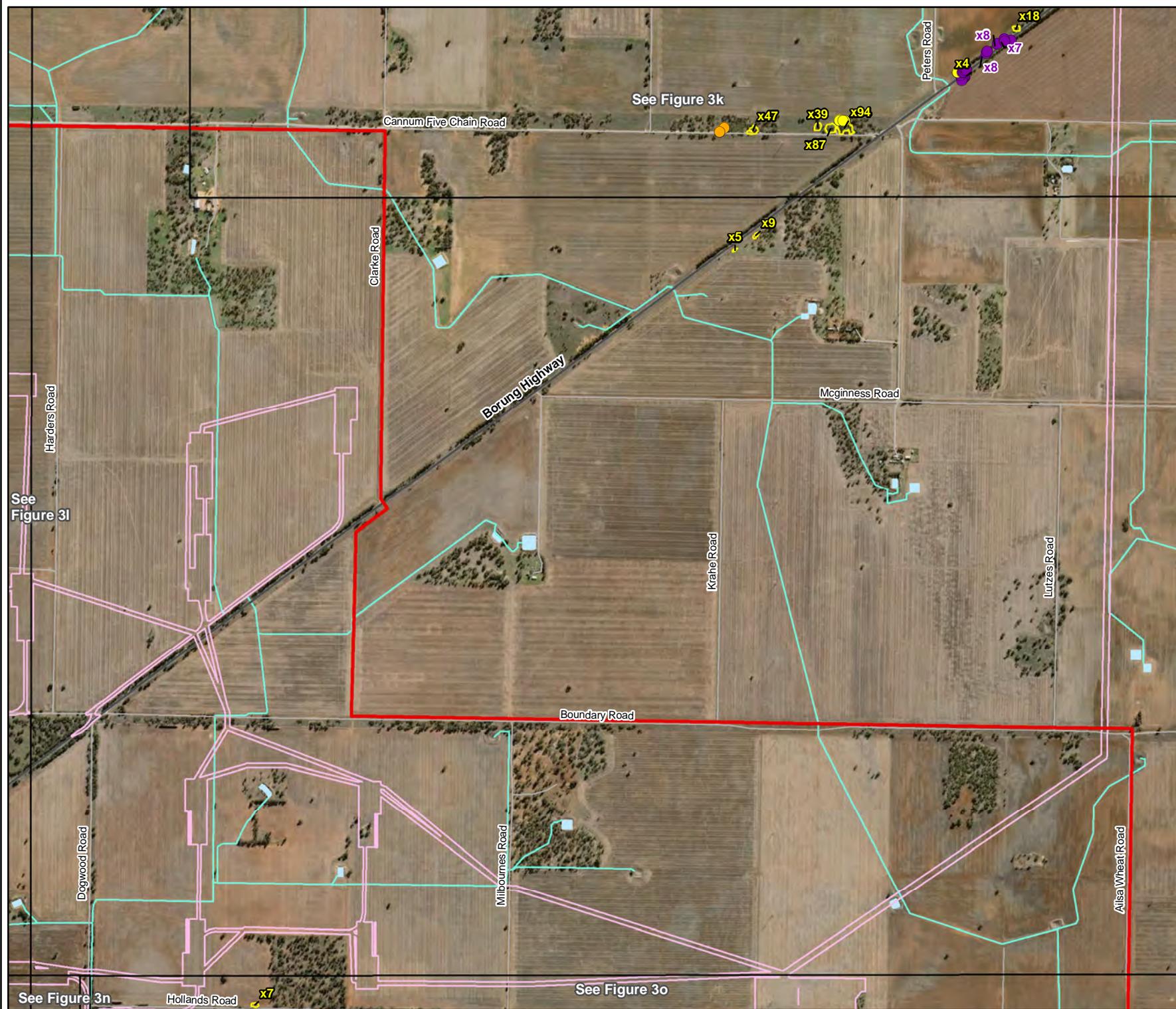


Map Scale: 1:30,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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12811_Fig03_TarqSurvResults_MB_G20.5/12/2022_melsley



Legend

- Study Area
- Works footprint (V08-06)

Flora survey results

FFG Act Listed Flora species

- *Acacia oswaldii*
- *Acacia pendula*
- *Allocasuarina luehmannii*

- Acacia pendula*
- Allocasuarina luehmannii*

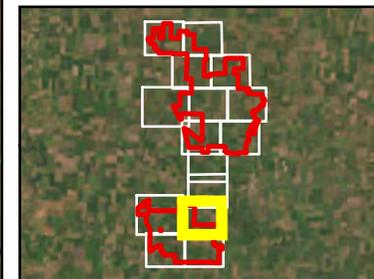
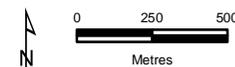


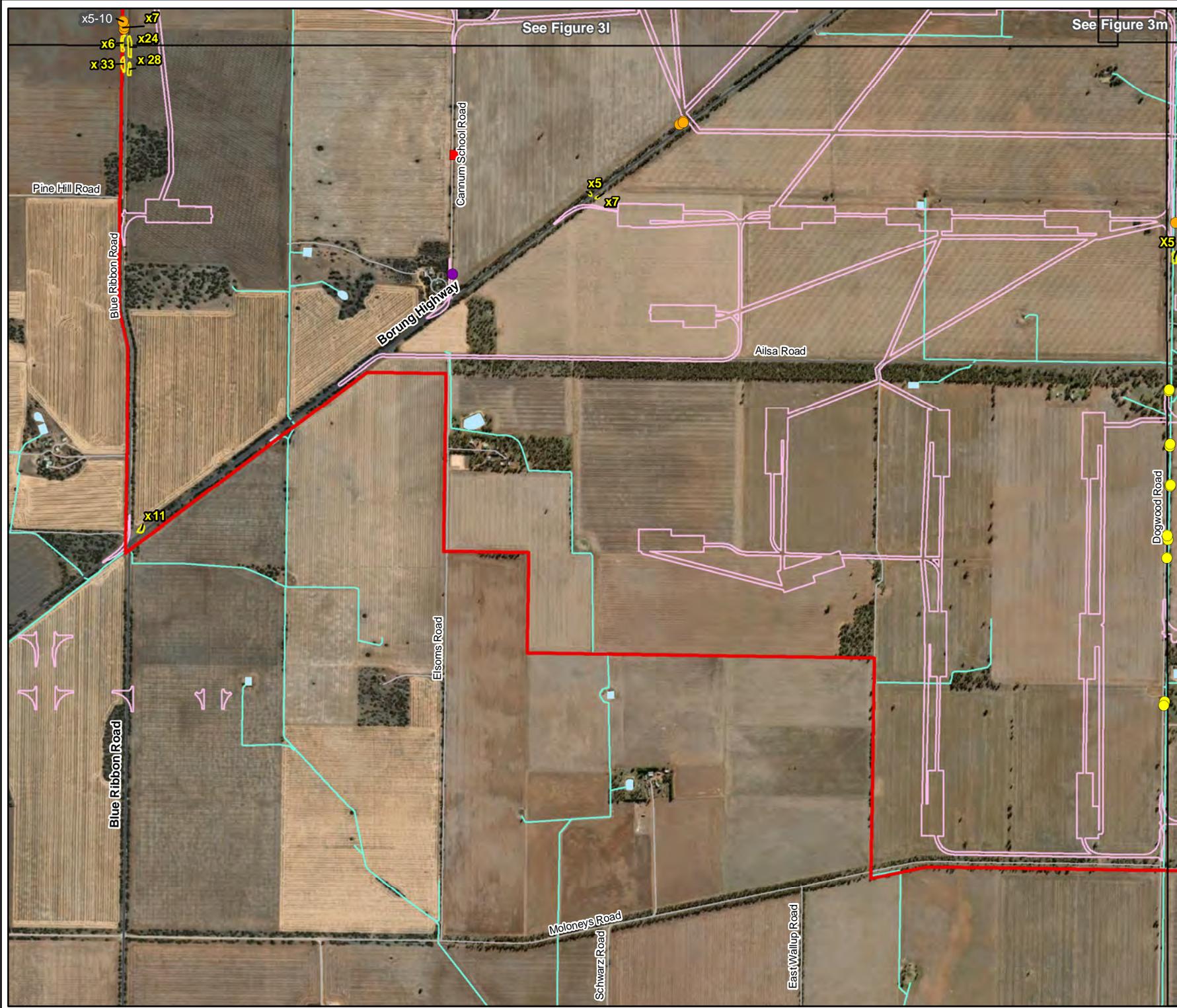
Figure 3m
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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- Legend**
- Study Area
 - Works footprint (V08-06)
- Flora survey results**
- FFG Act Protected Flora species**
- *Acacia acinacea*
- FFG Act Listed Flora species**
- *Acacia oswaldii*
 - *Acacia pendula*
 - *Allocasuarina luehmannii*
 - Allocasuarina luehmannii*

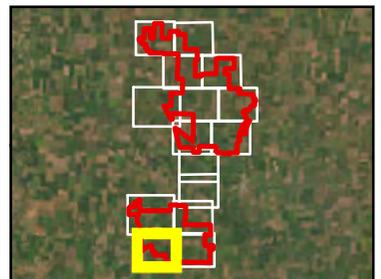
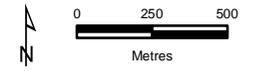


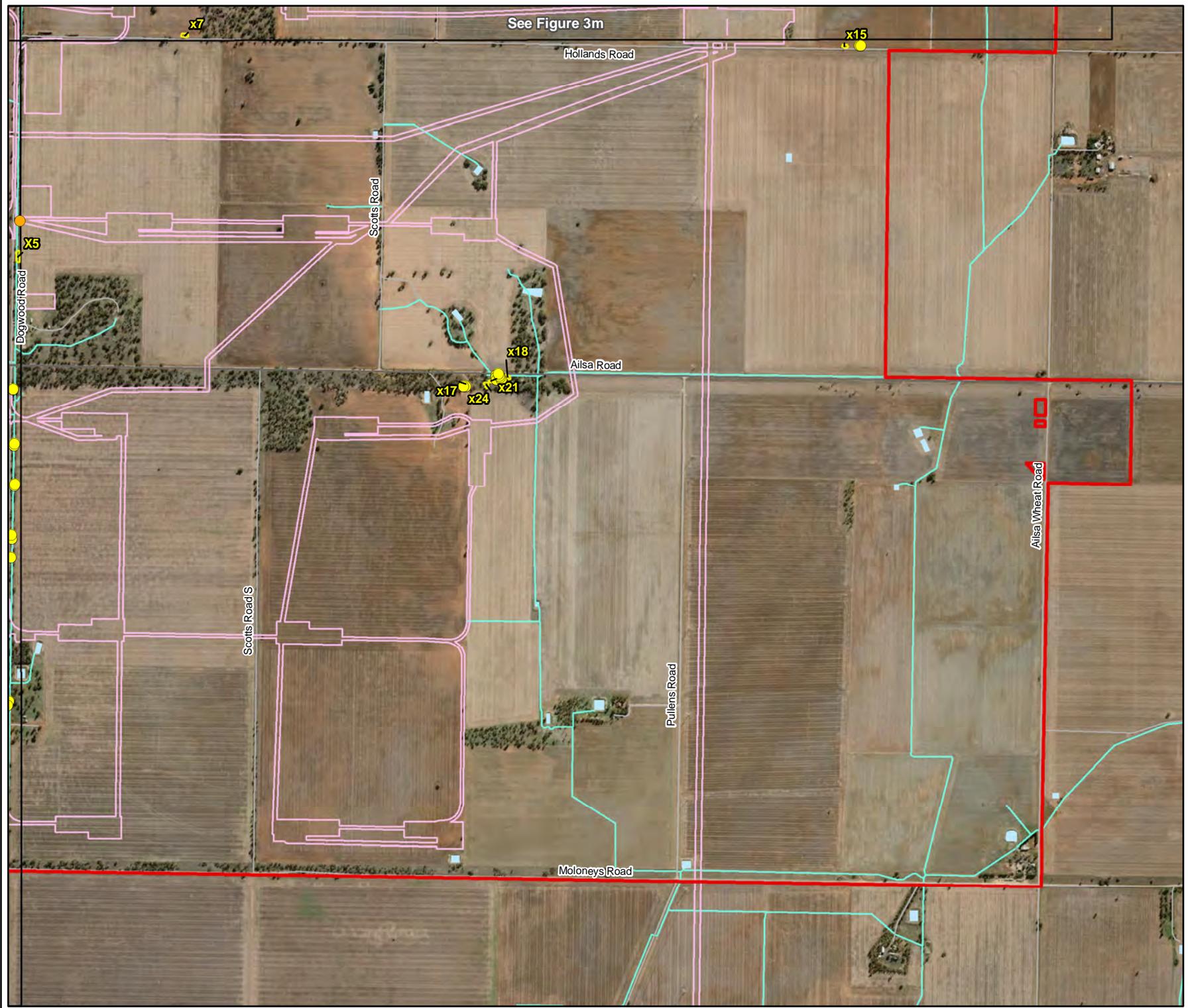
Figure 3n
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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- Legend**
- Study Area
 - Works footprint (V08-06)
- Flora survey results**
- FFG Act Listed Flora species
- *Acacia oswaldii*
 - *Allocasuarina luehmannii*
 - Allocasuarina luehmannii*

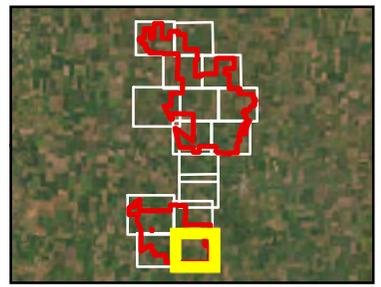
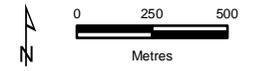


Figure 30
Flora survey results
Ecological Assessments for the Warracknabeal Energy Park



