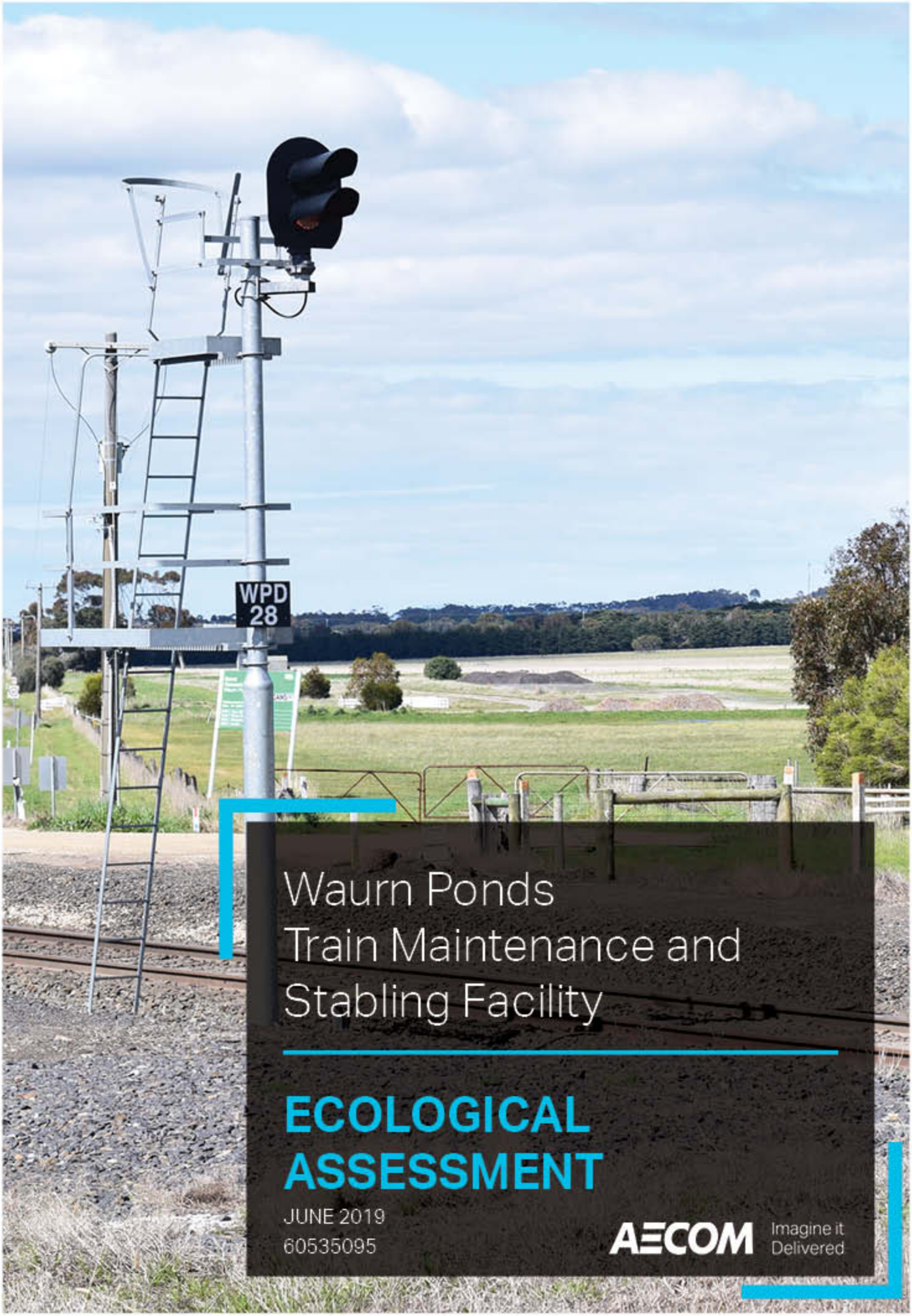

Waurn Ponds Train Maintenance and Stabling Facility

ECOLOGICAL ASSESSMENT

JUNE 2019

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AECOM Imagine it Delivered

Waurn Ponds Train Maintenance and Stabling Facility

Ecological Assessment

Client: Rail Projects Victoria

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Table of Contents

Table of Tables

1.0 Introduction

1.1 Context

AECOM Australia Pty Ltd (AECOM) was commissioned by Rail Projects Victoria (RPV) to conduct an ecological assessment of the proposed Waurn Ponds Train Maintenance and Stabling Facility, located in Waurn Ponds, Victoria.

AECOM understands that RPV is proposing to construct the Waurn Ponds Train Maintenance and Stabling Facility (the Project) on privately owned farmland located adjacent to the Geelong - Warrnambool railway line between Bogans Lane and Pettavel Road, Waurn Ponds. The assessment also includes the rail corridor from a distance of 3,500 metres east of the Bogans Lane level crossing to 1,300 metres west of the Pettavel Road level crossing to assess the implications of any required upgrades to signalling and utility services.

1.2 Scope of Work

The scope of works for the ecological assessment is to:

- Undertake a desktop review to highlight any species or vegetation communities of conservation significance that have been recorded either within, or in close proximity to the Project Land.
- Undertake a detailed field survey to map the extent and quality of any native vegetation patches within the Project Land.
- Note any incidental records of Commonwealth and State listed fauna and flora species and ecological communities within the Project Land.
- Characterise the existing ecological condition within the Project Land, as well as investigate the presence (or likely presence) of specific Commonwealth and State listed threatened flora and fauna species and communities.
- Recommend further ecological work and/or next steps that will clarify the path for regulatory approval for the proposed stabling facility.

2.0 Project Location and Description

The subject land is located approximately three kilometres from the south western extent of the Geelong urban area. The township of Moriac is located approximately six kilometres further to the west. The Facility is proposed to occur on a property located at 255 Reservoir Road, Waurn Ponds. The property has a Public Acquisition Overly (PAO) proposed on part of the property to the north and south of the existing rail line.

The subject land is currently used for farming and its surrounds has a rural character. Land to the north east of the subject land is developed as a quarry and cement works (Boral). Land immediately to the south, east and west is also currently used for rural purposes.

The directly affected property currently accommodates a family owned and operated wool farming business. The farm has been developed to include a farmhouse and farm infrastructure to the north of the proposed Facility. To the south, the property contains rural land and an additional dwelling, located on Bogans Lane close to Mt Duneed Road. Farm paddocks are connected to the dwelling and infrastructure by a central unsealed track which currently crosses the existing rail line at grade.

2.1 Land Requirements

<u>Project Land</u>

All areas of land required within the Site for the purposes of the Project:

- At 255 Reservoir Road:
  - 350 metres south of the rail reserve between Pettavel Road and Bogans Lane.

Wider Project Land

- Approximately 50 metres north of the rail corridor between Pettavel Road and Reservoir Road/Bogans Lane. It is anticipated that only a small portion of this wider project land will be required, subject to the determination of the ultimate location of the occupational crossing as part of Stage 2 of the project.

- Surrounding 255 Reservoir Road:
  - Within the existing rail corridor for approximately 3040 metres west and for 3550 metres east of Bogans Lane inclusive;
  - Within the Bogans Lane road reservation, 500 metres south of Reservoir Road;
  - Within the Pettavel Road road reservation, 170 metres north of the rail corridor and 480 metres south of the rail corridor;
  - Within the Reservoir Road road reservation, 800 metres east of, and including its intersection with Bogans Lane.

Figure 1 shows the regional context of the Project Land and Wider Project Land. Figure 2 shows the above Project Land and Wider Project Land in closer detail. The entire area depicted in Figure 2 was subject to ecological assessment.

2.2 Staged Delivery

It is proposed to deliver the Project in stages:

- Stage 1 is funded and is expected to be delivered by 2021;
- Delivery of the balance of the Facility (referred to in this report as Stage 2) is subject to further Government decision making in relation to the funding and procurement of new trains to service the Geelong Line and broader regional rail network and associated stabling and maintenance requirements. The timing for delivery of Stage 2 is unknown at this time. Stage 2 may be delivered in one or more stages depending on the outcome of this decision making.

Figure 3 presents the Concept Design for the Project. The Concept Design is indicative only and may be subject to change through the detailed design process.

2.2.1 Stage 1 infrastructure

Stage 1 is anticipated to deliver a train stabling facility with the capacity to stable 6 trains. It is anticipated that the facility will primarily cater for VLocity/DMU trains, however, it is proposed to have capacity to cater for 3 locomotive trains in the short-term while locomotives continue to be phased out of the V/Line fleet. The facility would be located south of the existing railway corridor, directly east of the existing farm laneway at the centre of the Site, and west of Bogans Lane. The Stage 1 facility would occupy an area of approximately 11 hectares, and would be in the order of 1030 metres long, 150 metres wide at its widest section and 100 metres wide at its most narrow point.

Stage 1 is anticipated to comprise:

Initial site development

- Land acquisition for the entire footprint of Stage 1 and Stage 2;
- On-site mobilisation;
- Connections to key services (electricity, water, sewerage, drainage, communications, etc.);
- Security fencing and entrance/exit gates around the perimeter of the stabling roads and Stage 1 facilities;
- Earthworks to support initial facilities and trackwork;
- Landscaping;
- Road access from Bogans Lane;

- Power and dam infrastructure works resulting from the acquisition of farmland for the facility site;
- Modified stock crossing and vehicular access to the adjacent leasehold farm property (i.e. the Boral owned land to the east);
- It is expected that the existing level crossing that serves the central farm laneway will remain in operation at its current location, potentially with some modifications as required by V/Line.

Track layout

- Six stabling roads, comprising four single ended and two double ended stabling roads;
- One single entry/exit train access point from existing rail corridor towards the eastern end of the site, just west of Bogans Lane.

Servicing facilities

- Fuelling facilities on four stabling roads;
- Power, toilet extraction and water replenishment equipment, footpaths and yard lighting provided on all of the stabling roads.

Ancillary facilities

- Upgrades to the existing signalling system within the rail corridor;
- Waste compound for rubbish and hard waste;
- Bunded fuelling area;
- Water storage and supply for stabling sidings;
- Drainage systems, including water sensitive urban design (WSUD) and the modification or relocation of farm dams;
- Telecommunications;
- Asphalt footpaths;
- CCTV to cover stabling sidings area;
- Driver and cleaner's amenities;
- Formed and sealed access roadways, with capacity to allow for B-double truck access and turnaround;
- Car parking for drivers, visitors and cleaners.

2.2.2 Stage 2 Infrastructure

As stated above, Stage 2 is subject to further Government decision making. However, it is anticipated that Stage 2 will increase the stabling capacity of the Facility to 26 trains and will introduce a train maintenance facility. Based on an indicative concept design, the Stage 2 facility is anticipated to occupy an area of approximately 46 hectares, and be in the order of 1720 metres long, 320 metres wide at its widest section and 160 metres wide at its narrowest.

Stage 2 is anticipated to comprise:

Site development

- Security fencing and entrance/exit gates around the perimeter of the Stage 2 facility;
- Earthworks to support expansion of facilities and trackwork;
- Landscaping;
- A rerouting of the farm laneway to cross the rail corridor in proximity to the Pettavel Road boundary of the Site.

Rail facilities

- Two access points from existing rail corridor, one towards the eastern end of the site and one towards the western end of the site;
- Stabling roads for up to 26 trains;
- Bio-wash facilities;
- Train wash facilities;
- A maintenance facility with 5 maintenance roads.

Servicing facilities

- Expansion of fuel and water facilities;
- A substation;
- Expansion of staff facilities;
- One gatehouse along the entry road.

Ancillary facilities may include the following:

- Drainage systems, including WSUD and the modification or relocation of farm dams;
- Telecommunications;
- Internal/external access arrangements;
- Utility protection and installation;
- Signalling infrastructure;
- Emergency access via Pettavel Road.

2.3 Construction Phase

2.3.1 Construction activities

Key construction activities anticipated for the Project include:

Table 1 Construction Activities

Stage	Construction Activities
Stage 1	
Site Development	• On-site mobilisation; • Connections to key services (electricity, water, sewerage, drainage, communications); • Security fencing and entrance/exit gates; • Earthworks to support initial facilities and trackwork; • Road access from Bogans Lane; • Initially required internal roads; and • Security and safety facilities.
Works	• Construction of internal roads, footpaths, car parking and associated sealing; • Construction of new rail tracks and associated signalling systems; • Construction of fuelling facilities; • Reinstatement and landscaping; • Installation of utility infrastructure; • Bulk earthworks; and • Construction of ancillary buildings and services.
Stage 2	
Works	• Construction of train maintenance building and internal fit out; • Construction of additional tracks and connections;

Stage	Construction Activities
	• Modifications to the fuelling facility; • Automated train wash plant and bio-wash; • Extension of stabling sidings; • Expansion of staff amenities and training facilities; • Provision of train cleaners store and amenities building; • Expansion of staff car parking; • Provision of train crew administration facilities.

Being grazed farmland, the site is already substantially cleared of vegetation. The exception is two areas of linear shelterbelt vegetation. Vegetation removal will be minimised to the extent practical and occur progressively throughout all activities.

3.2 Construction Operation

The construction duration is expected to be approximately 12 to 18 months for each stage of the Project, and subject to the Project requirements at the time. During each phase, the construction operating hours will be undertaken in accordance with the relevant protocols.

During the site preparation and construction phases, access to the site is anticipated to be provided via Bogans Lane for Stages 1 and 2. Alternative access may be possible from Pettavel Road for Stage 2.

Vehicle movements would be coordinated as required and advised by standard traffic management measures.

The preferred site access route during construction of the site is via the Geelong Ring Road. Alternatively, access to the site can be provided via Princes Highway.

3.3 Staff Numbers

During the construction phase it is expected that up to 100 personnel could be on-site at any one time.

2.4 Operational Phase

This section describes the expected operational activities.

Operational activities are subject to completion of the detailed design phase for each stage of the Project and confirmation of the operator's timetabling requirements.

2.4.1 Operation of Train Stabling and Maintenance Facilities

The Facilities are anticipated to operate 24 hours a day, seven days a week.

It is expected that trains will enter and exit the facility from turnouts constructed off the mainline. The layout of the track work would enable flexibility for the train operator and maintainers to minimise any potential conflicting train movements, and reduce the overall amount of shunting time onsite for the trains.

It is anticipated that trains will enter and exit the site during the day and night as required to serve the railway timetable. Trains may arrive/depart at 10 minute intervals during peak periods. The total number of train arrivals and departures per day is not yet known and will be subject to the operator's timetabling requirements.

It is assumed that up to 3 trains may be idling at any one point in time during Stage 1 operations. The total number of trains idling as part of Stage 2 is subject to future detailed design and operational requirements. These assumptions will be reviewed subject to the operator's timetabling requirements.

The overall operational concept for the Facility is to provide an efficient series progression for stabling, servicing and maintenance (if required) of trains from initial train arrival until its next scheduled departure into revenue service. Typical train movements would be entry through the northern most fuelling roads, continuing through to the western most shunting neck. From here the train would head

east into the stabling roads where it would reside prior to departure. If maintenance was required, trains would leave the stabling siding and enter the maintenance facility.

2.4.2 Staff numbers

It is anticipated that the Facility may accommodate 10 staff during Stage 1 of the Project and 40 staff during Stage 2, with the expectation that all staff will not be on site at any one time, and staff will work in shifts. An expected breakdown of shift allocation is as follows:

Table 2 Staff Numbers

Shift Time	Staff Percentage	Number of Staff for Stage 1	Number of Staff for Stage 2
Morning	40%	4	16
Afternoon	40%	4	16
Overnight	20%	2	8

2.4.3 Vehicle and Staff access

The primary access point to the Facility would be located to the east from Bogans Lane. The preferred access route to the site from the Geelong Ring Road would be via Anglesea Road and Reservoir Road. Vehicles will be expected to exit the site the same way.

The primary access gate is to be utilised by staff and delivery vehicles to both enter and exit the facility. Visitors and administration office personnel would be directed to the relevant area and directed to the car park after checking-in, identification and registration at the primary access gate.

For Stage 2, emergency vehicle access could be provided at the western end of the site from Pettavel Road, where required. Appropriate internal access would also be provided for emergency vehicles to the maintenance workshop, stabling tracks and main parts of the Facility.

The internal road layout would be designed to limit the need to cross tracks within the site.

Adequate car parking spaces will be provided for both maintenance and operations staff and visitors. It is expected that car parking areas will be located to minimise walking distances to site facilities.

Pedestrian movement networks would be designed to provide adequate access, minimise walking distances to site facilities and provide for personal safety.

3.0 Methods

3.1 Desktop Assessment

3.1.1 Past report synthesis

Ecology and Heritage Partners (EHP) were engaged by Opus Rail (on behalf of PTV) to undertake a biodiversity assessment of the private land at 255 Reservoir Road and the rail easement where it dissects this property (EHP, 2016). Although this assessment was undertaken against now superseded legislation, and the Project Land has since been expanded, this report provides valuable ecological context and the results of this survey have been incorporated into this report where relevant.

The private land of 255 Reservoir Road was also assessed by AECOM for the presence of Growling Grass Frog *Litoria raniformis*, listed as a vulnerable species under the *Environment Protection and Biodiversity Conservation Act 1998 (EPBC Act).* The survey was undertaken in November, 2017 (AECOM, 2017). The report is provided in **Appendix A** and summarised in Section 6.1. The lead surveyor and author of this report undertook the Growling Grass Frog Survey and has incorporated his knowledge of flora and fauna values in the private land into this assessment.

3.1.2 Ecological database review

The following ecological databases were assessed for records of significant species and ecological communities within the Project Land and surrounding landscape:

- Department of Environment and Energy (DoEE) – Protected Matters Search Tool (PMST) for EPBC Act-listed items was accessed in June 2018, incorporating a 5 kilometre (km) buffer of the Project Land.
- Victorian Department of Environment, Land, Water and Planning (DELWP) Native Vegetation Information Management (NVIM) tool and the Biodiversity Interactive Map (DELWP 2018 a & b) available at: http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit and accessed May 2018, for:
  - Location risk, modelled native vegetation patches and scattered trees and modelled habitat for rare or threatened species.
  - The extent of current and historic Ecological Vegetation Classes (EVC's).
- Victorian Biodiversity Atlas (VBA) for records of Commonwealth and State significant species incorporating a 5 km buffer of the Project Land (accessed June 2018).
- Planning Maps Online (DELWP, 2018c) and Planning Schemes Online (DELWP 2018d) to identify any biodiversity-related zoning and overlays relevant to the Project Land.
- Aerial photography of the Project Land and surrounding region.

3.1.3 Likelihood of threatened species

A likelihood of presence assessment was completed for each threatened species identified in the desktop study as either occurring, or having the potential to occur within a 5 km radius of the Project Land. The assessment was based on the presence of potential species habitat, species ecology and species records/modelling, and it determines the likelihood of species presence based on the results of the habitat assessments and the number of previous records of the species. The following likelihood categories were used to rate each species:

- **Unlikely**: No preferred habitat within the Project Land. Species unlikely to be present in the Project Land at any time or during any season.
- **Low**: Some of the preferred habitat is present within the Project Land. Species may infrequently visit the Project Land on-route to foraging resources but will not depend on habitats on Project Land for their survival. Migratory and aerial foraging birds may overfly the Project Land.
- **Moderate**: Project Land contains some of the preferred habitat to support a population of the species.

- **High**: Project Land contains the preferred habitat which is likely to support a population of the species, including roosting habitat.
- **Present**: Species directly observed in the Project Land or recently recorded in the Project Land. Preferred habitat is present within the Project Land.

This process is used to short-list species that have the potential to be impacted by the Project and therefore, prioritise field survey effort.

The desktop-based assessment was updated following the field assessment and targeted surveys.

3.2 Field-based Assessment

3.2.1 Detailed field survey

AECOM undertook a one-day field assessment (one DELWP-accredited botanist and a zoologist) to verify the results from desktop analysis and habitat modelling, and to survey for any additional ecological matters not identified during the desktop review. The Project Land was assessed on 30 May 2018, which is outside the ideal Spring/Summer survey period for temperate Australia.

Only public land and land within the rail corridor was surveyed. Access to the private property was prevented by lambing that was occurring within paddocks close to the rail corridor. The ecological values within much this Private Land has been inferred from EHP (2016), AECOM (2017) and by utilising modelled vegetation extents as per DELWP's Native Vegetation Information Management (NVIM) tool. The area of the Project Land that was not subject to on-ground survey is shown in Figure 4.

Plant specimens that could not be identified to species level in the field were identified at a later stage with reference to Walsh and Entwisle (1994, 1996, 1999) and Viridans (2009). Plant materials were collected as per AECOM's *Flora and Fauna Guarantee Act* 1988 permit (No. 10004435) protocols for the collection of plant material.

3.2.1.1 Past Field Surveys

Field surveys undertaken by EHP in 2016 occurred on 29 August and 7 September 2016. Whilst very early in the ideal Spring/Summer survey period, the extent and quality of vegetation mapped appears to be adequate and an accurate reflection of on-site values.

3.2.2 Remnant vegetation mapping and vegetation quality assessment

Remnant vegetation within the Project Land was mapped according to the prescriptions of the *'Guidelines for the removal, destruction or lopping of native vegetation'* (DELWP, 2017a). Under the Guidelines, remnant vegetation is considered to be either a remnant patch or scattered tree, where:

A remnant patch is defined as:

> *'An area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native, or*
>
> *any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or*
>
> *any mapped wetland included in the Current wetlands map, available in DELWP systems and tools' (*DELWP 2017a).

And a scattered tree is defined as:

> *'A native canopy tree that does not form part of a patch'* (DELWP 2017a).

The location of remnant patches and scattered trees was mapped using a Samsung tablet which has a spatial accuracy of approximately ± 5 metres depending on access to satellites.

A Vegetation Quality Assessment (VQA) was undertaken for all patches of remnant vegetation within the Project Land using the VQA method as described by DSE (2004).

3.2.3 Targeted Survey

Targeted surveys for Growling Grass Frog were previously completed for much of the land within the current Project Land, and the findings of this work are summarised within Section 6.1 of this report. It is considered that additional targeted surveys for Growling Grass Frog in the Project Land are not required to inform this assessment.

