Parwan-Balliang Irrigation District Supply Network - Pipeline, Pump Station and Balance Tank

Ecological Impact Assessment

Prepared for Western Water
Prepared by CH2M Beca Ltd - Australian Branch
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Revision History

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on behalf of	CH2M Beca Ltd - Australian Branch		

Executive Summary

CH2MBeca have been engaged by Western Water to undertake an Ecological Impact Assessment for the Parwan-Balliang Irrigation District (PBID) Supply Network – Pipeline, Pump Station and Balance Tank Project (the Project). The Project is a component of the Western Irrigation Network (WIN) Scheme being developed by Western Water to connect existing Western Water recycled water sources to supply a new irrigation district in the Parwan-Balliang area.

This report details the existing ecological values within the Assessment Area identified for the Project, and the potential impacts on these ecological values based on proposed Project works occurring within the designated Construction Corridor. This report also describes the avoidance and minimisation approach to design implemented for the project to reduce impacts to ecological values, recommends additional mitigation measures and calculates native vegetation offset requirements for residual ecological impacts. Approval requirements under relevant State and Commonwealth legislation, and local planning schemes are also identified based on the assessed impacts to ecological values.

Existing conditions

The following ecological values were identified within the Assessment Area:

- Two threatened ecological communities:
  - 1.945 ha of Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) listed as Critically Endangered under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act); and
  - 4.837 ha of Western (Basalt) Plains Grassland listed under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act).
- Three threatened flora species:
  - Buloke (*Allocasuarina luehmannii*) (FFG Act – listed, VicAdv – endangered)
  - Salt Copperbur (*Sclerolaena ventricosa*) (FFG Act – listed, VicAdv – endangered)
  - Flax-lily (*Dianella longifolia var. grandis*) (VicAdv - vulnerable).
- Six FFG Act protected flora species.
- Habitat for rare or threatened fauna species:
  - Growling Grass Frog (*Litoria raniformis*) (EPBC Act – Vulnerable, FFG Act – listed, VicAdv – endangered)
  - Striped Legless Lizard (*Delma impar*) (EPBC Act – Vulnerable, FFG Act – listed, VicAdv – endangered)
  - Golden Sun Moth (*Synemon plana*) (EPBC Act – Critically Endangered, FFG Act – listed, VicAdv – critically endangered)
  - Tussock Skink (*Pseudemoia pagenstecheri*) (VicAdv – vulnerable)
  - Fat-tailed Dunnart (*Sminthopsis crassicaudata*) (VicAdv – near threatened).
- A total of 9.704 ha of native vegetation, 29 large canopy trees and 34 scattered trees assessable under the Guidelines for removal, destruction or lopping of native vegetation (DELWP 2017c).
- One waterway (Balliang Creek), and one farm dam but no mapped wetlands.

Targeted surveys within the Assessment Area did not observe Striped Legless Lizard, Golden Sun Moth or Growling Grass Frog, or any EPBC Act listed threatened flora species.

Impact assessment

A Construction Corridor has been designated for construction of the Project including ancillary works (e.g. temporary laydown areas). Where practicable, the location of the Construction Corridor has been positioned to minimise the impact to ecological values, with a significant reduction in impacts achieved through the avoidance and minimisation approach to design described in this report. Impacts to the large majority of native vegetation, threatened ecological communities and threatened species habitat within the Assessment Area, particularly medium to high quality habitat, have been avoided through design and establishment of No-go Zones.

Based on the Construction Corridor the proposed impact to ecological values is as follows:

- Direct removal of 1.8646 ha of native vegetation (not excluding VicRoads data), 2 large canopy trees and 5 scattered trees, inclusive of:
  - 0.253 ha of EPBC Act listed NTGVVP
  - 0.7109 ha of FFG Act listed Western (Basalt) Plains Grassland
  - 0.0089 ha of medium-high quality Striped Legless Lizard habitat
  - Four FFG Act listed protected flora species
  - Two VicAdv listed species: one individual of Flax-lily (vulnerable) and several individuals of Slender Bindweed (poorly known).
- Temporary disturbance to the bed and banks (non-native vegetation) of Balliang Creek where it crosses Geelong-Bacchus Marsh Road (Balliang Creek Crossing 1) during open-trenching for pipeline installation, and the removal of a farm dam (no native or aquatic vegetation).

No EPBC Act or FFG Act listed threatened flora have been identified within the Construction Corridor during targeted surveys and are therefore unlikely to be impacted.

Legislation and policy implications

Based on the impact assessment, the following legislative requirements have been identified for the Project (see Table 1).

Table 1 Environmental legislative requirements for the Project.

Legislation/ policy	Ecological trigger	Next steps
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Potential for a significant impact due to removal of the following Matters of National Environmental Significance (MNES) within the Construction Corridor: • 0.253 ha of NTGVVP • 0.0089 ha of medium-high quality Striped Legless Lizard habitat.	**Referral recommended.**

Legislation/ policy	Ecological trigger	Next steps
State		
Environment Effects Act 1978 (EE Act)	Less than 10 ha of native vegetation removal is proposed as part of the Project (total removal 2.108 ha, including both patch and tree removal) and limited impacts to FFG Act values will occur based on implementation of the proposed mitigation measures.	**No further action required:** A referral under the EE Act is not required for this Project based on ecological criteria.
Flora and Fauna Guarantee Act 1988 (FFG Act)	The Project will impact 0.7109 ha of the FFG Act listed Western (Basalt) Plains Grassland threatened community within the Construction Corridor. A small area (0.0089 ha) of medium to high quality habitat for the FFG Act listed Striped Legless Lizard is proposed to be removed within the Construction Corridor. No FFG Act threatened species are impacted by the Project. FFG Act protected flora will be impacted by the Project, including flora species associated with the FFG Act listed ecological community Western (Basalt) Plains Grassland, along with four other protected flora species in the Construction Corridor.	**Permit required:** A 'permit to take' from the Department of Environment, Land, Water and Planning (DELWP) is required for removal of protected flora from public land prior to construction commencing. As a public authority, Western Water has a duty of care to avoid and reduce impacts to FFG Act values in accordance with the objectives of the Act.
Victorian Threatened Species Advisory Lists (VicAdv)	The following listed species will be removed by the Project: • Flax-lily (vulnerable) • Slender Bindweed (poorly known).	**Considered alongside other legislation below:** A species offset may be prescribed for native vegetation removal under the Guidelines and will be detailed in the Native Vegetation Removal (NVR) Report, if applicable (DELWP 2017c). Consideration of impacts to threatened species are incorporated into any permit application for native vegetation removal under Clause 52.17 of the planning scheme that requires assessment via the detailed (or intermediate) assessment pathway under the Guidelines.

Legislation/ policy	Ecological trigger	Next steps
Planning and Environment Act 1987 (P&E Act)	The Project is subject to both the Moorabool Planning Scheme (north of Balliang Creek Crossing 1 and east of Balliang Creek Crossing 2) and Greater Geelong Planning Scheme (south of Balliang Creek Crossing 1 and west of Balliang Creek Crossing 2). The following relevant overlays apply to the Construction Corridor: **Moorabool Planning Scheme** • Environmental Significance Overlay (Schedule 2 – Waterway Protection) (ESO2) • Environmental Significance Overlay (Schedule 7 – Grasslands within the Werribee Plains Hinterland) (ESO7) **Greater Geelong Planning Scheme** • Environmental Significance Overlay (Schedule 4 – Grasslands within the Werribee Plains Hinterland) (ESO4). Native and non-native vegetation to be removed is present within these overlay areas.	**Permits required:** A permit is required from both Councils to remove native vegetation under Clause 52.17 (Native vegetation) of the planning schemes, unless a specific exemption applies. A permit is also required from Moorabool Shire Council under Clause 42.01 (ESO) for removal of any vegetation within ESO2 and for removal of native vegetation within ESO7. A permit is also required from City of Greater Geelong Council under Clause 42.01 (ESO) for removal of native vegetation within ESO4.
Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines) (DELWP 2017c)	Native vegetation will be removed across the Construction Corridor within both Council jurisdictions.	**Permits required:** To support the application for a planning permit to remove, destroy or lop native vegetation from both Councils pursuant to Clause 52.17 (Native vegetation) of the planning schemes, assessment and offsetting of native vegetation impacts will need to comply with the Guidelines.

Legislation/ policy	Ecological trigger	Next steps
Catchment and Land Protection Act 1994 (CaLP Act)	Multiple CaLP Act listed noxious weeds and pest animals were observed during the assessment, including: • Patterson's Curse (*Echium plantagineum*) • African Boxthorn (*Lycium ferocissimum*) • Prickly Pear (*Opuntia stricta*) • Blackberry (*Rubus fruticosus L. sp. agg*.) • Serrated Tussock (*Nassella trichotoma*) • Spear Thistle (*Cirsium vulgare*) • Artichoke Thistle (*Cynara cardunculus*) • Variegated Thistle (*Silybum marianum*) • Stinkwort (*Dittrichia graveolens*) • European Foxes (*Vulpes vulpes*) • European Rabbits (*Oryctolagus cuniculus*). Construction materials and machinery are a potential conduit for weed dispersal.	**Construction Environmental Management Plan (CEMP) requirement:** It is the responsibility of the proponent to implement control measures to prevent the spread of noxious weeds and pest animals during construction of the Project. Weed and biosecurity management measures are to be included in the Project CEMP in accordance with the CaLP Act.
Wildlife Act 1975 (Wildlife Act)	The Project works have potential to impact native wildlife, notably during removal of the farm dam and open trenching at Balliang Creek Crossing 1, and removal of large trees which can support native wildlife, particularly species dependent on tree hollows or nesting birds.	**CEMP requirement:** To facilitate construction of the Project, it is necessary, as per the mitigation measures, to engage an Ecologist or qualified wildlife handler to relocate wildlife to a suitable habitat outside of the Construction Corridor, when the farm dam and large trees will be removed and during works at Balliang Creek Crossing 1. This requirement needs to be addressed in the CEMP.

Legislation/ policy	Ecological trigger	Next steps
Water Act 1989 (Water Act)	Balliang Creek is a designated waterway. Creek Crossing 1 will involve open trenching while Creek Crossing 2 will involve under-boring.	**Permit required:** A 'works on waterways' permit in accordance with section 188 of the Water Act will be required from Melbourne Water prior to construction. Aquatic ecologists should be engaged to undertake the application process.
Fisheries Act 1995 (Fisheries Act)	The drainage line of Balliang Creek at Creek Crossing 1 does not provide a viable pathway for fish movement through the road culvert. However, native fish may need to be handled and translocated during the removal of the farm dam and works on Balliang Creek.	**CEMP requirement:** The capture, handling or translocation of fish may be required during construction of the Project and persons undertaking these activities will need to hold the appropriate permit or licence under the Fisheries Act. This requirement will need to be addressed by the relevant construction contractor and should be included in the Project CEMP.
Environment Protection Act 1970 (EP Act)	Discharges and emissions (including sedimentation) during construction have potential for impacts on the environment, including waterways and other ecological values.	**CEMP requirement:** Design, construction, operation and decommissioning of the Project must comply with the general environmental duty and applicable State Environment Protection Policies (SEPPs) and Environmental Reference Standards under the EP Act as current at the time of construction. Control measures are to be included within the CEMP, as a minimum, to minimise erosion and sedimentation and other water pollution, and to prevent the spread of noxious weeds and pest animals.

1 Introduction

CH2MBeca have been engaged by Western Water (WW) to undertake an Ecological Impact Assessment for the Parwan-Balliang Irrigation District (PBID) Supply Network – Pipeline, Pump Station and Balance Tank Project (the Project) to inform design development and the approvals process.