Map Scale: 1:25,000 @ A4
 Coordinate System: GDA2020 MGA Zone 54



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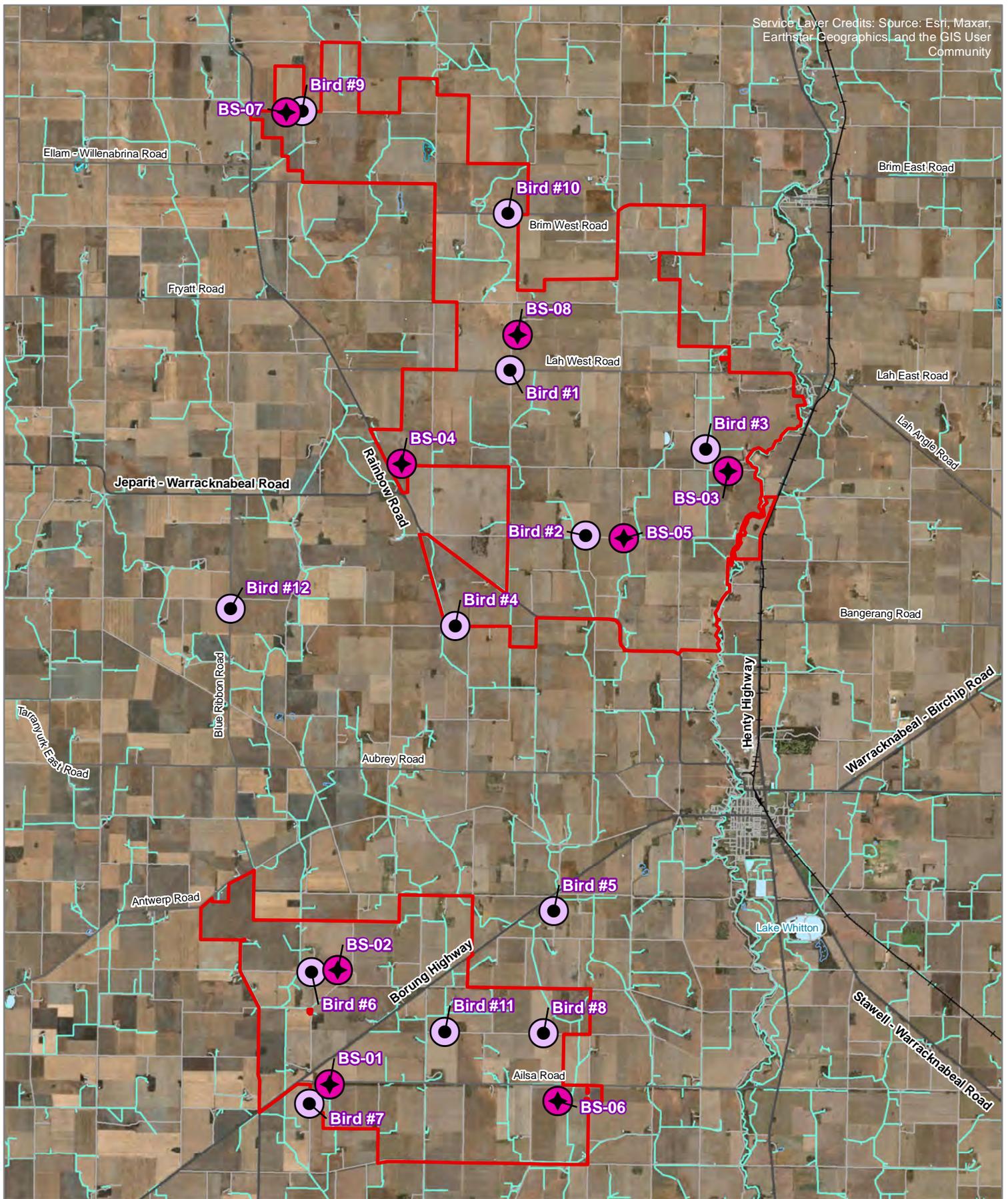
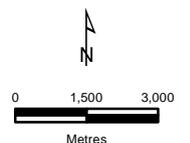


Figure 4
Bird and Microbat
survey locations
Ecological
Assessments for the
Warracknabeal
Energy Park

- Legend**
- Study Area
 - Survey locations**
 - Bird Utilisation Surveys
 - Microbat Surveys



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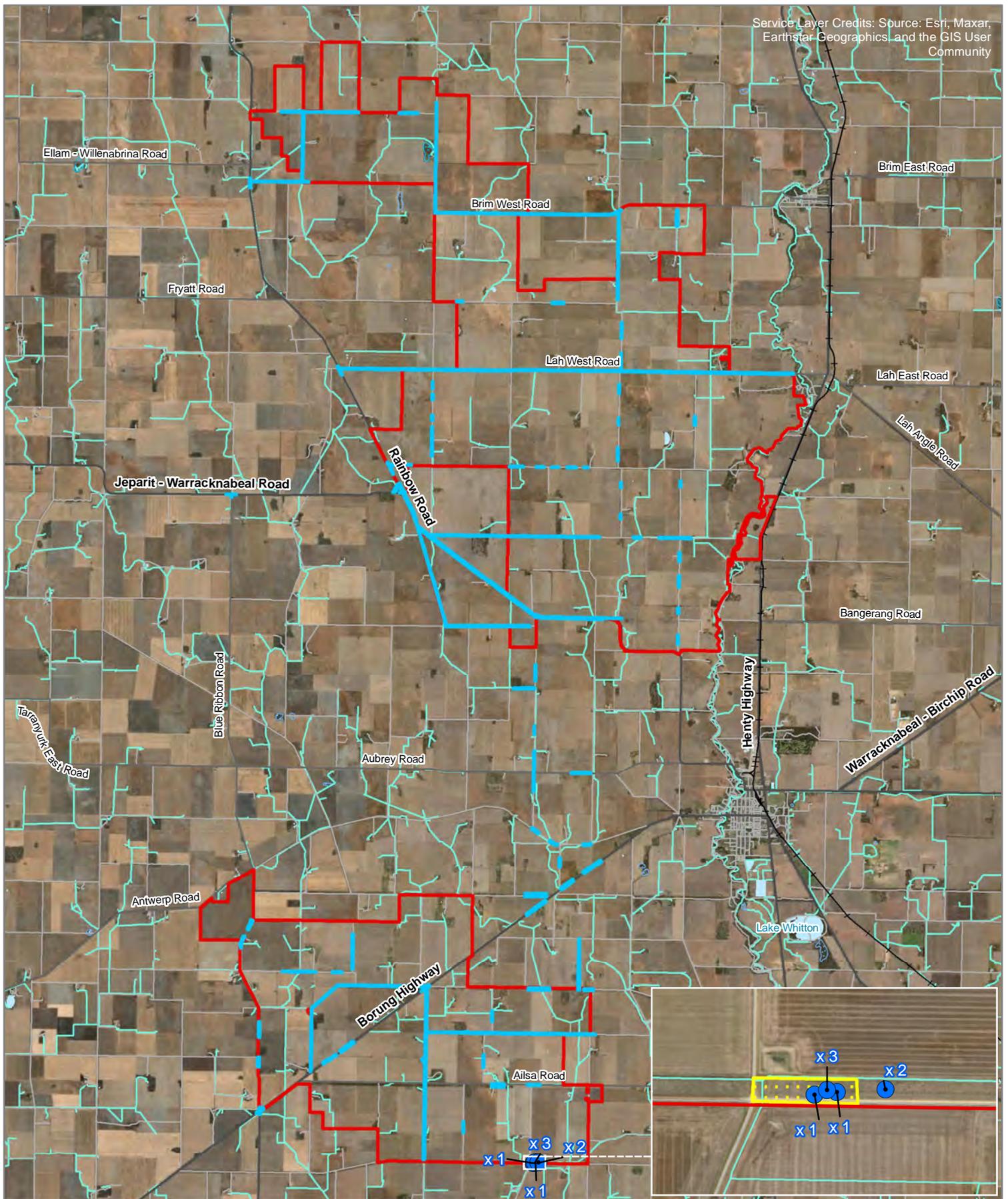
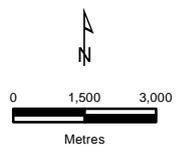
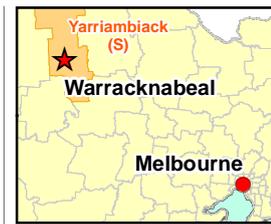


Figure 5
Golden Sun Moth
survey areas and
records
Ecological Assessments
for the Warracknabeal
Energy Park

- Legend**
- Study Area
 - Confirmed Golden Sun Moth habitat
 - Golden Sun Moth survey area
 - Golden Sun Moth record



VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.

Legend

- Study Area
- Half-bearded Spear-grass
- Bramble Wattle
- Bristly Sea-heath
- Buloke
- Buloke Mistletoe
- Cane Grass
- Club-hair New Holland Daisy
- Cut-leaf Burr-daisy
- Downy Swainson-pea
- Fine-hairy Spear-grass
- Frosted Goosefoot
- Fuzzy New Holland Daisy
- Hairy Tails
- Long Eryngium
- Neat Spear-grass
- ▲ Pin Sida
- ▲ Purple Love-grass
- ▲ Red Swainson-pea
- ▲ Slender Darling-pea
- ▲ Small-flower Mud-mat
- ▲ Spiny Lignum
- ▲ Swamp Sheoak
- ▲ Umbrella Wattle
- + Weeping Myall
- + Wimmera Woodruff
- + Winged New Holland Daisy
- + Yarriambiack Mallee-box

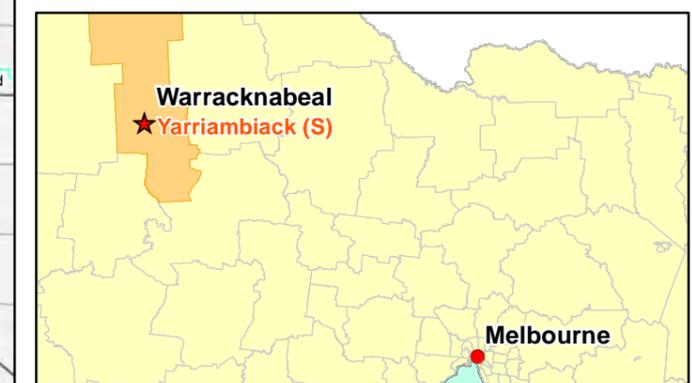
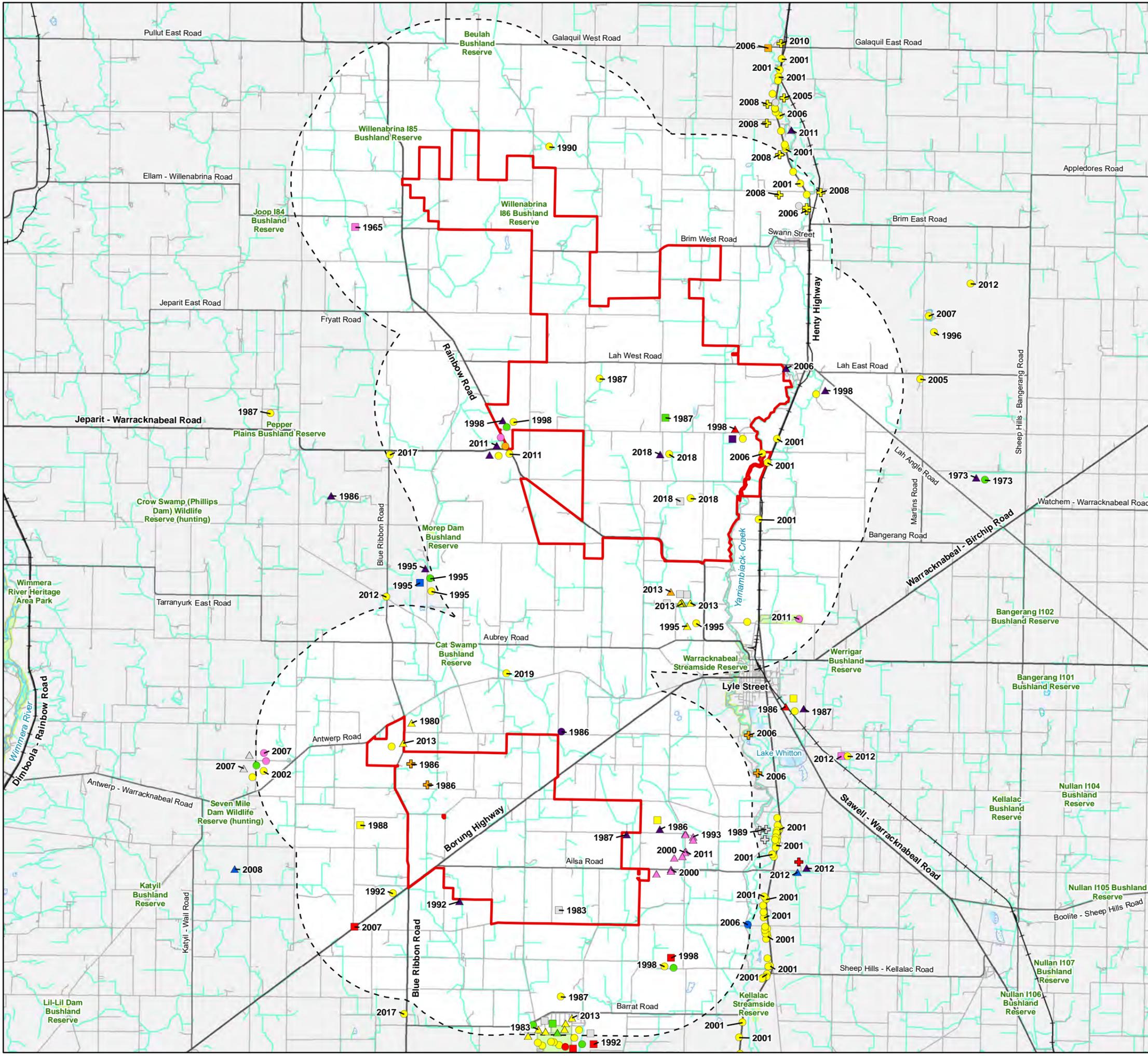


Figure 6
Previously documented significant flora within 5km of the study area
Ecological Assessments for the Warracknabeal Energy Park



Victorian Biodiversity Atlas (VBA) // Sourced from: 'VBA_FLORA25', 'VBA_FLORA100', 'VBA_FAUNA25' and 'VBA_FAUNA100'. Updated November 2022 © The State of Victoria, Department of Environment, Land, Water and Planning. Records prior to 1949 not shown.
 VicMap Data: The State of Victoria does not warrant the accuracy or completeness of information in this publication and any person using or relying upon such information does so on the basis that the State of Victoria shall bear no responsibility or liability whatsoever for any errors, faults, defects or omissions in the information.
 12811 Fig06_SigFlora_G20.5/12/2022_msl/ev



APPENDIX 1 - FLORA

Appendix 1.1 - Flora Results

Legend:

L Listed as threatened under the FFG Act (DELWP 2022d);

I Protected under the FFG Act (DELWP 2019);

* Listed as a noxious weed under the CaLP Act;

w Weed of National Significance;

Table A1.1. Flora within the Assessment Area.