3.3 Assumptions and Limitations

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

- Access to the Private Land was not permitted, and ecological values here are based on past reports and/or modelled information. Where possible modelled information should be supplemented by on ground verification of land not previously assessed.
- Mapping was conducted using hand-held computer (Samsung tablet) units and aerial photo interpretation. The accuracy of the mapping is subject to the accuracy of the unit and access to satellite information (generally < 6 metres). As such, these points should not be relied on for detailed design purposes.
- The field assessment was undertaken at the end of May which is considered sub-optimal timing for ecological survey in Victoria. It is possible that migratory or transitory fauna species and cryptic or annual flora species may have been missed during the assessment. It is noted however that the disturbed nature of much of the Project Land means that any species that were missed are unlikely to have been of conservation significance.
- Regardless of flora surveys to date being conducted outside of the ideal Spring/Summer survey period, it is considered that the data collected during the field investigation, is sufficient to provide an accurate account of the ecological value of the Project Land.
- In the absence of final detailed design, all ecological values within the Project Land are assumed to be impacted by the Project. This approach is likely to overstate Project related impacts.

4.0 Results

4.1 Desktop Assessment

4.1.1 Protected Matters Search Tool results

The PMST identified a number of Matters of National Environmental Significance (MNES) that may occur, or for which suitable habitat may occur within the Project Land.

Results of the PMST search as requested on the 12th June 2018 are summarised in Table 3.

Table 3 Summary of PMST results

MNES	Number of occurrences
World Heritage Properties	None
National Heritage Places	None
Wetlands of International Significance (Ramsar Sites)	One wetland of international significance • Port Phillip Bay (western shoreline) and Bellarine Peninsula
Listed threatened species and ecological communities	Four threatened ecological communities • Grassy Eucalypt Woodland of the Victorian Volcanic Plain (Critically Endangered) • Natural Damp Grassland of the Victorian Volcanic Plain, • Natural Temperate Grasslands of the Victorian Volcanic Plain (Critically Endangered) • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (Critically Endangered) 35 listed threatened species made up of • 15 listed fauna species • 20 listed flora species
Migratory Species	15 migratory species
Commonwealth Marine Areas	None

The Ramsar-listed wetland Port Phillip Bay (western shoreline) and Bellarine Peninsula is located approximately 12 km south east of the Project Land. Due to the location and nature of the works proposed and the absence of any connected and/or permanent waterways in the Project Land, impacts to the wetland are considered unlikely with no pathway of impact apparent. The nearest major waterway is Waurn Ponds Creek which is located approximately 5 km north-west of the Project Land and does not interact with the site. As such the Port Phillip Bay (western shoreline) and Bellarine Peninsula Ramsar site is not discussed further within this report.

The full PMST results are provided in Appendix B. A list of the threatened, migratory and marine species identified by the PMST is provided in Appendix C, along with their conservation status and information on any records within close proximity to the Project Land.

4.1.2 Victorian Biodiversity Atlas

The following section provides the results of the Victorian Biodiversity Atlas (VBA) extract. For the location of threatened species records refer to Figure 5.

Fauna

Thirty-two threatened fauna species have been historically recorded within a 5 km radius of the Project Land. Of these species seven are listed under the EPBC Act, 17 under the *Victorian Flora and Fauna Guarantee Act* 1988 (FFG Act) and 24 listed by DELWP Victorian Rare or Threatened Species (VROTS) advisory list (DEPI, 2014). Species listed as near threatened and data deficient in the VROTS advisory list are not considered threatened and were excluded unless also listed under the FFG Act and or EPBC Act.

Of the EPBC Act listed species the following been recorded in the last 30 years:

- Yarra Pygmy Perch *Nannoperca obscura* (2014).
- Swift Parrot *Lathamus discolour* (2006).
- Grey-headed Flying Fox *Pteropus poliocephalus* (2002).

Flora

Eight threatened flora species have been recorded within a 5 km radius of the Project Land. Species recorded include one species listed under the, FFG Act and advisory list of threatened flora (Bellarine Gum *Eucalyptus leucoxylon subsp. bellarinensis*) and seven species listed by VROTS advisory list of threatened flora (DEPI, 2014). Species listed as poorly known in the VROTS advisory are not considered threatened and were excluded unless also listed under the FFG Act and or EPBC Act.

No records of EPBC Act listed species were identified. The Project Land is considered outside the natural distribution of advisory list species Spotted Gum *Corymbia maculata* and Giant Honey Myrtle *Melaleuca armillaris* subsp.*armillaris* which are considered likely to have been planted in the region.

4.1.3 NatureKit

The Project Land crosses two Bioregions in Victoria: Otway Plain (OtP) and the Victorian Volcanic Plain (VVP). Based on DELWP EVC modelling, there is potential for six EVCs to occur within 5 km of the Project Land (Table 4). These EVCs and their Biodiversity Conservation Status (BCS) in the Otway Plain and Victorian Volcanic Plain bioregions are mapped in Figure 5.

Table 4 EVC mapping within 5 km of the Project Land derived from DELWP (2015)

EVC No.	EVC Name	BCS	
		OtP	VVP
55	Plains Grassy Woodland	Endangered	Endangered
56	Floodplain Riparian Woodland	Endangered	Endangered
83	Swampy Riparian Woodland	Endangered	Endangered
132	Plains Grassland	Endangered	Endangered
175	Grassy Woodland	Endangered	Endangered
198	Sedgy Riparian Woodland	Depleted	Vulnerable

4.1.4 Environmental Planning Controls Review

One overlay relevant to ecology is applicable to the Project Land – a Vegetation Protection Overlay-Schedule 1 (VPO1) of the Greater Geelong Planning Scheme. The VPO1 applies to the Pettavel Road easement / reserve where it interacts with the Project Land. The objective of VPO1 is to:

- protect areas of significant indigenous vegetation,
- maintain habitat corridors for indigenous flora and fauna, and
- ensure that all development and works minimise the loss of indigenous vegetation.

A planning permit from the City of Greater Geelong is required to remove vegetation from land affected by the VPO1.

4.2 Field Assessment

4.2.1 Flora

Vegetation quality within the Project Land is generally poor, a consequence of both the historical and continuing land use as an active rail corridor, and the agricultural and extractive industry land uses that lie proximate to the Project Land. The ecological values observed reflect the pressure that the Project Land faces from weed and pest animal invasion and regular disturbance from management and maintenance activities that occur in the rail corridor.

For much of the rail corridor, grassy and broad-leaf weeds dominate the ground cover. The paddocks of the private land to the north and south of the rail corridor were observed to support a high cover of exotic species, a number of which are considered to be environmental weeds. These included Cape Weed *Arctotheca calendula*, Galenia *Gazania sp,* Artichoke Thistle *Cynara cardunculus*, Spear Thistle *Cirsium vulgare*, Soursob *Oxalis pes-caprae* and Serrated Tussock *Nassella trichotoma.* Such species were observed growing amongst exotic grass species typical of grazing properties in the area including Toowoomba Canary-grass *Phalaris aquatica*, Wild Oats *Avena fatua*, Brown-top Bent *Agrostis capillaris*, Couch *Cynodon dactylon* and Ribwort Plantain *Plantago lanceolata*. Overstorey trees within the private property appear mostly exotic or non-indigenous native, with Monterey Cypress *Cupressus macrocarpa* and Sugar Gum *Eucalyptus cladocalyx* regularly planted. EHP (2016) recorded three River Red-gums *Eucalyptus camaldulensis* growing within a linear stand of Monterey Cypress on the Private Land to the south of the rail corridor.

The rail corridor, while less intensively disturbed than the Private Land is still dominated by exotic grassy and broad-leaf weed species. Couch, Toowoomba Canary-grass, Galenaia, Wild Oats, Paspaulm *Paspalum dilatatum*, dominate the ground layer. High-threat weeds species are common, and include Fennel *Foeniculum vulgare*, Serrated Tussock, Gorse *Ulex europaeus*, Flax-leaf Broom *Genista linifolia*, Spear Thistle, and Monterey Pine *Pinus Radiata*. There is some evidence that weeds species are being controlled through the application of herbicide, and it appears likely that this is carried out from over the fence of the Private Land. It is possible that the existence of some of these weeds within the grazing land is a result of their spread from the rail corridor.

Regardless of the history of disturbance evident within the corridor and the farming land, a number of patches of native vegetation were recorded and mapped, and are considered to represent three EVCs:

- EVC 132_62- Lighter Soils Plains Grassland.
- EVC 175- Grassy Woodland.
- EVC 647- Plains Sedgy Wetland.

None of the vegetation communities identified are considered to be representative of EPBC Act-listed threatened communities identified by the PMST (refer to 3.1.1). Whilst Natural Damp Grassland of the Victorian Volcanic Plain and Natural Temperate Grasslands of the Victorian Volcanic Plain had the potential to be present, all patches of vegetation mapped were either of insufficient quality or were too small (or both) to be considered representative of these communities.

One FFG Act listed community (Western (Basalt) Plains Grassland) was identified. This community is synonymous with those patches of vegetation identified as EVC 132_62. Implications of the presence of this community are detailed in Section 7.2.2

The following provides a description of each EVC as it was observed in the field. The majority of these patches were recorded from the rail corridor and from the road reserve of Pettavel Road. Whilst AECOM did not have access to the Private Land, EHP (2016) recorded a single patch of Plains Sedgy Wetland fringing a dam near the eastern boundary of the property, and the results of this assessment are adopted within this report. This dam was assessed for Growling Grass Frog by AECOM in 2017 (refer Section 6.1).

A full list of the flora species recorded during the field assessment is provided in Appendix D. It should be noted that as per Section 3.2.1, access to the Private Land was prevented by lambing that was occurring within paddocks close to the rail line. For the land not previously assessed by EHP (2016) vegetation quality and extent was informed by modelled vegetation extents determined by DELWP's NVIM tool. Whilst this approach is suitable to provide an indication of potential vegetation impacts, surveys in spring / summer are recommended to verify modelled data and validate vegetation quality and extent.

Plate 1 Grassy Woodland along Pettavel Road

Plate 2 Grassy Woodland within the rail corridor

Plate 3 Plains Sedgy Wetland

Plate 4 Non-indigenous amenity plantings line the Boral Quarry

Plate 5 Scattered Drooping Sheoak in the rail corridor

Plate 6 Grassy weeds dominate the eastern extent of the project

4.2.1.1 EVC 132_61- Plains Grassland

Plains grassland has only been recorded from nine small, isolated patches within the rail corridor, comprising 0.097 hectares of vegetation. These patches were considered to represent two broad quality zones. Typically, these patches were identified in the landscape by a dense cover of Kangaroo Grass *Themeda triandra.* In some patches, Kangaroo Grass was the only indigenous species present. Other patches also supported Wood Sorrel *Oxalis sp.*, Spear-grass *Austrostipa sp*., Wallaby Grass *Rytidosperma sp.*, Black-anther Flax-lily *Dianella admixta* and Sheep's Burr *Acaena echinata.*

Weed species were still a dominant feature of these patches, with Phalaris, Soursob *Oxalis pes-caprae*, Fennel and Serrated Tussock threatened the persistence of each patch.

4.2.1.2 EVC 647- Plains Sedgy Wetland

Ten patches of Plains Sedgy Wetland were mapped and assessed within the Project Land, and comprised 0.173 hectares of vegetation. This EVC was recorded from lower-lying areas within the rail corridor within proximity to drainage lines, and were either holding water, or were damp underfoot during the field assessment. Within the private property, the same vegetation type was recorded from around the farm dam located close to the eastern boundary of the farming land (EHP, 2016). These patches were typically poor quality, with only Small Spike-sedge *Eleocharis acuta,* and White Purslane *Montia australasica.*

Flat Drain-sedge *Cyperus eragrostis* and Paspalum were competing against these indigenous species within these patches of vegetation.

4.2.1.3 EVC 175- Grassy Woodland

Grassy Woodland was the most common EVC recorded during the field assessment, and 18 patches (comprising 0.698 hectares) were assessed during the fieldwork. Three quality zones were recorded, with those in the road reserve of Pettavel Road supporting large old Drooping Sheoak *Allocasuarina verticillata* above a predominately weedy understorey, and those in the rail corridor often devoid of canopy species but supporting a high diversity and high cover of shrub, grass and herb species.

4.2.1.4 Land not assessed

Access to the private farming land adjacent to the rail corridor was not permitted by the landowner during the course of this fieldwork.

Whilst it is considered that the significant disturbance through intensive agricultural practices has severely limited the extent of native vegetation on the private property, EHP (2016) recorded a single patch of Plains Sedgy Wetland around a dam near the eastern boundary of the property, as well as three scattered River Red-gums. The results if their assessment has been incorporated into this work for the purposes of calculating likely vegetation removal extents.

It is noted that the Project Land boundary has expanded beyond the EHP (2016) survey area. To account for land that has yet to be directly assessed, DELWP 2005 modelled EVC extent has been utilised as a proxy for vegetation presence (and removal). This dataset revealed the potential existence of a single patch of EVC 132_62 Plains Grassland within the centre of the private land. This patch has been assigned the highest quality score of the patches of Plains Grassland that were assessed (habitat score of 0.24) and is 0.063 hectares in size.

4.2.2 Vegetation Quality Assessment (Habitat Hectares)

37 patches of native vegetation were either recorded or have been modelled in the Project Land. These patches cover 0.968 hectares of land, and comprise 0.256 habitat hectares. These patches support a total of 21 large trees and have been grouped into six quality zones based on EVC and condition as shown in Table 5.

Table 5 summarises the Habitat Hectares scores of all habitat zones. The location of habitat zones is presented Figure 6.

Table 5 Habitat hectare assessments

Habitat Zones			GW1	GW2	GW3	PSW1	PG1	PG2
EVC			175	175	175	647	132_62	132_63
Bioregional Conservation Status (BCS)			E	E	E	E	E	E
Site Condition	Large Old Trees	N/A	0	10	0	N/A	N/A	NA
	Tree Canopy Cover	N/A	0	5	0	N/A	N/A	NA
	Understorey	25	5	5	15	5	5	5
	Lack of Weeds	15	2	2	6	4	6	4
	Recruitment	10	5	3	5	3	3	0
	Organic Litter	5	2	4	5	4	3	5
	Logs	NA	0	2	4	NA	N/A	NA
	Total Site Score	55	14	31	35	16	17	14
Standardiser (× 1.36)		1.36	N/A	N/A	N/A	1.36	1.36	1.36
Landscape Context Score		25	1	1	1	1	1	12
Habitat Score		100	15	32	36	23	24	20
# of Large Old Trees			**0**	**20**	**0**	**0**	**0**	**0**
Habitat Points = Score/100		1	**0.15**	**0.33**	**0.36**	**0.23**	**0.24**	**0.2**

4.2.3 Scattered Indigenous Trees

20 scattered trees were recorded across the Project Land, comprising nine Drooping Sheoak, eight Swamp Gum *Eucalyptus ovata* and three River Red-gums (refer Table 6). Four of the Drooping Sheoak were considered to be Large Old Trees (>40 cm DBH). The location of scattered trees is mapped in Figure 6.

Table 6 Scattered Trees

Tree No.	DBH (cm)	Species	Common Name
1	40	*Eucalyptus ovata*	Swamp Gum
2	16	*Allocasuarina verticillata*	Drooping Sheoak
3	25	*Allocasuarina verticillata*	Drooping Sheoak
4	35	*Eucalyptus ovata*	Swamp Gum
5	40	*Eucalyptus ovata*	Swamp Gum
6	30	*Allocasuarina verticillata*	Drooping Sheoak
7	30	*Allocasuarina verticillata*	Drooping Sheoak
8	45	*Eucalyptus ovata*	Swamp Gum
9	12	*Allocasuarina verticillata*	Drooping Sheoak
10	45	*Allocasuarina verticillata*	Drooping Sheoak
11	50	*Allocasuarina verticillata*	Drooping Sheoak
12	60	*Allocasuarina verticillata*	Drooping Sheoak
13	38	*Eucalyptus camaldulensis*	River Red-gum
14	51	*Eucalyptus camaldulensis*	River Red-gum
15	8	*Eucalyptus camaldulensis*	River Red-gum
16	18	*Eucalyptus ovata*	Swamp Gum
17	20	*Eucalyptus ovata*	Swamp Gum
18	20	*Eucalyptus ovata*	Swamp Gum
19	20	*Eucalyptus ovata*	Swamp Gum
20	60	*Allocasuarina verticillata*	Drooping Sheoak

4.2.4 Fauna

The history of disturbance and modification of land both within and proximal to the rail corridor has limited the value of most of the Project Land for threatened fauna species. Fauna species observed consisted almost entirely of common avian species typical of peri-urban landscapes.

In all, three exotic and 20 native fauna species were identified. Native species recorded included the regionally significant Little Eagle *Hieraaetus morphnoides* and Yellow-tailed Black Cockatoo *Calyptorhynchus funereus* and locally common species such as Australian Magpie *Cracticus tibicen,* Red Rumped Parrot *Psephotus haematonotus*, New Holland Honeyeater *Phylidonyris novaehollandiae* and Common Froglet *Crinia signifera*. Exotic species recorded included a flock of Common Starling *Sturnus vulgaris*

No threatened species as recognised by the EPBC Act and/or FFG Act were recorded. A list of fauna species observed is presented in Table 10 (refer Appendix D).

4.2.4.1 Fauna habitat

The widespread clearance of much of the remnant vegetation that would once have colonised the Project Land means that fauna habitat is limited in extent and quality.

Fauna habitat within the rail corridor was typically limited to scattered tree and shrub cover. Some indigenous ground cover was observed, but where found it had either recolonised on modified land forms or was identified to be modified with a high biomass and lacking inter-tussock spacing. Rock and woody debris cover, important for the refuge of ground dwelling fauna was notably sparse to absent with the exception of railway ballast. Also within the rail corridor was a series of ephemeral drainage lines and low lying areas subject to periodic inundation. These habitat features were typically anthropogenic in origin and denude of macrophyte cover. Drainage lines that crossed the rail easement were formalised passing under the railway via brick culverts. Such habitats may provide dispersal opportunities for common fauna on a landscape scale at times of heavy precipitation but are unlikely to support aquatic fauna on a regular basis. Only one frog species, Common Froglet was identified during the field program, though it is acknowledged that timing was not ideal for the identification of such species.

Plate 7 Fauna habitat observed within rail easement - typical modified grassland (left), and drainage line right

Surrounding farming land habitats included discrete areas containing indigenous grasses, scattered remnant trees, amenity trees planted for screening and windbreaks and dams and associated drainage lines. These habitat types were either outside but directly abutting the Project Land or within Private Land unable to be accessed at the time of the assessment. The habitat values of farming land within the Project Land was partially assessed during the aforementioned targeted Growling Grass Frog surveys completed in 2017 (AECOM, 2017). The outcomes of the assessment are detailed in Section 3.1.1. Habitat within farmland is of negligible value to threatened species and its use is likely to be restricted to common frog, reptile and bird species. Dams are likely to be opportunistically visited by waterfowl, with Black Swan *Cygnus atratus* and White-necked Heron *Ardea pacifica* observed to utilise such resources. Given the presence of similar aquatic habitats in the surrounding landscape including numerous dams and Waurn Ponds Creek, the removal of these habitat features is unlikely to significantly impact on the presence of such species in the region.

Fauna habitat was also noted along Pettavel Road. Vegetation at this location is described in Section 4.2.1. This habitat consisting of a thin linear strip of canopy cover either side of the road within the road reserve provides habitat of value to woodland bird species which are likely to roost and forage in the area. Foraging resources include flowering eucalypts and Drooping She-oak, the latter of which is a food resource of the regionally significant Yellow-tailed Black Cockatoo. Although this habitat is likely to be utilised by such species on an opportunistic and occasional basis, it is likely to form a negligible component of the species overall foraging and roosting habitat.

Whilst likely to provide habitat for a diversity of common fauna, no habitat for threatened species was identified. The suitability of habitat within the Project Land for threatened species is further considered in Section 5.2.

5.0 Likelihood of Threatened Species

A likelihood of presence rating has been assigned to each threatened species identified during the desktop study. The rating has been assigned based on previous and recent survey effort, number of records within close proximity to the Project Land, appraisal of the species habitat and availability of suitable habitat, as recorded during the habitat assessment. An assessment of threatened species likelihood, as identified by the desktop assessment, is presented in Appendix C.

In summary the Project Land is considered to be of low habitat value for flora and fauna and no EPBC Act listed species are considered to have a moderate or above likelihood of occurrence.

5.1 Flora

As presented in Table 9 (refer Appendix D), no threatened flora species were considered to have a moderate or above likelihood of being present within the Project Land.

As described in Section 4.2.1, the Project Land has been subject to historical and continuing land uses including rail and agriculture, which has modified land forms and vegetation communities. Ground cover is typically dominated by pasture grasses, broad leafed weeds. Remnant trees are sparse with the exception of Pettavel Road. As such, the investigation area is not considered to provide habitat for threatened flora, with past clearing, land modification, the use of fertilisers, weed competition, and livestock grazing making it unlikely that such species could persist.

Given a lack of suitable habitat for threatened flora, targeted surveys are not required.

5.2 Fauna

Following the likelihood assessment conducted in Appendix D, Table 10, only one fauna species was considered to have a moderate or above likelihood of presence within the Project Land. The likelihood of fauna within the Project Land is further expanded on below. Growling Grass Frog was previously identified as having a likelihood of presence and was subject to targeted assessment (refer to Section 6.1).

The Western Burrowing Crayfish is considered to have a moderate likelihood of occurrence at the site. The species which is recognised as endangered by the Victorian threatened fauna advisory list (DEPI, 2014) has the potential to be present within aquatic and semiaquatic habitats such as dams and drainage lines within private farming land and to a lesser extent areas subject to inundation in the rail corridor. The species was last recorded in 2014 on Waurn Ponds Creek approximately 5 km north west of the Project Land. Waurn Ponds Creek does not flow through the Project Land, however based on mapping tributaries of the waterways it passes as close as 1.2 km north of the Project Land. No burrows consistent with the species were identified within the rail corridor. Whilst completing targeted Growling Grass Frog assessments AECOM was made aware of a large population of Yabbies in a dam on the property. No signs of Western Burrowing Crayfish were observed at the time however the claw of a large yabby *Cherax destructor* was observed on the bank of the dam (the claw was too large to have belonged to Western Burrowing Crayfish).