1.1 Project description

The Project is a component of the Western Irrigation Network (WIN) Scheme, which aims to connect existing Western Water recycled water sources to supply a new irrigation district in the Parwan-Balliang area. The Project involves construction of the following recycled water supply infrastructure:

- A pump station and 2 ML balance tank, with associated access, drainage and services infrastructure, and network connections. These works will be constructed on a site of 6,732 m^2 to be acquired by Western Water at the south east corner of Nerowie Road and Parwan South Road.
- An approximately 14 km long, typically 675 mm diameter pipeline, extending from the pump station and balance tank site south along Parwan South Road, west along Schultz Road, south along Geelong-Bacchus Marsh Road including a crossing of Balliang Creek (Creek Crossing 1), and east along the Ripley Road 'paper road' through to Agars Road, including a second crossing of Balliang Creek (Creek Crossing 2).
- Pipeline offtakes to service recycled water customers including multiple parcels of cropping land, the Balliang East Primary School, and a Country Fire Authority facility.

Construction of the pipeline will involve:

- Approximately 12.4 km of open trench construction within a construction corridor ranging from 10-20 m wide, with sections of narrower corridor adopted through or adjacent to native vegetation.
- Approximately 100 m of micro-tunnelling for pipeline construction under Ballan Road and 140 m of micro-tunnelling for pipeline construction under School Road and adjacent amenity tree plantings.
- Two relatively short sections of horizontal directional drilling (HDD) for future pipeline offtakes under Geelong-Bacchus Marsh Road.
- Approximately 1.1 km of HDD for pipeline construction under Balliang Creek Crossing 2 and adjacent areas of native grassland to avoid impacts to large native trees along the creekline and a higher quality patch of native grassland.
- Approximately 230 m of HDD for pipeline construction near Agars Road to avoid areas of cultural heritage sensitivity.

The proposed pipeline is mostly located within existing road corridors, except for the following sections:

- Approximately 740 m of pipeline on privately owned cropping land along the eastern side of Geelong-Bacchus Marsh Road south of Schultz Road. The pipeline has been located outside the road corridor at this location to avoid ecological values, including larger and higher quality native grassland patches identified in the Geelong-Bacchus Marsh Road corridor.
- Approximately 3.1 km of pipeline on privately owned cropping land along the northern side of the paper road (includes Balliang Creek Crossing 2). The pipeline has been located outside the road reserve at this location due to engineering issues at the creek crossing in the road reserve and to provide increased separation to a large patch of higher quality native grassland located on the southern side of the paper road.

Four temporary laydown areas have been identified for construction of the pipeline:

- One on the eastern side of Geelong-Bacchus Marsh Road, south of Schultz Road (SPI: 3\PS315762, 2\PS315762)
- One on the eastern side of Geelong-Bacchus Marsh Road between the Balliang East Primary School and Balliang Creek (SPI: 4\LP12800)
- One in the north east corner of the Geelong-Bacchus Marsh Road / paper road intersection (SPI: 5\LP12800)
- One in the north west corner of the paper road / Agars Road intersection (SPI: 1\TP96216).

The proposed infrastructure is designed to store recycled water transferred to the Parwan-Balliang area via the proposed Melton to Bacchus Marsh Interconnector Pipeline from the Bacchus Marsh and Melton Recycled Water Plants, and to distribute this recycled water to interested agricultural landowners within the proposed Parwan-Balliang Irrigation District.

1.2 Project area

The Project is located within the Parwan-Balliang area approximately 8 km south of the township of Bacchus Marsh, Victoria, and 45 km west of the Melbourne Central Business District (CBD).

The Parwan-Balliang area is characterised by agricultural practices, particularly cropping and sheep farming. As such, ecological values within the local landscape are heavily degraded, with the majority of farm paddocks de-rocked. Where surface rock remains, remnant native grasslands are commonly present.

The Project falls within:

- Victorian Volcanic Plain bioregion.
- Moorabool Local Government Area (north of Balliang Creek Crossing 1 and east of Balliang Creek Crossing 2).
- Greater Geelong Local Government Area (south of Balliang Creek Crossing 1 and west of Balliang Creek Crossing 2).
- Port Phillip and Westernport Catchment Management Authority (CMA).

For the purpose of this report, two Project areas have been considered:

- Assessment Area – an area encompassing the Construction Corridor, which was subject to desktop and field assessments to identify ecological values for the purpose of informing design and development of a Construction Corridor that avoids or minimises environmental and cultural heritage impacts.
- Construction Corridor – the area of proposed impact during construction of the Project, which is located within the Assessment Area, and includes all proposed infrastructure along with temporary access and laydown areas. The Construction Corridor assessed in this report is based on the Detailed Design current at 3 February 2021, and provides the basis for the impact assessment, including native vegetation and habitat loss calculations described in this report.

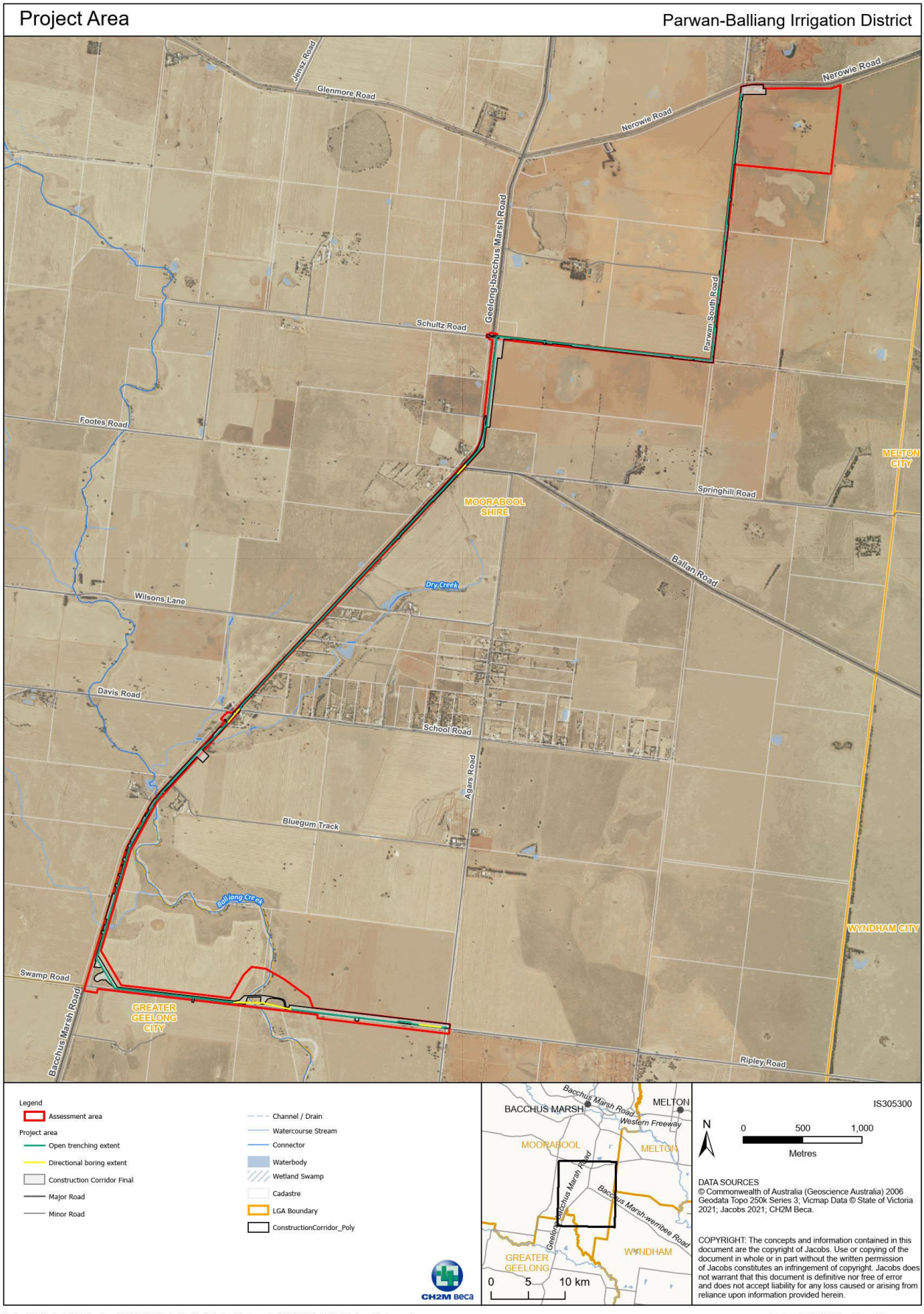
1.3 Report purpose

The objectives of this report are to:

- Update the desktop assessment to determine potential ecological values present within the current Assessment Area
- Detail the results of the field assessment, including targeted threatened species surveys, of the Assessment Area to ground-truth the desktop findings and to inform further design refinement
- Assess and describe ecological impacts associated with the Project, including calculation of proposed areas of removal of native vegetation and threatened species habitat within the Construction Corridor

- Provide recommendations on mitigation measures to avoid and minimise impacts to ecological values, and identify offsets for unavoidable removal of native vegetation
- Undertake a review of relevant Commonwealth and State legislation to identify approval requirements based on the observed ecological values and assessed impacts.

Figure 1-1 Location of Project Assessment Area and Construction Corridor



2 Method

2.1 Avoidance and mitigation approach

Together with approval requirements under Commonwealth and State legislation, the PBID Project team has worked to utilise the avoidance and mitigation hierarchy framework consistent with the Guidelines, to reduce impacts to ecological values, where possible.

The framework allows for the implementation of the following steps:

- Avoid and minimise impacts first
- Mitigate impacts where avoidance is not possible
- Offset where residual impacts cannot be avoided.

Multiple iterations of the pipeline alignment have been considered throughout the life of the Project. At the Concept Design Stage, a broad Preliminary Assessment Corridor nominally 100 m wide around the pipeline alignment and encompassing the whole property containing the proposed pump station and balance tank (and future storage dam) was developed to undertake the preliminary ecological assessment.

In January 2020, sections of pipeline within the Preliminary Assessment Corridor west of Geelong-Bacchus Marsh Road were removed from the Project due to a lack of customer interest and a new section of pipeline was added to the east of Geelong-Bacchus Marsh Road along the general alignment of a paper road through to Agars Road. Due to engineering constraints at the creek crossing within the paper road corridor, high level consideration was given to creek crossing options outside the road corridor, both north and south. Following preliminary ecological and engineering site assessments, creek crossing options north of the paper road corridor were identified as preferred for further design development to increase separation of works to a large patch of higher quality native grassland located on the southern side of the paper road. Four alignment options (A-D) for a Balliang Creek crossing north of the paper road were then developed and presented to project ecologists for assessment in March 2020 (provided by CH2M Beca (9/04/2020)).

The Assessment Area shown in Figure 1-1 encompasses these changes to the pipeline alignment, along with a narrowing of the width of the Preliminary Assessment Corridor around the pipeline to nominally:

- 20 m wide along the northern section of proposed pipeline (south to School Road)
- 40 m wide along the southern section of proposed pipeline within the eastern side of Geelong-Bacchus Marsh Road (south of School Road to the paper road)
- 50 m wide along the paper road, with localised widening to accommodate property connections and consideration of multiple alignment options for the second crossing of Balliang Creek.