Scientific Name	Common Name	Notes
INDIGENOUS SPECIES		
<i>Acacia acinacea</i> s.l.	Gold-dust Wattle	I
<i>Acacia brachybotrya</i>	Grey Mulga	I
<i>Acacia oswaldii</i>	Umbrella Wattle	L
<i>Acacia pendula</i>	Weeping Myall	L
<i>Acacia</i> spp.	Wattle	I
<i>Allocasuarina luehmannii</i>	Buloke	L
<i>Amyema miquelii</i>	Box Mistletoe	L
<i>Arthropodium fimbriatum</i>	Nodding Chocolate-lily	-
<i>Atriplex semibaccata</i>	Berry Saltbush	-
<i>Austrostipa elegantissima</i>	Feather Spear-grass	-
<i>Austrostipa scabra</i>	Rough Spear-grass	-
<i>Austrostipa</i> spp.	Spear Grass	-
<i>Bursaria spinosa</i>	Sweet Bursaria	-
<i>Callitris gracilis</i>	Slender Cypress-pine	-
<i>Cassytha glabella</i>	Slender Dodder-laurel	-
<i>Chloris truncata</i>	Windmill Grass	-
<i>Clematis microphylla</i> s.l.	Small-leaved Clematis	-
<i>Dichanthium sericeum</i> subsp. <i>sericeum</i>	Silky Blue-grass	-
<i>Dodonaea viscosa</i>	Sticky Hop-bush	-
<i>Duma florulenta</i>	Tangled Lignum	-
<i>Enchylaena tomentosa</i> var. <i>tomentosa</i>	Ruby Saltbush	-
<i>Enneapogon nigricans</i>	Dark Bottle-washers	-
<i>Eryngium paludosum</i>	Long Eryngium	L

Scientific Name	Common Name	Notes
<i>Eucalyptus calycogona</i> subsp. <i>trachybasis</i>	Red Mallee	-
<i>Eucalyptus dumosa</i>	Dumosa Mallee	-
<i>Eucalyptus incrassata</i>	Yellow Mallee	-
<i>Eucalyptus largiflorens</i>	Black Box	-
<i>Eucalyptus leptophylla</i>	Slender-leaf Mallee	-
<i>Eucalyptus leucoxylon</i>	Yellow Gum	-
<i>Euphorbia dallachyana</i>	Caustic-weed	-
<i>Eutaxia microphylla</i>	Common Eutaxia	-
<i>Leptorhynchos squamatus</i> subsp. <i>squamatus</i>	Scaly Buttons	I
<i>Lomandra filiformis</i>	Wattle Mat-rush	-
<i>Maireana decalvans</i> s.l.	Black Cotton-bush	-
<i>Maireana enchylaenoides</i>	Wingless Bluebush	-
<i>Marsilea drummondii</i>	Common Nardoo	I
<i>Melaleuca lanceolata</i>	Moonah	-
<i>Myoporum platycarpum</i>	Sugarwood	-
<i>Pimelea</i> spp.	Rice Flower	-
<i>Pittosporum angustifolium</i>	Weeping Pittosporum	-
<i>Ptilotus erubescens</i>	Hairy Tails	L
<i>Rhagodia spinescens</i>	Hedge Saltbush	-
<i>Roepera glauca</i>	Twinleaf	-
<i>Salsola tragus</i>	Prickly Saltwort	-
<i>Sclerolaena</i> spp.	Copperburr	-
<i>Senna artemisioides</i> spp. agg.	Desert Cassia	-
<i>Sida corrugata</i>	Variable Sida	-
<i>Solanum esuriale</i>	Quena	-
<i>Swainsona</i> spp.	Swainson Pea	L
<i>Templetonia rossii</i>	Flat Templetonia	I
<i>Teucrium racemosum</i> s.s.	Grey Germander	-
<i>Vittadinia</i> sp.	New Holland Daisy	I
NON-INDIGENOUS OR INTRODUCED SPECIES		
<i>Avena fatua</i>	Wild Oat	-
<i>Bromus</i> spp.	Brome	-
<i>Cynodon dactylon</i>	Couch	-
<i>Eragrostis curvula</i>	African Love-grass	-
<i>Gazania linearis</i>	Gazania	-

Scientific Name	Common Name	Notes
<i>Heliotropium europaeum</i>	Common Heliotrope	-
<i>Helminthotheca echioides</i>	Ox-tongue	-
<i>Hordeum</i> spp.	Barley Grass	-
<i>Lepidium</i> spp.	Peppergrass	-
<i>Lolium rigidum</i>	Wimmera Rye-grass	-
<i>Lycium ferocissimum</i>	African Box-thorn	*w
<i>Malva parviflora</i>	Small-flower Mallow	-
<i>Marrubium vulgare</i>	Horehound	*
<i>Opuntia</i> spp.	Prickly pear	*w
<i>Plantago</i> spp.	Plantain	-
<i>Romulea rosea</i>	Onion Grass	-
<i>Rumex</i> spp.	Dock	-
<i>Salvia verbenaca</i>	Wild Sage	-
<i>Schinus molle</i>	Pepper Tree	-
<i>Sisymbrium irio</i>	London Rocket	-
<i>Solanum</i> sp.	Nightshade	-
<i>Sonchus</i> spp.	Sow Thistle	-
<i>Tribulus terrestris</i>	Caltrop	*
<i>Trifolium</i> spp.	Clover	-
<i>Xanthium spinosum</i>	Bathurst Burr	*

Appendix 1.2 - Significant Flora Species

Significant flora within 10 kilometres of the Project Area is provided in the Table A1.2.3 at the end of this section, with Tables A1.2.1 and A1.2.2 below providing the background context for the values in Table 1.2.3.

Table A1.2.1 Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 7 in Table A1.2.3.

EPBC (<i>Environment Protection and Biodiversity Conservation Act 1999</i>):		FFG (<i>Flora and Fauna Guarantee Act 1988</i>):	
EX	Extinct	L	Listed as threatened
CR	Critically endangered	N	Nominated for listing as threatened
EN	Endangered	D	Delisted as threatened
VU	Vulnerable	I	Rejected for listing as threatened; taxon invalid
#	Listed on the Protected Matters Search Tool	X	Rejected for listing as threatened; taxon ineligible

Table A1.2.2 Likelihood of occurrence rankings: Habitat characteristics assessment of significant flora species previously recorded within 10 kilometres of the Project Area, or that may potentially occur within the Project Area to determine their likelihood of occurrence. The values in this table correspond to Column 8 in Table A1.2.3.

1	Known Occurrence	<ul style="list-style-type: none"> Recorded within the Project Area recently (i.e. within ten years).
2	High Likelihood	<ul style="list-style-type: none"> Previous records of the species in the local vicinity; and/or, The Project Area contains areas of high-quality habitat.
3	Moderate Likelihood	<ul style="list-style-type: none"> Limited previous records of the species in the local vicinity; and/or The Project Area contains poor or limited habitat.
4	Low Likelihood	<ul style="list-style-type: none"> Poor or limited habitat for the species, however other evidence (such as lack of records or environmental factors) indicates there is a very low likelihood of presence.
5	Unlikely	<ul style="list-style-type: none"> No suitable habitat and/or outside the species range.

Table A1.2.3 Significant flora recorded within 10 kilometres of the Project Area.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in Project Area (post survey effort)
NATIONAL SIGNIFICANCE						
<i>Caladenia tensa</i> #	Greencomb Spider-orchid	-	-	EN	-	5
<i>Lepidium monoplacoides</i>	Winged Peppergrass	1	1901	EN	en	5
<i>Lepidium pseudopapillosum</i> #	Erect Pepper-grass	-	-	VU	CR	5
<i>Maireana cheelii</i> #	Chariot Wheels	-	-	VU	EN	5
<i>Myriophyllum porcatum</i>	Ridged Water-milfoil	1	1903	VU	cr	5
<i>Pimelea spinescens</i> subsp. <i>pubiflora</i> #	Wimmera Rice-flower	-	-	CR	CR	3
<i>Sclerolaena napiformis</i> #	Turnip Copperburr	-	-	EN	CR	5
<i>Senecio macrocarpus</i> #	Large-fruit Fireweed	-	-	VU	CR	5
<i>Swainsona murrayana</i>	Slender Darling-pea	28	2013	VU	en	4
<i>Swainsona plagiotropis</i>	Red Swainson-pea	1	2013	VU	en	4
STATE SIGNIFICANCE						
<i>Acacia oswaldii</i>	Umbrella Wattle	15	2018	-	cr	1
<i>Acacia pendula</i>	Weeping Myall	7	1989	-	cr	1
<i>Acacia trineura</i>	Three-nerve Wattle	1	1992	-	cr	4
<i>Acacia victoriae</i> subsp. <i>victoriae</i>	Bramble Wattle	2	1987	-	en	4
<i>Allocasuarina luehmannii</i>	Buloke	112	2019	-	vu	1
<i>Amyema linophylla</i> subsp. <i>orientalis</i>	Buloke Mistletoe	9	2007	-	cr	1
<i>Asperula wimmerana</i>	Wimmera Woodruff	3	2012	-	en	3
<i>Austrostipa hemipogon</i>	Half-bearded Spear-grass	1	1995	-	vu	4
<i>Austrostipa mundula</i>	Neat Spear-grass	1	1998	-	en	5

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in Project Area (post survey effort)
<i>Austrostipa puberula</i>	Fine-hairy Spear-grass	5	2007	-	en	3
<i>Brachyscome chrysoglossa</i>	Yellow-tongue Daisy	2	1903	-	en	5
<i>Calotis anthemoides</i>	Cut-leaf Burr-daisy	1	1986	-	cr	5
<i>Casuarina obesa</i>	Swamp Sheoak	11	2011	-	cr	4
<i>Chenopodium desertorum</i> subsp. <i>desertorum</i>	Frosted Goosefoot	1	2006	-	en	4
<i>Duma horrida</i> subsp. <i>horrida</i>	Spiny Lignum	2	2012	-	cr	4
<i>Eragrostis australasica</i>	Cane Grass	1	2006	-	cr	4
<i>Eragrostis lacunaria</i>	Purple Love-grass	2	1998	-	en	5
<i>Eryngium paludosum</i>	Long Eryngium	1	2012	-	en	1
<i>Eucalyptus polybractea</i>	Blue Mallee	4	2010	-	en	4
<i>Eucalyptus yarriambiack</i>	Yarriambiack Mallee-box	9	2010	-	cr	4
<i>Frankenia serpyllifolia</i>	Bristly Sea-heath	1	2011	-	vu	5
<i>Glossostigma cleistanthum</i>	Small-flower Mud-mat	1	1986	-	en	5
<i>Goodenia arguta</i>	Grassland Goodenia	1	1770	-	en	5
<i>Ptilotus erubescens</i>	Hairy Tails	3	1998	-	cr	1
<i>Sida fibulifera</i>	Pin Sida	2	2007	-	en	4
<i>Swainsona swainsonioides</i>	Downy Swainson-pea	13	2018	-	en	3
<i>Vittadinia condyloides</i>	Club-hair New Holland Daisy	4	2011	-	en	4
<i>Vittadinia cuneata</i> var. <i>hirsuta</i>	Fuzzy New Holland Daisy	2	1986	-	en	4
<i>Vittadinia cuneata</i> var. <i>morrisii</i>	Fuzzy New Holland Daisy	1	1988	-	en	4
<i>Vittadinia pterochaeta</i>	Winged New Holland Daisy	4	2006	-	en	3

Data Sources: Victorian Biodiversity Atlas (DELWP 2022d); Protected Matters Search Tool (DCCEEW 2022).

APPENDIX 2 - FAUNA

Appendix 2.1 - Significant Fauna Species

Significant fauna within 10 kilometres of the Project Area is provided in the Table A2.1.3 at the end of this section, with Tables A2.1.1 and A2.1.2 below providing the background context for the values in Table 2.1.3.

Table A2.1.1 Conservation status of each species for each Act/policy. The values in this table correspond to Columns 5 to 8 in Table A2.1.3.

<p>EPBC (<i>Environment Protection and Biodiversity Conservation Act 1999</i>):</p> <p>EX Extinct</p> <p>CR Critically endangered</p> <p>EN Endangered</p> <p>VU Vulnerable</p> <p>CD Conservation dependent</p> <p># Listed on the Protected Matters Search Tool</p>	<p>FFG (<i>Flora and Fauna Guarantee Act 1988</i>):</p> <p>L Listed as threatened</p> <p>N Nominated for listing as threatened</p> <p>D Delisted as threatened</p> <p>I Rejected for listing as threatened; taxon invalid or ineligible</p>
	<p>NAP (National Action Plans for several Australian species [Cogger <i>et al.</i> 1993; Duncan <i>et al.</i> 1999; Garnet <i>et al.</i> 2011; Sands and New 2002; Tyler 1997; Woinarski <i>et al.</i> 2014]):</p> <p>EX Extinct</p> <p>CR Critically endangered</p> <p>EN Endangered</p> <p>VU Vulnerable</p> <p>NT Near threatened</p> <p>CD Conservation dependent</p> <p>DD Data deficient (insufficient or poorly known)</p> <p>LC Least concern</p>

Table A2.1.2 Likelihood of occurrence rankings: Habitat characteristics assessment of significant fauna species previously recorded within 10 kilometres of the Project Area, or that may potentially occur within the Project Area to determine their likelihood of occurrence. The values in this table correspond to Column 9 in Table A2.1.3.

Likelihood of occurrence	Decision guidelines
1 – Known occurrence	Recorded within the project area recently (i.e. within 10 years).
2 - High	Previous records of the species in the local vicinity; and/or, the project area contains areas of high-quality habitat.
3 – Moderate	Limited previous records of the species in the local vicinity; and/or, the project area contains some characteristics of the species' preferred habitat.
4 – Low	Poor or limited habitat for the species however other evidence (such as a lack of records or environmental factors) indicates there is a low likelihood of presence.
5 – Unlikely	No potential habitat and/or outside the species range.

Table 29. Decision guidelines for determining a fauna species likelihood of occurrence within the wind farm development boundary.

Likely presence or use of the project area	Decision guidelines
1 – Known occurrence	Recorded within the project area recently (i.e. within 10 years).
2 - High	Likely resident in the project area based on database records, or expert advice; and/or, recent records (i.e. within 10 years) of the species in the local area; and/or, the project area contains the species' preferred habitat.
3 - Moderate	The species is likely to visit the project area regularly (i.e. at least seasonally); and/or, previous records of the species in the local area; and/or, the project area contains some characteristics of the species' preferred habitat.
4 - Low	The species may visit the project area occasionally or opportunistically whilst en route to more suitable sites; and/or, there are only limited or historical records of the species in the local area (i.e. more than 20 years old); and/or, the project area contains few or no characteristics of the species' preferred habitat.
5 - Unlikely	No previous records of the species in the local area; and/or, the species may fly over the project area when moving between areas of more suitable habitat; and/or, out of the species' range; and/or, no suitable habitat present.