Swift Parrot is a highly dispersive species which breeds exclusively in Tasmania migrating to Victoria to forage during its non-breeding period. This species would only be expected to visit the Project Land on a rare and occasional basis. Likewise, Grey-headed Flying Fox may also be present on a rare and occasional basis. The closest Grey-headed Flying Fox breeding colony to the Site is in Eastern Park, Geelong, where a management plan and revegetation program is being implemented to ensure that suitable roosting habitat is available for the species into the future. For both species, vegetation within the Project Land is largely unsuitable for foraging and is considered to form a negligible component of overall foraging habitat. For this reason, both species have been assigned a low likelihood of occurrence and are not considered to warrant further investigation. Given the proximity of the site to the existing light and noise pollution associated with the Boral Cement Works, increased light and noise associated with the facility would be anticipated to be of negligible impact to Swift Parrot and Grey-headed Flying fox and other avian, and mammal species that are identified as having the potential to overfly the site. It should be noted that the existing transport (road and rail), residential and industrial land uses also provide sources of noise and light pollution in the locality.

Vegetation and landform is considered too modified to provide habitat for grassland species such as Striped Legless Lizard *Delma impar* and Golden Sun Moth *Synemon plana,* which would have historically occurred in the region. A lack of inter-tussock spacing, a lack of natural rock cover and an over-abundance of biomass mean that such species are unlikely to persist.

No suitable habitat for the historically recorded Southern Brown Bandicoot *Isoodon obesulus obesulus* and Yarra Pygmy Perch were observed. Whilst occasionally associated within linear easements such as rail corridors, Southern Brown Bandicoot typically requires dense understorey cover and is most commonly associated with swamp scrub or heathy woodland vegetation. Such habitat was notably absent within the Project Land. As described in Section 4.2.4.1 aquatic habitats interfacing with the rail corridor were ephemeral and typically of anthropogenic origin. Yarra Pygmy Perch is usually associated with permanent flowing waterways and all records for the species in the locality are associated with the main channel of Waurn Ponds Creek. As such no suitable habitat for the species was identified in the Project Land. Dwarf Galaxias *Galaxiella pusilla* as identified by the PMST is sometimes associated with drainage lines and dams as present within the Project Land, however, given a lack of past records and the sparse cover of macrophyte cover within dams, the species it has been assigned a low likelihood.

A number of migratory, wading and aquatic birds may visit the Project Land on an infrequent basis however habitat is considered marginal for such species and thus unlikely to be important for their survival. Species assigned a low likelihood of occurrence are unlikely to have any reliance on habitats present within the site and as such no impacts to such species are anticipated.

Targeted assessments to determine the presence of threatened fauna other than Growling Grass Frog (see Section 6.1) are not considered to be required. Only one species was identified as having a moderate likelihood of occurrence. This species Western Burrowing Crayfish is listed solely under the DELWP advisory list and not under commonwealth or state legislation and as such is not considered to warrant detailed assessment. Impacts to advisory list species are considered through the application of the Native Vegetation Removal Guidelines.

6.0 Targeted Assessment

One threatened species has been subject to targeted assessment. This species was Growling Grass Frog and was subject to targeted assessment in November of 2017 (AECOM, 2017). On the basis of habitat observed at the site and an analysis of past records no additional threatened species as listed under the EPBC Act and FFG Act are considered likely to occur. Therefore no additional targeted assessments are necessary to inform the ecological impacts of this project.

6.1 Growling Grass Frog

Targeted assessment for Growling Grass Frog has been completed for this project. As described in Section 3.1.1, Growling Grass Frog is listed as vulnerable under the EPBC Act. Additionally, the species is listed under the FFG Act and is considered endangered by the DELWP advisory list (DEPI, 2014). The species was subject to a targeted assessment in response to the identification of suitable species habitat within the Project Land (EHP, 2016).Surveys were completed in accordance with Commonwealth survey guidelines for the species (DEWHA, 2010). Whilst initially scoped to survey the sole dam considered to provide habitat for the species, three additional waterbodies were surveyed at the request of the landowner (refer to Figure 1 in Appendix A). The assessment therefore focussed on two dams to the north of the rail easement north and two to the south of the rail easement. Two of these four dams fall in the revised Project Land.

Despite the identification of suitable habitat, sufficient water levels and adequate macrophyte cover, no Growling Grass Frog were recorded. Notably frog activity across the surveyed waterbodies was low with recorded species limited to the Common Froglet *Crinia signifera* and Spotted Marsh Frog *Limnodynastes tasmaniensis* observed and heard in low numbers

On the basis of the outcomes of these surveys, Growling Grass Frog is considered unlikely to persist in the Project Land. Whilst not every dam within the current Project Land has been surveyed, those that haven't appear significantly degraded as a result of unimpeded stock access and are thus unlikely to support the species. Regardless, it is considered that the call playback broadcast during the survey on site) would likely have carried between the waterbodies and the response (if the species was present) would have been audible to the survey team.

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7.0 Legislative Context

7.1 Commonwealth

7.1.1 Environment Protection and Biodiversity Conservation Act 1999

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

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

Under the EPBC Act, actions[1] that are likely[2] to have a significant impact upon MNES are required to be referred to the Environment Minister for approval.

Of these MNES, listed and threatened species and ecological communities, as well as migratory species, protected under international agreements are relevant to this project. Under the EPBC Act, actions that are likely to have a significant impact upon MNES require approval from the Commonwealth Minister for the Environment. Furthermore, due to the broad nature of the PMST, which is used to query the potential occurrence of MNES, species considered not to be relevant to this study (e.g. marine mammal records returned for land-based enquiries) have been omitted from further discussion.

Implications:

No MNES were identified within the Project Land or to have the potential to be impacted by its development. As such no implications under the EPBC Act are identified and a Commonwealth referral on the basis of ecological matters is not considered warranted

7.2 Victorian

7.2.1 Planning and Environment Act 1987

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

7.2.1.1 Planning Overlays

Planning overlays are part of municipal planning schemes and are applied to areas of land to control development. Overlays may be applied to protect areas from adverse impacts or to allow easy identification of constraints in developments on that area. One or more overlays may be applied to an area. For example, VPOs are applied to areas where vegetation of significance exists. Most overlays also have schedules which specify municipal objectives and requirements.

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

Implications:

The Project Land incorporates land zoned as Farming Zone (FZ), Public Use Zone 1 – Utility (PUZ1) and Public Use Zone 4 – Transport (PUZ4) under the Greater Geelong and Surf Coast Planning Schemes.

One environmental and landscape overlay (VPO1) was identified to apply to the Project Land and is described in Section 4.1.4. A permit would be required should vegetation subject to this overlay be proposed for removal.

7.2.1.2 Native vegetation removal Guidelines

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

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

- Location risk is determined by assessing the likelihood that the removal of a small amount of native vegetation may impact the persistence of a rare or threatened species. Location risk has been determined for all of Victoria with areas being categorised as Location 1, Location 2 or Location 3. The location risk of a particular site is determined using the native vegetation location risk map available from the NVIM tool found on the DELWP website.
- Extent risk is determined by the extent of the native vegetation including the presence or absence of large trees that is proposed to be removed.

Together, these two types of risk are used to determine the assessment pathway for a permit application to remove native vegetation (DELWP, 2017a).

Table 7 presents the risk-based pathways for remnant patches of native vegetation and scattered trees.

Table 7 Remnant patch risk-based pathways

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

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

- Basic or Intermediate assessment pathway: A habitat hectare assessment is not required and modelled site condition scores can be used to assess basic and intermediate pathway applications. However, if a habitat hectare assessment report is available, then this can be used in place of modelled data for determining general offset requirements if a permit is granted.

- Detailed assessment pathway applications: A habitat-hectare assessment report must be included and accompanied by a statement outlining the steps that have been taken to ensure that impacts on biodiversity from the removal of native vegetation has been minimised. Offsets required for detailed assessment pathway applications may trigger a *species offset requirement* (if the native vegetation is habitat for rare or threatened taxa).

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

Implications:

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

In accordance to the Guidelines, the proposed vegetation removals are within Location 2.

Total possible removal comprises 1.51 hectares (and 21 Large Trees in patches), 4 Large scattered trees and 16 Small scattered trees. As such, an application to remove this extent of vegetation would be assessed under a detailed pathway. Removals of this magnitude would require on offset of 0.375 general habitat units with a minimum strategic biodiversity score of 0.279 and incorporating at least 25 large trees. The removals are not considered likely to have significant impact on any habitat for rare or threatened species, and as such, no species-specific offsets are considered likely to be necessary.

It is noted that the design of the Facility has yet to be finalised. Consideration of the 'avoid and minimise' principles of vegetation clearance should be given during the detailed design within the Project Land. Consideration should also be given to avoiding impacts to the Tree Protection Zone of trees to be retained or located on neighbouring properties. DELWP consider that any encroachment greater than 10% of the area of the TPZ requires that a tree be considered lost.

Following the provision of the detailed design and identification of the loss of scattered tree and/or vegetation patches, a Native Vegetation Removal Report (NVRR) will need to be prepared using the EnSym tool curated by DELWP. The NVRR report will provide an account of the impact and the required offsets to compensate for these impacts, and needs to be provided accompanying any planning permit application to remove native vegetation. An offset strategy for the Project should be developed once offset requirements are known and offsets must be secured prior to any vegetation clearance.

An indicative NVRR assuming the complete loss of vegetation is provided in Appendix E.

7.2.2 Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act* 1988 (FFG Act) was established to provide a legal framework for enabling and promoting the conservation of all Victoria's native flora and fauna, and to enable management of potentially threatening processes. One of the main features of the FFG Act is the listing process, whereby native species and communities of flora and fauna, and the processes that threaten native flora and fauna, are listed in the schedules of the FFG Act. This assists in identifying those species and communities that require management to survive and identifies the processes that require management to minimise the threat to native flora and fauna species and communities within Victoria.

Impacts to any flora or fauna species and communities within the Project Land listed as protected or threatened under the FFG Act, require the proponent to apply for a 'permit to take' issued by DELWP. By definition, 'take' means to kill, injure, disturb or collect.

It should be noted that the Flora and Fauna Guarantee Act amendment Bill 2018 has been introduced to parliament and this may alter the legislative implications under that Act if implemented prior to the Project achieving approvals.

Implications:

One FFG Act listed ecological community Western Basalt Plain Grassland was identified to be present within the Project Land. This ecological community aligns with mapping of EVC 132_61 as shown in Figure 5. Under the FFG Act, a permit to remove / destroy this community is required. Additionally, a number of protected flora species such as those species including members of the *Asteraceae* and *Epacridaceae* families, and the Acacia genera may be present within the Project Land. Under the FFG Act a permit to remove such species will be required.

Of further relevance to the FFG Act is that the land that is currently in private ownership will be subject to the provisions of the FFG Act following acquisition. Whilst all the Western Basalt Plain Grassland community recorded was from within the rail reserve, there remains the potential for protected flora species to exist within the private land. A 'permit to take' application for such species will need to be submitted to DELWP.

No species listed as threatened under the FFG Act are considered likely to be impacted by the Project.

7.2.3 Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act 1994* (CaLP Act) establishes a framework for management and protection of catchments through the management of land and water resources. The CaLP Act is the principal legislation relating to the management of pest plants and animals in Victoria.

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

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

Invasive species can cause environmental and economic harm or are considered to have the potential to cause such harm. They can also present risks to human health. Weed categories include:

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

CaLP Act-listed weed species present within the Project Land require that the proponent take all reasonable steps to prevent the growth and spread of regionally controlled weeds.

Implications:

Any works must be considerate of the CaLP Act and take reasonable measures to avoid the spread of CaLP listed species. Mitigation measures pertaining to the spread of weeds and pathogens should be detailed in a Construction Environment Management Plan (CEMP) prepared prior to works on the project commencing. The spread of weeds on the site could have significant implications for adjoining farming use and the mitigation of their spread and introduction should be a key consideration in the development and implementation of a CEMP.

7.2.4 Wildlife Act 1975

The *Wildlife Act 1975* (Wildlife Act) forms the procedural, administrative and operational basis for the protection and conservation of native wildlife within Victoria. The purposes of the Wildlife Act are to establish procedures in order to promote:

- the protection and conservation of wildlife
- the prevention of taxa of wildlife from becoming extinct

- the sustainable use of and access to wildlife

The Wildlife Act often sits as the default reference for other associated policies regarding wildlife. For example, the operation of the FFG Act often needs to be considered in conjunction with the provisions and procedures of the Wildlife Act as some species would be deemed protected wildlife under the Wildlife Act and protected under the FFG Act.

All fauna species indigenous to Victoria are listed as protected under the Wildlife Act. Any potential for impact to these species, including the need to translocate fauna species from the Project Land would require authorisation from DELWP under the Wildlife Act.

Implications:

The desktop assessment and aerial imagery and field assessment has identified there are large trees situated in the Project Land (particularly Pettavel Road) that may provide habitat for common arboreal species. If these trees and other habitats are removed, then salvage works may be required under the Wildlife Act for these species. Salvage and translocation works, if undertaken, would be subject to a management authorisation under the Act. Pre clearance surveys of vegetation should be undertaken to determine the presence of fauna and signs of fauna habitation, such as nests and hollows. Given that fauna usage is likely to change on a temporal basis such surveys are best timed in the period directly leading up to vegetation clearance (within three days). Trees requiring salvage (if observed) would then be marked so as that they can be felled in the presence of a suitably qualified and experienced wildlife handler.

8.0 Summary and Recommendations

8.1 Summary

This ecological assessment of the proposed Waurn Ponds Train Maintenance and Stabling Facility was completed to identify the key ecological constraints and to inform planning and environmental approvals for the Project. It has involved both desktop and detailed field assessments. The following points provide a summary of the findings of this report:

- The site exhibited signs of a history of disturbance resulting from its long-term use as a public transport corridor and proximity to agricultural and extractive industries land uses.
- Despite continuing land-use pressures, 37 remnant patches persist in the Wider Project Land.
- Patches of vegetation represent three EVCs - EVC 132_62- Lighter Soils Plains Grassland, EVC 647- Plains Sedgy Wetland and EVC 175- Grassy Woodland and cover 0.968 hectares and 0.256 habitat hectares. These patches supported 21 large trees.
- 20 scattered trees were recorded of which four are considered large trees.
- The vegetation lining Pettavel Road is covered by a VPO1 of the City of Greater Geelong planning scheme and permit requirements and decision guidelines of the VPO will need to be considered for the Project.
- One FFG Act-listed threatened Community Western Basalt Plains Grassland is present within the Project Land. This vegetation covers an extent of 0.26 ha and aligns with vegetation identified as EVC 132.
- Targeted surveys were undertaken for Growling Grass Frog (AECOM, 2017) however none were recorded from the Project Land. The species is now considered unlikely to occur and no impacts pertaining to the Project on the species are anticipated.
- No additional threatened flora and fauna species requiring targeted assessment have been identified by this or past reports prepared for the Project Land.

The points below highlight legislative implications of the Project.

8.1.1 Commonwealth

- *Environment Protection and Biodiversity Conservation Act 1999*
  - No expected impacts. A Commonwealth referral is not required.

8.1.2 Victorian

- *Flora and Fauna Guarantee Act 1988*
  - Impacts to one FFG Act listed community. A permit under the FFG Act will be required for its destruction / removal.
  - Native flora ‘protected’ under the FFG Act will require removal, and a permit for the removal will need to be obtained from DELWP.
- *Planning and Environment Act 1987*
  - Removal of up to 0.968 hectares (0.256Hha) of remnant patches.
  - Removal of up to 20 scattered trees (of which 4 are large trees).
  - Under clause 52.17 an application to the relevant planning authority for a permit to remove native vegetation would be required should vegetation be proposed for clearance.
  - Vegetation removal on Pettavel Road would require a permit in accordance VPO1 of the City of Greater Geelong planning scheme.

- *Catchment and Land Protection Act 1994*
  - A number of CaLP Act-listed weeds were recorded from the Project Land and will require appropriate management through the direction provided by a Construction Environment Management Plan (CEMP).
- *Wildlife Act, 1975*
  - All native Victorian fauna is protected under the Wildlife Act, and any salvage of such fauna during construction will require a management authorisation obtained from DELWP.

8.2 Recommendations and mitigation measures

The following recommendations are made in relation to the findings of this report:

- Consideration should be given to the 'avoid and minimise' principles as detailed in the Guidelines (DELWP, 2017a).
- A Native Vegetation Removal report should be prepared by DELWP following the finalisation of the extent of the necessary removals.
- Preparation of the following documents and management plans to minimise impacts to the environment:
  - A CEMP: ecological and environmental impacts during the construction of the project can be controlled and minimised through the preparation of a CEMP. The CEMP should include provision for a qualified zoologist to be available during vegetation clearance to salvage and translocate fauna species impacted by clearance activities (in line with the requirements of the Wildlife Act), measures to protect water quality, management measures in relation to listed weeds and pests (in line with the requirements of the CaLP Act), and measures to protect native vegetation and fauna habitat to be retained (such as the installation of fencing around the designated No Go areas).
  - Offset strategy: An offset strategy be developed to address applicable offset requirements under the P and E Act.
  - There is the potential for the works will encroach into the Tree Protection Zone of trees located on neighbouring properties. Potential impacts to these trees should be assessed by a suitably qualified arboricultural consultant following detailed design. If required, a Tree Management Plan will be prepared for the Project Land.
  - Areas of Private Land not previously assessed by AECOM or EHP should be subject to a detailed vegetation assessment during the ideal Spring/Summer survey period to validate the modelled vegetation quality and extent.

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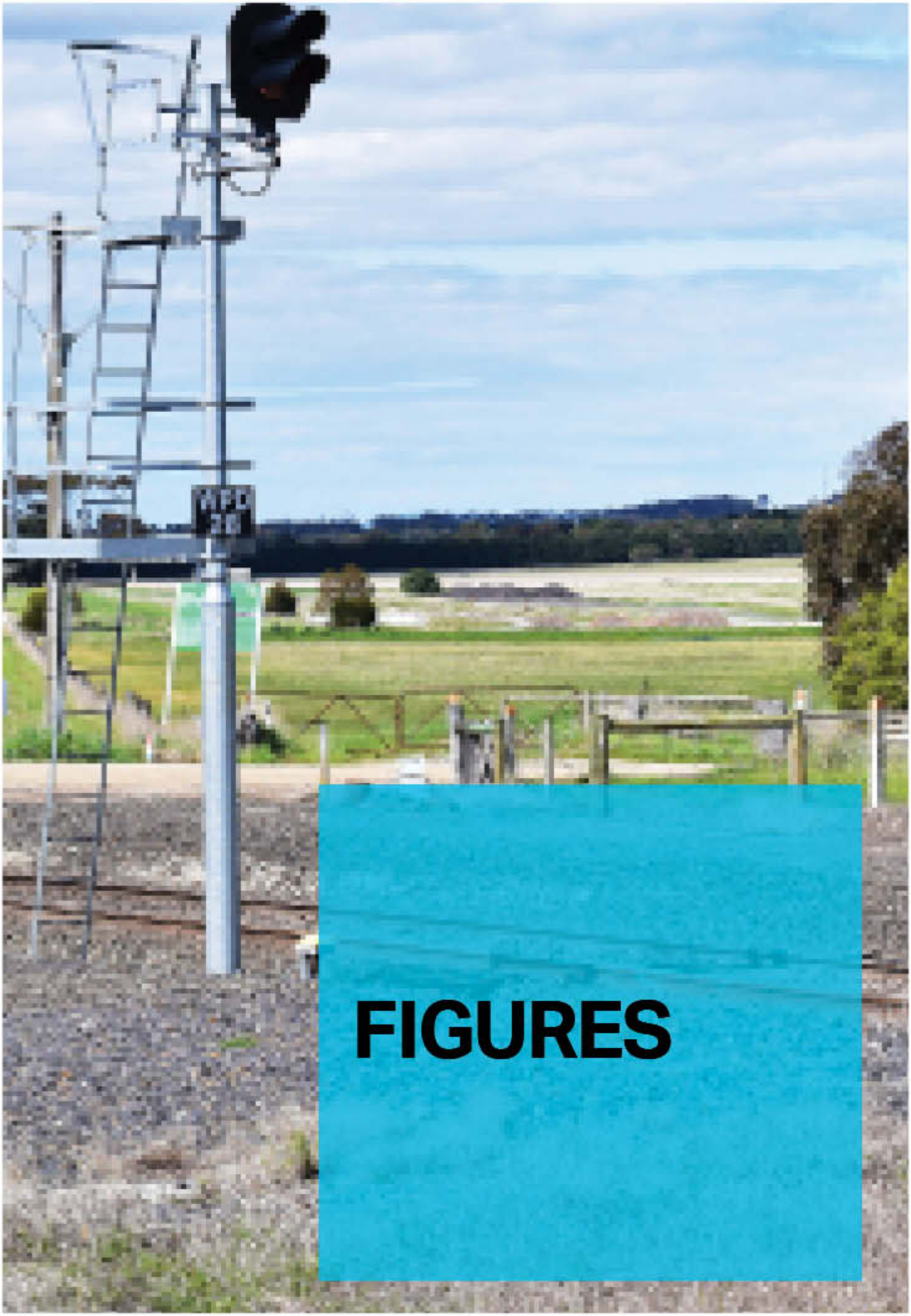