Detailed ecological field assessments were undertaken within the Assessment Area and based on this information, along with cultural heritage and engineering considerations, a risk assessment was undertaken of alignment options at the paper road Balliang Creek crossing to determine a preferred option. Under-boring the entire creek section and utilising existing farm access tracks across the creek and through paddocks was determined to be the preferred approach to works in this area, and provides for maximum avoidance of ecological values, notably Matters of National Environmental Significance (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Other sections of the pipeline will be directionally bored including the following locations:

- Under two crossings of Geelong-Bacchus Marsh Road to connect the main pipeline to offtakes
- Under Ballan Road to avoid impacts to a newly constructed roundabout
- A small section under planted screening trees in front of Balliang East Primary School, School Road
- A small section in private property along the northern side of the paper road near Agars Road to avoid areas of cultural heritage sensitivity.

Where directional boring is occurring, native vegetation loss is also minimised.

In addition to under-boring Balliang Creek Crossing 2 to avoid or minimise impacts to a higher quality patch of EPBC Act listed Natural Temperate Grasslands of the Victorian Volcanic Plain (NTGVVP) and potential Striped Legless Lizard habitat, other design decisions contributing to reduced impacts to ecological values for the project include:

- Locating the pipeline along the western side of Parwan South Road to avoid a patch of NTGVVP (and more extensive/larger patches of non-EPBC Act quality native grassland) on the eastern side of the road
- Negotiating with landowners to realign a section of pipeline outside the Geelong-Bacchus Marsh Road corridor onto private cropping land south of Schultz Road (between about Ch. 4100 and Ch. 4840) to avoid a large patch of EPBC Act listed NTGVVP and other large, contiguous patches of native grassland identified in the road corridor
- Where full avoidance through realignment or under-boring were not feasible, impacts to native vegetation have been minimised by preferencing location of the pipeline along the edge of native vegetation patches and / or localised narrowing of the construction corridor (to a minimum of 10-12 m), compared to the more efficient construction footprint width of 16-20 m allowed along other sections of the pipeline.

2.2 Desktop assessment

A review of the following government databases and associated documents was undertaken to provide information on ecological values previously identified (or modelled) to occur within the Assessment Area and hence deemed to be relevant to the Project. These databases provide information of biodiversity values that may trigger the need to respond to Commonwealth and/or State legislation. The desktop assessment completed during Concept Design for the much broader Preliminary Assessment Corridor was updated in January 2021 and the results are provided in this report.

Previous assessments:

- Preliminary Flora and Fauna Assessment for PBID prepared by CH2MBeca for Western Water.
- Preliminary Documentation prepared by SMEC for VicRoads (SMEC 2019) for EPBC Act Referral 2017-8018, which compiles existing ecological data and targeted surveys (Golden Sun Moth and Striped Legless Lizard) associated with investigations conducted along the Geelong-Bacchus Marsh Road Upgrade Project. The project area for the road upgrade project intersects with the PBID Assessment Area along Geelong-Bacchus Marsh Road and hence, the findings are relevant to this Project. The Preliminary Documentation includes summation of the following reports:
  - Ecological Assessment, including Vegetation Assessments along Geelong-Bacchus Marsh Road (OC 2017).
  - Striped Legless Lizard surveys along Geelong-Bacchus Marsh Road (EHP 2017c, EHP 2017b).
  - Targeted Golden Sun Moth surveys in 2018 (Okologie 2017)
  - Targeted surveys for Growling Grass Frog completed in creeks and culverts along Geelong-Bacchus Marsh by Ecology and Heritage Partners (EHP) (EHP 2017a). A number of these survey sites intersect with the PBID Assessment Area.
- Ecological Assessment and Preliminary Documentation for the EPBC Act Referral (2018-8260) prepared for Melton RWP to Bacchus Marsh RWP Interconnector Pipeline; the recycled water pipeline the current Project (PBID) will connect to along Nerowie Road when constructed (EHP 2020).

Commonwealth Department of Agriculture, Water and the Environment (DAWE) database:

- Protected Matters Search Tool (DAWE 2021a): The Protected Matters Search Tool (PMST) highlights Matters of National Environmental Significance (MNES) relevant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) that are likely to occur within a 5 km buffer of the Assessment Area (database accessed 11 January 2021).

Victorian Department of Environment, Land, Water and Planning (DELWP) Biodiversity databases:

- Nature Kit (DELWP 2020c): comprises spatial data of native vegetation across Victoria; including modelled distributions of Ecological Vegetation Classes (EVCs).
- Victorian Biodiversity Atlas (VBA) (DELWP 2020d): comprises historical spatial data records of flora and fauna species from across the state. Records are added opportunistically, as flora and fauna surveys are conducted within Victoria for a variety of purposes. The mapping of flora and fauna distribution and determination of species' habitat preferences is an ongoing process (database accessed 11 January 2021).

Mapping (GIS datasets) provided by the Victorian Government:

- 1750 extent modelled EVC mapping (DSE 2007b)
- 2005 extent modelled EVC mapping (DSE 2007a)
- Victorian Wetland Inventory (Current) (DELWP 2017b).

A likelihood of presence assessment has been undertaken for threatened species identified from the database searches. Further details on the methods are provided in Appendix E.

2.3 Field assessment

To inform pipeline design, preliminary field assessments of the Concept Design Preliminary Assessment Corridor were conducted by CH2MBeca ecologists on 23 and 29 August 2019, and 2 and 3 September 2019. The walkover of the new paper road alignment was undertaken on 30 January 2020. Preliminary field assessment of the four alignment options for crossing the Balliang Creek along paper road was undertaken on 9 April 2020.

The detailed vegetation assessment of the Assessment Area mostly occurred between 4 May and 7 May 2020 and was completed on 19 May 2020. A condition check of patches with the potential to qualify as the NTGVVP ecological community occurred on 12 October 2020.

The purpose of the field assessments were to:

- Map native vegetation including patches, large trees and scattered trees in accordance with the Guidelines (DELWP 2017c).
- Undertake Habitat Hectare Assessments of any patches of native vegetation in accordance with the Vegetation Quality Assessment Manual v1.3 (DSE 2004)
- Assess potential habitat for threatened flora and fauna that may occur based on desktop searches
- Assess the presence of threatened communities in accordance with the listing advice for those communities
- Describe vegetation and habitat presence, including recording the flora taxa observed.

2.3.1 Native vegetation

Native vegetation was mapped for the whole of the Assessment Area in accordance with the Guidelines (DELWP 2017c) as either a patch, scattered tree or other native vegetation, as described below:

Patch:

- 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.

Scattered tree:

- a native canopy tree that does not form part of a remnant patch. A native canopy tree is a mature tree (i.e. it is able to flower) that is greater than 3 m in height and is normally found in the upper layer of the relevant vegetation type.

Other native vegetation:

- native vegetation that is not a remnant patch or scattered tree was incidentally identified, such as scattered understorey trees.

Patches were further categorised into Ecological Vegetation Classes (EVC) and then into Habitat Zones. These areas were GPS mapped and assessed using the habitat hectare method described in the *Vegetation Quality Assessment Manual – Guidelines for applying the Habitat Hectare scoring method – Version 1.3* (DSE 2004). Any large trees contained within patches were identified, GPS mapped and their Diameter at Breast Height (DBH) recorded.

2.3.2 Loss calculation methodology

The extent of vegetation loss is calculated by overlaying the Construction Corridor over the mapped areas of native vegetation. The extent of vegetation loss was assessed in accordance with the Guidelines (DELWP 2017c) and further guidance provided in the Native Vegetation Newsletter, *Update on the 2017 native vegetation removal regulations and Guidelines for the removal, destruction or lopping of native vegetation – March 2018* (DELWP 2018). The following was assumed:

- The Construction Corridor represents the ground level impacts required for Project construction. Five sections of pipeline are being directional bored within the Construction Corridor. Where applicable, these locations have been excluded from the vegetation loss calculations. For instance, if heavy vehicle traffic will still be driving over the location of directional boring within the Construction Corridor, vegetation loss has been assumed where vegetation is present.
- Where discrete areas of remnant vegetation are present within and surrounding the Construction Corridor, a 17 m buffer, as specified in the Native Vegetation Newsletter (DELWP 2018), has been applied.
- Scattered trees are considered lost when greater than 10% of the Tree Protection Zone (TPZ) is impacted. The TPZ is calculated as 12 x the Diameter at Breast Height (DBH) (cm).

2.4 Targeted surveys

Targeted threatened species survey methods are detailed below, along with justifications for survey site selection. Due to extensive, prior survey effort within the road reserve of Geelong-Bacchus Marsh Road section of the Assessment Area, previous surveys also informed targeted survey site selection (EHP 2017b, EHP 2017c, EHP 2017a, OC 2017, SMEC 2019). Areas not previously surveyed within the current Assessment Area, such as private property where suitable habitat was present, were targeted for the current set of species-specific surveys. Additionally, during the detailed vegetation assessment, habitat within Geelong-Bacchus Marsh Road was found to have degraded (E.g. topsoil scalping) following the previous targeted survey effort. As such, higher quality habitat outside of the Geelong-Bacchus Marsh Road reserves was prioritised for targeted survey. The results of surveys previously undertaken on Geelong-Bacchus Marsh Road have been incorporated into the Results section, section 3, and in some instances presence has been assumed.

2.4.1 Threatened communities and flora

Surveys for EPBC Act listed NTGVVP and FFG Act listed Western (Basalt) Plains Grasslands Community, occur during spring (September to November) to determine native plant species diversity (DEWHA 2011). However, most features, such as vegetation structure, minimum patch size and perennial ground layer vegetation cover can be assessed all year round (DEWHA 2011). As such the initial assessment of NTGVVP occurred during the detailed vegetation assessment in May 2020. A condition check of patches within these identified patches occurred on 12 October 2020. The NTGVVP condition check involves walking over the patches with three Ecologists to assess for both percentage native grass cover and wildflower diversity. The transect walks particularly involved searching for seasonally flowering threatened (incorporating those state-threatened species classified as poorly known (k) and near threatened (nt), but still listed under the appropriate legislation) flora species, including:

EPBC Act

- Clover Glycine (*Glycine latrobeana*)
- Matted Flax-lily (*Dianella amoena*)
- Large-fruit Fireweed (*Senecio macrocarpus*).

State-listed (FFG Act and VicAdv)

- Flax-lily (*Dianella longifolia var. grandis*)
- Slender Bindweed (*Convolvulus angustissimus subsp. omnigracilis*)
- Slender Tick-trefoil (*Desmodium varians*)
- Plains Joyweed (*Alternanthera* sp. 1 (Plains))

The above-listed species were identified via Desktop and likelihood of presence verified during preliminary site assessments. For species that do not flower Spring to Summer, when NTGVVP checks occur, targeted species-specific surveys were undertaken and are detailed below. Following the NTGVVP check, given the vegetation quality results, further targeted surveys were determined as not required for the remaining species listed above.

2.4.2 Spiny Rice-flower

In addition to the EPBC Act listed threatened flora above, the Spiny Rice-flower (*Pimelea spinescens subsp. spinescens*) can be difficult to find when not flowering, as such targeted transect surveys are undertaken between April to August within suitable habitat, when the species is flowering (DEWHA 2009b). Timing of flowering of the species does vary over geography. As such, a nearby reference site where Spiny Rice-flower are known to occur are checked regularly between April-August to identify when the species in flowering in the region. Over several checks of Truganina Cemetery, Truganina, Spiny Rice-flower were flowering on 17 June 2020 (Figure 2-1).

Targeted surveys occurred on 24 June 2020 within areas of suitable habitat within the Assessment Area, focusing on the same sites where Golden Sun Moth (*Synemon plana*) targeted surveys occurred, excluding the Schultz Road section due to recent pesticide spraying removing the native vegetation patches present. Transects were walked parallel by two Ecologists 5 metres apart. The timing and methodology of the targeted Spiny Rice-flower surveys is consistent with the Commonwealth survey guidelines (DEWHA 2009b). Surveys were not undertaken along Geelong-Bacchus Marsh Road due to the continued, historical modified nature of the road reserve and overall, low native forb diversity. Survey locations can be viewed in Appendix A, Figure A-1.