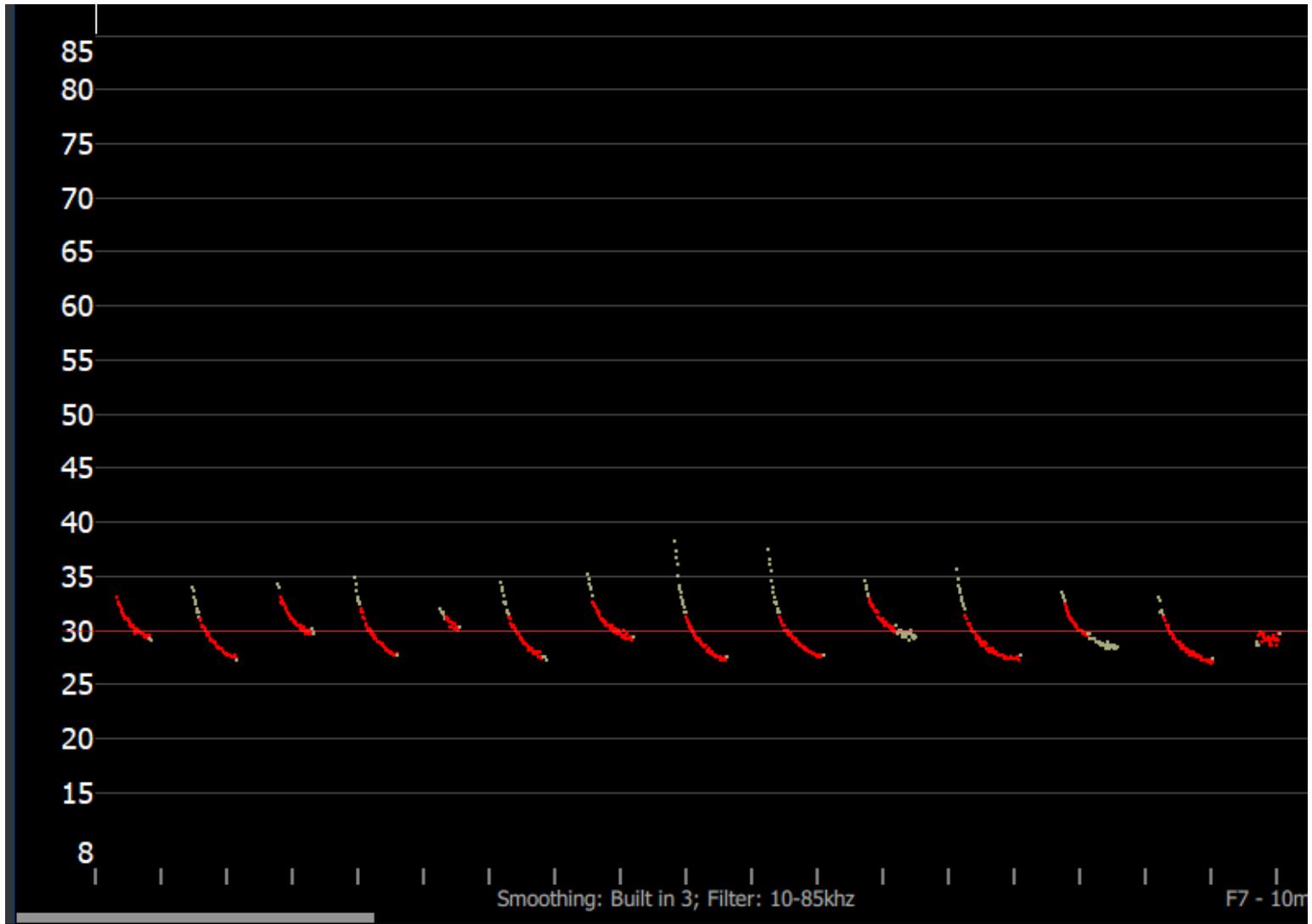
Table A2.1.3. Significant fauna within 10 kilometres of the Project Area.

Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in Project Area (post survey effort)
NATIONAL SIGNIFICANCE						
<i>Botaurus poiciloptilus</i> #	Australasian Bittern	-	-	EN	cr	5
<i>Calidris ferruginea</i> #	Curlew Sandpiper	-	-	CR	cr	5
<i>Delma impar</i> #	Striped Legless Lizard	-	-	VU	en	5
<i>Falco hypoleucos</i> #	Grey Falcon	-	-	VU	vu	4
<i>Grantiella picta</i> #	Painted Honeyeater	-	-	VU	vu	4
<i>Hirundapus caudacutus</i>	White-throated Needletail	1	1978	VU	vu	3
<i>Leipoa ocellata</i> #	Malleefowl	-	-	VU	vu	5
<i>Litoria raniformis</i>	Growling Grass Frog	4	1982	VU	vu	4
<i>Maccullochella peelii</i> #	Murray Cod	-	-	VU	en	5
<i>Manorina melanotis</i> #	Black-eared Miner	-	-	EN	cr	5
<i>Numenius madagascariensis</i> #	Eastern Curlew	-	-	CR	cr	5
<i>Nyctophilus corbeni</i> #	Corben's Long-eared Bat	-	-	VU	en	5
<i>Pedionomus torquatus</i> #	Plains-wanderer	-	-	CR	cr	5
<i>Polytelis anthopeplus monarchoides</i> #	Regent Parrot (eastern)	-	-	VU	vu	3
<i>Rostratula australis</i> #	Australian Painted Snipe	-	-	EN	cr	5
<i>Synemon plana</i> #	Golden Sun Moth	-	-	VU	vu	1
STATE SIGNIFICANCE						
<i>Anseranas semipalmata</i>	Magpie Goose	3	1999	-	vu	4
<i>Aythya australis</i>	Hardhead	11	1992	-	vu	4

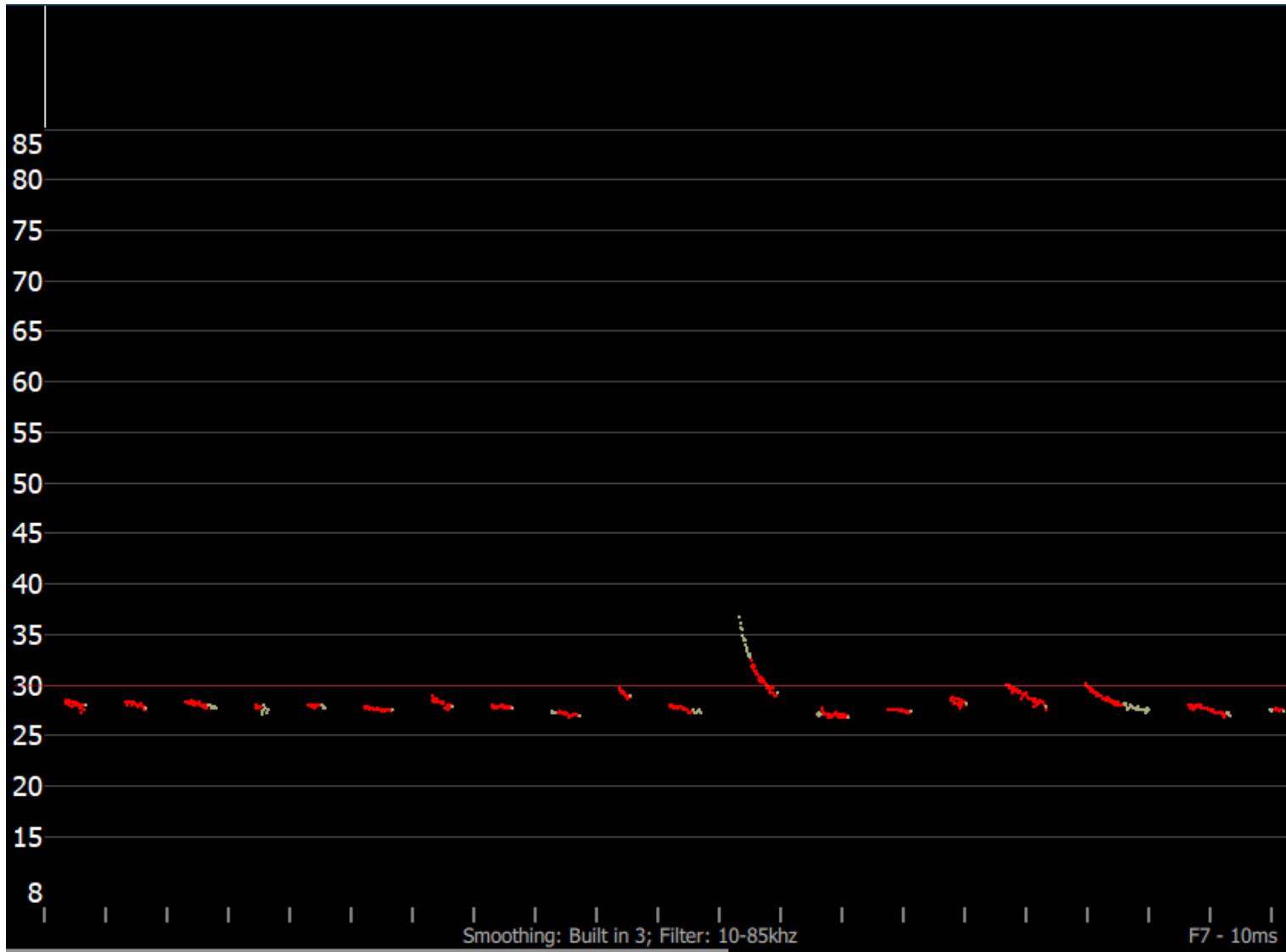
Scientific name	Common name	Total # of documented records	Last documented record	EPBC	FFG	Likely occurrence in Project Area (post survey effort)
<i>Biziura lobata</i>	Musk Duck	5	1992	-	vu	4
<i>Burhinus grallarius</i>	Bush Stone-curlew	1	1964	-	cr	4
<i>Falco subniger</i>	Black Falcon	1	2000	-	cr	3
<i>Hieraaetus morphnoides</i>	Little Eagle	4	2000	-	vu	3
<i>Melanodryas cucullata</i>	Hooded Robin	11	2000	-	vu	3
<i>Oxyura australis</i>	Blue-billed Duck	3	1994	-	vu	5
<i>Pogona barbata</i>	Bearded Dragon	1	1979	-	vu	4
<i>Spatula rhynchotis</i>	Australasian Shoveler	8	2018	-	vu	4
<i>Stagonopleura guttata</i>	Diamond Firetail	5	1980	-	vu	4
<i>Tandanus tandanus</i>	Freshwater Catfish	1	2018	-	en	5

Data source: Victorian Biodiversity Atlas (DELWP 2022d); Protected Matters Search Tool (DCCEEW 2022).