FIGURES

Figure 1 Regional Context Map

Figure 2 Project Land and Wider Project Land

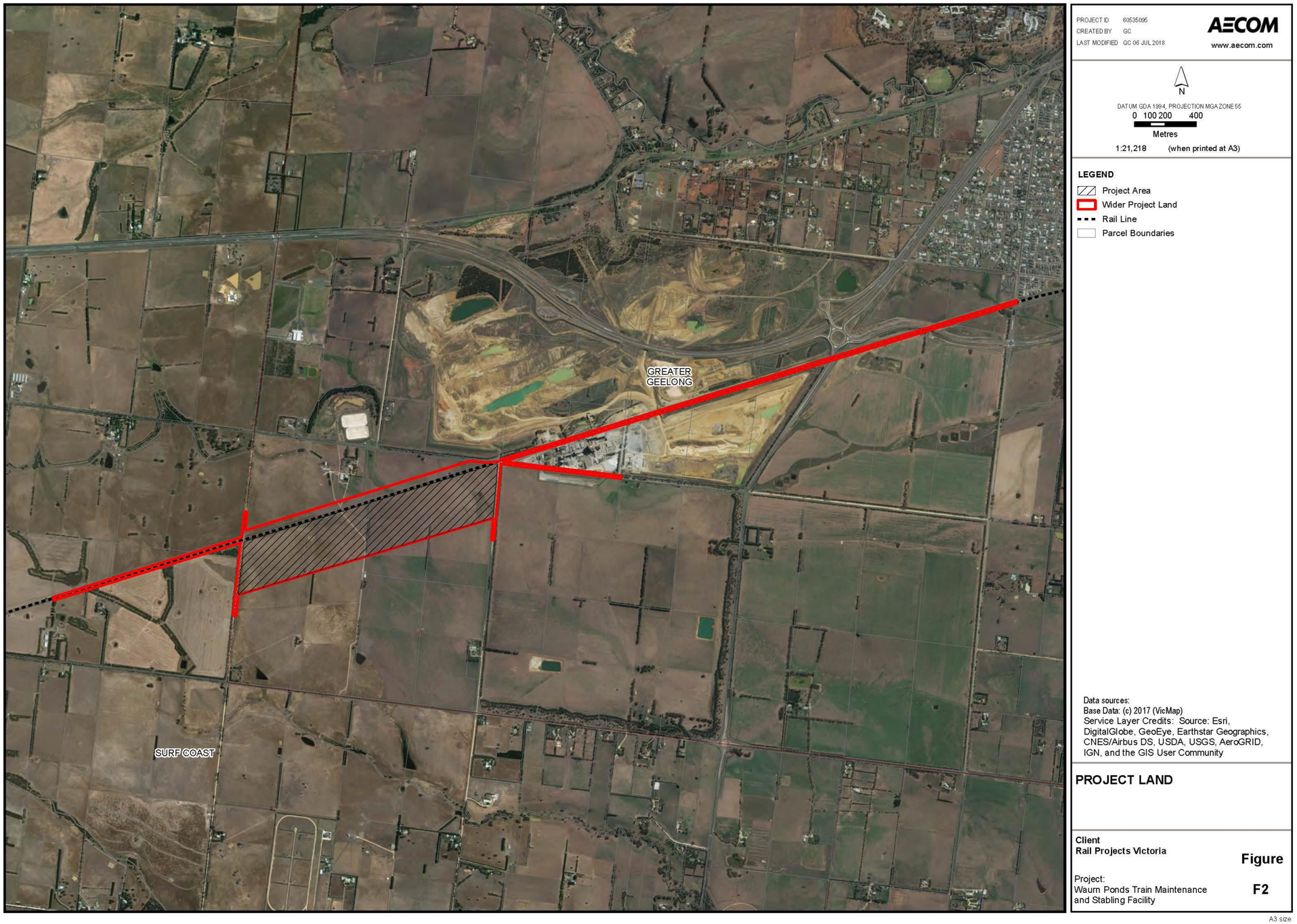


Figure 3 Concept Design

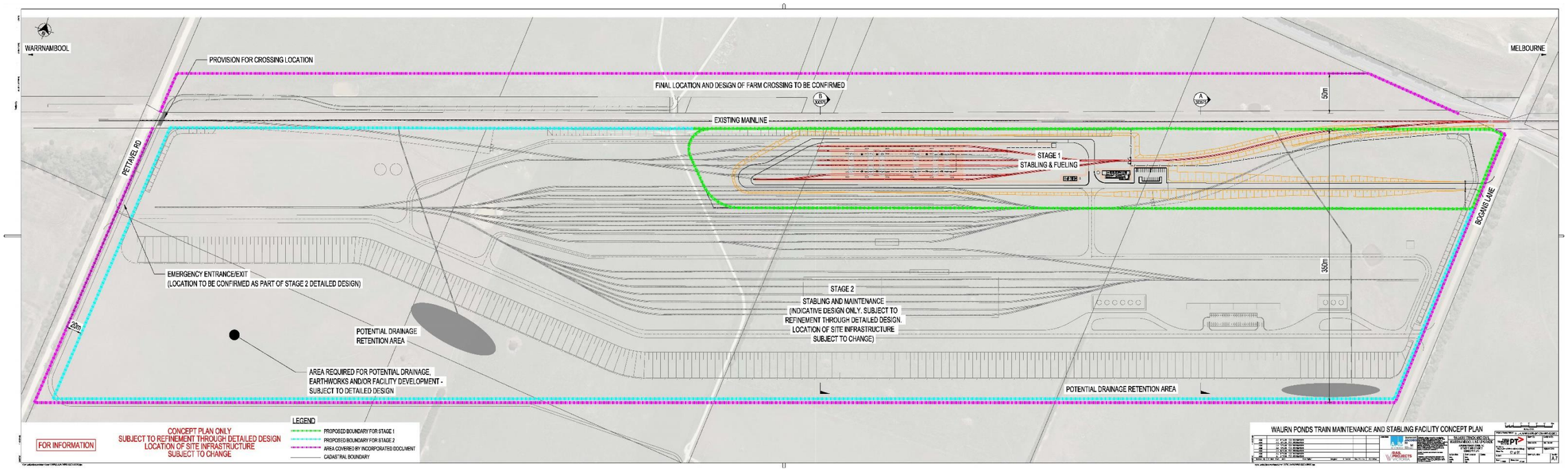


Figure 4 Project Land and Wider Project Land surveyed and not surveyed

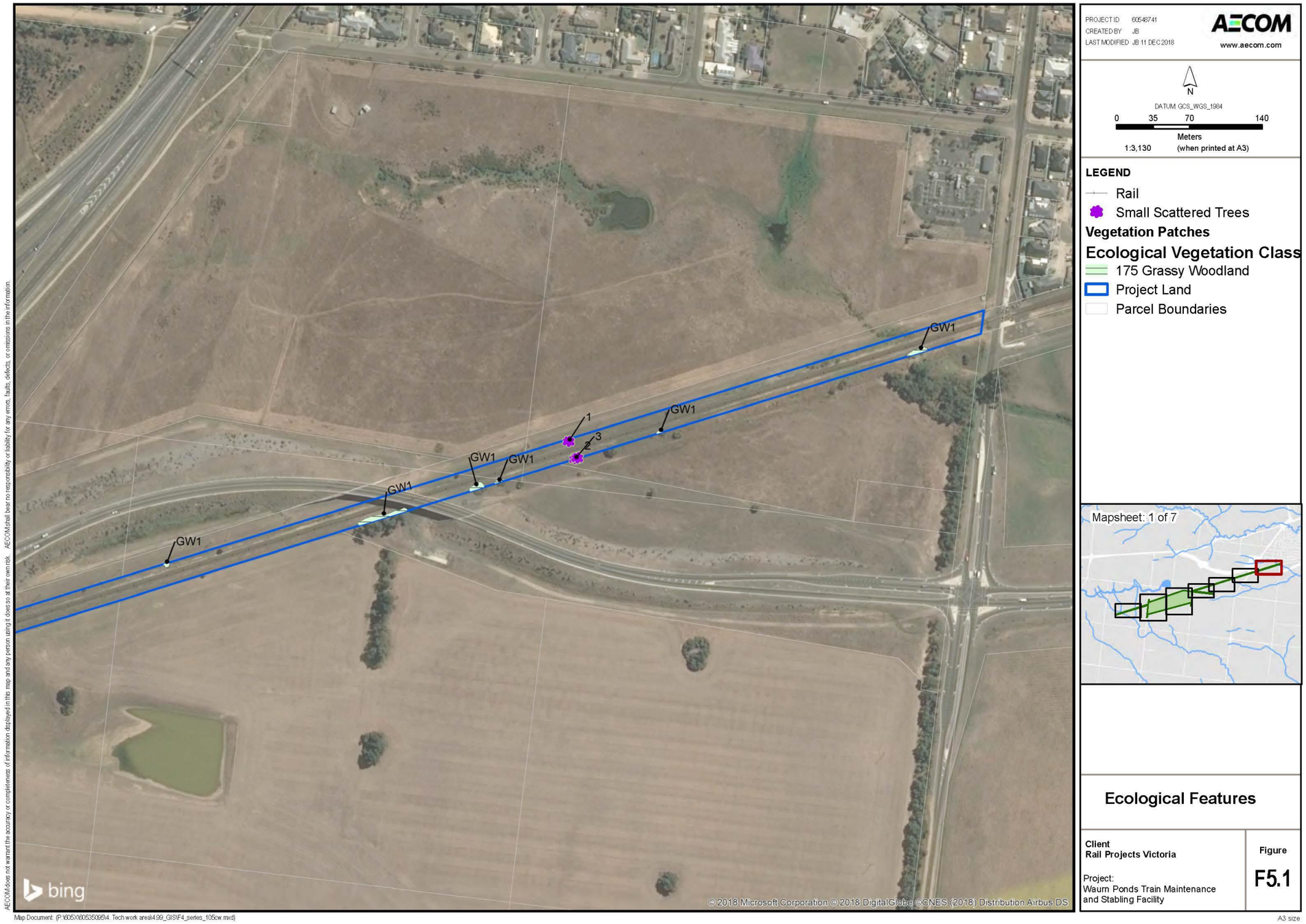


Figure 5 Victorian Biodiversity Atlas

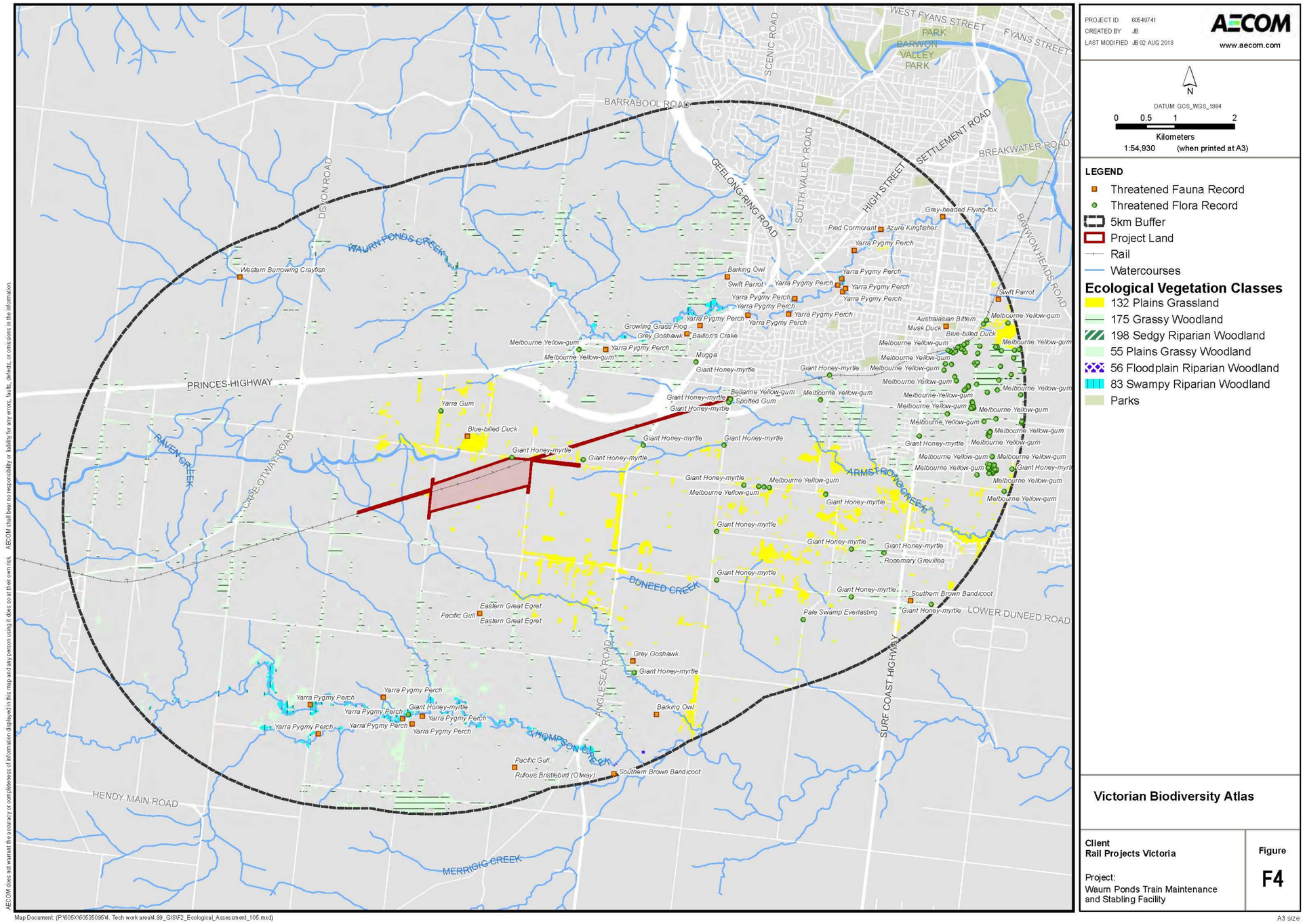
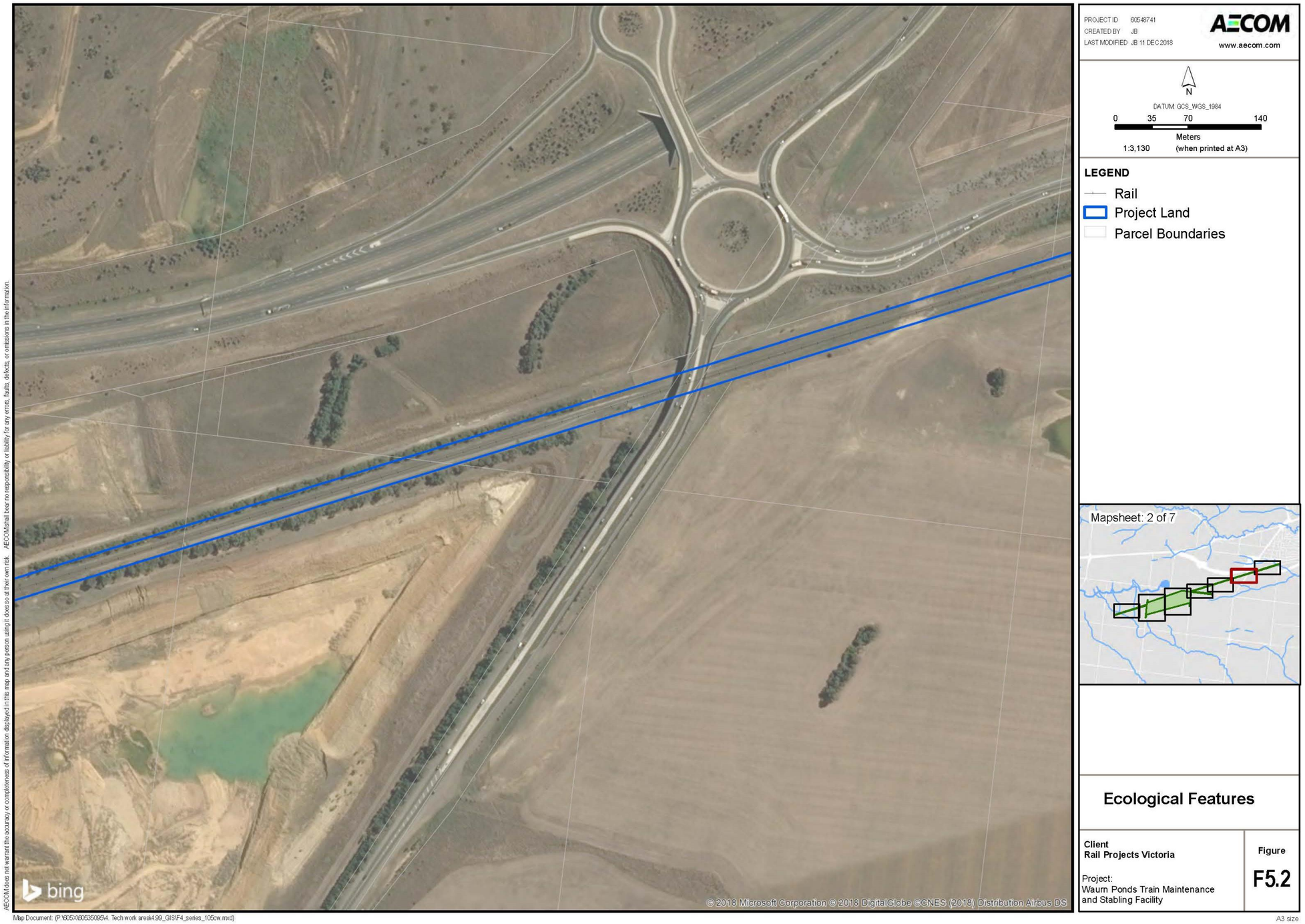


Figure 6 Ecological Features



PROJECT ID 60548741
CREATED BY JB
LAST MODIFIED JB 11 DEC 2018

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DATUM: GCS_WGS_1984

0 35 70 140
Meters
1:3,130 (when printed at A3)

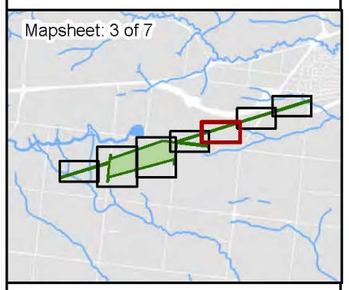
LEGEND

- Rail
- Small Scattered Trees

Vegetation Patches

Ecological Vegetation Class

- 175 Grassy Woodland
- Project Land
- Parcel Boundaries



Ecological Features

Client
Rail Projects Victoria

Project:
Waurn Ponds Train Maintenance and Stabling Facility

Figure
F5.3

A3 size

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PROJECT ID 60548741
CREATED BY JB
LAST MODIFIED JB 11 DEC 2018

AECOM
www.aecom.com

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DATUM GCS_WGS_1984

0 35 70 140
Meters
1:3,130 (when printed at A3)

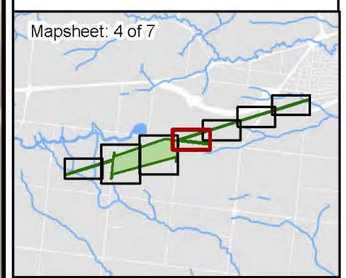
LEGEND

- Rail
- Large Scattered Trees
- Small Scattered Trees

Vegetation Patches

Ecological Vegetation Class

- 132 Plains Grassland
- 647 Plains Sedgy Wetland
- Project Land
- Parcel Boundaries
- Access restricted



Ecological Features

Client
Rail Projects Victoria

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Ecological Features

Client
Rail Projects Victoria

Project:
Waurn Ponds Train Maintenance and Stabling Facility

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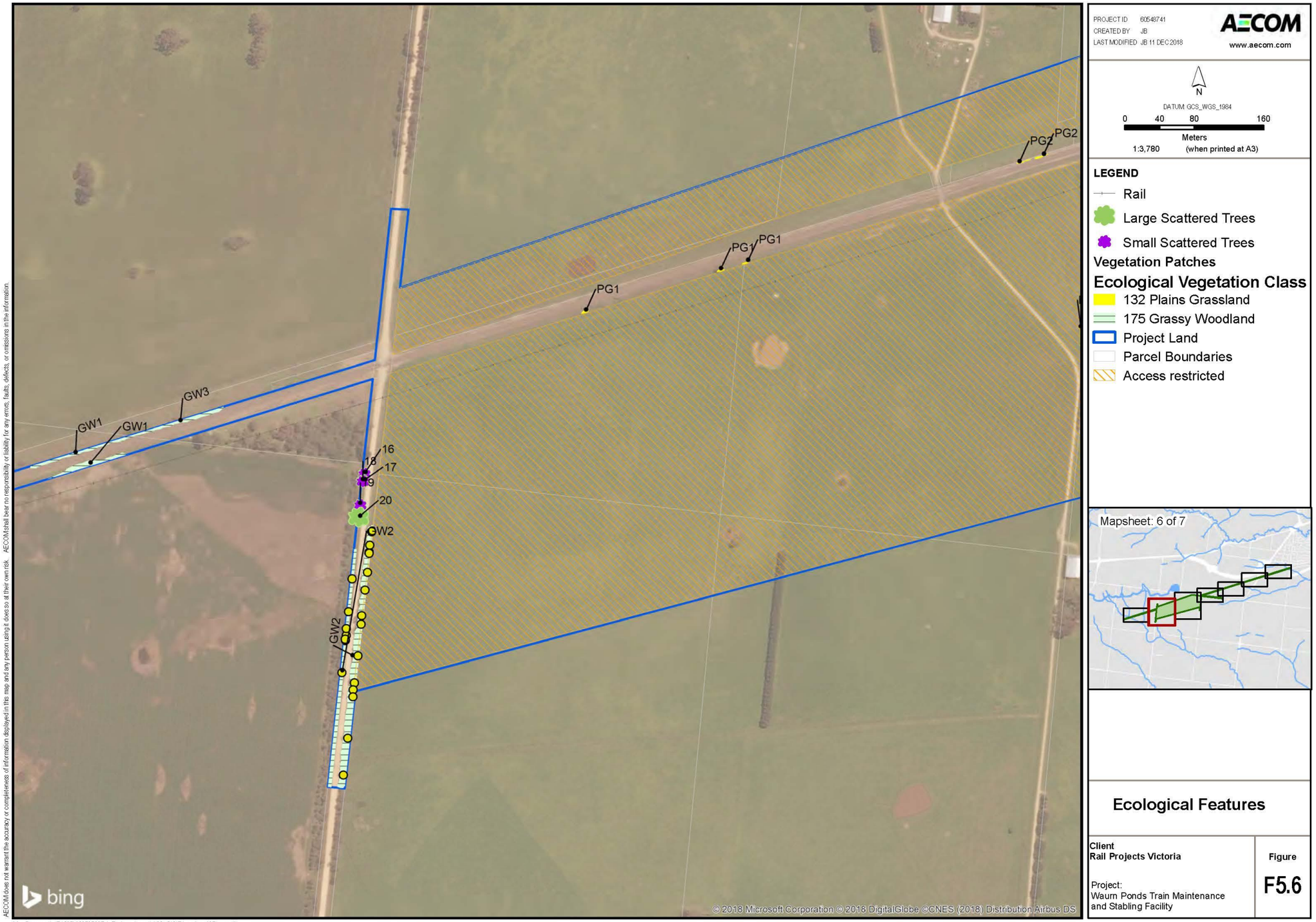