Figure 2-1 A Spiny Rice-flower flowering at Truginina Cemetery on 17 June 2020

2.4.3 Growling Grass Frog

Call-playback surveys for Growling Grass Frog (*Litoria raniformis*) were undertaken following a heavy rainfall event in January 2021, where water pooled along Balliang Creek. Call-playback surveys were conducted from sunset by two Ecologists, between 8:30 pm and 12:00 am on 13 and 21January 2021. Surveys were conducted in accordance with the methodology described in:

- Significant Impact Guidelines for the Vulnerable Growling Grass Frog (*Litoria raniformis*) EPBC Act Policy Statement 3.14 (DEWHA 2009c), and
- Survey Guidelines for Australia's Threatened Frogs (DEWHA 2010).

Growling Grass Frog inhabit both permanent and ephemeral wetlands, lakes, swamps and ponds, and sometimes slow flowing sections of river or streams (Clemann and Gillespie 2010). Populations of Growling Grass Frog are often found where groups of neighbouring, permanent waterbodies are present, which are usually somewhat connected via tributaries or drainage lines, creating a dispersal-matrix throughout the local area (Heard et al. 2004, Hamer and Organ 2008, Heard et al. 2015). Each cluster of Growling Grass Frog at each waterbody (permanent or ephemeral), make-up a larger grouping of the species, known at Meta-

populations (Hale et al. 2013). As a pond-breeding species, recruitment is often less successful in ephemeral waterways, when compared to breeding in permanent waterbodies. As such, population persistence is reliant on permanent waterbodies, making movement within populations essential for informing conservation planning and mitigation.

A range of characteristics are required for waterbodies to be considered suitable to support Growling Grass Frog sub-populations, including (DELWP 2017a):

- Size
- Depth
- Hydroperiod
- Water quality, including heat and disease
- Aquatic vegetation cove
- Predators
- Connectivity.

Connectivity between waterbodies can be through waterways, such as slow-flowing creeks or rivers, drainage lines, swales, or wet depressions. Choice of survey sites was based on the above, as well as the habitat assessment descriptions (DEPI 2013) detailed in Section 2.4.3.1.

The targeted survey focussed on all areas of potential habitat for Growling Grass Frog within the Assessment Area, including the following waterways:

- Balliang Creek road crossing at Geelong-Bacchus Marsh Road (culvert connecting two farm dams).
- Balliang Creek north of the paper road – south of the existing access track (one pool).
- Balliang Creek north of the paper road – north of the existing access track (two pools).

Survey locations can be viewed in Figure 3-8.

Growling Grass Frog are most active in spring and summer, during the breeding season between November and March. Breeding begins after heavy rain events each season. During the breeding season, males call to attract females. Calls are mainly produced at night from August – February. Consequently, nocturnal surveys are undertaken for the species during the breeding season to increase likelihood of species detection from both direct observation and aural listening. Males normally call whilst floating in water.

At the beginning of each call-playback survey at each survey site, 10 minutes was spent listening for frog calls at the water's edge. Within the last three minutes of the listening period a pre-recorded Growling Grass Frog advertisement call was played, with a final 2 minutes of listening for frog calls. Active searching was then undertaken by two ecologists using spotlights, within suitable habitat up to 50 m from the water's edge, including inspection of culverts where applicable.

Weather conditions and survey times can be viewed in Appendix B, Table B-1.

2.4.3.1 Habitat assessment

A habitat quality assessment also took place prior to the targeted survey to ascertain the suitability of the water bodies or waterways within the Assessment Area to support Growling Grass Frog. These assessments also informed the targeted survey locations. The description of habitat quality is provided in Table 2-1.

Table 2-1 Growling Grass Frog habitat suitability of waterbodies or movement corridors (DEPI 2013).

Habitat quality	Description
Low	**Sites that are unlikely to be used by Growling Grass Frog for breeding or dispersal:** • absence or lack of aquatic vegetation • low water quality • presence of predatory fish • lack or low cover of terrestrial refuge sites • Major dispersal barriers present.
Medium	**Sites have a possibility of being used by Growling Grass Frog for breeding and dispersal:** • Habitat that supports one or more key 'High' habitat characteristics outlined below, but not all (for example site may be important for dispersal or foraging but not breeding). • Limited dispersal barriers present across the landscape.
High	**Confirmed or high likelihood of Growling Grass Frog use for breeding:** • Areas that currently contain, or are highly likely to contain, important habitat attributes required by the species for breeding as well as foraging and dispersal. - Deep permanently or consistently available water (up to 1.5 m deep is preferable) that is still or slow moving. - High densities of emergent and submergent and / or floating vegetation, with an adequate vegetative buffer zone surrounding the waterbody (approximately a 20 m radius). • Submergent vegetation zone constituting a minimum of 50 per cent and preferably 60–70 per cent of the total wetland surface area. • Emergent vegetation zone should occupy approximately 30–40 per cent of the wetland area. • High cover of vegetation as well as rock, logs and patches of bare ground surrounding the wetland offers the greatest chance of ongoing occupancy of a site (Clemann and Gillespie 2010).

2.4.4 Golden Sun Moth

Golden Sun Moth (*Synemon plana*) targeted surveys were completed at six sites within areas of suitable habitat within the Assessment Area during December 2020 and January 2021. Survey methodology followed the approach outlined in the Commonwealth Significant Impact Guidelines for Golden Sun Moth (DEWHA 2009a). Each day of survey two Ecologists walked parallel transects no more than 5 m apart. The transects walked during the surveys can be viewed in Appendix A, Figure A-1. Survey locations outside of the Assessment Area were undertaken to consider potential residual impacts of the Project.

Four surveys were conducted between the hours of 10:00 and 14:00 in suitable weather conditions. Suitable days were first identified via weather conditions; cloudless, still weather warmer than 20◦c by 10:00 and at least two days since a local rain event. Survey weather conditions can be viewed in Appendix B, Table B-2.

On days of suitable weather, a reference site was then checked from 10:00 to determine if Golden Sun Moth were 'flying' in the local area. The reference site used was along Gisborne Road (EHP 2018), west of Long Forest Reserve, north of Bacchus Marsh, where a known population of the species resides. Surveys within the Assessment Area only took place when Golden Sun Moth were observed flying at the reference site.

Survey dates include:

- 27 November 2020
- 14 December 2020
- 30 December 2020
- 11 January 2021.

2.4.4.1 Habitat assessment

Golden Sun Moth populations occur within native grasslands and grassy woodlands containing Wallaby Grass (*Rytidosperma spp*.), Spear-grass (*Austrostipa spp*.), Kangaroo Grass (*Themeda triandra*) and Red-leg Grass (*Bothriochloa,spp*.) as known food sources, and within degraded grassland areas that can be dominated by the exotic, weed species, Chilean Needlegrass (*Nassella nessiana*). Within the Victorian Volcanic Plains Bioregion, this habitat is synonymous with EVC 132 Plains Grassland or EVC 55 Plains Grassy Woodland.

There is also evidence that Golden Sun Moth favour a slightly sloping landscape, with north facing sites and minimal shading favoured (DSEWPaC 2011a). Low biomass with inter-tussock spaces are important for breeding (DSEWPaC 2011a). The species is also highly susceptible to disturbance, including pesticides, soil compaction and fragmentation. The species have limited flying ability and are unlikely to travel more than 100 m. A single population is defined as a 'patch' of suitable habitat with confirmed species presence greater than 200 m apart. Therefore, patches within 200 m of each other can potentially be considered as one population.

A habitat assessment was undertaken to ascertain patch suitability of habitat for the target species and to inform survey site selection and was based on the classifications below in Table 2-2 (O'Dwyer C 2000, Gilmore D 2008, DSE 2010, Biosis 2019).

Table 2-2 Habitat suitability prescriptions for Golden Sun Moth habitat.

Habitat quality	Description
Low	• Small, modified fragment • High weed cover (≥ 40%) • Limited known food source, or introduced vegetation dominant (≥ 40% weed cover) • Poor quality native vegetation (VQA score ≤30/75) • Soil disturbance (e.g. Domestic Cattle (*Bos taurus*) grazing, fertiliser use, cropping, soil scalping).
Medium	• ≥ 40% food source • Up to 20% weed cover • > 50% native grasses (tufted-graminoid) cover • Larger/ connectivity over wider landscape • Moderate quality native vegetation • Reduced modification and soil disturbance • Inter-tussock space varies temporarily (due to presence of pasture species, such as Toowoomba Canary-grass (*Phalaris aquatica*), Oat Grass (*Avena spp*). and Cocksfoot (*Dactylis glomerata*).

Habitat quality	Description
High	• > 40% food source (predominantly Wallaby Grass) • Up to 20 % weed cover • High native grasses (tufted-graminoid) cover (E.g. ≥70 %) • North-facing slope, no shade • Inter-tussock space present most of the year (appropriate management practices) • Higher quality native vegetation.

2.4.5 Striped Legless Lizard

Targeted surveys for Striped Legless Lizard (*Delma impar*) were undertaken from October 2019 through to 3 April 2020 in accordance with accepted survey guidelines:

- Survey Guidelines for Australia's Threatened Reptiles (Department of Sustainability Environment Water Population and Communities 2011)
- Referral Guidelines for the Vulnerable Striped Legless Lizard, *Delma impar* (DSEWPaC 2011a).

The surveys were conducted during appropriate seasonal and daily climate conditions: surveys began October 2019 and were completed in March 2020. Surveys were conducted in areas of potential habitat identified for the species during the preliminary field assessment of the Preliminary Assessment Corridor, literature review, and analysis of VBA records (Section 2.4.5.1). At the time Striped Legless Lizard surveys commenced, sections of pipeline and a header tank were proposed west of Geelong-Bacchus Marsh Road and included some areas of suitable habitat for this species, which were subsequently surveyed. However, as the majority of these areas are no longer within the Assessment Area following design development as discussed in Section 2.1, these survey locations and results are not included in this report. The survey locations (tile plots) and results for all areas of suitable habitat surveyed within the Assessment Area are presented within this report. The location of relevant tile transects are presented in Figure 3-8. For the remainder of suitable Striped Legless Lizard habitat within the current Assessment Area, presence was assumed.

Survey methods included:

- Transects comprising of 50 artificial shelter sites (roofing tiles, 'French Terracotta' style with dimensions of 430 mm x 340 mm) were used to provide temporary habitat for the species.
- Two, 250 m long transects were established in areas identified as suitable habitat.
- Tiles were placed at intervals of 5 m apart, labelled and their GPS location recorded.
- Tile checks occurred every two weeks.

Surveys occur when the Lizards are most active, during morning and early afternoon on days, typically with temperatures below 28 degrees where possible (DSEWPaC 2011a). Survey weather conditions are provided in Appendix B, Table B-3.

2.4.5.1 Habitat assessment

Striped legless Lizard populations are found within temperate grassland habitats (DSEWPaC 2011b, DAWE 2021b). Within the Victorian Volcanic Plains Bioregion, this habitat is synonymous with EVC 132 Plains Grassland. The species predominantly prefers native grasslands with Spear-grass (*Austrostipa bigeniculata*) and Kangaroo Grass, although are now known to occur in locations dominated by introduced species, such as Toowoomba Canary Grass or Serrated Tussock (*Nasella trichotoma*).The species is surface active during the day from late spring to early autumn, with a peak in activity in November and December. The species spends nights and brumation (long periods of rest similar to hibernation but without the extreme temperatures) within the soil layer or at the base of tussocks (DSEWPaC 2011a).