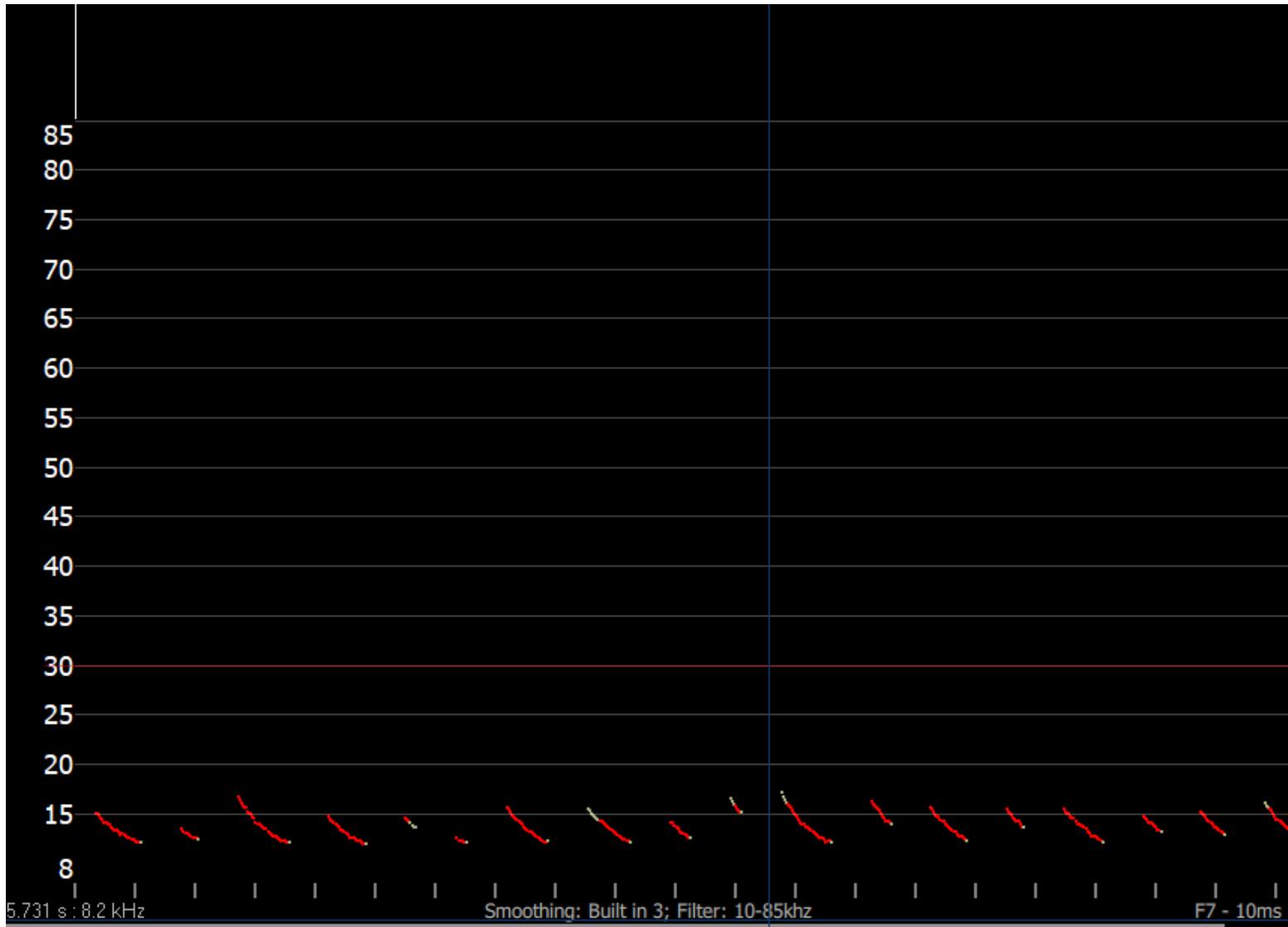
APPENDIX 3 - ANABAT CALL ANALYSIS



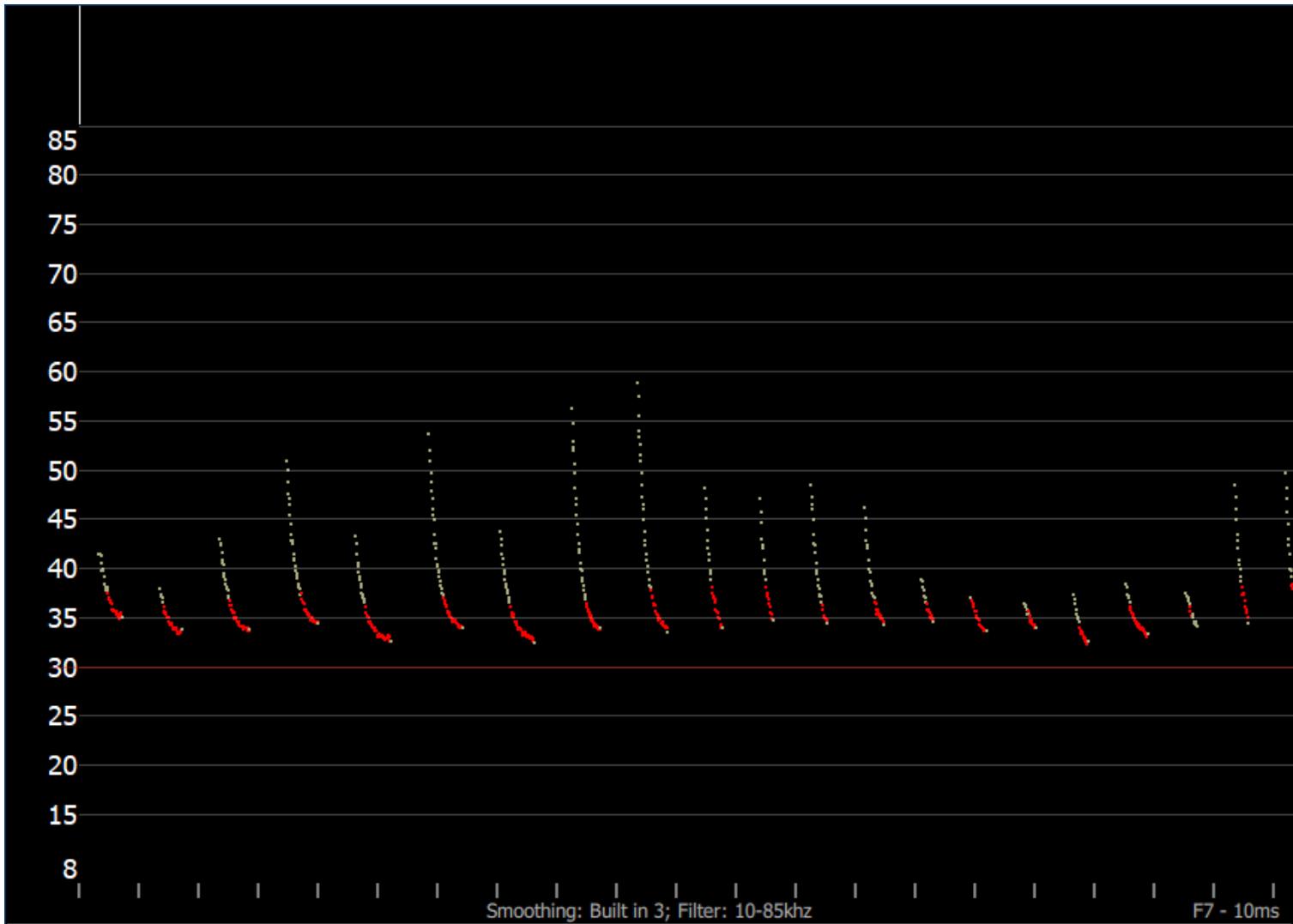
Gould's Wattled Bat



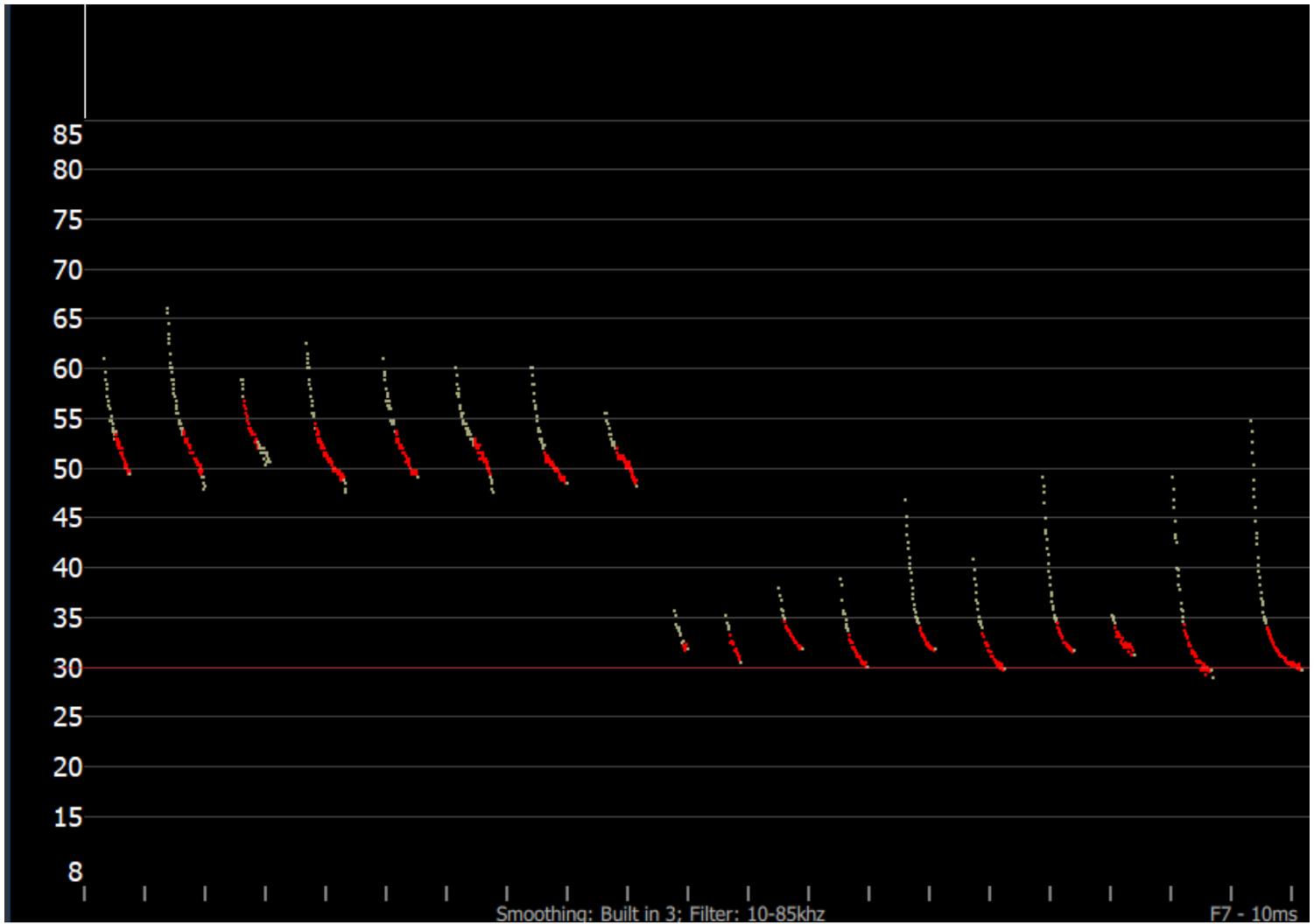
Southern Freetail Bat



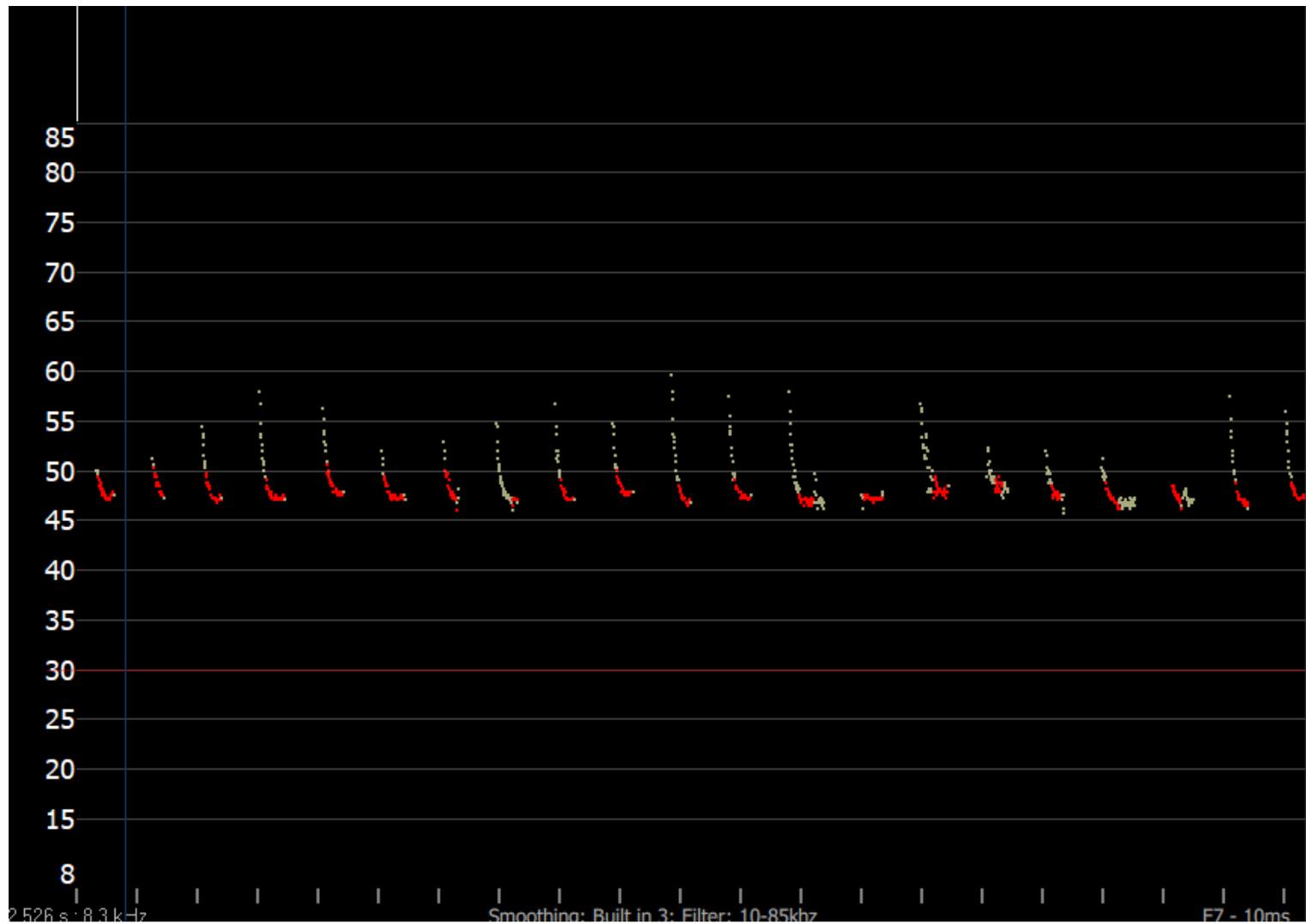
White-striped Freetail Bat



Inland Broad-nosed Bat



Chocolate Wattled Bat



Little Forest Bat

APPENDIX 4 - ENSYM SCENARIO 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: 27/03/2023

Report ID: EHP_2023_041

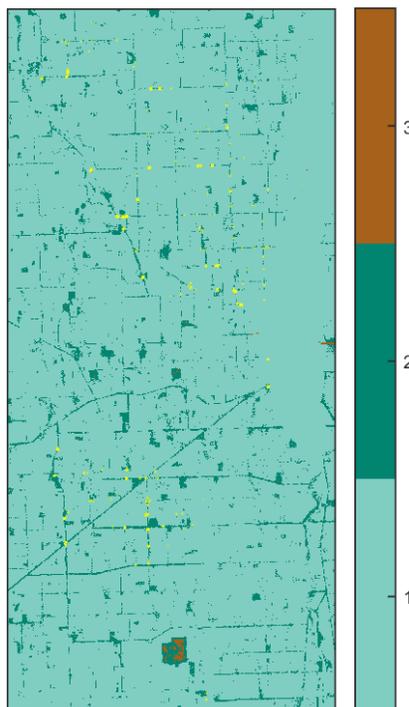
Time of issue: 8:46 am

Project ID	EHP12811_Warracknabeal_VG94_23032023
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Assessment pathway

Assessment pathway	Detailed Assessment Pathway
Extent including past and proposed	8.141 ha
Extent of past removal	0.000 ha
Extent of proposed removal	8.141 ha
No. Large trees proposed to be removed	48
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 amount¹	3.311 general habitat units
Vicinity	Wimmera Catchment Management Authority (CMA) or Yarriambiack Shire Council
Minimum strategic biodiversity value score ²	0.249
Large trees	48 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 defensible 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.

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For more information contact the DELWP Customer Service Centre 136 186

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Obtaining this publication does not guarantee that an application will meet the requirements of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes or that a permit to remove native vegetation will be granted.

Notwithstanding anything else contained in this publication, you must ensure that you comply with all relevant laws, legislation, awards or orders and that you obtain and comply with all permits, approvals and the like that affect, are applicable or are necessary to undertake any action to remove, lop or destroy or otherwise deal with any native vegetation or that apply to matters within the scope of Clauses 52.16 or 52.17 of the Victoria Planning Provisions and Victorian planning schemes.