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Ecological Features

Client
Rail Projects Victoria

Project:
Waurn Ponds Train Maintenance and Stabling Facility

Figure
F5.6

PROJECT ID 60548741
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DATUM: GCS_WGS_1984

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Meters
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LEGEND

Rail

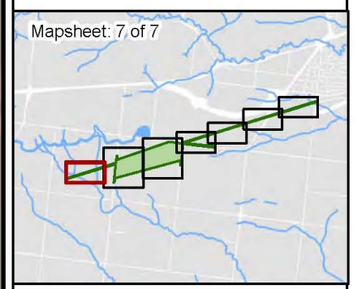
Vegetation Patches

Ecological Vegetation Class

175 Grassy Woodland

Project Land

Parcel Boundaries



Ecological Features

Client
Rail Projects Victoria

Project:
Waurn Ponds Train Maintenance and Stabling Facility

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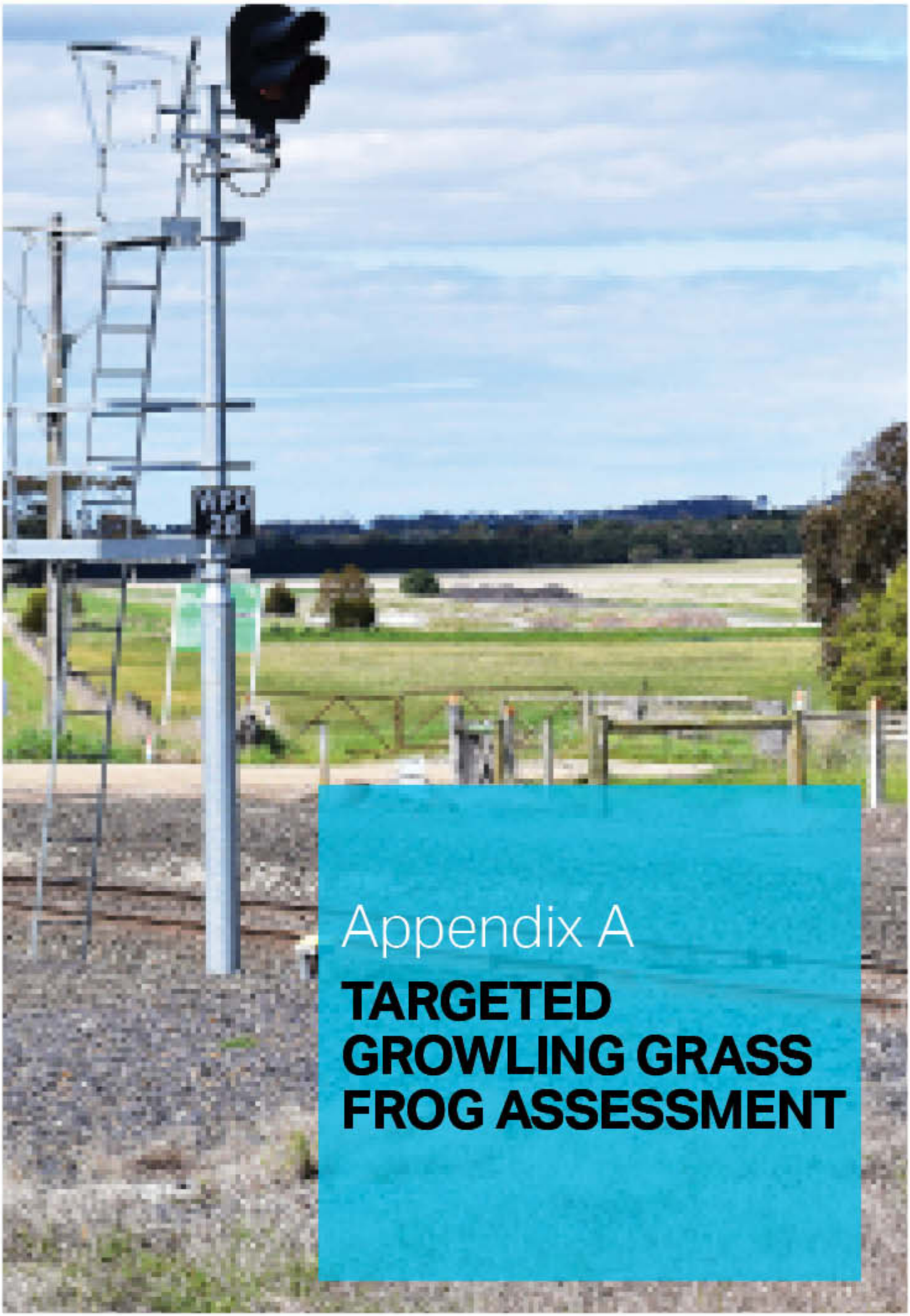

Appendix A

TARGETED GROWLING GRASS FROG ASSESSMENT

18 December 2017

Troy O'Sullivan
Public Transport Victoria
Level 8, 750 Collins Street
Docklands VIC 3008

Public Transport Victoria

Waurn Ponds Train Maintenance and Stabling Facility- Targeted Surveys Growling Grass Frog

1.0 Introduction

AECOM Australia Pty Ltd (AECOM) was commissioned by Public Transport Victoria (PTV) to conduct targeted Growling Grass Frog *Litoria raniformis* surveys at 255 Reservoir Road, Waurn Ponds, Victoria (the site). This survey supports additional planning and approvals work being completed by AECOM to facilitate the development of the Waurn Ponds Train Maintenance and Stability Facility.

AECOM understands that the site was previously subject to a biodiversity assessment by Ecology and Heritage Partners (EHP). The EHP report was published in December 2016 and completed field assessments in late August and early September of the same year. EHP (2016) identified potential habitat for Growling Grass Frog and recommended targeted assessment of the species to determine its status at the site. A determination of species presence was required to inform requirements and required project approvals under both Commonwealth and state legislation.

In the initial assessment undertaken by EHP, only one dam within the proposed development site was identified as providing potential to support Growling Grass Frog (EHP 2016). However, based on concerns voiced by the landholder and AECOM's own desktop assessment, a decision was made to expand the surveys to include a further three dams. Of these additional three dams, one occurs within the proposed development footprint and the other two upstream to the north of the existing railway corridor. Refer to Figure 1 below for the spatial locations of each of these dams.

The initial dam recommended for targeted assessment will hereafter be referred to as Dam 1 and the secondary dam within the construction footprint as Dam 2. The upstream dam on the north eastern portion of the site is referred to as Dam 3 and the upstream dam to the west as upstream Dam 4.

Figure 1. Overview of the subject site showing the surveyed dams (aerial image source: Google earth).

Site hydrology is the subject of an additional study and is described in detail in Waurn Ponds Stabling Yards – Flood Impact, Water Quality and Drainage Feasibility Report, AECOM, 2017 (DRAFT). Upstream Dams 3 and 4 connect to Dam 1 via overland flows and pipe culvert and an associated drainage line.

1.1 Species profile

Growling Grass Frog is listed as vulnerable under the Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999* (EPBC Act), under the *Flora and Fauna Guarantee Act 1988* (FFG Act) and is considered vulnerable under the Victorian Rare or Threatened Species advisory list.

The Growling Grass Frog is a member of the 'Bell Frog' species complex (*Anura: Hylidae*) which includes generally large and very colourful specimens (Barker et al,1995). The Growling Grass Frog is one of the largest species of this complex with females growing to approximately 100 millimetres (mm) (snout-vent-length) (Barker et al 1995). Colouration in adults is variable but consistently includes a pale green mid-dorsal stripe often with large black spots in a roughly linear series on the back. Dark brown warty protuberances occur on the dorsum and upper surface of the legs and the groin and posterior of the thighs are turquoise (Barker et al 1995). Tadpoles can grow to over 100 mm in length and typically metamorphose after two or three months (Heard et al 2010), although tadpoles may overwinter and metamorphose in spring (Pyke 2002, in Heard et al 2010).

The species inhabits a wide range of still water bodies across its range, including lagoons, swamps, lakes, ponds, farm dams, irrigation channels and quarries, as well as slow-flowing sections of streams and rivers (DEC, 2005). Important habitat features of favoured sites generally contain high densities of emergent and waterside vegetation and still or slow-flowing water in or near permanent freshwater waterbodies, although the species has also been recorded in low saline waters (Clemann & Gillespie, 2012).

Plate 1 Male Growling Grass Frog (Photo: Jonathan Billington)

2.0 Methods

Methods employed for the targeted survey of Growling Grass Frog at the site were consistent with Commonwealth Survey Guidelines for Australia's Threatened Frogs (DEWHA, 2010). Surveys methods were completed in full for Dams 1 and 2, whilst a simplified approach was taken to Dams 3 and 4 in which a more simplistic habitat assessment (not including water quality) was undertaken. All dams were subject to the same survey effort with regards to targeted nocturnal survey. Diurnal habitat assessments were completed in the afternoon of 14 November 2017 and nocturnal surveys were conducted after sunset on the 14 November and 27 of November, 2017.

All works were subject to the strict weed and pathogen controls as detailed in PTV letter (8 November 2017) to Ms Peta Olive, Principal, Aiken Partners Lawyers and Advisors.

2.1 Habitat assessment

In order to ensure consistency with the approach for Growling Grass Frog habitat surveys preferred by the Department of Environment Land Water and Planning (DELWP). AECOM completed the assessment as per Heard *et al* 2008. AECOM collected the required environmental parameters presented in **Table 1** as part of the field assessment.

Table 1 Data to be collected during field assessment

Parameter	Description
Location	Type, area, location
Site Description	Structure, dominant vegetation, any key flora species present, farm dam, drain, waterway etc.
Estimated surface area	An estimate of the surface area of the waterbody
Hydroperiod	As per Heard et al. 2010, Table 1
Quality of habitat	Habitat will be evaluated using criteria to assess habitats as, either negligible, low, medium or high quality. This will be based on various habitat features including water permanency to inform the suitability of sites as breeding Growling Grass Frog habitat
Percentage cover of Vegetation (E)	Estimates of emergent vegetation
Percentage cover of Vegetation (S)	Estimates of submerged vegetation
Percentage cover of Vegetation (F)	Estimates of floating vegetation
Water chemistry	Dissolved Oxygen (DO)
Water chemistry	Electrical Conductivity (EC)
Water chemistry	pH
Water chemistry	Turbidity
Other habitat features	Presence of significant habitat components that will assist with determining the likelihood of GGF occurrence.
Barriers	Note any barriers to dispersal
Photos	Photos will be taken that best characterise the condition of the water body

During habitat assessment, incidental frog observations were recorded. Surveyors also took the opportunity to systematically search habitat for the species, searching under rocks at the base of reeds and any other potential refuge present.

2.2 Targeted survey

Diurnal and nocturnal surveys were conducted with reference to Federal survey guidelines for the species, specifically (DEWHA. 2010) Survey guidelines for Australia's threatened frogs.

AECOM undertook targeted Growling Grass Frog survey over two non-consecutive nights. Targeted survey consisted of minimum 90 minute visits to ensure a 90% probability of detecting the Growling Grass Frog. Surveys were undertaken by suitably qualified and experienced ecologists.

On initial inspection of habitat, surveyors quietly listened for the species. If the species was not heard, surveyors then imitated the advertisement call of male Growling Grass Frog for several minutes (using a recording broadcast on a portable speaker) to elicit a response from any adult males residing within the waterbody. This was then followed by quiet listening for several minutes. Call playback was then followed by a systematic spotlight search for Growling Grass Frog on the banks, floating vegetation, areas of emergent vegetation, and terrestrial habitat within 10 metres of identified species habitat.

All frog species detected during the surveys were recorded. A broad estimate of the number of individuals was also made. Weather conditions at the commencement of each survey were also recorded

3.0 Results

3.1 Habitat assessment

Habitat is described by waterbody below. The results of water-quality sampling are presented in **Appendix A**.

3.1.1 Dam 1

Dam 1 is a circular dam with a diameter of approximately 35 meters. The dam appears to have a relatively gradual depth profile with margins colonised by emergent macrophyte cover, with Small Spike Rush *Eleocharis acuta* dominant. Other vegetation present was noted to include Swamp Wallaby Grass *Amphibromus sp.* whilst banks were dominated by exotic pasture grasses such as Perennial Rye *Lolium perenne* and Barley grasses *Hordeum vulgare* (improved pasture) and Toowoomba Canary-grass *Phalaris aquatica*. Whilst the margins were dominated by emergent macrophyte cover the dam was largely made up of open water with macrophyte cover only accounting for about 10% -15% of its total area. Floating and submerged macrophyte cover was lacking (less than 1%) and the dam is assumed as having a semi-permanent hydro-period.

Stock access to the dam appeared minimal, with old fence posts (star pickets) and wire suggesting it was in the past excluded from stock access, though fencing was in a state of disrepair.

The dam is considered to provide moderate quality habitat for Growling Grass Frog.

The dam is fed by a semi continuous drainage channel to the north. The drainage channel varied in depth and width and connected to Dam 3 to the north of the rail easement via a pipe culvert. Deeper, wider sections of the channel included Small Spike Rush, however most sections were colonised by exotic pasture species. The drainage channel provided low to moderate dispersal habitat for Growling Grass Frog and if the species was present would facilitate species movement between waterbodies.

Plate 2 Dam 1 western bank looking east (above), shallow margin dominated by Small Spike Rush (below). above showing the

3.1.2 Dam 2

Dam 2 is a large open dam with approximate dimensions of 25 x 30 meters and is assumed to have a semi-permanent hydro period. The dam was noted to be completely devoid of macrophyte cover, with bare edges and banks dominated by improved pasture. The dam provided little to no suitable habitat for Growling Grass Frog and there was little to no refuge for the species within 10 meters of the waterline. Signs of stock assess were prevalent with some pugging of the banks and a flock of sheep present at the time of assessment.

The dam is considered to provide low quality dispersal habitat for Growling Grass Frog. Prior to survey AECOM was informed by the landowner that the dam contained a large population of yabbies and was frequented by Black Swan *Cygnus atratus.* This was verified by the observation of a large yabby claw *Cherax destructor* on the dam's bank.

Plate 3 Dam 2, north eastern bank looking south

3.1.3 Dam 3

Dam 3 is located to the north of the existing rail easement and connecting to Dam 1 via the aforementioned drainage channel. The dam has an oval shape with approximate dimensions of 15x10 meters. Like Dam 1, the dam was noted to largely comprise of open water but unlike Dam 1, macrophyte cover included both emergent and submerged/floating vegetation around its perimeter. Emergent macrophyte cover was again dominated by Small Spike Rush with a small bed of Bulrush *Typha sp*. present in the dam's north western corner. Total emergent macrophyte cover was approximately 15%. Floating vegetation appeared to be in a state of die off with filamentous algae also prevalent and accounted for roughly 10% cover. Bank vegetation was gain dominated by improved pasture. Based on structure The dam is considered to provide moderate quality dispersal habitat for Growling Grass Frog. Suitability for breeding is considered low to negligible.

Plate 4 Dam 3, south western bank looking north

3.1.4 Dam 4

Dam 4 is a large shallow densely vegetated dam. Macrophyte cover included a variety of species including Large Club Rush *Schenoplectus validus*, Tall Spike Rush *Eleocharis sphacelata*, Small Spike Rush, Sedges *Cyperus sp.*, Water Ribbon *Triglochin*, an unidentified species of large water lily *Nymphaea sp.* and Bulrush. Toowoomba Canary Grass was also prevalent. Emergent vegetation was dominant and accounted for 70% of the dams surface area, with greatest densities at the dams centre. The reaming 30% was dominated by floating and submerged vegetation, with open water accounting less than 2% of the dams total area. Water depth was difficult to determine but is assumed to be shallow and the dam is likely to be ephemeral. The southern portion of the dam was shaded by a mature Pepper Corn Tree *Schinus molle.* The dam appeared to be fed by via a culvert and overland flows from the road reserve of Reservoir Road and drained into inundated areas of open pasture to the south. Despite the dam's diversity of macrophyte species, it was considered to provide only low quality habitat for Growling Grass Frog. Macrophyte cover observed at such a density that it chocked the waterbody and would likely be too dense to be suitable for the species, with thick beds of Bulrush likely to form a barrier to species dispersal.

Plate 5 Dam 4, looking south

3.2 Species status

Conditions at the time of survey are summarised in Table 2 below. All surveys were undertaken in suitable weather conditions with high ambient temperatures, low wind and high humidity all conducive to species detection.

Table 2 weather conditions

Date	14/11/2017	29/11/2017
Temperature	26.4	28.9
humidity	39%	47%
Wind	Still	gentle easterly, 13km/h
Cloud cover	1/8	7/8 clearing to 3/8

Despite ideal survey conditions and the presence of suitable habitat on site, no Growling Grass Frog were heard or observed and the species is considered unlikely to present. Observations by waterbody are presented in

Table 3 below. In total, only two species were recorded across the four waterbodies. These species, Common Froglet *Crinia signifera* and Spotted Marsh Frog *Limnodynastes tasmaniensis,* are considered widespread, common species in Victoria*.* Frog abundance was low and species were typically heard calling within waterbodies vegetated margins and associated drainage lines / soaks.

Table 3 Survey results

Date	14/11/2017	29/11/2017
Dam 1	5 Spotted Marsh Frog, 2 Common Froglet.	5 Spotted Marsh Frog, Spotted Marsh Frog and Common Froglet calling from drainage line
Dam 2	Nothing heard, one Spotted Marsh Frog seen on southern bank	3 Spotted Marsh Frog
Dam 3	2 Spotted Marsh Frog, 1 Common Froglet	2 Common Froglet, 1 Spotted Marsh Frog
Dam 4	No frog activity	1 Common Froglet

In addition to the above, the exotic fish species Mosquito Fish *Gambusia holbrooki* was also observed in dam 1 and upstream dam 3. Yabbies where also observed at Dam 3 and a Tawny Frog Mouth *Podargus strigoides* was observed perching in the Pepper Corn Tree at Dam 4.

4.0 Discussion

Growling Grass Frog was not detected and given the above demonstrated survey effort is considered unlikely to occur on the site. Despite suitable habitat, ideal survey timing and conditions, frog activity was notably low (in relative terms). The reason for the paucity of frog observations is unknown and may relate to past or surrounding land uses. Past stocking of dams with fish and /or yabbies is likely to have also compromised habitat suitability.

Whilst waterbodies present are considered to provide aquatic habitat for common frogs and waterfowl, habitat is not considered significant on a regional or landscape scale. Dams present are likely to provide similar habitat to those present across the broader landscape and to be of lesser value when compared to nearby biodiversity hotspots such as Armstrong Creek, Freshwater Creek, Reedy Lake and associated tributaries of the Barwon River. This is supported by modelled information accessible from NatureKit, an extract of which is provided below (DELWP, 2017). Approximate site location is shown by a blue dot.

The mapping below provides an indication of the sites strategic biodiversity value, with the majority of the site considered to fall in the category of 30.1 – 50 (3/8). Strategic biodiversity value modelling was created by DELWP by combining and analysing biodiversity information (such as threatened species records and vegetation mapping) across Victoria. The objective of this analysis was to rank all locations across Victoria for their ability to support threatened (VROT) vertebrate fauna, vascular flora, and the full range of Victoria's native vegetation and inform the decision making process. Under the model, those areas with lower scores are considered more suitable for development.