Population of Striped legless Lizard occur within reciprocal habitat to Golden Sun Moth and are also a species highly susceptible to disturbance, and as such an assessment of habitat quality and suitability for the lizard can be undertaken similarly to Table 2.2. Additionally, habitat attributes tending to classification of high quality habitat for the species include (DSEWPaC 2011b, DAWE 2021b):

- A mixture of tussock-forming grasses, often > 50% cover
- Embedded surface rocks, most often basalt rock (1-10% of rock cover)
- Well -drained soil.

Additionally, the following factors infer that a site is not likely to support an important population under the EPBC Act (DSEWPaC 2011b):

- Sites less than 0.5 hectares
- Small isolated areas of habitat which are currently under pressure or are likely to experience long-term pressures (for example sites located within urban settings, such as adjacent to factories or in residential subdivisions)
- Small sites which support marginal or low-quality habitat (for example dominated by high threat weeds).

2.5 Environmental legislation and policies

A summary of the legislation and policies referred to throughout the document is provided in Appendix C, Table C-1. If any additional works are proposed to be undertaken outside the Construction Corridor, or the Construction Corridor changes from what is considered in Appendix C, Table C-1, further assessments and approvals may be required to adhere to the legislation and policies described.

2.6 Assumptions and limitations

- This report is intended for the purpose of identifying potential ecological impacts associated with the Project and informing required approvals. Information presented in this report is based on available information at the time of the assessment. Changes to the ecological conditions occur over time through natural and human influences and may alter the conclusions of this report.
- Calculations and figures, including the calculation of vegetation loss, are based on design details available at the time of writing (03/02/2021). Where design details change, the outcomes of this report may require updating.
- Information from the desktop assessment is only as reliable as the data available and in the case of the VBA, the number of surveys previously undertaken (i.e. an area where many surveys have been taken in the past, will, most likely, have a more extensive list of species than areas where very little survey work has been undertaken). The accuracy of past surveys is also variable and point locations can be out by up to 1 km. In addition to the number of previous surveys undertaken, there are other reasons why species, including threatened species, may not have previously been recorded. For example, at the time of historical site visits some plant species may not have been visible above the ground or flowering and therefore not identified as being present within the area surveyed. Also, the data collected is likely to consist of opportunistic observations only, and, therefore, listed fauna species moving in and out of the

area may not have been observed or recorded. Similarly, many fauna species are cryptic, nocturnal and well-hidden such that their presence can only be detected through detailed targeted assessment methods. Hence, only species that can be readily identified at that time, heard or have distinctive signs, such as tracks, scats, diggings are those most likely to be recorded.

- Spatial data layers assessed were the most current available at the time of assessment. Any changes to these layers may require this report to be updated.
- An independent review of the EPBC Act was completed in October 2020, with the Final Report released in January 2021. A number of Bills seeking to amend the current EPBC Act in response to the findings of the independent review are currently being considered by the Australian Parliament. Any changes to the applicable legislation and agreements may affect the outcomes of this report.
- The FFG Act Amendment Bill 2019 has passed through Victorian Parliament with amendments taking effect on 1 June 2020. To support the amendments, the FFG Act threatened species list and protected flora lists are currently being reviewed, with revised lists expected to come into effect in early 2021. The assessments contained in this report are based on the FFG Act lists and associated approval requirements current at the date of this report. The status of species on the FFG Act lists and associated approval requirements may change when the new lists come into effect and as such, the approval requirements outlined in this report should be confirmed prior to construction.
- Golden Sun Moth threatened species status is proposed to be revised under the EPBC Act from Critically Endangered to Vulnerable. The assessment in this Report is based on the current threatened species listing. If listing status does change prior to development of an Offset Management Plan, for example, the new status will be incorporated into that assessment.

3 Results

Results of the desktop and detailed field assessment are combined within this section, and presented based on Commonwealth (Section 3.1) and State (Section 3.2) legislation and regulations. Results of the PMST are presented in Appendix Dand results of the VBA are presented in Appendix Ein conjunction with the Likelihoods Assessment.

3.1 Commonwealth values

Results returned by the PMST (DAWE 2020b) (Appendix D), combined with the Likelihoods Assessment (Appendix E) based on detailed field assessment results, have been considered for relevance to the Project and are summarised in Table 3-1. Two MNES under the EPBC Act are relevant to the Assessment Area; Listed Threatened Ecological Communities (TECs) and Listed Threatened Species. Targeted survey results are presented below.

Table 3-1 Relevant Matters of National Environmental Significance

MNES	PMST results	Project relevance	Action required
World Heritage Properties	-	Not applicable	**No action required.**
National Heritage Places	-	Not applicable	**No action required.**
Wetlands of International Importance (Ramsar wetlands)	1	One Ramsar wetland is identified in the PMST search: • Port Phillip Bay (Western Shoreline) and Bellarine Peninsula.	**No action required.** The Assessment Area is 10-20 km upstream of the Ramsar wetland. Works are not expected to significantly impact the wetlands through implementation of standard sedimentation controls when working around waterways.
Great Barrier Reef Marine Park	-	Not applicable	No action required.
Commonwealth Marine Area	-	Not applicable	No action required.
Listed Threatened Ecological Communities (TECs)	5	Five threatened ecological communities were modelled as potentially occurring within the Assessment Area, including: • Critically Endangered Grassy Eucalypt Woodland of the Victorian Volcanic Plain	**Referral recommended** NTGVVP is present within the Construction Corridor and will be impacted by the Project.

MNES	PMST results	Project relevance	Action required
		• Critically Endangered Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP)– identified as present within the Construction Corridor. • Endangered Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia – no areas of Grey Box woodland were mapped within the Assessment Area. • Critically Endangered Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains – no areas of Seasonal Herbaceous Wetland were mapped within the Assessment Area. • Critically Endangered White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland – no areas of Yellow Box woodland were mapped within the Assessment Area. Further information is provided in Section 3.1.1.	
Listed Threatened Species	33	Thirty-three threatened species were modelled as potentially occurring within the Assessment Area, including 11 listed threatened birds, two fish, one frog, one insect, two mammals, 14 plants, and two reptiles. EPBC Act listed threatened species considered to have a moderate or higher likelihood of presence within the Assessment Area (see Appendix E) are: • Grey-headed Flying-fox (*Pteropus poliocephalus*) • Growling Grass Frog • Golden Sun Moth • Striped Legless Lizard • Matted Flax-lily • Spiny Rice-flower. • Large-fruited Groundsel.	**Referral recommended** Habitat for Striped Legless Lizard is present within the Construction Corridor and will be impacted by the Project

MNES	PMST results	Project relevance	Action required
Listed Migratory Species	14	One listed Migratory Marine bird, five Migratory Terrestrial birds, eight Migratory Wetland birds are modelled as potentially occurring within the Assessment Area.	**No action required** No habitat for listed migratory species has been identified during field assessments

3.1.1 Threatened ecological communities

An assessment of threatened ecological communities listed under the EPBC Act that are modelled as potentially occurring within the Assessment Area is provided below in Table 3-2. The modelled likelihood of occurrence of EPBC Act listed communities is indicated by the PMST (DAWE 2020b). A determination of the likelihood of the community occurring within the Assessment Area was determined based on the findings of the detailed field assessment.

Table 3-2 EPBC Act listed threatened ecological communities modelled as potentially occurring within the Assessment Area

EPBC Act listed community	EPBC Act status	PMST-modelled likelihood of occurrence	CH2MBeca-determined likelihood of occurrence
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	Critically Endangered	Community known to occur within area	**Not present** One woodland (EVC 55) area of poor quality resides within the paper road section of the Assessment Area, near Agars Road. The tree canopy was dominated by River Red Gum (*Eucalyptus camaldulensis*), with no native ground-layer present and as such does not meet the condition thresholds of this TEC.
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area	**Not present** Some scattered Grey Box (*Eucalyptus microcarpa*) and Yellow Box (*Eucalyptus melliodora*), likely planted, were observed within the Assessment Area. Patches of vegetation that included Grey Box, did not fall within the Construction Corridor and did not meet the condition thresholds of this TEC.

EPBC Act listed community	EPBC Act status	PMST-modelled likelihood of occurrence	CH2MBeca-determined likelihood of occurrence
NTGVVP	Critically Endangered	Community likely to occur within area	**Present** NTGVVP is present within the Assessment Area, including the Construction Corridor, along Geelong-Bacchus Marsh Road with higher quality patches of NTGVVP observed within the Assessment Area, including a very small area of the Construction Corridor, on private property along the paper road alignment.
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	Critically Endangered	Community likely to occur within area	**Not present** A few small areas of Plains Grassy Wetland (EVC 125) were mapped at wet depression Geelong-Bacchus Marsh Road. Poor species diversity and small size (<0.5ha) meant the patches did not meet the condition threshold of the TEC.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community may occur within area	**Not present** One woodland area of poor quality resides within the paper road section of the Assessment Area, with large remnant River Red Gum also observed along Balliang Creek (in the vicinity of Creek Crossing 2). Both areas lacked under-storey species, and the dominant overstorey species was River Red Gum and therefore did not correspond with this TEC.

NTGVVP

Areas of Plains Grassland (EVC 132), associated with the Critically Endangered threatened ecological community NTGVVP were identified within the Assessment Area, including within the Construction Corridor. Following targeted survey, some patches of Plains Grassland were confirmed as meeting the condition thresholds of NTGVVP (DEWHA 2011). A total of 2.692 ha of NTGVVP was mapped within the Assessment Area. Patches which were considered as NTGVVP were treeless and dominated by native grasses and herbs.

To sufficiently qualify for national listing (DEWHA 2011), patches of NTGVVP met the following conditions:

1. Larger than or equal to 0.05 hectares; and
2. Met one of the following descriptions:
   a) The dominant native species represented at least 50% of the native species and the perennial tussock cover; or
   b) Non-grass weeds comprised less than 30% of ground cover; or
   c) Native forbs (wildflowers) comprised at least 50% of total vegetation cover during spring – summer.

Locations of NTGVVP mapped within the Assessment Area can be viewed in Figure 3-9.

NTGVVP patches have been scored as per the Vegetation Quality Assessment Manual: Guidelines for applying the Habitat Hectares scoring method. Version 1.3 (DSE 2004), and are detailed in Appendix G. NTGVVP patches occurred along the road reserve of Geelong-Bacchus Marsh Road, where modified patches were of lower native forb diversity, but the native grass layer cover was 50% or over. These patches were dominated by either Spear-grass or Bristly Wallaby Grass (*Rytidosperma setaceum*) (Figure 3-1) meeting criterion 2 a) and b), and were otherwise historically highly modified. The building-up of driveways, drainage lines, powerlines and fencelines has fragmented larger areas of grassland within the road reserve into discrete sections, particularly between Ballan Road and School Road, some of which still meet the criterion 1. Regular slashing has reduced biomass and weed cover, increasing inter-tussock space. However, surface rock is absent and has been used for fencing.

The addition of access tracks for powerline easements along Geelong-Bacchus Marsh Road eastern road reserve, between School Road and the paper road or Nerowie Road, have resulted in degradation of grassland patches and weed invasion following previous assessments. Again, these NTGVVP patches are considered modified, but meet criterion 1, 2 a) and b), but lack forb diversity. Surface rock has been removed and regular slashing occurs.

In addition, on 9 April 2020 topsoil dredging was observed along the eastern side of Geelong-Bacchus Marsh Road from the School Road intersection south to the paper road (Figure 3-3). Therefore, the NTGVVP ecological community mapped here during previous surveys (SMEC 2019) is no longer present, or is reduced in size. Evidence of pesticide use was also observed along property fencelines and crop edges adjacent to NTGVVP patches of vegetation.