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:

$$\text{Species habitat units} = \text{extent} \times \text{condition} \times \text{species landscape factor} \times 2, \text{ where the species landscape factor} = 0.5 + (\text{habitat importance score}/2)$$

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:

$$\text{General habitat units} = \text{extent} \times \text{condition} \times \text{general landscape factor} \times 1.5, \text{ where the general landscape factor} = 0.5 + (\text{strategic biodiversity value score}/2)$$

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
1-BP	Patch	mum_0826	Endangered	0	no	0.290	0.062	0.062	0.460		0.020	General
1-DV	Patch	wim_0096	Endangered	2	no	0.480	0.122	0.122	0.306		0.057	General
1-FK	Patch	wim_0826	Endangered	0	no	0.390	0.043	0.043	0.233		0.016	General
2-EC	Patch	wim_0096	Endangered	0	no	0.540	0.108	0.108	0.932		0.084	General
3-DX	Patch	wim_0096	Endangered	0	no	0.490	0.001	0.001	0.260		0.000	General
4-DZ	Patch	wim_0096	Endangered	0	no	0.510	0.045	0.045	0.260		0.022	General
2-FE	Patch	wim_0826	Endangered	0	no	0.320	0.010	0.010	0.260		0.003	General
5-DX	Patch	wim_0096	Endangered	0	no	0.490	0.051	0.051	0.318		0.025	General
3-FC	Patch	wim_0826	Endangered	0	no	0.290	0.002	0.002	0.130		0.001	General
6-EB	Patch	wim_0096	Endangered	0	no	0.530	0.000	0.000	0.190		0.000	General
7-DQ	Patch	wim_0096	Endangered	0	no	0.430	0.103	0.103	0.270		0.042	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
4-FE	Patch	wim_0826	Endangered	0	no	0.320	0.021	0.021	0.270		0.006	General
8-DU	Patch	wim_0096	Endangered	0	no	0.470	0.012	0.012	0.240		0.005	General
5-Y	Patch	mum_0096	Endangered	0	no	0.350	0.013	0.013	0.220		0.004	General
2-AE	Patch	mum_0096	Endangered	0	no	0.410	0.077	0.077	0.200		0.028	General
3-AL	Patch	mum_0096	Endangered	0	no	0.490	0.019	0.019	0.190		0.008	General
6-Y	Patch	mum_0096	Endangered	0	no	0.350	0.029	0.029	0.138		0.009	General
4-AC	Patch	mum_0096	Endangered	1	no	0.390	0.035	0.035	0.210		0.012	General
7-Y	Patch	mum_0096	Endangered	0	no	0.350	0.013	0.013	0.260		0.004	General
5-AB	Patch	mum_0096	Endangered	0	no	0.380	0.027	0.027	0.260		0.010	General
6-AL	Patch	mum_0096	Endangered	0	no	0.490	0.035	0.035	0.210		0.015	General
8-Y	Patch	mum_0096	Endangered	0	no	0.350	0.042	0.042	0.137		0.013	General
7-CY	Patch	wim_0096	Endangered	0	no	0.250	0.008	0.008	0.190		0.002	General
9-DT	Patch	wim_0096	Endangered	0	no	0.460	0.031	0.031	0.190		0.013	General
10-DN	Patch	wim_0096	Endangered	0	no	0.400	0.067	0.067	0.198		0.024	General
8-AD	Patch	mum_0096	Endangered	0	no	0.400	0.110	0.110	0.210		0.040	General
9-AA	Patch	mum_0096	Endangered	0	no	0.370	0.078	0.078	0.201		0.026	General
11-DN	Patch	wim_0096	Endangered	0	no	0.400	0.084	0.084	0.240		0.031	General
10-AQ	Patch	mum_0096	Endangered	0	no	0.540	0.024	0.024	0.130		0.011	General
11-AP	Patch	mum_0096	Endangered	0	no	0.530	0.032	0.032	0.123		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
12-AQ	Patch	mum_0096	Endangered	0	no	0.540	0.022	0.022	0.160		0.010	General
13-AI	Patch	mum_0096	Endangered	0	no	0.460	0.024	0.024	0.160		0.010	General
9-R	Patch	mum_0096	Endangered	0	no	0.270	0.007	0.007	0.100		0.001	General
14-AO	Patch	mum_0096	Endangered	0	no	0.520	0.014	0.014	0.100		0.006	General
15-AD	Patch	mum_0096	Endangered	0	no	0.400	0.032	0.032	0.260		0.012	General
16-AP	Patch	mum_0096	Endangered	1	no	0.530	0.017	0.017	0.200		0.008	General
17-AQ	Patch	mum_0096	Endangered	0	no	0.540	0.014	0.014	0.200		0.007	General
18-AN	Patch	mum_0096	Endangered	0	no	0.510	0.016	0.016	0.180		0.007	General
10-W	Patch	mum_0096	Endangered	0	no	0.330	0.014	0.014	0.560		0.005	General
19-AB	Patch	mum_0096	Endangered	0	no	0.380	0.024	0.024	0.560		0.011	General
11-X	Patch	mum_0096	Endangered	0	no	0.340	0.013	0.013	0.100		0.004	General
12-T	Patch	mum_0096	Endangered	0	no	0.300	0.013	0.013	0.100		0.003	General
12-DO	Patch	wim_0096	Endangered	1	no	0.410	0.018	0.018	0.930		0.011	General
13-EK	Patch	wim_0096	Endangered	1	no	0.620	0.021	0.021	0.930		0.019	General
20-AW	Patch	mum_0096	Endangered	0	no	0.600	0.003	0.003	0.260		0.001	General
21-AS	Patch	mum_0096	Endangered	0	no	0.560	0.002	0.002	0.260		0.001	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
22-AW	Patch	mum_0096	Endangered	0	no	0.600	0.005	0.005	0.260		0.003	General
23-AT	Patch	mum_0096	Endangered	0	no	0.570	0.004	0.004	0.260		0.002	General
24-AS	Patch	mum_0096	Endangered	1	no	0.560	0.026	0.026	0.150		0.013	General
25-AV	Patch	mum_0096	Endangered	1	no	0.590	0.027	0.027	0.150		0.014	General
26-AH	Patch	mum_0096	Endangered	0	no	0.450	0.011	0.011	0.250		0.005	General
27-AI	Patch	mum_0096	Endangered	1	no	0.460	0.020	0.020	0.148		0.008	General
28-AA	Patch	mum_0096	Endangered	0	no	0.370	0.023	0.023	0.110		0.007	General
29-AR	Patch	mum_0096	Endangered	0	no	0.550	0.003	0.003	0.220		0.001	General
30-AK	Patch	mum_0096	Endangered	0	no	0.480	0.010	0.010	0.220		0.004	General
31-AS	Patch	mum_0096	Endangered	2	no	0.560	0.067	0.067	0.180		0.033	General
32-BN	Patch	mum_0803	Endangered	0	no	0.250	0.014	0.014	0.100		0.003	General
13-Q	Patch	mum_0096	Endangered	0	no	0.260	0.021	0.021	0.100		0.004	General
14-W	Patch	mum_0096	Endangered	0	no	0.330	0.007	0.007	0.150		0.002	General
15-S	Patch	mum_0096	Endangered	0	no	0.290	0.017	0.017	0.100		0.004	General
16-H	Patch	mum_0096	Endangered	0	no	0.150	0.036	0.036	0.100		0.004	General
14-EM	Patch	wim_0096	Endangered	0	no	0.660	0.000	0.000	0.880		0.000	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
33-BU	Patch	mum_0803	Endangered	0	no	0.410	0.054	0.054	0.220		0.020	General
34-AW	Patch	mum_0096	Endangered	0	no	0.600	0.002	0.002	0.230		0.001	General
35-AW	Patch	mum_0096	Endangered	0	no	0.600	0.093	0.093	0.222		0.051	General
36-AR	Patch	mum_0096	Endangered	0	no	0.550	0.079	0.079	0.222		0.040	General
17-G	Patch	mum_0066	Endangered	0	no	0.680	0.068	0.068	0.100		0.038	General
37-AN	Patch	mum_0096	Endangered	0	no	0.510	0.012	0.012	0.190		0.005	General
38-B	Patch	mum_0066	Endangered	0	no	0.200	0.000	0.000	0.900		0.000	General
39-AF	Patch	mum_0096	Endangered	0	no	0.420	0.000	0.000	0.130		0.000	General
40-AH	Patch	mum_0096	Endangered	0	no	0.450	0.012	0.012	0.200		0.005	General
41-AC	Patch	mum_0096	Endangered	0	no	0.390	0.001	0.001	0.200		0.000	General
42-AI	Patch	mum_0096	Endangered	0	no	0.460	0.000	0.000	0.240		0.000	General
43-AC	Patch	mum_0096	Endangered	0	no	0.390	0.000	0.000	0.230		0.000	General
44-AI	Patch	mum_0096	Endangered	0	no	0.460	0.001	0.001	0.125		0.000	General
45-AJ	Patch	mum_0096	Endangered	0	no	0.470	0.003	0.003	0.170		0.001	General
46-BO	Patch	mum_0826	Endangered	0	no	0.280	0.006	0.006	0.100		0.001	General
47-BO	Patch	mum_0826	Endangered	0	no	0.280	0.015	0.015	0.100		0.004	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
48-BO	Patch	mum_0826	Endangered	0	no	0.280	0.001	0.001	0.100		0.000	General
49-CU	Patch	wim_0096	Endangered	0	no	0.210	0.012	0.012	0.570		0.003	General
15-DJ	Patch	wim_0096	Endangered	1	no	0.360	0.014	0.014	0.570		0.006	General
18-EV	Patch	wim_0826	Endangered	0	no	0.210	0.014	0.014	0.145		0.003	General
16-DY	Patch	wim_0096	Endangered	0	no	0.500	0.011	0.011	0.180		0.005	General
17-DM	Patch	wim_0096	Endangered	0	no	0.390	0.059	0.059	0.180		0.020	General
50-CG	Patch	wim_0066	Endangered	0	no	0.350	0.027	0.027	0.460		0.011	General
19-U	Patch	mum_0096	Endangered	2	no	0.310	0.025	0.025	0.106		0.006	General
51-AJ	Patch	mum_0096	Endangered	0	no	0.470	0.012	0.012	0.120		0.005	General
20-J	Patch	mum_0096	Endangered	0	no	0.180	0.000	0.000	0.100		0.000	General
21-M	Patch	mum_0096	Endangered	0	no	0.220	0.019	0.019	0.660		0.005	General
52-AK	Patch	mum_0096	Endangered	0	no	0.480	0.015	0.015	0.130		0.006	General
53-AM	Patch	mum_0096	Endangered	1	no	0.500	0.016	0.016	0.130		0.007	General
18-DD	Patch	wim_0096	Endangered	0	no	0.300	0.000	0.000	0.230		0.000	General
22-Y	Patch	mum_0096	Endangered	0	no	0.350	0.040	0.040	0.230		0.013	General
23-N	Patch	mum_0096	Endangered	0	no	0.230	0.020	0.020	0.210		0.004	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
24-FE	Patch	wim_0826	Endangered	0	no	0.320	0.036	0.036	0.360		0.012	General
19-DD	Patch	wim_0096	Endangered	1	no	0.300	0.039	0.039	0.100		0.010	General
54-CH	Patch	wim_0066	Endangered	0	no	0.360	0.020	0.020	0.110		0.006	General
55-BZ	Patch	wim_0066	Endangered	0	no	0.200	0.016	0.016	0.110		0.003	General
25-EV	Patch	wim_0826	Endangered	0	no	0.210	0.004	0.004	0.230		0.001	General
20-DM	Patch	wim_0096	Endangered	2	no	0.390	0.033	0.033	0.260		0.012	General
56-CV	Patch	wim_0096	Endangered	0	no	0.220	0.000	0.000	0.260		0.000	General
21-EB	Patch	wim_0096	Endangered	0	no	0.530	0.050	0.050	0.660		0.033	General
22-DS	Patch	wim_0096	Endangered	0	no	0.450	0.025	0.025	0.260		0.011	General
23-DW	Patch	wim_0096	Endangered	0	no	0.480	0.045	0.045	0.260		0.020	General
24-EA	Patch	wim_0096	Endangered	0	no	0.520	0.031	0.031	0.910		0.023	General
26-P	Patch	mum_0096	Endangered	2	no	0.250	0.017	0.017	0.100		0.004	General
25-DI	Patch	wim_0096	Endangered	0	no	0.350	0.000	0.000	0.200		0.000	General
57-CY	Patch	wim_0096	Endangered	1	no	0.250	0.017	0.017	0.910		0.006	General
58-AI	Patch	mum_0096	Endangered	0	no	0.460	0.011	0.011	0.180		0.005	General
27-ET	Patch	wim_0826	Endangered	0	no	0.190	0.027	0.027	0.260		0.005	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
59-AP	Patch	mum_0096	Endangered	0	no	0.530	0.015	0.015	0.190		0.007	General
28-FD	Patch	wim_0826	Endangered	0	no	0.310	0.000	0.000	0.230		0.000	General
29-FM	Patch	wim_0826	Endangered	0	no	0.410	0.069	0.069	0.220		0.026	General
60-CH	Patch	wim_0066	Endangered	0	no	0.360	0.011	0.011	0.910		0.006	General
26-ED	Patch	wim_0096	Endangered	0	no	0.550	0.047	0.047	0.901		0.037	General
27-DX	Patch	wim_0096	Endangered	0	no	0.490	0.005	0.005	0.890		0.003	General
28-EJ	Patch	wim_0096	Endangered	0	no	0.610	0.007	0.007	0.190		0.004	General
30-N	Patch	mum_0096	Endangered	1	no	0.230	0.040	0.040	0.158		0.008	General
61-BE	Patch	mum_0103	Depleted	0	no	0.340	0.004	0.004	0.120		0.001	General
31-K	Patch	mum_0096	Endangered	0	no	0.190	0.010	0.010	0.114		0.002	General
32-K	Patch	mum_0096	Endangered	0	no	0.190	0.002	0.002	0.100		0.000	General
33-X	Patch	mum_0096	Endangered	0	no	0.340	0.053	0.053	0.212		0.016	General
62-BY	Patch	wim_0066	Endangered	0	no	0.170	0.050	0.050	0.210		0.008	General
29-DO	Patch	wim_0096	Endangered	0	no	0.410	0.002	0.002	0.230		0.001	General
30-DD	Patch	wim_0096	Endangered	0	no	0.300	0.011	0.011	0.130		0.003	General
31-DD	Patch	wim_0096	Endangered	0	no	0.300	0.014	0.014	0.130		0.004	General

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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
63-CJ	Patch	wim_0066	Endangered	0	no	0.420	0.017	0.017	0.430		0.008	General
64-BN	Patch	mum_0803	Endangered	0	no	0.250	0.002	0.002	0.100		0.000	General
65-BN	Patch	mum_0803	Endangered	0	no	0.250	0.003	0.003	0.100		0.001	General
34-FN	Patch	wim_0826	Endangered	0	no	0.430	0.037	0.037	0.460		0.018	General
35-FN	Patch	wim_0826	Endangered	0	no	0.430	0.010	0.010	0.530		0.005	General
36-M	Patch	mum_0096	Endangered	0	no	0.220	0.003	0.003	0.660		0.001	General
37-S	Patch	mum_0096	Endangered	0	no	0.290	0.016	0.016	0.210		0.004	General
38-S	Patch	mum_0096	Endangered	0	no	0.290	0.014	0.014	0.210		0.004	General
66-AI	Patch	mum_0096	Endangered	0	no	0.460	0.012	0.012	0.150		0.005	General
67-AI	Patch	mum_0096	Endangered	0	no	0.460	0.009	0.009	0.160		0.004	General
39-V	Patch	mum_0096	Endangered	0	no	0.320	0.009	0.009	0.100		0.002	General
40-V	Patch	mum_0096	Endangered	0	no	0.320	0.008	0.008	0.100		0.002	General
32-DD	Patch	wim_0096	Endangered	0	no	0.300	0.010	0.010	0.250		0.003	General
68-AD	Patch	mum_0096	Endangered	0	no	0.400	0.003	0.003	0.100		0.001	General
69-AD	Patch	mum_0096	Endangered	0	no	0.400	0.002	0.002	0.100		0.001	General
41-Y	Patch	mum_0096	Endangered	0	no	0.350	0.093	0.093	0.190		0.029	General
70-AE	Patch	mum_0096	Endangered	0	no	0.410	0.015	0.015	0.140		0.005	General