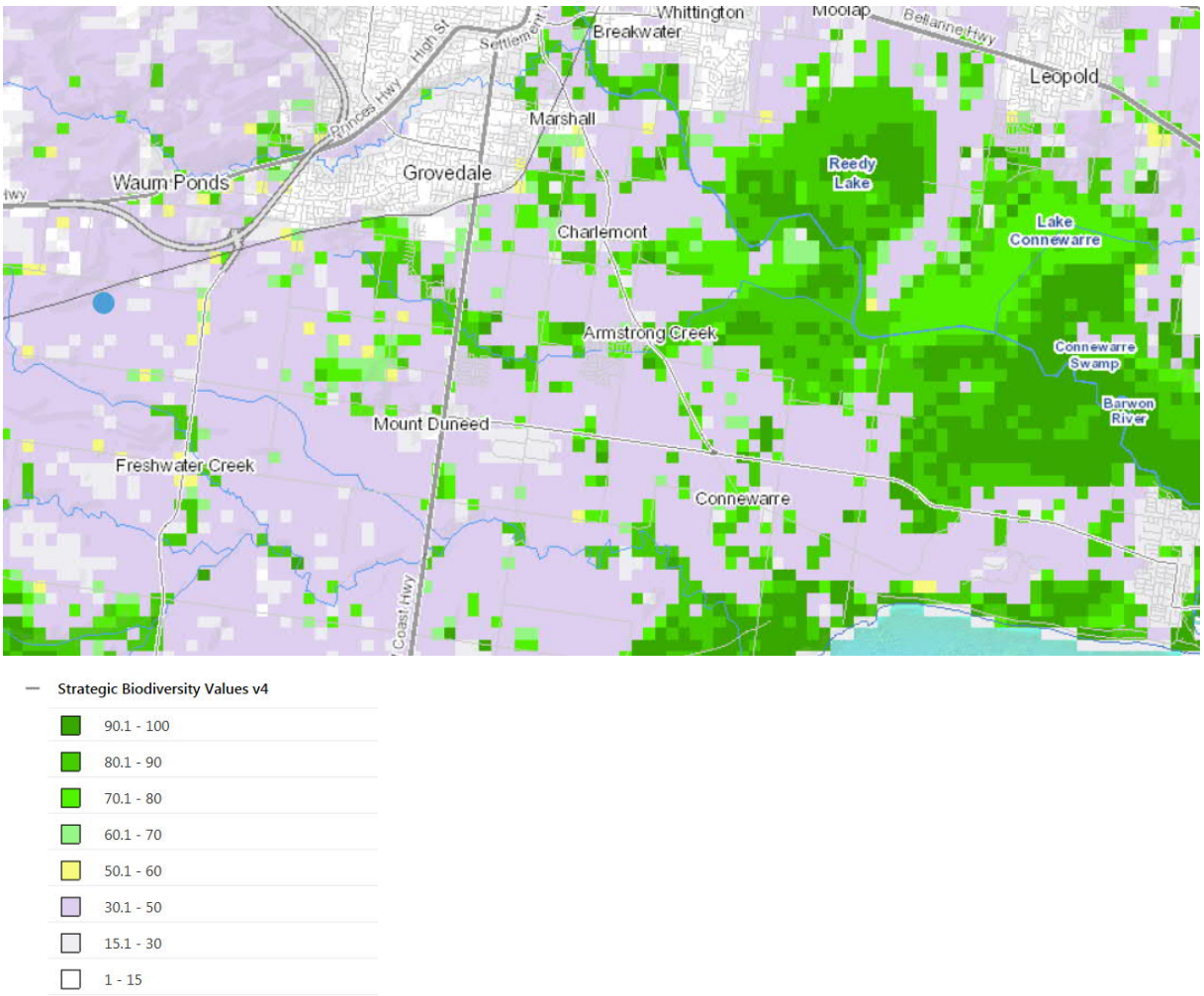

Figure 2 Strategic Biodiversity value modelling (DELWP 2017)

5.0 Conclusion and recommendations

It is considered that Growling Grass Frog is not present at the site. No further action in relation to this species is recommended. Works completed at the site should be subject to best practice spill, runoff and sedimentation mitigation measures. Protocols to minimise the spread of weeds and pathogens should also be followed. Such measures should be detailed in a Construction Environment Management Plan (CEMP) to be developed prior to works commencing.

Acknowledgments

AECOM would like to thank the landholders for granting access to their property, meeting its representatives on site and informing surveys.

Kind regards

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Appendix A

Water quality

AECOM Imagine it. Delivered.

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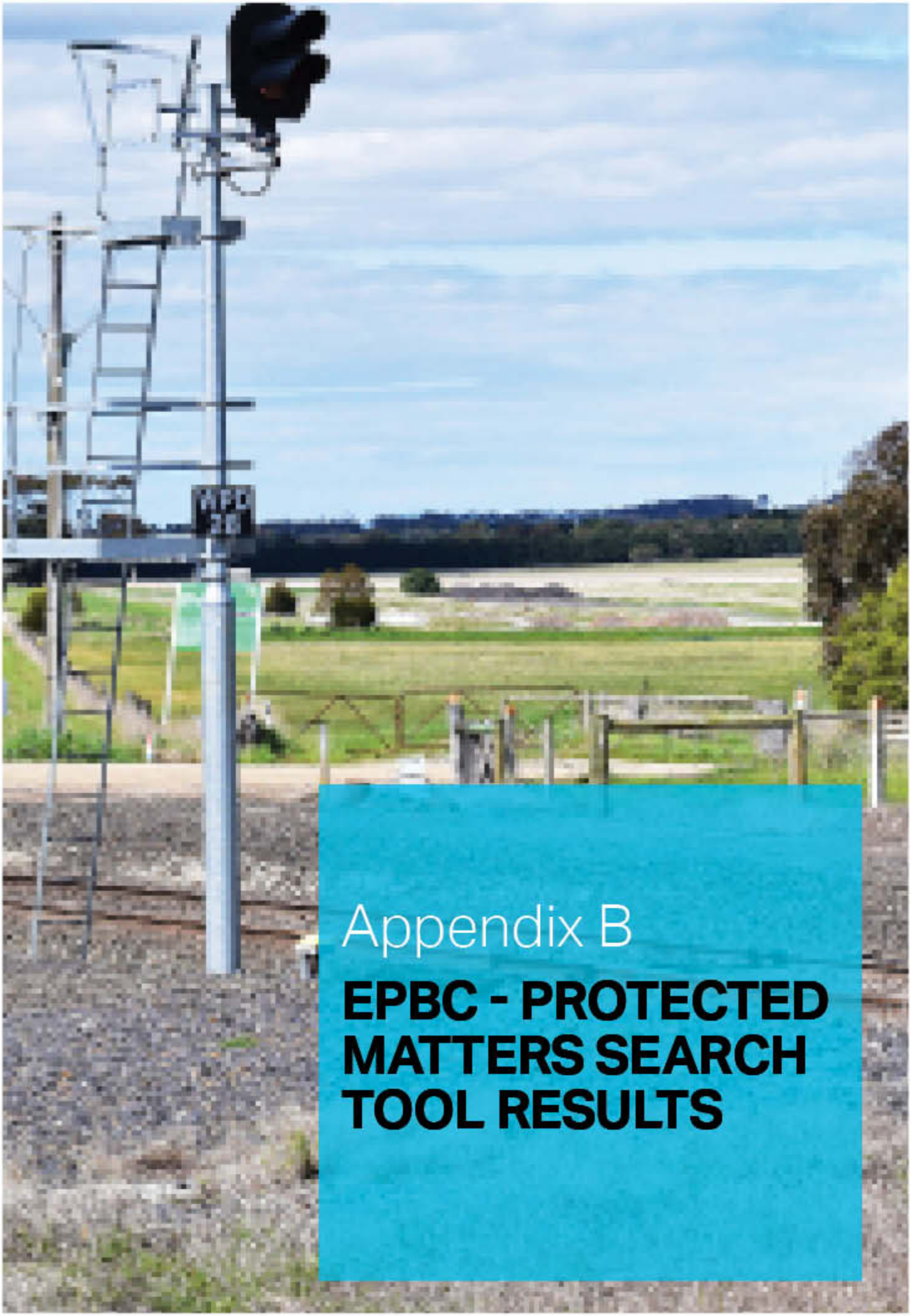
Appendix A Water quality

Table 4 Water quality dam 1

Parameter	Value
pH	6.97
Conductivity (µs/cm)	247
Turbidity (NTU)	22.7
Temperature (°C)	21.4
DO (mg/L)	8.02

Table 5 Water quality dam 2

Parameter	Value
pH	8.11
Conductivity (µs/cm)	323
Turbidity (NTU)	144.3
Temperature (°C)	27.6
DO (mg/L)	7.81



Appendix B

EPBC - PROTECTED MATTERS SEARCH TOOL RESULTS

Australian Government

Department of the Environment and Energy

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected.

Information on the coverage of this report and qualifications on data supporting this report are contained in the caveat at the end of the report.

Information is available about Environment Assessments and the EPBC Act including significance guidelines, forms and application process details.

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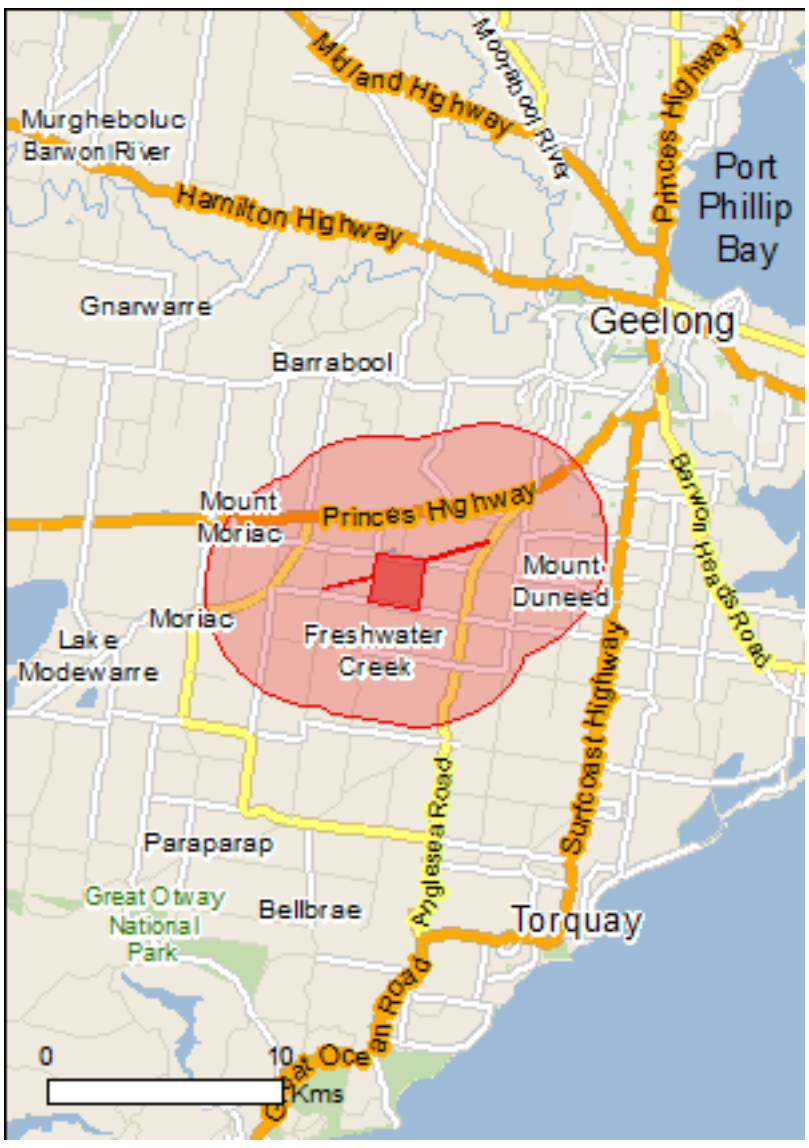

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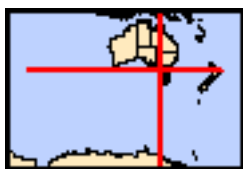
Coordinates

Buffer: 5.0Km



Summary

Matters of National Environmental Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	None
Wetlands of International Importance:	1
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	4
Listed Threatened Species:	35
Listed Migratory Species:	15

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at http://www.environment.gov.au/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Land:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	22
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Commonwealth Reserves Marine:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have nominated.

State and Territory Reserves:	None
Regional Forest Agreements:	1
Invasive Species:	40
Nationally Important Wetlands:	None
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar)	[Resource Information]
Name	Proximity
Port phillip bay (western shoreline) and bellarine peninsula	Within 10km of Ramsar

Listed Threatened Ecological Communities		[Resource Information]
For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.		
Name	Status	Type of Presence
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community known to occur within area
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community may occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species		[Resource Information]
Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat known to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pedionomus torquatus Plains-wanderer [906]	Critically Endangered	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat likely to occur within area
Nannoperca obscura Yarra Pygmy Perch [26177]	Vulnerable	Species or species habitat likely to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat likely to occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat may occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat may occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat may occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Plants		
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat likely to occur within area
Caladenia pumila Dwarf Spider-orchid [4155]	Critically Endangered	Species or species habitat likely to occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat likely to occur within area
Lachnagrostis adamsonii Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat may occur within area
Leucochrysum albicans var. tricolor Hoary Sunray, Grassland Paper-daisy [56204]	Endangered	Species or species habitat may occur within area
Pimelea spinescens subsp. spinescens Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat likely to occur within area
Prasophyllum frenchii Maroon Leek-orchid, Slaty Leek-orchid, Stout	Endangered	Species or species

Name	Status	Type of Presence
Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]		habitat likely to occur within area
Prasophyllum validum Sturdy Leek-orchid [10268]	Vulnerable	Species or species habitat may occur within area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis cucullata Leafy Greenhood [15459]	Vulnerable	Species or species habitat may occur within area
Rutidosis leptorrhynchoides Button Wrinklewort [7384]	Endangered	Species or species habitat likely to occur within area
Senecio macrocarpus Large-fruit Fireweed, Large-fruit Groundsel [16333]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat may occur within area
Thelymitra matthewsii Spiral Sun-orchid [4168]	Vulnerable	Species or species habitat may occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
Delma impar Striped Legless Lizard [1649]	Vulnerable	Species or species habitat may occur within area

Listed Migratory Species

[Resource Information]

* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.

Name	Threatened	Type of Presence
Migratory Marine Birds		
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species

Name	Threatened	Type of Presence
		habitat likely to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Other Matters Protected by the EPBC Act

Listed Marine Species		[Resource Information]
* Species is listed under a different scientific name on the EPBC Act - Threatened Species list.		
Name	Threatened	Type of Presence
Birds		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat likely to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat may occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within

Name	Threatened	Type of Presence
		area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat may occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Species or species habitat likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area
Pandion haliaetus Osprey [952]		Species or species habitat may occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat likely to occur within area
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat may occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat likely to occur within area

Extra Information

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
West Victoria RFA	Victoria

Invasive Species [Resource Information]

Weeds reported here are the 20 species of national significance (WoNS), along with other introduced plants that are considered by the States and Territories to pose a particularly significant threat to biodiversity. The following feral animals are reported: Goat, Red Fox, Cat, Rabbit, Pig, Water Buffalo and Cane Toad. Maps from Landscape Health Project, National Land and Water Resouces Audit, 2001.

Name	Status	Type of Presence
Birds		
Acridotheres tristis Common Myna, Indian Myna [387]		Species or species habitat likely to occur within area
Alauda arvensis Skylark [656]		Species or species habitat likely to occur within area
Anas platyrhynchos Mallard [974]		Species or species habitat likely to occur within area
Carduelis carduelis European Goldfinch [403]		Species or species habitat likely to occur within area
Carduelis chloris European Greenfinch [404]		Species or species habitat likely to occur within area
Columba livia Rock Pigeon, Rock Dove, Domestic Pigeon [803]		Species or species habitat likely to occur within area
Passer domesticus House Sparrow [405]		Species or species habitat likely to occur within area
Passer montanus Eurasian Tree Sparrow [406]		Species or species habitat likely to occur within area
Streptopelia chinensis Spotted Turtle-Dove [780]		Species or species habitat likely to occur within area
Sturnus vulgaris Common Starling [389]		Species or species habitat likely to occur within area
Turdus merula Common Blackbird, Eurasian Blackbird [596]		Species or species habitat likely to occur within area
Turdus philomelos Song Thrush [597]		Species or species habitat likely to occur within area
Mammals		
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Felis catus Cat, House Cat, Domestic Cat [19]		Species or species habitat likely to occur within area
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Austrocylindropuntia spp. Prickly Pears [85132]		Species or species habitat likely to occur within area
Cenchrus ciliaris Buffel-grass, Black Buffel-grass [20213]		Species or species habitat may occur within area
Chrysanthemoides monilifera Bitou Bush, Boneseed [18983]		Species or species habitat may occur within area
Chrysanthemoides monilifera subsp. monilifera Boneseed [16905]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species

Name	Status	Type of Presence
		habitat likely to occur within area
Genista linifolia Flax-leaved Broom, Mediterranean Broom, Flax Broom [2800]		Species or species habitat likely to occur within area
Genista monspessulana Montpellier Broom, Cape Broom, Canary Broom, Common Broom, French Broom, Soft Broom [20126]		Species or species habitat likely to occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Rubus fruticosus aggregate Blackberry, European Blackberry [68406]		Species or species habitat likely to occur within area
Salix spp. except S.babylonica, S.x calodendron & S.x reichardtii Willows except Weeping Willow, Pussy Willow and Sterile Pussy Willow [68497]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Caveat

The information presented in this report has been provided by a range of data sources as acknowledged at the end of the report.

This report is designed to assist in identifying the locations of places which may be relevant in determining obligations under the Environment Protection and Biodiversity Conservation Act 1999. It holds mapped locations of World and National Heritage properties, Wetlands of International and National Importance, Commonwealth and State/Territory reserves, listed threatened, migratory and marine species and listed threatened ecological communities. Mapping of Commonwealth land is not complete at this stage. Maps have been collated from a range of sources at various resolutions.

Not all species listed under the EPBC Act have been mapped (see below) and therefore a report is a general guide only. Where available data supports mapping, the type of presence that can be determined from the data is indicated in general terms. People using this information in making a referral may need to consider the qualifications below and may need to seek and consider other information sources.

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species distributions have been derived through a variety of methods. Where distributions are well known and if time permits, maps are derived using either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc) together with point locations and described habitat; or environmental modelling (MAXENT or BIOCLIM habitat modelling) using point locations and environmental data layers.

Where very little information is available for species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc). In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More reliable distribution mapping methods are used to update these distributions as time permits.

Only selected species covered by the following provisions of the EPBC Act have been mapped:

- migratory and
- marine

The following species and ecological communities have not been mapped and do not appear in reports produced from this database:

- threatened species listed as extinct or considered as vagrants
- some species and ecological communities that have only recently been listed
- some terrestrial species that overfly the Commonwealth marine area
- migratory species that are very widespread, vagrant, or only occur in small numbers

The following groups have been mapped, but may not cover the complete distribution of the species:

- non-threatened seabirds which have only been mapped for recorded breeding sites
- seals which have only been mapped for breeding sites near the Australian continent

Such breeding sites may be important for the protection of the Commonwealth Marine environment.

Coordinates

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Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact Us page.

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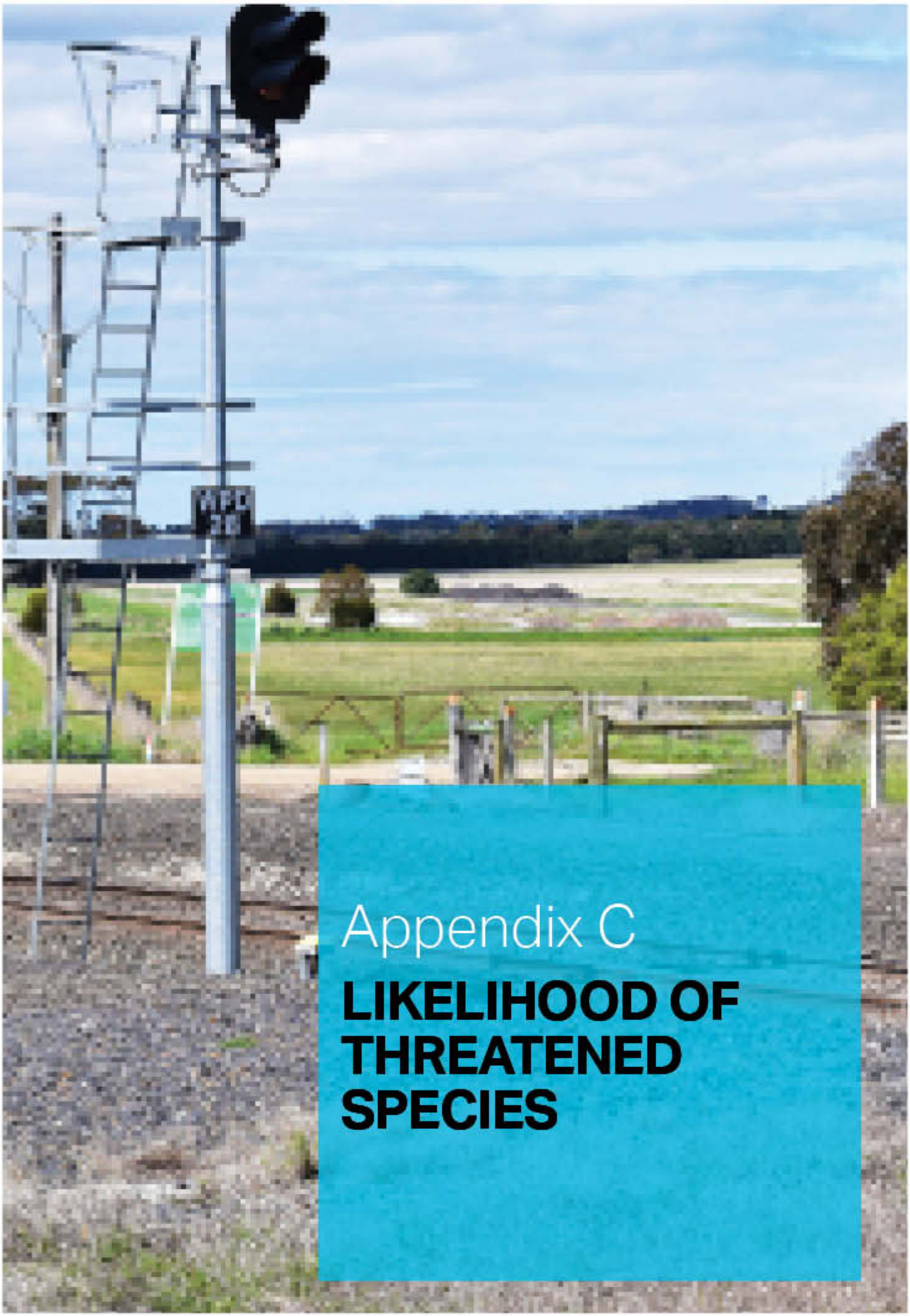