Higher quality patches occurred within the southern section of the Assessment Area, within private property along the northern side of the paper road east of the Balliang Creek Crossing 2 (Figure 3-2). These patches were notably dominated by native grass species such as Kangaroo Grass, Windmill Grass (*Chloris truncata*), Spear-grasses, Wallaby grasses, Common Wheat-grass (*Anthosacne scabra*) and Red-leg Grass. Many supported herbaceous plains grassland species including Sheep's Burr (*Acaena echinata*), Bluebell (*Wahlenbergia stricta*), Common New Holland Daisy (*Vittadinia cuneata*), Slender Bindweed (*Convolvulus angustissimus ssp. omnigracilis*), Kidney Weed (*Dichondra repens*) and Jersey Cudweed (*Helichrysum luteoalbum*). Although not actively managed or secured via fencing, surface rock and inter-tussock spaces were present, with surrounding crops creating isolated patches of NTGVVP. Weed species included Wild Oat, which often dominated patches at the beginning of Spring, taking-up the majority of inter-tussock space.

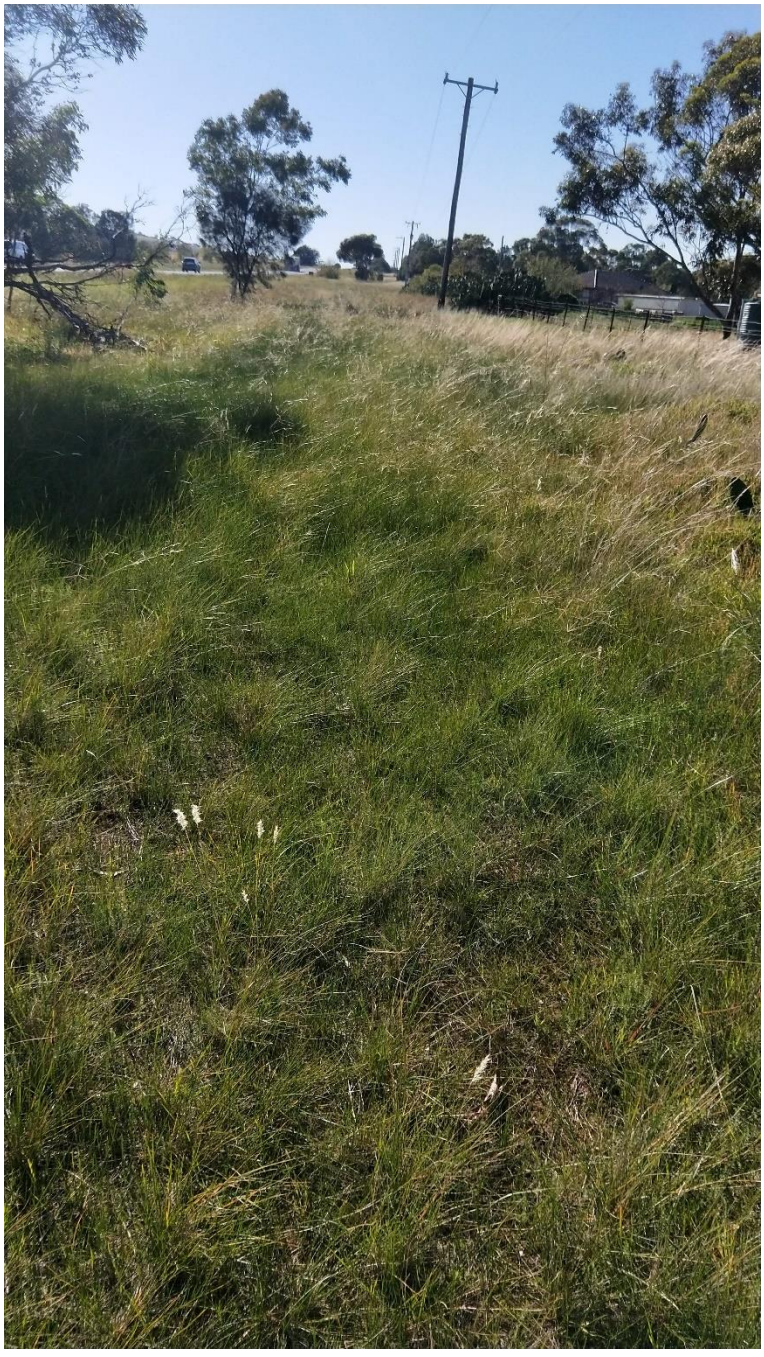


Figure 3-1 Example of a NTGVVP patch within the Geelong-Bacchus Marsh Road reserve.

Figure 3-2 A patch of Spear-grass (*Austrostipa spp*.) dominant Plains Grassland (EVC 132) east of Balliang Creek along the paper road that qualifies as NTGVVP.

Figure 3-3 Evidence of topsoil scalping along the eastern side of Geelong-Bacchus Marsh Road from School Road intersection to the paper road. Photo taken on 9 April 2020.

3.1.2 Threatened species

Following the desktop assessment and preliminary field assessment, the following EPBC Act listed threatened species were identified as potentially occurring (moderate-high likelihood) within the Assessment Area (see Appendix E):

- Grey-headed Flying-fox (*Pteropus poliocephalus*)
- Growling Grass Frog (*Litoria raniformis*)
- Golden Sun Moth (*Synemon plana*)
- Striped Legless Lizard (*Delma impar*)
- Matted Flax-lily (*Dianella amoena*)
- Spiny Rice-flower (*Pimelea spinescens subsp. spinescens*)
- Large-fruit Fireweed (*Senecio macrocarpus*).

Results of targeted surveys and an assessment of the likelihood of impact on these species are detailed further below and summarised in Table 3-3.

Table 3-3 EPBC Act listed threatened species - likelihood of impact assessment

Threatened species	EPBC Act status	Desktop likelihood of presence	Results of field assessment	Likelihood of impact
Flora species				
Matted Flax-lily	Endangered	**Moderate** Recent records within 5 km and the Assessment Area supports suitable habitat for the species, particularly in less modified locations.	**Not observed** Species not observed during spring surveys. Historical and ongoing disturbance within the Geelong-Bacchus Marsh Road reserve indicate the species is unlikely to persist in lower quality habitat in these areas. The higher quality grassland patches (e.g. NTGVVP patches) on private property are not managed for conservation purposes. Given the species biological requirements, it is likely to be outcompeted due to the lack of inter-tussock space. As such, the species is unlikely to occur within the Assessment Area. This is further detailed in Section 3.2.1.	**Low**
Spiny Rice-flower	Critically Endangered	**Moderate** Recent records within 5 km and suitable grassland habitat is present within the Assessment Area.	**Not observed** Species not observed during targeted surveys. Historical and ongoing disturbance within the Geelong-Bacchus Marsh Road reserve indicate the species is unlikely to persist in lower quality grassland habitat in these areas. Disturbance, including pesticide use, and temporal changes in weed cover of grassland patches of higher quality within private property in the Assessment Area indicate the species is also unlikely to persist in these areas.	**Low**

Threatened species	EPBC Act status	Desktop likelihood of presence	Results of field assessment	Likelihood of impact
Large-fruit Fireweed	Vulnerable	**Moderate** Recent records within 5 km and suitable habitat present within the Assessment Area.	**Not observed** Species not observed during NTGVVP check surveys. Disturbance and weed cover of grassland patches of higher quality within the Assessment Area indicate the species is unlikely to persist.	**Low**
Fauna species				
Striped Legless Lizard	Vulnerable	**High** This species has been recently recorded near the Assessment Area during past surveys south of the paper road (EHP 2017b, EHP 2017c). Suitable habitat within the Assessment Area is present, particularly within private property east of Balliang Creek Crossing 2.	**Not observed – assumed presence in medium-high quality habitat not surveyed** Targeted surveys have been completed along Parwan South Road and the species was not observed. Past surveys did not identify the species within transects at Geelong-Bacchus Marsh Road within the current Assessment Area (EHP 2017b, EHP 2017c). Habitat within the Assessment Area on private property north of the paper road and east of Balliang Creek has been assessed as moderate likelihood of presence. Targeted surveys were not completed in this area and presence of this species has been assumed for impact assessment purposes. Only a very small area of medium to high quality suitable habitat (0.0089 ha) for this species falls within the Construction Corridor and will be potentially impacted by the Project.	**Low**

Threatened species	EPBC Act status	Desktop likelihood of presence	Results of field assessment	Likelihood of impact
Growling Grass Frog	Vulnerable	**Moderate** Marginal dispersal habitat is potentially available along Balliang Creek in the vicinity of Creek Crossing 2 however, this is unlikely to comprise breeding habitat for this species and mitigation measures could avoid impacts. Previous targeted surveys for the Geelong-Bacchus Marsh Road Project targeted Balliang Creek and other culverts within the current Assessment Area and no Growling Grass Frog were detected (EHP 2017a).	**Not observed** Species not observed during targeted survey following heavy rain in January 2021. Barriers to movement along Balliang Creek (e.g. existing culverts and access track crossings), general absence of aquatic vegetation, poor water quality in pooled area and cropping indicate the species is unlikely to persist in the Assessment Area.	**Negligible**
Golden Sun Moth	Critically Endangered	**Moderate** This species has been recently recorded near the Assessment Area, approximately 2 km south at Birds Road (SMEC 2019) and suitable habitat is available.	**Not observed** Targeted surveys did not observe the species. Continued disturbance at Geelong-Bacchus Marsh Road and unsuitable management practices within suitable habitat in private property indicate the species is unlikely to persist in the Assessment Area.	**Low**

Threatened species	EPBC Act status	Desktop likelihood of presence	Results of field assessment	Likelihood of impact
Grey-headed Flying-fox	Vulnerable	**Moderate** Species home-range spans widely, however there are no known roosts within the Assessment Area.	**Not observed** No targeted field assessment undertaken and species not observed during site visits. Foraging habitat is limited across the Assessment Area and no roosting habitat is available within the Construction Footprint. Permanent Camps are unlikely to be formed within the Assessment Area.	**Negligible**

Growling Grass Frog

Growling Grass Frog were given a moderate likelihood of being present within the Assessment Area. Marginal dispersal habitat, providing movement to farm dams or wetlands throughout the wider landscape, is potentially available along Balliang Creek at both locations where the alignment crosses the Creek. Locations within the Assessment Area include:

- Balliang Creek Crossing 1 – culvert at Geelong-Bacchus Marsh Road.
- Balling Creek Crossing 2 – access track crossing at southern end of the Assessment Area.

Both Creek Crossings 1 and 2 have limited to no aquatic vegetation present (Figure 3-4, Figure 3-5, Figure 3-6). Some Common Reed (*Phragmites australis*) is present along the drainage line at Creek Crossing 1 (Figure 3-5). However, the growing habitat of the Common Read offers little to no protection for Growling Grass Frog to disperse through and the drainage line is most often dry. Physical barriers to movement are also present, including at Creek Crossing 2, where dirt has been built-up to provide an access track for farming vehicles to cross the creek, blocking the flow of water or access for aquatic species north or south of the access track. Other similar barriers have been built south of the Assessment Area, at Sharkey Road, to cross Balliang Creek. Any water that does enter Balliang Creek pools at the two farm dams either side of Geelong-Bacchus Marsh Road Creek Crossing 1. Both dams lack aquatic vegetation. The drainage line, as mentioned, at Creek Crossing 1, is dominated by exotic species, such as Water Couch (*Paspalum distichum*) and an access track was evident in the southbound road reserve across the drainage line. As such, both creek crossing points were assessed as low-quality habitat for the species (Table 3-4). A total of 2.2215 ha of low-quality Growling Grass Frog habitat was mapped within the Assessment Area.