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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
71-AE	Patch	mum_0096	Endangered	0	no	0.410	0.009	0.009	0.140		0.003	General
42-X	Patch	mum_0096	Endangered	0	no	0.340	0.003	0.003	0.220		0.001	General
43-X	Patch	mum_0096	Endangered	0	no	0.340	0.015	0.015	0.220		0.005	General
44-X	Patch	mum_0096	Endangered	0	no	0.340	0.069	0.069	0.230		0.022	General
45-X	Patch	mum_0096	Endangered	0	no	0.340	0.055	0.055	0.230		0.017	General
72-BP	Patch	mum_0826	Endangered	0	no	0.290	0.042	0.042	0.155		0.011	General
73-BP	Patch	mum_0826	Endangered	0	no	0.290	0.013	0.013	0.356		0.004	General
74-BP	Patch	mum_0826	Endangered	0	no	0.290	0.008	0.008	0.315		0.002	General
33-DW	Patch	wim_0096	Endangered	0	no	0.480	0.012	0.012	0.100		0.005	General
46-X	Patch	mum_0096	Endangered	0	no	0.340	0.009	0.009	0.230		0.003	General
47-X	Patch	mum_0096	Endangered	0	no	0.340	0.010	0.010	0.230		0.003	General
48-FM	Patch	wim_0826	Endangered	0	no	0.410	0.034	0.034	0.220		0.013	General
49-FM	Patch	wim_0826	Endangered	0	no	0.410	0.110	0.110	0.628		0.055	General
50-ET	Patch	wim_0826	Endangered	0	no	0.190	0.002	0.002	0.200		0.000	General
51-ET	Patch	wim_0826	Endangered	0	no	0.190	0.057	0.057	0.200		0.010	General
75-CY	Patch	wim_0096	Endangered	0	no	0.250	0.101	0.101	0.270		0.024	General
76-CY	Patch	wim_0096	Endangered	0	no	0.250	0.023	0.023	0.270		0.005	General

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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
34-ER	Patch	wim_0096	Endangered	0	no	0.730	0.171	0.171	0.240		0.116	General
35-ER	Patch	wim_0096	Endangered	0	no	0.730	0.017	0.017	0.240		0.012	General
36-EG	Patch	wim_0096	Endangered	0	no	0.580	0.001	0.001	0.800		0.001	General
37-ED	Patch	wim_0096	Endangered	0	no	0.550	0.004	0.004	0.229		0.002	General
38-ED	Patch	wim_0096	Endangered	0	no	0.550	0.005	0.005	0.230		0.002	General
52-FR	Patch	wim_0826	Endangered	0	no	0.490	0.133	0.133	0.755		0.086	General
39-DP	Patch	wim_0096	Endangered	0	no	0.420	0.020	0.020	0.270		0.008	General
40-DP	Patch	wim_0096	Endangered	0	no	0.420	0.051	0.051	0.260		0.020	General
41-DP	Patch	wim_0096	Endangered	0	no	0.420	0.003	0.003	0.260		0.001	General
42-EA	Patch	wim_0096	Endangered	0	no	0.520	0.027	0.027	0.735		0.018	General
43-EA	Patch	wim_0096	Endangered	0	no	0.520	0.048	0.048	0.710		0.032	General
53-FC	Patch	wim_0826	Endangered	0	no	0.290	0.009	0.009	0.270		0.002	General
54-FC	Patch	wim_0826	Endangered	0	no	0.290	0.008	0.008	0.230		0.002	General
77-CX	Patch	wim_0096	Endangered	0	no	0.240	0.071	0.071	0.253		0.016	General
78-CX	Patch	wim_0096	Endangered	0	no	0.240	0.015	0.015	0.250		0.003	General

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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
79-BY	Patch	wim_0066	Endangered	0	no	0.170	0.002	0.002	0.430		0.000	General
44-DV	Patch	wim_0096	Endangered	0	no	0.480	0.000	0.000	0.270		0.000	General
45-DV	Patch	wim_0096	Endangered	0	no	0.480	0.000	0.000	0.460		0.000	General
46-DV	Patch	wim_0096	Endangered	0	no	0.480	0.011	0.011	0.368		0.006	General
47-DV	Patch	wim_0096	Endangered	0	no	0.480	0.006	0.006	0.460		0.003	General
48-DV	Patch	wim_0096	Endangered	0	no	0.480	0.025	0.025	0.270		0.012	General
49-DV	Patch	wim_0096	Endangered	0	no	0.480	0.007	0.007	0.270		0.003	General
50-DV	Patch	wim_0096	Endangered	0	no	0.480	0.046	0.046	0.170		0.019	General
51-DV	Patch	wim_0096	Endangered	1	no	0.480	0.035	0.035	0.170		0.015	General
55-FD	Patch	wim_0826	Endangered	1	no	0.310	0.038	0.038	0.260		0.011	General
56-FD	Patch	wim_0826	Endangered	0	no	0.310	0.007	0.007	0.270		0.002	General
57-EZ	Patch	wim_0826	Endangered	0	no	0.250	0.001	0.001	0.260		0.000	General
58-EZ	Patch	wim_0826	Endangered	0	no	0.250	0.061	0.061	0.263		0.014	General
52-ED	Patch	wim_0096	Endangered	0	no	0.550	0.000	0.000	0.940		0.000	General
53-ED	Patch	wim_0096	Endangered	1	no	0.550	0.077	0.077	0.460		0.046	General

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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
54-ED	Patch	wim_0096	Endangered	0	no	0.550	0.001	0.001	0.460		0.000	General
55-DZ	Patch	wim_0096	Endangered	0	no	0.510	0.013	0.013	0.519		0.008	General
56-DZ	Patch	wim_0096	Endangered	0	no	0.510	0.000	0.000	0.860		0.000	General
57-DZ	Patch	wim_0096	Endangered	0	no	0.510	0.002	0.002	0.860		0.002	General
58-EA	Patch	wim_0096	Endangered	0	no	0.520	0.002	0.002	0.190		0.001	General
59-EA	Patch	wim_0096	Endangered	0	no	0.520	0.000	0.000	0.190		0.000	General
60-EA	Patch	wim_0096	Endangered	0	no	0.520	0.000	0.000	0.190		0.000	General
61-EA	Patch	wim_0096	Endangered	2	no	0.520	0.076	0.076	0.190		0.035	General
62-EA	Patch	wim_0096	Endangered	0	no	0.520	0.027	0.027	0.230		0.013	General
59-FC	Patch	wim_0826	Endangered	0	no	0.290	0.002	0.002	0.270		0.001	General
60-FC	Patch	wim_0826	Endangered	0	no	0.290	0.043	0.043	0.270		0.012	General
80-AG	Patch	mum_0096	Endangered	0	no	0.430	0.000	0.000	0.110		0.000	General
81-AG	Patch	mum_0096	Endangered	0	no	0.430	0.000	0.000	0.110		0.000	General
82-AG	Patch	mum_0096	Endangered	0	no	0.430	0.078	0.078	0.240		0.031	General
83-AG	Patch	mum_0096	Endangered	0	no	0.430	0.001	0.001	0.260		0.000	General

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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
84-AT	Patch	mum_0096	Endangered	0	no	0.570	0.000	0.000	0.210		0.000	General
85-AT	Patch	mum_0096	Endangered	1	no	0.570	0.017	0.017	0.216		0.009	General
86-AT	Patch	mum_0096	Endangered	0	no	0.570	0.007	0.007	0.184		0.003	General
61-G	Patch	mum_0066	Endangered	0	no	0.660	0.000	0.000	0.100		0.000	General
62-G	Patch	mum_0066	Endangered	0	no	0.660	0.072	0.072	0.100		0.039	General
63-G	Patch	mum_0066	Endangered	0	no	0.660	0.000	0.000	0.100		0.000	General
87-BT	Patch	mum_0826	Endangered	0	no	0.370	0.019	0.019	0.120		0.006	General
88-BT	Patch	mum_0826	Endangered	0	no	0.370	0.010	0.010	0.540		0.004	General
63-DC	Patch	wim_0096	Endangered	0	no	0.290	0.006	0.006	0.570		0.002	General
64-DC	Patch	wim_0096	Endangered	0	no	0.290	0.000	0.000	0.570		0.000	General
64-EV	Patch	wim_0826	Endangered	0	no	0.210	0.005	0.005	0.160		0.001	General
65-EV	Patch	wim_0826	Endangered	0	no	0.210	0.017	0.017	0.160		0.003	General
66-EV	Patch	wim_0826	Endangered	0	no	0.210	0.000	0.000	0.160		0.000	General
65-DG	Patch	wim_0096	Endangered	0	no	0.330	0.048	0.048	0.189		0.014	General
66-DG	Patch	wim_0096	Endangered	0	no	0.330	0.014	0.014	0.190		0.004	General
89-AQ	Patch	mum_0096	Endangered	0	no	0.540	0.000	0.000	0.150		0.000	General

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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
90-AQ	Patch	mum_0096	Endangered	0	no	0.540	0.000	0.000	0.150		0.000	General
91-AQ	Patch	mum_0096	Endangered	0	no	0.540	0.007	0.007	0.150		0.003	General
67-EB	Patch	wim_0096	Endangered	1	no	0.530	0.066	0.066	0.240		0.033	General
68-EB	Patch	wim_0096	Endangered	0	no	0.530	0.002	0.002	0.240		0.001	General
69-EB	Patch	wim_0096	Endangered	0	no	0.530	0.001	0.001	0.240		0.001	General
70-EB	Patch	wim_0096	Endangered	0	no	0.530	0.009	0.009	0.260		0.005	General
71-EB	Patch	wim_0096	Endangered	0	no	0.530	0.008	0.008	0.260		0.004	General
72-EB	Patch	wim_0096	Endangered	1	no	0.530	0.068	0.068	0.266		0.034	General
73-EB	Patch	wim_0096	Endangered	0	no	0.530	0.001	0.001	0.270		0.000	General
74-EB	Patch	wim_0096	Endangered	0	no	0.530	0.009	0.009	0.270		0.005	General
75-DM	Patch	wim_0096	Endangered	1	no	0.390	0.005	0.005	0.260		0.002	General
76-DM	Patch	wim_0096	Endangered	1	no	0.390	0.009	0.009	0.260		0.003	General
67-ES	Patch	wim_0096	Endangered	1	no	0.750	0.125	0.125	0.270		0.089	General
68-ES	Patch	wim_0096	Endangered	0	no	0.750	0.003	0.003	0.270		0.002	General
69-ES	Patch	wim_0096	Endangered	0	no	0.750	0.004	0.004	0.270		0.003	General

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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
70-ES	Patch	wim_0096	Endangered	0	no	0.750	0.001	0.001	0.270		0.000	General
92-CF	Patch	wim_0066	Endangered	0	no	0.320	0.031	0.031	0.269		0.009	General
93-CF	Patch	wim_0066	Endangered	0	no	0.320	0.063	0.063	0.270		0.019	General
77-DH	Patch	wim_0096	Endangered	2	no	0.340	0.102	0.102	0.450		0.038	General
78-DH	Patch	wim_0096	Endangered	0	no	0.340	0.031	0.031	0.450		0.012	General
94-CX	Patch	wim_0096	Endangered	1	no	0.240	0.063	0.063	0.250		0.014	General
95-CX	Patch	wim_0096	Endangered	0	no	0.240	0.001	0.001	0.250		0.000	General
79-DZ	Patch	wim_0096	Endangered	0	no	0.510	0.001	0.001	0.250		0.000	General
80-DZ	Patch	wim_0096	Endangered	0	no	0.510	0.064	0.064	0.250		0.030	General
81-EJ	Patch	wim_0096	Endangered	0	no	0.610	0.011	0.011	0.260		0.006	General
82-EJ	Patch	wim_0096	Endangered	0	no	0.610	0.054	0.054	0.265		0.031	General
71-I	Patch	mum_0096	Endangered	0	no	0.160	0.040	0.040	0.160		0.006	General
72-I	Patch	mum_0096	Endangered	0	no	0.160	0.000	0.000	0.160		0.000	General
73-FC	Patch	wim_0826	Endangered	0	no	0.290	0.037	0.037	0.270		0.010	General
74-FC	Patch	wim_0826	Endangered	0	no	0.290	0.000	0.000	0.270		0.000	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
83-DW	Patch	wim_0096	Endangered	0	no	0.480	0.014	0.014	0.130		0.006	General
84-DW	Patch	wim_0096	Endangered	0	no	0.480	0.011	0.011	0.130		0.004	General
85-EP	Patch	wim_0096	Endangered	0	no	0.700	0.001	0.001	0.840		0.001	General
86-EP	Patch	wim_0096	Endangered	0	no	0.700	0.174	0.174	0.840		0.168	General
75-FF	Patch	wim_0826	Endangered	0	no	0.200	0.003	0.003	0.100		0.001	General
76-FF	Patch	wim_0826	Endangered	0	no	0.200	0.031	0.031	0.100		0.005	General
87-EG	Patch	wim_0096	Endangered	0	no	0.210	0.001	0.001	0.740		0.000	General
88-EG	Patch	wim_0096	Endangered	0	no	0.660	0.008	0.008	0.790		0.007	General
89-D	Patch	mum_0066	Endangered	0	no	0.700	0.116	0.116	0.793		0.109	General
90-D	Patch	mum_0066	Endangered	0	no	0.670	0.054	0.054	0.928		0.052	General
91-D	Patch	mum_0066	Endangered	0	no	0.650	0.007	0.007	0.940		0.006	General
96-BC	Patch	mum_0103	Depleted	0	no	0.200	0.051	0.051	0.239		0.010	General
77-FI	Patch	wim_0826	Endangered	0	no	0.400	0.004	0.004	0.440		0.002	General
78-FI	Patch	wim_0826	Endangered	0	no	0.370	0.009	0.009	0.440		0.004	General
92-EG	Patch	wim_0096	Endangered	0	no	0.600	0.002	0.002	0.690		0.001	General
93-EG	Patch	wim_0096	Endangered	0	no	0.280	0.000	0.000	0.850		0.000	General