Appendix C

LIKELIHOOD OF THREATENED SPECIES

Appendix C Likelihood of threatened species

Table 8 Likelihood of threatened species

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Plants								
Acacia howittii	Sticky Wattle			r	12,008	VBA	Confined to eastern Victoria from the upper Macalister River near Mt Howitt south to near Yarram and east to near Tabberabbera. Grows in moist forest.	Unlikely
Amphibromus fluitans	River Swamp Wallaby-grass	VU			-	PMST	Inhabits both natural and man-made water-bodies, including swamps, lagoons, billabongs and dams. Numerous populations exist in northern Victoria, near the Murray River and its tributaries, such as Ovens River and Broken River between Kerang and Tallangatta. In southern Victoria, it is known from several localities in south Gippsland, including Rosedale, Meeniyan and Wonthaggi areas, as well as in the Melbourne (Lysterfield), Ballarat, and Portland–Casterton areas.	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Caladenia pumila	Dwarf Spider-orchid	CR	L	e	-	PMST	Two plants known from Parks Victoria reserve. Exact location not disclosed	Unlikely
Coronidium gunnianum	Pale Swamp Everlasting			v	1. 1996	VBA	Occurs within lowland swamps and wetlands, usually on black cracking clay soils.	Low
Eucalyptus leucoxylon subsp. bellarinensis	Bellarine Yellow-gum		L	e	4, 2012	VBA	Occurs in exposed coastal areas on the Bellarine Peninsula near Ocean Grove and Torquay, on heavy clay soils. .	Unlikely
Eucalyptus leucoxylon subsp. connata	Melbourne Yellow-gum			v	92. 2014	VBA	Open woodlands around Melbourne.	Unlikely
Eucalyptus sideroxylon subsp. sideroxylon	Mugga			r	1, 2009	VBA	Typically in drier open-forests on well-drained skeletal soils, on low ridges or adjacent flat country in undulating terrain below 550m. Mainly found inland from the Great Divide, chiefly with boxes, Red Gum and Yellow Gum.	Unlikely
Eucalyptus yarraensis	Yarra Gum			r	1, 2008	VBA	Disjunct distribution primarily in heavier soils of gullies and streams. Endemic to Victoria, extending from Glengarry (near Traralgon) north-west to Ararat and Daylesford	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Glycine latrobeana	Clover Glycine	VU	L	v	-	PMST	Endemic in Victoria and sporadically dispersed. Grows mainly in grasslands and grassy woodlands. Native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer	Unlikely
Lachnagrostis adamsonii	Adamson's Blown-grass	EN	L	v	-	PMST	Slightly saline, seasonally wet areas.	Unlikely
Leucochrysum albicans var. tricolor	Hoary Sunray	EN	L	e	-	PMST	Cool regions with moist non-sandy soils	Unlikely
Pimelea spinescens subsp. spinescens	Spiny Rice-flower	CR	L	e	-	PMST	Grows in grassland, open shrub-land and occasionally woodland, often on basalt-derived soils. Mostly west of Melbourne (to near Horsham), but extending as far north as Echuca.	Unlikely
Prasophyllum frenchii	Maroon Leek-orchid	EN	L	e	-	PMST	Grasslands, grassy woodlands and heaths. Predominantly in or near coastal swamps. Rarely occupies sites more than 10 km inland.	Unlikely
Prasophyllum validum	Sturdy Leek-orchid	VU		e	-	PMST	Dry woodland habitats with an open understorey.	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Pterostylis chlorogramma	Green-striped Greenhood	VU	L	v	-	PMST	Grows in moist areas of heathy and shrubby forest, on well-drained soils.	Unlikely
Pterostylis cucullata	Leafy Greenhood	VU	L	v	-	PMST	Widely distributed but disjunct, mostly occurring in coastal areas, rarely inland. Recent records from volcanic soils. Coastal populations occur on stabilised sand dunes under open to closed scrub of Coast Tea-tree or Moonah	Unlikely
Rutidosis leptorrhynchoides	Button Wrinklewort	EN	L	e	-	PMST	Confined to basaltic grasslands. In Victoria known distribution is between Rokewood and Melbourne.	Unlikely
Senecio macrocarpus	Large-fruit Fireweed	VU	L	e	-	PMST	Largely confined to remnant Kangaroo-grass grasslands on loamy grey soils derived from Basalt.	Unlikely
Thelymitra epipactoides	Metallic Sun-orchid	EN	L	e	-	PMST	Small colonies in mainly coastal areas on fertile loams, but also inland in scrubby heaths, grassland and woodlands or near swampy depressions.	Unlikely
Thelymitra matthewsii	Spiral Sun-orchid	VU	L	v	-	PMST	Common and widespread in various habitats, from	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							watercourses to scrubby woodlands, in sand, gravel and clay soils	
Xerochrysum palustre	Swamp Everlasting	VU	L	v	-	PMST	Sedge-rich lowland swamps and wetlands, usually on black cracking clay soils	Unlikely
Amphibians								
Litoria raniformis	Growling Grass Frog	VU	L	en	1, 1982	VBA, PMST	Permanent lakes, swamps, dams and lagoons or very wet areas in woodland and shrubland; often in waterbodies with dense standing and floating vegetation	Unlikely
Birds								
Accipiter novaehollandiae novaehollandiae	Grey Goshawk		L	vu	2, 2001	VBA	Various forests and woodlands, especially tall closed forests, including rainforests, tall woodlands and timbered watercourses; disperse to more open country in autumn-winter	Low
Anthochaera phrygia	Regent Honeyeater	CR	L	cr		PMST	Widespread but with an extremely patchy distribution. Its range extends from south-east Queensland to central Victoria. Most sightings originate from a few sites in north-east Victoria, along the western slopes of the	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							Great Dividing Range in NSW, and the Central Coast in NSW. Depends on nectar and insects from Box Ironbark Eucalypt forests. Only breeding habitat lies in northeast Victoria (Chiltern-Albury) and more eastern parts of NSW at Capertee Valley and the Bundarra-Barraba region. central coast of NSW.	
Actitis hypoleucos	Common Sandpiper	Mi, Ma			2, 1979	VBA, PMST	Aerial over a wide range of habitats, from inland to coast; spring-summer non-breeding migrant	Low, possible fly over head
Apus pacificus	Fork-tailed Swift	Mi, Ma				PMST	Occurs mainly in densely vegetated freshwater wetlands and, rarely, in estuaries or tidal wetlands. Favours wetlands with tall dense vegetation, where it forages in still, shallow water up to 0.3 m deep, often at the edges of pools or waterways, or from platforms or mats of vegetation over deep water. Prefers permanent and seasonal freshwater habitats, particularly those dominated by sedges, rushes and/or reeds	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							growing over muddy or peaty substrate.	
Ardea alba	Cattle Egret	Ma				PMST	Estuaries and tidal mudflats	Unlikely
Ardea alba	Great Egret	Ma				PMST	Coastal estuaries, bays and shallow wetlands, tidal mudflats and sandflats; mainly spring-summer non-breeding migrant	Unlikely
Ardea intermedia	Intermediate Egret		L	en	1, 1979	VBA	Freshwater swamps, intertidal mudflats, inland lakes and floodplains, well vegetated rivers; also farm dams, pastures and artificial wetlands	Low
Ardea modesta	Eastern Great Egret		L	vu	29, 1981	VBA	Freshwater and brackish wetlands and watercourses, intertidal mudflats, inland lakes, swamps and rivers; also farm dams, irrigation drainages and artificial wetlands.	Low
Aythya australis	Hardhead			vu	16, 1981	VBA	Deep, permanent open freshwater wetlands and waterbodies with dense fringing vegetation. Sometimes artificial wetlands (dams, sewage ponds), especially during dry periods inland.	Low

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Biziura lobata	Musk Duck			vu	7, 1981	VBA	Permanent freshwater and brackish swamps and wetlands with dense vegetation, more open waters in non-breeding season; occasionally coastal areas and estuaries.	Low
Botaurus poiciloptilus	Australasian Bittern	EN	L	en	1, 1976	VBA, PMST	Open box-ironbark forests, eucalypt and casuarina woodlands and well vegetated watercourses, particularly where trees are infested with mistletoe; mainly spring-summer migrant to south-eastern Australia	Low
Calidris acuminata	Sharp-tailed Sandpiper	Mi, Ma		nt		PMST	Breeds in Tasmania, late spring-summer; occurs as non-breeding migrant to mainland south-eastern Australia mainly autumn-early spring. Generally prefers Box-Ironbark forests and woodlands inland of the Great Dividing Range; sometimes also other forests and woodlands in coastal and sub-coastal areas.	Low
Calidris canutus	Red Knot	EN, Mi, Ma		en		PMST	Coastal saltmarshes, small islands and peninsulas, sometimes on adjacent dunes, grasslands or shrub-lands; sometimes on golf courses and	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							coastal pastures; autumn-winter non-breeding visitor to mainland south-eastern Australia; in wild breeds only in Tasmania.	
Calidris ferruginea	Curlew Sandpipe	CR, Mi, Ma	L	en		PMST	Coastal lakes, estuaries, tidal mudflats and sandflats, mangroves and saltmarshes; occasionally fresh or brackish lakes near coast; mainly spring-summer non-breeding migrant	Unlikely
Calidris melanotos	Pectoral Sandpiper	Mi, Ma				PMST	Low, open native grasslands, typically with sward less than 1m high, with extensive inter-tussock spaces and high diversity of small herbs; sometimes in unimproved pastures or crops.	Unlikely
Dasyornis broadbenti caryochrous	Rufous Bristlebird (Otway)		L	nt	2, 2000	VBA	Dense thickets, heathland and shrub-land on coastal dunes and cliffs, including dense Moonah scrub and low heaths or scrubs with dense overhead cover and more open ground cover; in Otways, also extend inland in gullies and valleys with dense undergrowth (sword-sedges, blackberries etc.), open eucalypt forests on northern slopes of foothills and dense undergrowth	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							in Myrtle Beech rainforest or Mountain Ash forests. Sensitive to too frequent fire.	
Egretta garzetta nigripes	Little Egret		L	en	1, 1979	VBA	Tidal mudflats, brackish and saltwater wetlands, including saltmarshes, estuaries, littoral habitat and mangroves; less often freshwater wetlands and occasionally sewage ponds.	Low
Falco subniger	Black Falcon			vu	6, 1980	VBA	Woodland, scrub, shrub-land and grassland types in arid and semi-arid zones.	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Gallinago hardwickii	Latham's Snipe	Mi, Ma				PMST	Has been recorded from wetlands in all Australian states, however is most common in eastern Australia, especially the Murray-Darling Basin. Individuals are nomadic, and there is some evidence of partial migration from south-eastern wetlands to coastal central and northern Queensland in autumn and winter. Inhabits shallow, well vegetated, temporary or infrequently filled wetlands, which may have associated trees, shrubs or samphire. Occasionally inhabits brackish wetlands, saltmarsh or claypans.	Unlikely
Grantiella picta	Painted Honeyeater	VU	L	v		PMST	Aerial, mainly eastern Australia often associated with coastal and mountain regions; spring-summer non-breeding migrant.	Unlikely
Haliaeetus leucogaster	White-bellied Sea-Eagle	Ma				PMST	An insectivorous monarch normally found foraging in denser mid-level parts of forests. The species is typically noted for rainforest, vine thickets and similar closed forests, though known also for softwood scrub dominated by Brigalow and for	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							mangroves. Upland and lowland rainforests and gully forests with tall, dense mid-storey shrubs. Spring-summer migrant to south-eastern Australia.	
Hirundapus caudacutus	White-throated Needletail	Mi, Ma			4, 1981	VBA, PMST	A diversity of wet or inundated habitats including in modified landscapes	Low
Hydroprogne caspia	Caspian Tern	Mi, Ma	L	nt	11, 1981	VBA	Coastal, sub-coastal and inland saltwater, brackish and fresh waterbodies and waterways, beaches, lakes and sheltered estuaries. Occasionally reservoirs and artificial wetlands.	Low
Lathamus discolor	Swift Parrot	CR, Ma	L	en	2, 2006	VBA, PMST	Mainly in wet forests and dense woodlands, particularly with tall canopy of eucalypts with an understorey of tea-trees and wattles along streams. Seasonal visitor (mainly spring) to drier inland woodlands, coastal areas and occasionally gardens and parklands.	Unlikely
Merops ornatus	Rainbow Bee-eater	Ma				PMST	Typically a fantail of dense forests such as rainforests, wet sclerophyll forests, monsoon forests, mangroves and riparian	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							vegetation with a common preference for a shrubby understory (Higgins et al. 2006). Inhabits and breeds in wet eucalypt forests and rainforests, particularly gullies and in dense undergrowth. Seasonal (mainly autumn-winter) dispersal to more open habitat (e.g. woodlands, parklands with areas of dense undergrowth, box ironbark forests).	
Monarcha melanopsis	Black-faced Monarch	Mi, Ma				PMST	Edges of saltwater to fresh waterbodies and wetlands, including estuaries, lakes, drainage lines, tidal watercourses and mudflats; occasionally beaches and rocky headlands; mainly spring-summer non-breeding migrant	Unlikely
Motacilla flava	Yellow Wagtail	Mi, Ma				PMST	Margins of brackish waterbodies with emergent sedges grassland, saltmarsh or similar vegetation.	Unlikely
Myiagra cyanoleuca	Satin Flycatche	Mi, Ma				PMST	Shallow freshwater or brackish wetlands, including swamps, flooded grasslands, sewage ponds, occasionally tidal flats and saltmarshes	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Neophema chrysogaster	Orange-bellied Parrot	CR, Ma	L	cr		PMST	Wet grasslands and pastures, open and wooded swamps; spring-summer non-breeding migrant	Low
Ninox connivens connivens	Barking Owl		L	en	2, 2000	VBA	Open forests and woodlands on lowlands and foothills, including box-ironbark forest, riparian woodlands and treed watercourses; occasionally wooded farmlands.	Unlikely
Numenius madagascariensis	Eastern Curlew	CR, Mi, Ma	L	v		PMST	Littoral and coastal habitats, and terrestrial wetlands generally preferring coastal cliffs. May also occur in atypical habitats.	Unlikely
Oxyura australis	Blue-billed Duck		L	en	3, 1978	VBA	Well vegetated freshwater swamps, large dams, lakes. Typically on more open waters in winter.	Low
Pandion haliaetus	Osprey	Mi, Ma				PMST	Margins of freshwater and brackish wetlands, sewage ponds, saltmarshes, dams and sometimes tidal flats and estuaries.	Unlikely
Pedionomus torquatus	Plains-wanderer	CR	L	cr		PMST	Freshwater and brackish wetlands and watercourses, intertidal mudflats, inland lakes,	Low

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							swamps and rivers; also farm dams, irrigation drainages and artificial wetlands.	
Porzana pusilla palustris	Baillon's Crake		L	vu	1, 1985	VBA	Well vegetated freshwater to brackish swamps, typically with dense floating vegetation (e.g. *Triglochin, Potamogeton*)	
Rhipidura rufifrons	Rufous Fantail	Mi, Ma				PMST	Freshwater and brackish wetlands and watercourses, intertidal mudflats, inland lakes, swamps and rivers; also farm dams, irrigation drainages and artificial wetlands.	Low
Rostratula australis	Australian Painted Snip	EN, Ma	L	cr		PMST	Occupies all coastal areas extending inland through main waterways, coastal islands, coastal lakes and along some inland rivers. It forages primarily for fish over large areas of open water.	Unlikely
Sternula albifrons sinensis	Little Tern		L	vu	1, 1979	VBA	Coastal estuaries, bays and inlets, saltwater and brackish lakes; also coastal salt-fields and sewage ponds; mainly spring-summer migrant to south-eastern Australia	low

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Sternula nereis nereis	Fairy Tern	VU	L	en	2, 1978	VBA	Coastal estuaries, bays and inlets, saltwater and brackish lakes; also coastal salt-fields and sewage ponds	Low, may overfly
Tringa nebularia	Common Greenshank	Mi, Ma			1, 1978	VBA, PMST	Spring-summer migrants to Victoria where they occur in many wooded habitats with an annual rainfall of less than 800mm, especially north of the Great Divide; often along vegetated watercourses and cuttings or banks along watercourses	Low

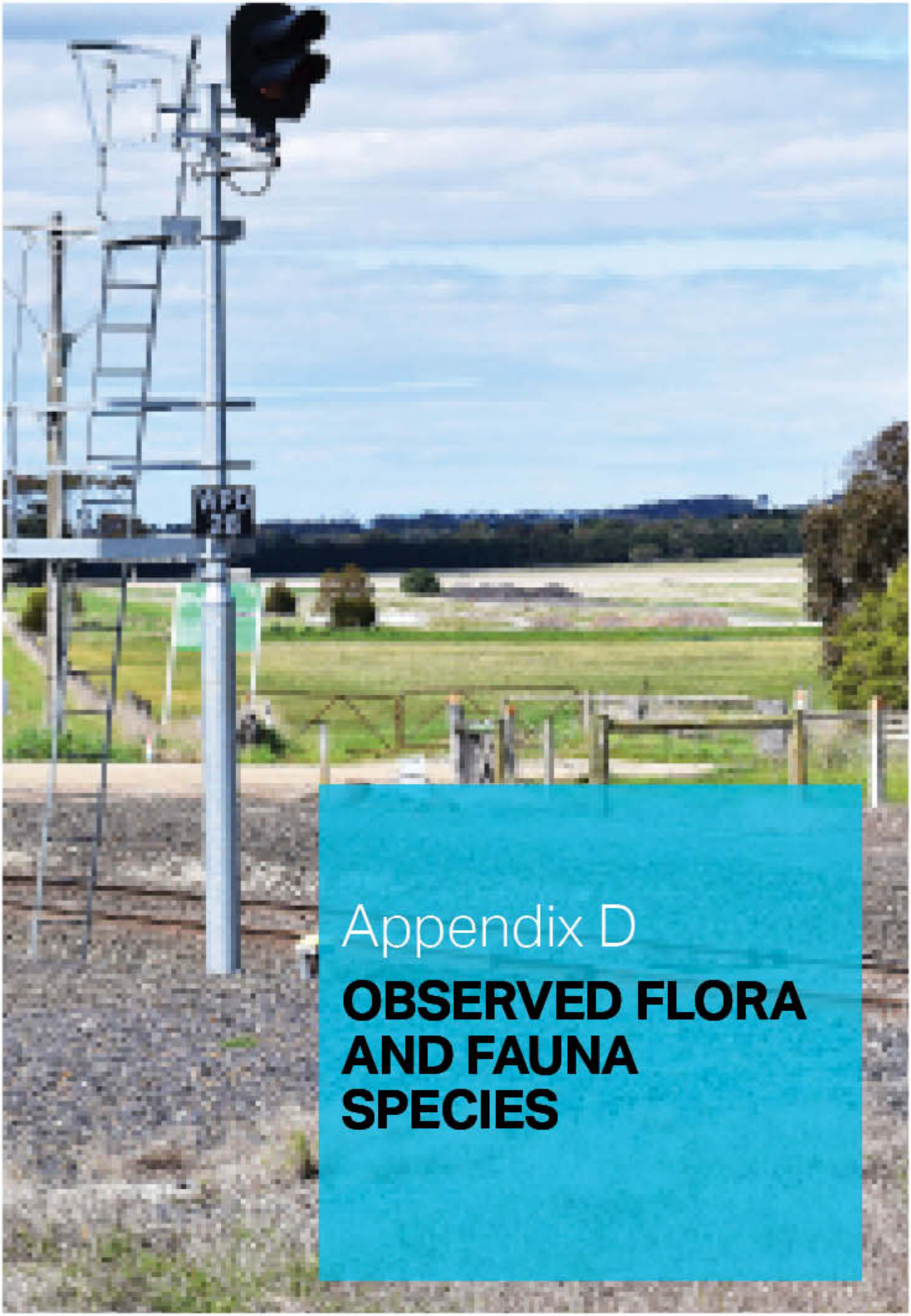
Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Fish								
Galaxiella pusilla	Eastern Dwarf Galaxias	VU				PMST	Swamps, pools, back waters and lake margins among rocks and vegetation. Slow flowing and still, shallow, permanent and temporary, freshwater habitats (swamps, drains and backwaters of streams and creeks, often containing dense aquatic macrophytes and emergent plants (Saddler, Jackson and Hammer. 2010).	Low
Nannoperca obscura	Yarra Pygmy Perch	VU			19, 2014	VBA, PMST	Streams and small lakes, prefers flowing water with abundant cover of aquatic and emergent vegetation. Often cohabitates with Southern Pygmy Perch *N. australis*. Patchy distribution West Gippsland east through southern Victoria and in south-eastern South Australia, as far west as near the mouth of the Murray River.	Unlikely
Prototroctes maraena	Australian Grayling	VU	L	vu		PMST	Spends part of its life cycle in freshwater in rivers, typically in gravel bottom pools. Often forming aggregations below	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
							barriers to upstream movement such as waterfalls.	
Invertebrates								
Engaeus merosetosus	Western Burrowing Crayfish			en	1, 2014	VBA	Associated with semi aquatic habitats in the Geelong Ballarat Region of Victoria. Recorded in Waurn Ponds Creek.	Moderate
Synemon plana	Golden Sun Moth	CR	L	cr		PMST	Native grasslands and grassy woodlands, particularly where Wallaby-grasses dominant. Now recognised to occur also in exotic grasslands dominated by Chilean Needle Grass.	Low
Mammals								
Antechinus minimus maritimus	Swamp Antechinus	VU	L	nt		PMST	Located in the south of the central highlands, Wimmera and alpine regions of Victoria and the extreme south of SA around Mt. Gambier. Some also range through Tasmania including Sunday Island, King Island and Flinders Island. Habitat includes closed health, wet dense health, open forest, open health, swampy drainages and tussock grassland with bracken and sedge growth.	Unlikely

Common Name	Scientific Name	Conservation Status			Record #, (year)	Source	Habitat	Likelihood of occurrence
		EPBC Act	FFG Act	VROT				
Isoodon obesulus obesulus	Southern Brown Bandicoot	EN	L	nt	2, 1981	VBA, PMST	Heathy forest, heath and coastal scrub.	Unlikely
Potorous tridactylus tridactylus	Long-nosed Potoroo	VU	L	nt		PMST	Coastal Victoria, in coastal heathy woodland, rainforest and adjacent to wet sclerophyll forest. Requires dense cover.	Unlikely
Pteropus poliocephalus	Grey-headed Flying-fox	VU	L	v	2, 2002	VBA, PMST	Roost sites commonly occur in gullies, in vegetation with dense canopy cover and close to water. Rarely more than 200km inland	Low, may overfly
Reptiles								
Delma impar	Striped Legless Lizard	VU	L	v		PMST	Native grasslands and grassy woodland, within grass tussocks, cracks in the ground or under rocks. Has been recorded in exotic pasture.	Low

Legend

EPBC Act	FFG Act	VROTS
CR – Critically Endangered	L – Listed	re – regionally extent
EN - Endangered	N- Nominated for listing	ce – critically endangered
VU - Vulnerable	I – Invalid or ineligible	e - endangered
	D - Delisted	v - vulnerable
		r - rare
		k – poorly known