Prior to January 2021, water had not been observed during various ecological surveys for this Project within Balliang Creek, either at the southern Balliang Creek section (Creek Crossing 2) or at the Geelong-Bacchus Marsh Road culvert (Creek Crossing 1), excluding the dams east and west of the culverts on private property. A site visit on 11 January 2021 noted that, following heavy rain, water had pooled in three locations within Creek Crossing 2 and dams were overflowing at Creek Crossing 1. However, water was not flowing through the culvert at the time, but some had pooled on the southbound side of the road reserve. Given that water is not often present at these locations in the Assessment Area, as a conservative approach, this opportunity was taken to undertake targeted surveys for Growling Grass Frog despite the marginal habitat quality.

Targeted surveys did not encounter Growling Grass Frog. Common frog species, such as Striped Marsh Frog (*Limnodynastes peronii*) and Pobblebonk (*Limnodynastes dumerilli*), were heard over the two nights of survey, at both Creek Crossing 1 and 2. The water quality at Creek Crossing 2 had deteriorated following the rain event, forming stagnant blackwater and had large numbers of mosquito larvae (Figure 3-6). Water run-off and pollution at Creek Crossing 1 is also expected to create poor water quality conditions for Growling Grass Frog. Previous targeted Growling Grass Frog surveys for the Vic Roads Geelong-Bacchus Marsh Road project targeted Balliang Creek (Crossing 1) and other culverts within the current Assessment Area and no Growling Grass Frogs were detected during those previous surveys (EHP 2017). Given the degraded extent of Balliang Creek throughout the landscape, artificial barriers along the creekline and historical agricultural land use, including cropping and pesticide use, Growling Grass Frog are not expected to persist within the Assessment Area or wider local area.

Table 3-4 Results of habitat assessment of Growling Grass Frog within the Assessment Area.

Habitat quality	Description
Low	• Limited native aquatic vegetation within Balliang Creek and permanent farm dams. • Low water quality – stagnant blackwater or no water present. • Low cover of terrestrial refuge sites, with Balliang Creek surrounded by cropping. • No recent species records within 1 km of the Assessment Area. • Dispersal barriers, including multiple road / track crossings.

Targeted survey locations and mapped habitat can be viewed in Figure 3-8. The weather conditions and results of targeted surveys for Growling Grass Frog are provided in Appendix B, Table B-1.

Striped Legless Lizard

Desktop assessment indicated Striped Legless Lizard to have a high potential to occur within the Assessment Area and preliminary field assessments confirmed potential habitat available at a number of locations within the Assessment Area. In addition to potential habitat along Geelong-Bacchus Marsh Road surveyed during previous assessments for the Geelong-Bacchus Marsh Road Project, potential habitat for this species was identified within the Assessment Area along Parwan South Road (Figure 3-7), along Schultz Road, on private property east of Geelong-Bacchus Marsh Road and south of Bluegum Track, and on private property north of the paper road with a particularly large area east of Balliang Creek Crossing 2 (Figure 3-1). Suitable habitat was also observed on private property south of the paper road, however, these areas are not located within the Assessment Area having been identified for avoidance early in the design process for the section of pipeline along the paper road.

Higher quality habitat available near the paper road is characterised by more open areas of Kangaroo Grass, Spear Grass and Wallaby Grass, with bare ground and surface rock present. Lower quality habitat was present along Parwan South Road and Schultz Road, dominated by Spear Grass and a lack of wild forb diversity. However, surface rock was sporadically present along edges of the gravel tracks within the Parwan South Road and Schultz Road. Habitat suitability results are detailed in Table 3-5 and presented in Figure 3-8.

Targeted surveys for Striped Legless Lizard were undertaken along Parwan South Road and no individuals were observed. Evidence of pesticide use and heavy vehicle soil compaction is present along the edges of the farm access track within the Parwan South Road reserves, with sporadic removal of surface rock and high weed cover (> 40%). Throughout the survey period, from preliminary field assessments through to detailed field assessment, habitat along Parwan South Road deteriorated via farming activities, with pesticides used to clear vegetation or hay bales placed over patches. Striped Legless Lizard are a cryptic species and, as such, absence during targeted surveys does not always equate to absence from the suitable habitat. However, surveys were completed under conditions to maximise detection and, therefore, Striped

Legless Lizard are not expected to be present along Parwan South Road. Given similar, continued modification of suitable habitat has occurred along Schultz Road and Geelong-Bacchus Marsh Road within the Assessment Area, and that previous targeted surveys for the Geelong-Bacchus Marsh Road Project did not record the species within the current Assessment Area, Striped Legless Lizard are not expected to persist at these locations (EHP 2017b, EHP 2017c, SMEC 2019). Although, past targeted survey did record Striped Legless Lizard approximately 1 km south of the of the Assessment Area (EHP 2017b, EHP 2017c).

Some areas of habitat were classified as a combination of both medium-high quality. This is due to the patch quality varying over time and from ongoing, and historical, ground disturbance. Wild Oat dominated the majority of the vegetation patches in Spring, removing inter-tussock spaces at the paper road property. Evidence of soil disturbance is also present, including Domestic Sheep (*Ovis aries*) grazing, European Rabbits (*Oryctolagus cuniculus*) and pesticide use. As these locations of medium- high quality patches have not been surveyed, a Moderate likelihood of presence is assumed.

Table 3-5 Striped Legless Lizard and Golden Sun Moth habitat within the Assessment Area

Habitat quality	Location (patches of habitat)
Low	• Geelong-Bacchus Marsh Road • Parwan South Road • Schultz Road
Medium-High	• Private property on the eastern side of Geelong-Bacchus Marsh south of Bluegum Track • Private property on the northern and southern side of paper road near Balliang Creek Crossing 2

Targeted survey locations and mapped habitat can be viewed in Figure 3-8. The weather conditions and results of targeted surveys for Striped Legless Lizard are provided in Appendix B, Table B-3.

Golden Sun Moth

The desktop assessment indicated Golden Sun Moth to have moderate potential to occur within the Assessment Area, particularly along the paper road section near Balliang Creek Crossing 2. Areas of suitable habitat and associated quality of habitat for Golden Sun Moth is consistent with that described for Striped Legless Lizard in Table 3-5 and shown in Figure 3-8.

Targeted survey for Golden Sun Moth took place within all areas of medium-high habitat suitability within the Assessment Area, along with previously unsurveyed areas of low quality habitat along Schultz Road. Following further deterioration of low quality habitat along Parwan South Road since the preliminary field assessment, which had resulted in complete removal or fragmentation of grassland patches from pesticide use, topsoil removal or placement of farm items (e.g. hay bales) on top of the habitat, targeted surveys were not undertaken for Golden Sun Moth along Parwan South Road. Habitat quality along Schultz Road, where surveys occurred, was also observed to be degraded by pesticide following the detailed vegetation assessment. No Golden Sun Moth were observed during the targeted surveys.

Past targeted surveys in 2016 within the Geelong-Bacchus Marsh Road reserve did not record the species within the Assessment Area (SMEC 2019). Golden Sun Moth were recorded south of the Assessment Area between the paper road and Birds Road (west side)/ Sharkey Road (east side), including within the Geelong-Bacchus Marsh Road reserve (Okologie 2017, SMEC 2019{Okologie, 2017 #666). Previous targeted surveys observed the species within EVC 132 Plains Grassland. Patches were dominated by the native Kneed Spear-grass (*Austrostipa bigeniculata*), Rough Spear-grass (*Austrostipa scabra*), Common Wallaby Grass (*Rytidosperma caespitosum*) and Bristly Wallaby Grass at 60-80 % cover. The patches also contained 10-20 % exotic weed cover and 5-10 % bare-ground (Okologie 2017, SMEC 2019{Okologie, 2017 #666). Medium-high quality habitat surveyed during the 2020/ 2021 season was similar to these parameters.

Historical and ongoing disturbance along the road reserve of Geelong-Bacchus Marsh Road, including recent topsoil scalping (Figure 3-3), within the Assessment Area indicate that the species would not persist in lower quality grassland habitat. NTGVVP patches within the road reserve of the Assessment Area often occurred at lower points in the landscape, near drainage lines and driveway culverts, where water pooling is evident (Figure 3-2). Persistent mowing and vehicle access within the road reserve are likely to have led to soil compaction. Similarly, inappropriate management of grassland habitat, including pesticide use, sheep grazing and the presence of European Rabbits, is evident on private property south of Bluegum Track and on private property on the northern side of the paper road. In these areas, increases in percentage cover of, mainly, Wild Oat in Spring removed any available bare-ground at the paper road survey sites, indicating that Golden Sun Moth populations are unlikely to persist in the Assessment Area.

Survey transects and habitat assessment results can be viewed in Figure 3-8.

Threatened flora species

The four EPBC Act listed flora species ear-marked for further consideration and targeted survey are unlikely to persist within the Assessment Area. Targeted surveys for Spiny Rice Flower and spring targeted flora surveys did not observe any of the four species.

The historically modified nature of the Geelong-Bacchus Marsh Road reserve indicates that these species are not likely to persist within this section of the Assessment Area. Disturbance-conducive flora species, such as Fuzzy New Holland-daisy (*Vittadinia cuneata var. cuneata*), were present in low numbers in small sections for the road reserve. However, overall wild forb diversity was low.

Low species diversity was also representative of the private properties targeted for flora surveys, including Bluegum Track and the paper road in the southern part of the Assessment Area. An increase in grassland species diversity did occur within the NTGVVP area at the paper road section east of Balliang Creek, although, limited bare-ground and extensive weed cover may contribute to the absence of these species across the Assessment Area.

Figure 3-4 The dry bed at Balliang Creek Crossing 2 where it intersects the paper road section.

Figure 3-5 Common Reed (Phragmites australis) present along the culvert drainage line of Geelong-Bacchus Marsh Road (Creek Crossing 1).