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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
94-EG	Patch	wim_0096	Endangered	0	no	0.220	0.000	0.000	0.850		0.000	General
95-EG	Patch	wim_0096	Endangered	0	no	0.600	0.007	0.007	0.690		0.005	General
96-EG	Patch	wim_0096	Endangered	0	no	0.280	0.000	0.000	0.850		0.000	General
97-BY	Patch	wim_0066	Endangered	0	no	0.200	0.133	0.133	0.100		0.022	General
98-BY	Patch	wim_0066	Endangered	0	no	0.520	0.120	0.120	0.610		0.075	General
79-FI	Patch	wim_0826	Endangered	0	no	0.600	0.000	0.000	0.250		0.000	General
80-FI	Patch	wim_0826	Endangered	0	no	0.690	0.037	0.037	0.808		0.034	General
2-TL	Scattered Tree	mum_0096	Endangered	1	no	0.200	0.070	0.070	0.100		0.012	General
3-TL	Scattered Tree	wim_0096	Endangered	1	no	0.200	0.070	0.070	0.270		0.013	General
5-TL	Scattered Tree	wim_0096	Endangered	1	no	0.200	0.070	0.070	0.180		0.012	General
6-TL	Scattered Tree	mum_0096	Endangered	1	no	0.200	0.070	0.070	0.230		0.013	General
12-TL	Scattered Tree	wim_0096	Endangered	1	no	0.200	0.070	0.070	0.122		0.012	General
19-TL	Scattered Tree	wim_0066	Endangered	1	no	0.200	0.070	0.070	0.190		0.013	General
24-TL	Scattered Tree	mum_0096	Endangered	1	no	0.200	0.070	0.070	0.180		0.012	General
42-TL	Scattered Tree	mum_0096	Endangered	1	no	0.200	0.070	0.056	0.210		0.010	General
43-TL	Scattered Tree	mum_0096	Endangered	1	no	0.200	0.070	0.056	0.210		0.010	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
48-TL	Scattered Tree	mum_0096	Endangered	1	no	0.200	0.070	0.069	0.250		0.013	General
50-TL	Scattered Tree	wim_0096	Endangered	1	no	0.200	0.070	0.070	0.230		0.013	General
14-TL	Scattered Tree	wim_0096	Endangered	1	no	0.200	0.070	0.070	0.270		0.013	General
2-ST	Scattered Tree	mum_0096	Endangered	0	no	0.200	0.031	0.028	0.100		0.005	General
3-ST	Scattered Tree	mum_0096	Endangered	0	no	0.200	0.031	0.028	0.100		0.005	General
4-ST	Scattered Tree	mum_0096	Endangered	0	no	0.200	0.031	0.031	0.100		0.005	General
9-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.023	0.180		0.004	General
11-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.031	0.200		0.006	General
12-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.031	0.260		0.006	General
13-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.023	0.260		0.004	General
14-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.023	0.260		0.004	General
15-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.031	0.270		0.006	General
16-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.031	0.760		0.008	General
17-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.031	0.760		0.008	General
26-ST	Scattered Tree	wim_0096	Endangered	0	no	0.200	0.031	0.031	0.210		0.006	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
Three-nerve Wattle	<i>Acacia trineura</i>	500096	Vulnerable	Dispersed	Habitat importance map	0.0013
Slender Darling-pea	<i>Swainsona murrayana</i>	503321	Endangered	Dispersed	Habitat importance map	0.0006
Blue Mallee	<i>Eucalyptus polybractea</i>	501311	Rare	Dispersed	Habitat importance map	0.0005
Yellow-tongue Daisy	<i>Brachyscome chrysoglossa</i>	503654	Vulnerable	Dispersed	Habitat importance map	0.0005
Downy Swainson-pea	<i>Swainsona swainsonioides</i>	503328	Endangered	Dispersed	Habitat importance map	0.0005
Erect Peppercross	<i>Lepidium pseudopapillosum</i>	501909	Endangered	Dispersed	Habitat importance map	0.0005
Winged New Holland Daisy	<i>Vittadinia pterochaeta</i>	503542	Vulnerable	Dispersed	Habitat importance map	0.0005
Yellow Burr-daisy	<i>Calotis lappulacea</i>	500598	Rare	Dispersed	Habitat importance map	0.0004
Swamp Sheoak	<i>Casuarina obesa</i>	500682	Endangered	Dispersed	Habitat importance map	0.0004
Needle Wattle	<i>Acacia havilandiorum</i>	500043	Endangered	Dispersed	Habitat importance map	0.0003
Riverine Flax-lily	<i>Dianella porracea</i>	504266	Vulnerable	Dispersed	Habitat importance map	0.0003
Umbrella Grass	<i>Digitaria divaricatissima</i> var. <i>divaricatissima</i>	501045	Vulnerable	Dispersed	Habitat importance map	0.0003
Long Eryngium	<i>Eryngium paludosum</i>	501238	Vulnerable	Dispersed	Habitat importance map	0.0003
Hairy-pod Wattle	<i>Acacia glandulicarpa</i>	500039	Vulnerable	Dispersed	Habitat importance map	0.0003
Pin Sida	<i>Sida fibulifera</i>	503142	Vulnerable	Dispersed	Habitat importance map	0.0003
Small Monkey-flower	<i>Elacholoma prostrata</i>	502196	Rare	Dispersed	Habitat importance map	0.0003
Red Swainson-pea	<i>Swainsona plagiotropis</i>	503324	Endangered	Dispersed	Habitat importance map	0.0003
Southern Swainson-pea	<i>Swainsona behriana</i>	504944	Rare	Dispersed	Habitat importance map	0.0002
Spiny Lignum	<i>Duma horrida</i> subsp. <i>horrida</i>	502230	Rare	Dispersed	Habitat importance map	0.0002

Scaly Mantle	<i>Eriochlamys squamata</i>	505661	Vulnerable	Dispersed	Habitat importance map	0.0002
Inland Pomaderris	<i>Pomaderris paniculosa</i> subsp. <i>paniculosa</i>	503943	Vulnerable	Dispersed	Habitat importance map	0.0002
Chariot Wheels	<i>Maireana cheelii</i>	502099	Vulnerable	Dispersed	Habitat importance map	0.0002
Common White Sunray	<i>Rhodanthe floribunda</i>	505296	Endangered	Dispersed	Habitat importance map	0.0002
Milkwort Sunray	<i>Rhodanthe polygalifolia</i>	501649	Rare	Dispersed	Habitat importance map	0.0002
Bramble Wattle	<i>Acacia victoriae</i> subsp. <i>victoriae</i>	500101	Rare	Dispersed	Habitat importance map	0.0002
Fine-hairy Spear-grass	<i>Austrostipa puberula</i>	503988	Rare	Dispersed	Habitat importance map	0.0002
Cane Spear-grass	<i>Austrostipa breviglumis</i>	503268	Rare	Dispersed	Habitat importance map	0.0002
Neat Spear-grass	<i>Austrostipa mundula</i>	503281	Rare	Dispersed	Habitat importance map	0.0002
Broom Bitter-pea	<i>Daviesia genistifolia</i> s.s.	503813	Rare	Dispersed	Habitat importance map	0.0002
Fuzzy New Holland Daisy	<i>Vittadinia cuneata</i> var. <i>morrisii</i>	505060	Rare	Dispersed	Habitat importance map	0.0002
Turnip Copperburr	<i>Sclerolaena napiformis</i>	503991	Endangered	Dispersed	Habitat importance map	0.0002
Bristly Sea-heath	<i>Frankenia serpyllifolia</i>	501374	Rare	Dispersed	Habitat importance map	0.0002
Button Immortelle	<i>Leptorhynchos waitzia</i>	501949	Vulnerable	Dispersed	Habitat importance map	0.0002
Silky Umbrella-grass	<i>Digitaria ammophila</i>	501041	Vulnerable	Dispersed	Habitat importance map	0.0002
Kamarooka Mallee	<i>Eucalyptus froggattii</i>	501279	Rare	Dispersed	Habitat importance map	0.0001
Umbrella Wattle	<i>Acacia oswaldii</i>	500070	Vulnerable	Dispersed	Habitat importance map	0.0001
Hairy Tails	<i>Ptilotus erubescens</i>	502825	Vulnerable	Dispersed	Habitat importance map	0.0001
Jericho Wire-grass	<i>Aristida jerichoensis</i> var. <i>subspinulifera</i>	504631	Endangered	Dispersed	Habitat importance map	0.0001
Small Burr-grass	<i>Tragus australianus</i>	503418	Rare	Dispersed	Habitat importance map	0.0001
Yarran	<i>Acacia melvillei</i>	500058	Vulnerable	Dispersed	Habitat importance map	0.0001
Yakka Grass	<i>Sporobolus caroli</i>	503227	Rare	Dispersed	Habitat importance map	0.0001
Grassland Velleia	<i>Velleia arguta</i>	503487	Rare	Dispersed	Habitat importance map	0.0001
Dwarf Yellow-heads	<i>Trichanthodium baracchianum</i>	501476	Vulnerable	Dispersed	Habitat importance map	0.0001

Grey Podolepis	<i>Podolepis aristata subsp. affinis</i>	502614	Rare	Dispersed	Habitat importance map	0.0001
Buloke Mistletoe	<i>Amyema linophylla subsp. orientalis</i>	500217	Vulnerable	Dispersed	Habitat importance map	0.0001
Club-hair New Holland Daisy	<i>Vittadinia condyloides</i>	503536	Rare	Dispersed	Habitat importance map	0.0001
Sand Brome	<i>Bromus arenarius</i>	500497	Rare	Dispersed	Habitat importance map	0.0001
Winged Peppergrass	<i>Lepidium monoplacoides</i>	501905	Endangered	Dispersed	Habitat importance map	0.0001
Spear-grass	<i>Austrostipa trichophylla</i>	504512	Rare	Dispersed	Habitat importance map	0.0001
Rock Wattle	<i>Acacia rupicola</i>	500082	Rare	Dispersed	Habitat importance map	0.0001
Buloke	<i>Allocasuarina luehmannii</i>	500678	Endangered	Dispersed	Habitat importance map	0.0001
Bristly Love-grass	<i>Eragrostis setifolia</i>	501195	Vulnerable	Dispersed	Habitat importance map	0.0001
Dwarf Swainson-pea	<i>Swainsona phacoides</i>	503323	Endangered	Dispersed	Habitat importance map	0.0001
Mallee Annual-bluebell	<i>Wahlenbergia tumidifructa</i>	504060	Rare	Dispersed	Habitat importance map	0.0001
Heathy Bluebush	<i>Maireana oppositifolia</i>	502106	Rare	Dispersed	Habitat importance map	0.0001
Waterbush	<i>Myoporum montanum</i>	502240	Rare	Dispersed	Habitat importance map	0.0000
Giant New Holland Daisy	<i>Vittadinia megacephala</i>	503540	Vulnerable	Dispersed	Habitat importance map	0.0000
Diosma Rice-flower	<i>Pimelea flava subsp. dichotoma</i>	502518	Rare	Dispersed	Habitat importance map	0.0000
Desert Jasmine	<i>Jasminum didymum subsp. lineare</i>	501801	Vulnerable	Dispersed	Habitat importance map	0.0000
Slender Club-sedge	<i>Isolepis congrua</i>	501773	Vulnerable	Dispersed	Habitat importance map	0.0000
Green-leaf Mallee	<i>Eucalyptus phenax subsp. phenax</i>	504270	Rare	Dispersed	Habitat importance map	0.0000
Black Falcon	<i>Falco subniger</i>	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Cane Grass	<i>Eragrostis australasica</i>	501184	Vulnerable	Dispersed	Habitat importance map	0.0000
Jumping-jack Wattle	<i>Acacia enterocarpa</i>	500032	Endangered	Dispersed	Habitat importance map	0.0000
Half-bearded Spear-grass	<i>Austrostipa hemipogon</i>	503985	Rare	Dispersed	Habitat importance map	0.0000
Finger Grass	<i>Dactyloctenium radulans</i>	500949	Rare	Dispersed	Habitat importance map	0.0000

Spiny Goosefoot	<i>Rhagodia ulicina</i>	502931	Rare	Dispersed	Habitat importance map	0.0000
Small-flower Tobacco	<i>Nicotiana goodspeedii</i>	502273	Rare	Dispersed	Habitat importance map	0.0000
Satin Daisy-bush	<i>Olearia minor</i>	504130	Rare	Dispersed	Habitat importance map	0.0000
Purple Pentatlope	<i>Rhyncharhena linearis</i>	502934	Vulnerable	Dispersed	Habitat importance map	0.0000
Streaked Wattle	<i>Acacia lineata</i>	500050	Rare	Dispersed	Habitat importance map	0.0000
Golden Sun Moth	<i>Synemon plana</i>	15021	Critically endangered	Dispersed	Habitat importance map	0.0000
Australian Bustard	<i>Ardeotis australis</i>	10176	Critically endangered	Dispersed	Habitat importance map	0.0000
Twining Purslane	<i>Calandrinia volubilis</i>	500556	Rare	Dispersed	Habitat importance map	0.0000
Red Microcybe	<i>Microcybe multiflora</i> subsp. <i>multiflora</i>	502177	Vulnerable	Dispersed	Habitat importance map	0.0000
Western Golden-tip	<i>Goodia medicaginea</i>	501518	Rare	Dispersed	Habitat importance map	0.0000
Purple Love-grass	<i>Eragrostis lacunaria</i>	501190	Vulnerable	Dispersed	Habitat importance map	0.0000
Dark Wire-grass	<i>Aristida calycina</i> var. <i>calycina</i>	503630	Rare	Dispersed	Habitat importance map	0.0000
Tiny Bog-sedge	<i>Schoenus nanus</i>	503050	Rare	Dispersed	Habitat importance map	0.0000
Bearded Dragon	<i>Pogona barbata</i>	12177	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Milkwort	<i>Comesperma polygaloides</i>	500798	Vulnerable	Dispersed	Habitat importance map	0.0000
Branching Groundsel	<i>Senecio cunninghamii</i> var. <i>cunninghamii</i>	503104	Rare	Dispersed	Habitat importance map	0.0000
Small Elachanth	<i>Elachanthus pusillus</i>	501135	Rare	Dispersed	Habitat importance map	0.0000
Grey-crowned Babbler	<i>Pomatostomus temporalis</i> <i>temporalis</i>	10443	Endangered	Dispersed	Habitat importance map	0.0000
Spreading Angianthus	<i>Angianthus brachypappus</i>	500227	Vulnerable	Dispersed	Habitat importance map	0.0000
Scrambling Twin-leaf	<i>Zygophyllum angustifolium</i>	504117	Rare	Dispersed	Habitat importance map	0.0000
Frosted Goosefoot	<i>Chenopodium desertorum</i> subsp. <i>rectum</i>	504382	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Water-fire	<i>Bergia trimera</i>	500387	Vulnerable	Dispersed	Habitat importance map	0.0000