Appendix D

OBSERVED FLORA AND FAUNA SPECIES

Appendix D Observed flora and fauna species

Table 9 Observed flora species

Status	Common Name	Scientific Name
	Hedge Wattle	*Acacia paradoxa*
	Grassland Wood-sorrel	*Oxalis perennans*
	Bristly Wallaby-grass	*Rytidosperma setaceum*
	Kangaroo Grass	*Themeda triandra*
	Sheep's Burr	*Acaena echinata*
	Silver Wattle	*Acacia dealbata*
	Common Spike-sedge	*Eleocharis acuta*
	Black Wattle	*Acacia mearnsii*
	Blackwood	*Acacia melanoxylon*
	Drooping Sheoak	*Allocasuarina verticillata*
	Spear Grass	*Austrostipa spp.*
	Sweet Bursaria	*Bursaria spinosa*
	Drooping Cassinia	*Cassinia arcuata*
	Black-anther Flax-lily	*dianella admixta*
	Swamp Gum	*Eucalyptus ovata*
	River Red-gum	*Eucalyptus camaldulensis*
	Sugar Gum	*Eucalyptus cladocalyx#*
	Hop Goodenia	*Goodenia ovata*
	Rush	Juncus sp
	Annual Rye-grass	*Lolium rigidum**
	Wattle Mat-rush	*Lomandra filiformis*
	Spiny-headed Mat-rush	*Lomandra longifolia*
	Wallaby Grass	*Rytidosperma sp*
	Cranberry Heath	*Astroloma humifusum*
	White Purslane	*Montia australasica*
	Golden Wattle	*Acacia Pycnantha*
	Kangaroo Apple	*Solanum aviculare*
	Common Rice-flower	*Pimelia humilis*

Status	Common Name	Scientific Name
Introduced and non-indigenous native species		
	Cape Weed	*Arctotheca calendula**
	Giant Honey-myrtle	*Melaleuca armillaris*
	Tuart	*Eucalyptus gomphocephala*
	Galenia	*Galenia pubescens var. pubescens**
	Southern Mahogany	*Eucalyptus botryoides#*
	Oat	*Avena* spp.
	Sugar Gum	*Eucalyptus cladocalyx#*
	Fennel	*Foeniculum vulgare**
	Flatweed	*Hypochaeris radicata**
	Couch	*Cynodon dactylon**
	Wild Oat	*Avena fatua**
	Twiggy Turnip	*Brassica fruticulosa**
	Panic Veldt-grass	*Ehrharta erecta**
	Paterson's Curse	*Echium plantagineum**
	Monterey Cypress	*Cupressus macrocarpa**
	Lesser Quaking-grass	*Briza minor**
	Indian Mustard	*Brassica juncea**
	Turnip	*Brassica spp.**
	Ox-tongue	*Helminthotheca echioides*
	Flat Drain-sedge	*Cyperus eragrostis**
	Brown-top Bent	*Agrostis capillaris**
RR	Spear Thistle	*Cirsium vulgare*
RC	Angled Onion	*Allium triquetrum**
	Barley Grass	Hordeum spp.
	Flatweed	*Hypochaeris radicata*
RC	Sweet Briar	*Rosa rubiginosa*
	Soft Brome	*Bromus hordaceus**
	Wheat	*Triticum aestivum*
	Sheep Sorrel	*Acetosella vulgaris**
	Coast Wattle	*Acacia longifolia subsp. sophorae*

Status	Common Name	Scientific Name
	Cat's Ear	*Hypochaeris spp.**
	Giant Honey Myrtle	*Melaleuca armillaris#*
	Soursob	*Oxalis pes-caprae**
	Large-flowered Wood-sorrel	*Oxalis purpurea**
	Blackberry	*Rubus fruticosus spp. agg.**
	Rough Sow-thistle	*Sonchus asper**
	Onion Grass	*Romulea rosea**
	Common Sow-thistle	*Sonchus oleraceus**
	Parramatta Grass	*Sporobolus africanus*
RC	Gorse	*Ulex europaeus**
	Fescue	*Vulpia spp.**
RC	Artichoke Thistle	*Cynara cardunculus*
RC	Serrated Tussock	*Nasella trichotoma*
	Monterey Cypress	*Cupressus macrocarpa*
	Paspalum	*Paspalum dilatatum*
	Flax-leaf broom	*Genista liniifolia*
	Monterey Pine	*Pinus radiata*

Legend

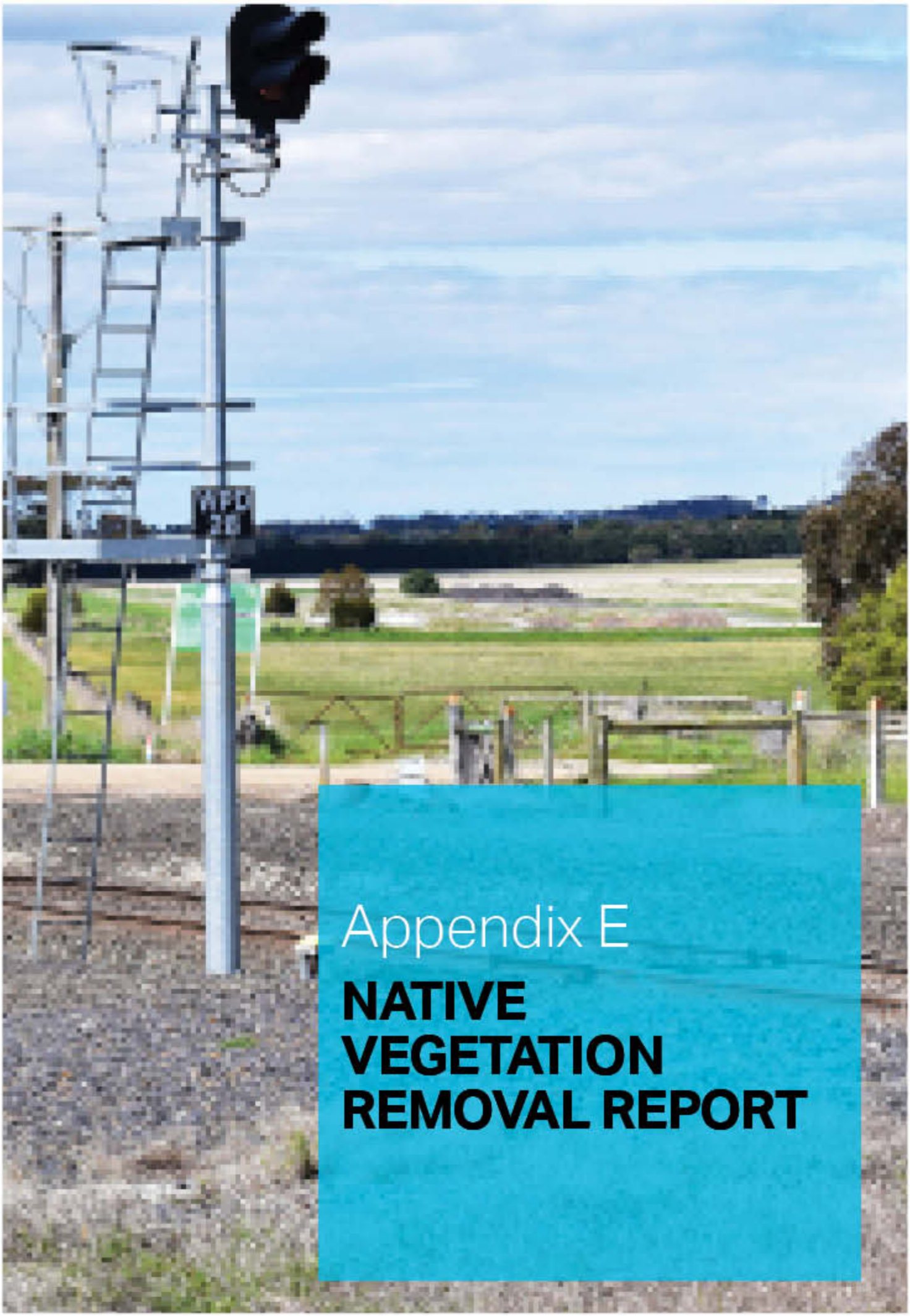
EPBC Act	FFG Act	VROTS
CR – Critically Endangered	L – Listed	re – regionally extent
EN - Endangered	N- Nominated for listing	ce – critically endangered
VU - Vulnerable	I – Invalid or ineligible	e - endangered
	D - Delisted	v - vulnerable
		r - rare
		k – poorly known

Table 10 Observed fauna species

Scientific Name	Common Name	EPBC	FFG	VROT
Amphibians				
Crinia signifera	Common Froglet			
Birds				
Acanthiza chrysorrhoa	Yellow-rumped Thornbill			
*Acridotheres tristis**	Common Myna			
Anthochaera carunculata	Red Wattlebird			
Ardea pacifica	White-necked Heron			
Cacomantis pallidus	Pallid Cuckoo			
Calyptorhynchus funereus	Yellow-tailed Balck Cockatoo			
Corvus mellori	Little Raven			
Cracticus tibicen	Australian Magpie			
Falco berigora	Brown Falcon			
Glossopsitta concinna	Musk Lorikeet			
Hieraaetus morphnoides	Little Eagle			
Malurus cyaneus	Superb Fairy-wren			
Manorina melanocephala	Noisy Miner			
Ocyphaps lophotes	Crested Pigeon			
Petroica phoenicea	Flame Robin			
Phylidonyris novaehollandiae	New Holland Honeyeater			
Platycercus eximius	Eastern Rosella			
Psephotus haematonotus	Red-rumped Parrot			
Rhipidura leucophrys	Willie Wagtail			
*Sturnus vulgaris**	Common Starling			
Trichoglossus moluccanus	Rainbow Lorikeet			
*Turdus merula**	Common Blackbird			

Legend

EPBC Act	FFG Act	VROTS
CR – Critically Endangered	L – Listed	re – regionally extent
EN - Endangered	N- Nominated for listing	ce – critically endangered
VU - Vulnerable	I – Invalid or ineligible	e - endangered
	D - Delisted	v - vulnerable
** - introduced species*		dd - data deficient
		nt - near threatened



Appendix E

NATIVE VEGETATION REMOVAL REPORT

Scenario test – native vegetation removal

This report provides offset requirements for internal testing of different proposals to remove native vegetation. **This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.** A report must be obtained from the Department of Environment, Land, Water and Planning (DELWP).

Date of issue: **14/06/2018**
Time of issue: **9:51 pm**

Report ID: Scenario Testing

Project ID	NVR_EnSym_WaurnPonds

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	1.510 ha
Extent of past removal	0.000 ha
Extent of proposed removal	1.510 ha
No. Large trees proposed to be removed	25
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

Scenario test – native vegetation removal

Offset requirements if a permit is granted

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

General offset amount[1]	0.375 general habitat units
Vicinity	Corangamite Catchment Management Authority (CMA) or Greater Geelong City, Surf Coast Shire Council
Minimum strategic biodiversity value score[2]	0.279
Large trees	25 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

Scenario test – native vegetation removal

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.

This report DOES NOT support an application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria.

If you wish to remove the mapped native vegetation you must submit the related shapefiles to the Department of Environment, Land, Water and Planning (DELWP) for processing, by email to ensymnvrtool.support@delwp.vic.gov.au. DELWP will provide a *Native vegetation removal report* that is required to meet the permit application requirements in accordance with *Guidelines for the removal, destruction or lopping of native vegetation* (Guidelines).

Appendix 1: Description of native vegetation to be removed

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

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

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

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

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

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

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

Native vegetation to be removed

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	**Type**	**BioEVC**	**BioEVC conservation status**	**Large tree(s)**	**Partial removal**	**Condition score**	**Polygon Extent**	**Extent without overlap**	**SBV score**	**HI score**	**Habitat units**	**Offset type**
29-A	Patch	vvp_0175	Endangered	0	no	0.150	0.037	0.037	0.420		0.006	General
32-A	Patch	vvp_0175	Endangered	0	no	0.320	0.102	0.102	0.382		0.034	General
7-A	Patch	vvp_0175	Endangered	0	no	0.150	0.003	0.003	0.350		0.000	General
6-A	Patch	vvp_0175	Endangered	0	no	0.150	0.002	0.002	0.390		0.000	General
25-A	Patch	vvp_0132	Endangered	0	no	0.200	0.003	0.003	0.340		0.001	General
24-A	Patch	vvp_0132	Endangered	0	no	0.200	0.002	0.002	0.340		0.000	General
23-A	Patch	vvp_0132	Endangered	0	no	0.200	0.001	0.001	0.340		0.000	General
22-A	Patch	vvp_0132	Endangered	0	no	0.240	0.002	0.002	0.410		0.001	General
21-A	Patch	vvp_0132	Endangered	0	no	0.240	0.003	0.003	0.410		0.001	General
20-A	Patch	vvp_0647	Endangered	0	no	0.230	0.023	0.023	0.370		0.005	General
19-A	Patch	vvp_0647	Endangered	0	no	0.230	0.007	0.007	0.370		0.002	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
18-A	Patch	vvp_0647	Endangered	0	no	0.230	0.003	0.003	0.370		0.001	General
17-A	Patch	vvp_0647	Endangered	0	no	0.230	0.004	0.004	0.370		0.001	General
16-A	Patch	vvp_0647	Endangered	0	no	0.230	0.006	0.006	0.370		0.001	General
15-A	Patch	vvp_0647	Endangered	0	no	0.230	0.005	0.005	0.370		0.001	General
14-A	Patch	vvp_0132	Endangered	0	no	0.200	0.003	0.003	0.370		0.001	General
13-A	Patch	vvp_0647	Endangered	0	no	0.230	0.014	0.014	0.370		0.003	General
12-A	Patch	vvp_0647	Endangered	0	no	0.230	0.028	0.028	0.372		0.007	General
10-A	Patch	vvp_0132	Endangered	0	no	0.200	0.004	0.004	0.420		0.001	General
9-A	Patch	vvp_0132	Endangered	0	no	0.240	0.016	0.016	0.420		0.004	General
11-A	Patch	vvp_0647	Endangered	0	no	0.230	0.057	0.057	0.420		0.014	General
28-B	Patch	vvp_0175	Endangered	0	no	0.150	0.032	0.032	0.420		0.005	General
27-A	Patch	vvp_0175	Endangered	7	no	0.320	0.102	0.102	0.373		0.033	General
26-A	Patch	vvp_0175	Endangered	14	no	0.320	0.225	0.225	0.371		0.074	General
35-A	Patch	vvp_0175	Endangered	0	no	0.150	0.009	0.009	0.363		0.001	General
31-A	Patch	vvp_0175	Endangered	0	no	0.320	0.073	0.073	0.389		0.024	General
33-A	Patch	vvp_0175	Endangered	0	no	0.150	0.012	0.012	0.360		0.002	General
28-A	Patch	vvp_0175	Endangered	0	no	0.360	0.041	0.041	0.365		0.015	General
30-A	Patch	vvp_0175	Endangered	0	no	0.150	0.019	0.019	0.420		0.003	General
8-A	Patch	vvp_0647	Endangered	0	no	0.230	0.027	0.027	0.298		0.006	General
34-A	Patch	vvp_0175	Endangered	0	no	0.150	0.009	0.009	0.360		0.001	General
1-A	Patch	vvp_0175	Endangered	0	no	0.150	0.007	0.007	0.630		0.001	General
2-A	Patch	vvp_0175	Endangered	0	no	0.150	0.001	0.001	0.570		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
3-A	Patch	vvp_0175	Endangered	0	no	0.150	0.001	0.001	0.160		0.000	General
4-A	Patch	vvp_0175	Endangered	0	no	0.150	0.007	0.007	0.160		0.001	General
5-A	Patch	vvp_0175	Endangered	0	no	0.150	0.017	0.017	0.373		0.003	General
36-A	Patch	vvp_0132	Endangered	0	no	0.240	0.062	0.062	0.390		0.016	General
56-A	Scattered Tree	vvp_0175	Endangered	1	no	0.200	0.070	0.070	0.376		0.015	General
55-A	Scattered Tree	vvp_0175	Endangered	1	no	0.200	0.070	0.051	0.178		0.009	General
54-A	Scattered Tree	vvp_0175	Endangered	1	no	0.200	0.070	0.051	0.176		0.009	General
53-A	Scattered Tree	vvp_0175	Endangered	1	no	0.200	0.070	0.070	0.370		0.014	General
52-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.023	0.363		0.005	General
51-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.020	0.343		0.004	General
50-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.031	0.160		0.005	General
49-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.009	0.354		0.002	General
48-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.030	0.100		0.005	General
47-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.018	0.350		0.004	General
46-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.031	0.350		0.006	General
45-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.017	0.160		0.003	General
44-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.020	0.336		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
43-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.018	0.350		0.004	General
42-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.017	0.379		0.003	General
41-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.017	0.160		0.003	General
40-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.016	0.379		0.003	General
39-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.005	0.390		0.001	General
38-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.012	0.390		0.002	General
37-A	Scattered Tree	vvp_0175	Endangered	0	no	0.200	0.031	0.015	0.390		0.003	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
Curly Sedge	*Carex tasmanica*	500650	Vulnerable	Dispersed	Habitat importance map	0.0002
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*	504484	Vulnerable	Dispersed	Habitat importance map	0.0001
Large-headed Fireweed	*Senecio macrocarpus*	503116	Endangered	Dispersed	Habitat importance map	0.0000
Yellow Watercrown Grass	*Paspalidium flavidum*	507820	Endangered	Dispersed	Habitat importance map	0.0000
Salt Blown-grass	*Lachnagrostis robusta*	504223	Rare	Dispersed	Habitat importance map	0.0000
Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	503624	Endangered	Dispersed	Habitat importance map	0.0000
Small Scurf-pea	*Cullen parvum*	502773	Endangered	Dispersed	Habitat importance map	0.0000
Brackish Plains Buttercup	*Ranunculus diminutus*	504314	Rare	Dispersed	Habitat importance map	0.0000
Snowy Mint-bush	*Prostanthera nivea var. nivea*	502746	Rare	Dispersed	Habitat importance map	0.0000
Wavy Swamp Wallaby-grass	*Amphibromus sinuatus*	503625	Vulnerable	Dispersed	Habitat importance map	0.0000
Plains Yam-daisy	*Microseris scapigera s.s.*	504657	Vulnerable	Dispersed	Habitat importance map	0.0000
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0000
Pale-flower Crane's-bill	*Geranium sp. 3*	505344	Rare	Dispersed	Habitat importance map	0.0000
Purple Blown-grass	*Lachnagrostis punicea subsp. punicea*	504206	Rare	Dispersed	Habitat importance map	0.0000
Arching Flax-lily	*Dianella sp. aff. longifolia (Benambra)*	505560	Vulnerable	Dispersed	Habitat importance map	0.0000
Leafy Twig-sedge	*Cladium procerum*	500786	Rare	Dispersed	Habitat importance map	0.0000
Clumping Golden Moths	*Diuris gregaria*	504887	Endangered	Dispersed	Habitat importance map	0.0000
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0000

Purple Blown-grass	*Lachnagrostis punicea subsp. filifolia*	504222	Rare	Dispersed	Habitat importance map	0.0000
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0000
Swamp Everlasting	*Xerochrysum palustre*	503763	Vulnerable	Dispersed	Habitat importance map	0.0000
Swamp Flax-lily	*Dianella callicarpa*	505086	Rare	Dispersed	Habitat importance map	0.0000
Fine-hairy Spear-grass	*Austrostipa puberula*	503988	Rare	Dispersed	Habitat importance map	0.0000
Trailing Hop-bush	*Dodonaea procumbens*	501090	Vulnerable	Dispersed	Habitat importance map	0.0000
Button Wrinklewort	*Rutidosis leptorhynchoides*	502982	Endangered	Dispersed	Habitat importance map	0.0000
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	504823	Endangered	Dispersed	Habitat importance map	0.0000
Small Milkwort	*Comesperma polygaloides*	500798	Vulnerable	Dispersed	Habitat importance map	0.0000
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0000
Hairy Tails	*Ptilotus erubescens*	502825	Vulnerable	Dispersed	Habitat importance map	0.0000
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0000
Bog Gum	*Eucalyptus kitsoniana*	501290	Rare	Dispersed	Habitat importance map	0.0000
Tough Scurf-pea	*Cullen tenax*	502776	Endangered	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Golden Cowslips	*Diuris behrii*	501061	Vulnerable	Dispersed	Habitat importance map	0.0000
Bellarine Yellow-gum	*Eucalyptus leucoxylon subsp. bellarinensis*	504891	Endangered	Dispersed	Habitat importance map ; special site	0.0000
Branching Groundsel	*Senecio cunninghamii var. cunninghamii*	503104	Rare	Dispersed	Habitat importance map	0.0000
Elegant Parrot	*Neophema elegans*	10307	Vulnerable	Dispersed	Habitat importance map	0.0000
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0000
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0000
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0000

Velvet Daisy-bush	*Olearia pannosa subsp. cardiophylla*	502317	Vulnerable	Dispersed	Habitat importance map	0.0000
Woodland Leek-orchid	*Prasophyllum sp. aff. validum A*	505904	Endangered	Dispersed	Habitat importance map	0.0000
Golden Sun Moth	*Synemon plana*	15021	Critically endangered	Dispersed	Habitat importance map	0.0000
Tufted Grass-tree	*Xanthorrhoea caespitosa*	505088	Rare	Dispersed	Habitat importance map	0.0000
Brolga	*Grus rubicunda*	10177	Vulnerable	Dispersed	Habitat importance map	0.0000
Australian Little Bittern	*Ixobrychus dubius*	10195	Endangered	Dispersed	Habitat importance map	0.0000
Paper Flower	*Thomasia petalocalyx*	503392	Rare	Dispersed	Habitat importance map	0.0000
Blue-billed Duck	*Oxyura australis*	10216	Endangered	Dispersed	Habitat importance map	0.0000
Musk Duck	*Biziura lobata*	10217	Vulnerable	Dispersed	Habitat importance map	0.0000
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000

Habitat group

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

Habitat impacted

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

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map