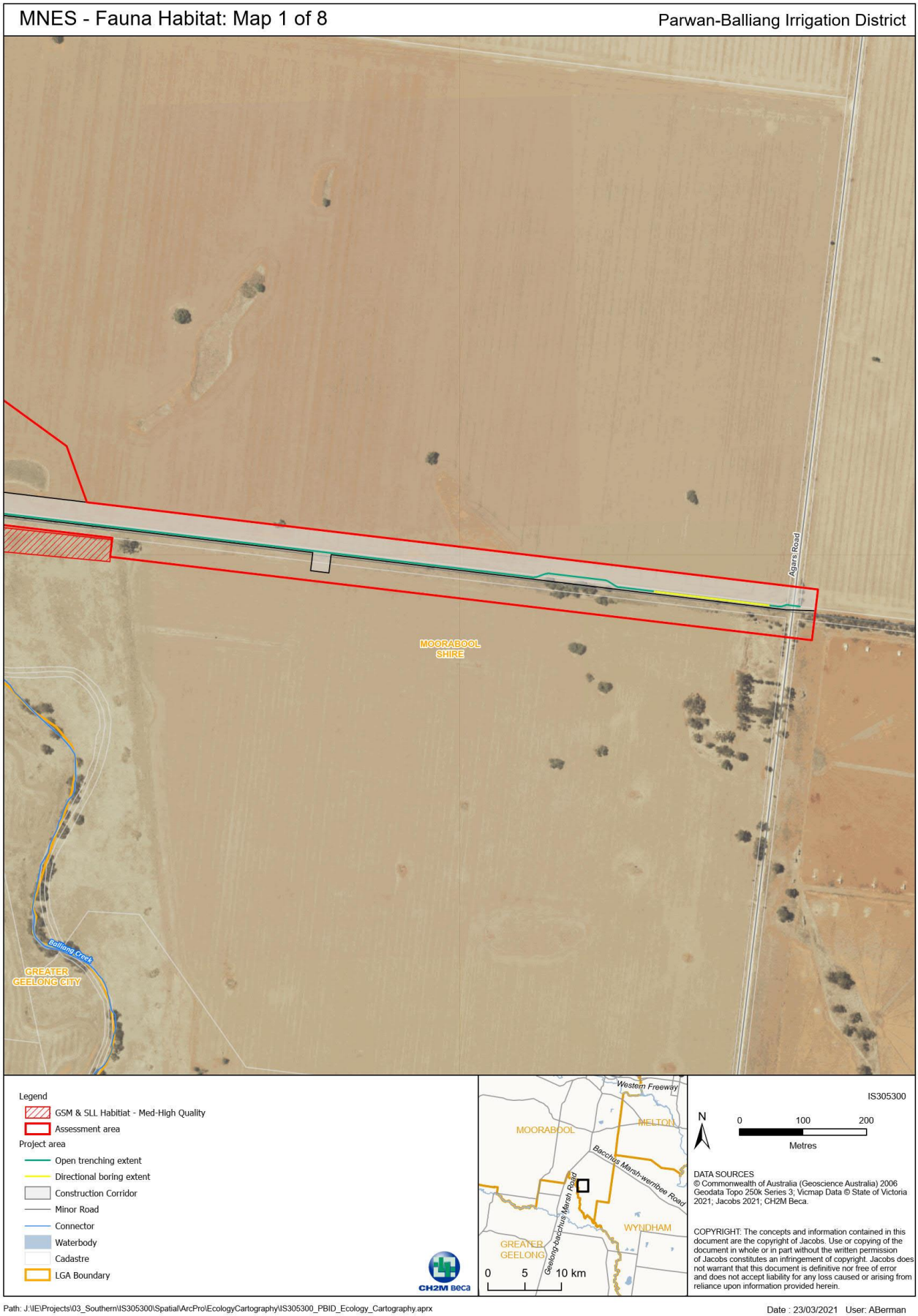
a) Representation of pools after heavy rainfall forming potential Growling Grass Frog habitat on 11 January 2021

b) Degradation of water quality (back water) when surveys occurred.

Figure 3-6 Marginal Growling Grass Frog habitat after heavy rain at Balliang Creek Crossing 2.

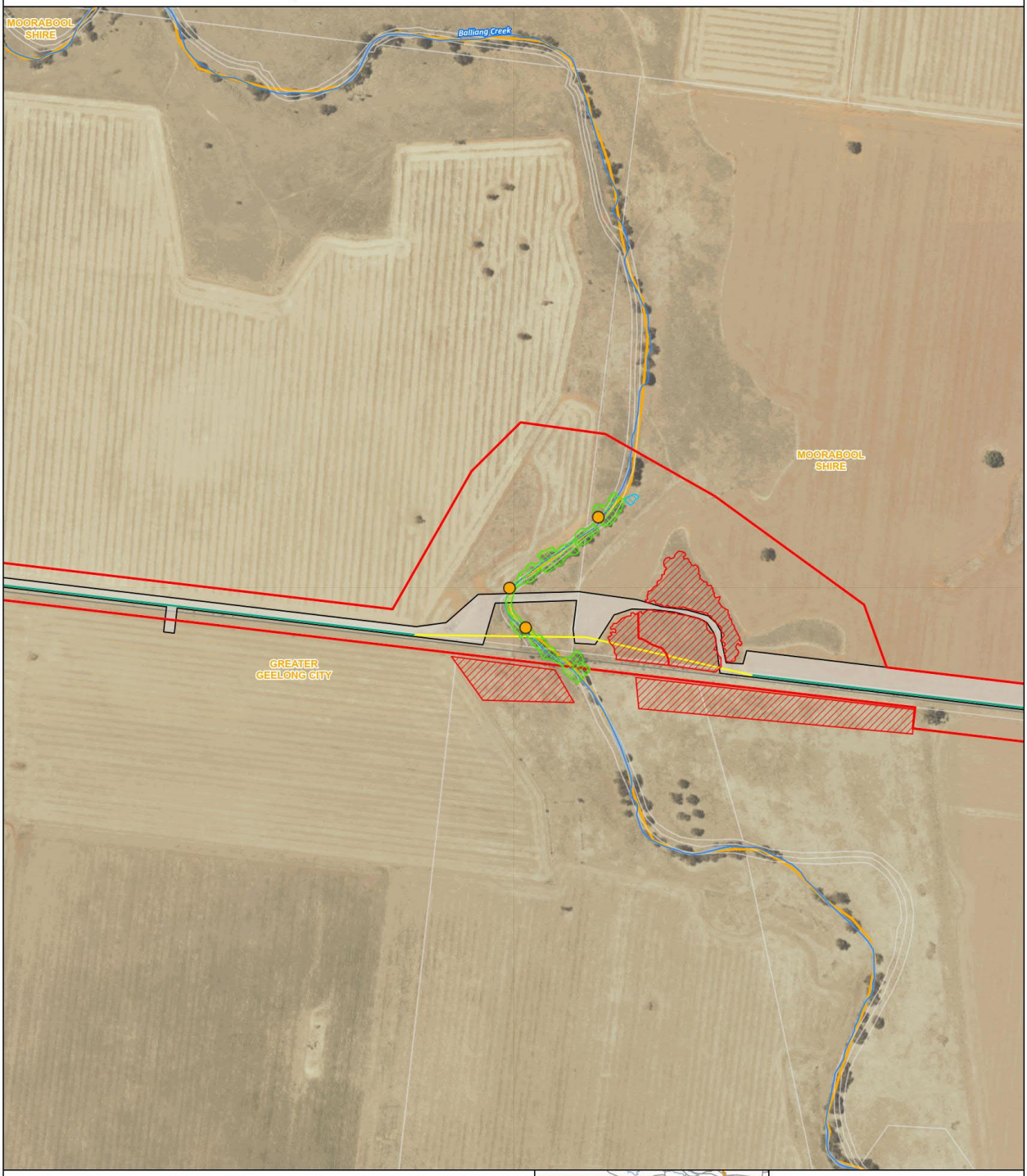
Figure 3-7 Potential Striped Legless Lizard habitat along Parwan South Road. Targeted surveys were undertaken at this location.

Figure 3-8 Fauna habitat values identified within the Assessment Area



MNES - Fauna Habitat: Map 2 of 8

Parwan-Balliang Irrigation District



Legend

- GGF Survey locations
- GSM & SLL Habitat - Med-High Quality
- GSM & SLL habitat – Low Quality
- GGF Habitat – Low quality
- Assessment area

Project area

- Open trenching extent
- Directional boring extent
- Construction Corridor
- Minor Road
- Connector
- Waterbody
- Cadastre
- LGA Boundary

IS305300

N

0 100 200

Metres

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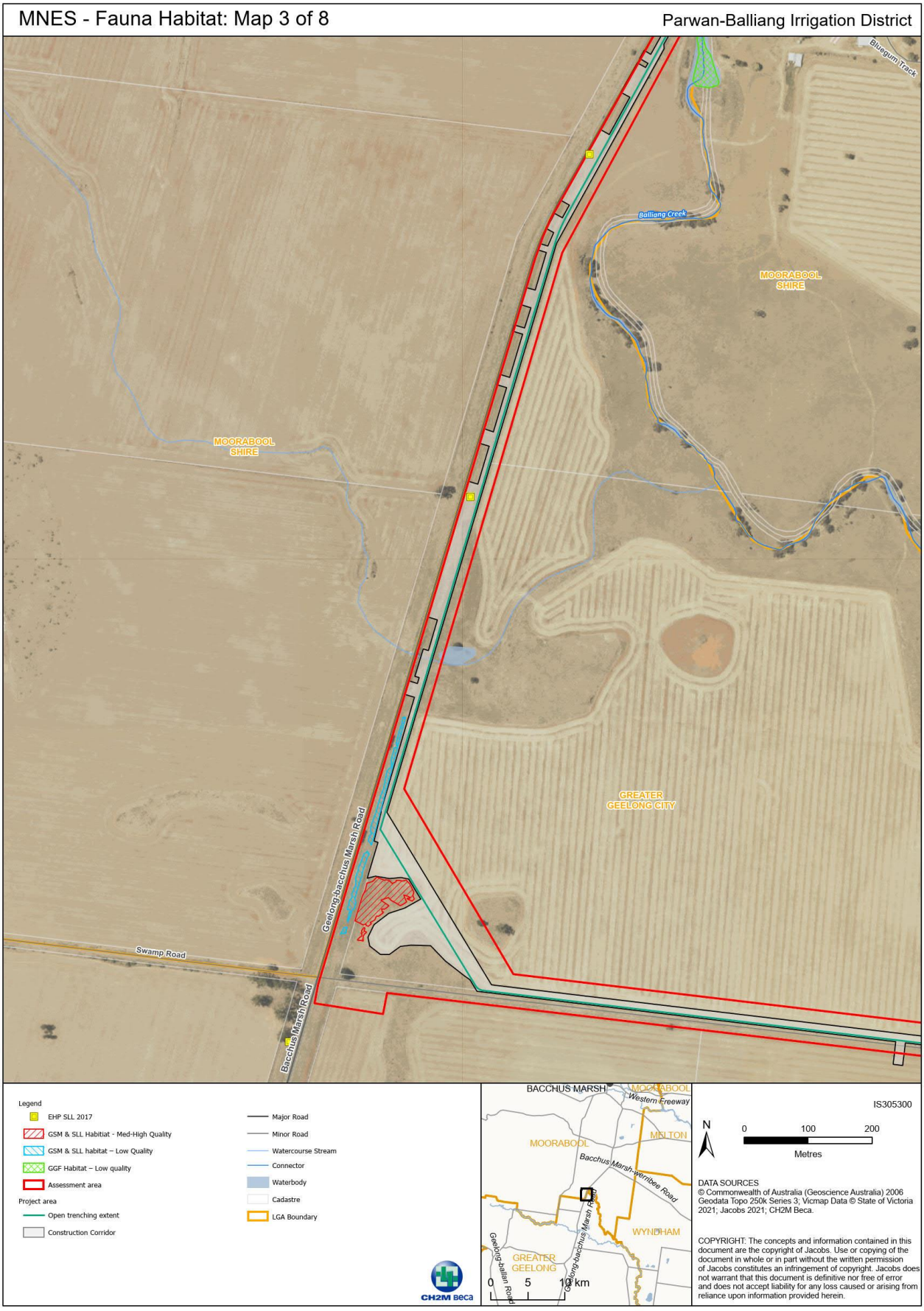
MNES - Fauna Habitat: Map 3 of 8
Parwan-Balliang Irrigation District
Bluegum Track
Balliang Creek
MOORABOOL SHIRE
MOORABOOL SHIRE
GREATER GEELONG CITY
Geelong-bacchus Marsh Road
Swamp Road
Bacchus Marsh Road
Legend
EHP SLL 2017
GSM & SLL Habitat - Med-High Quality
GSM & SLL habitat – Low Quality
GGF Habitat – Low quality
Assessment area
Project area
Open trenching extent
Construction Corridor
Major Road
Minor Road
Watercourse Stream
Connector
Waterbody
Cadastre
LGA Boundary
CH2M Beca
BACCHUS MARSH
MOORABOOL
Western Freeway
MELTON
MOORABOOL
Bacchus Marsh-Werribee Road
WYNDHAM
GREATER GEELONG
Geelong-bacchus Marsh Road
Geelong-ballan Road
0 5 10 km
IS305300
N
0 100 200
Metres
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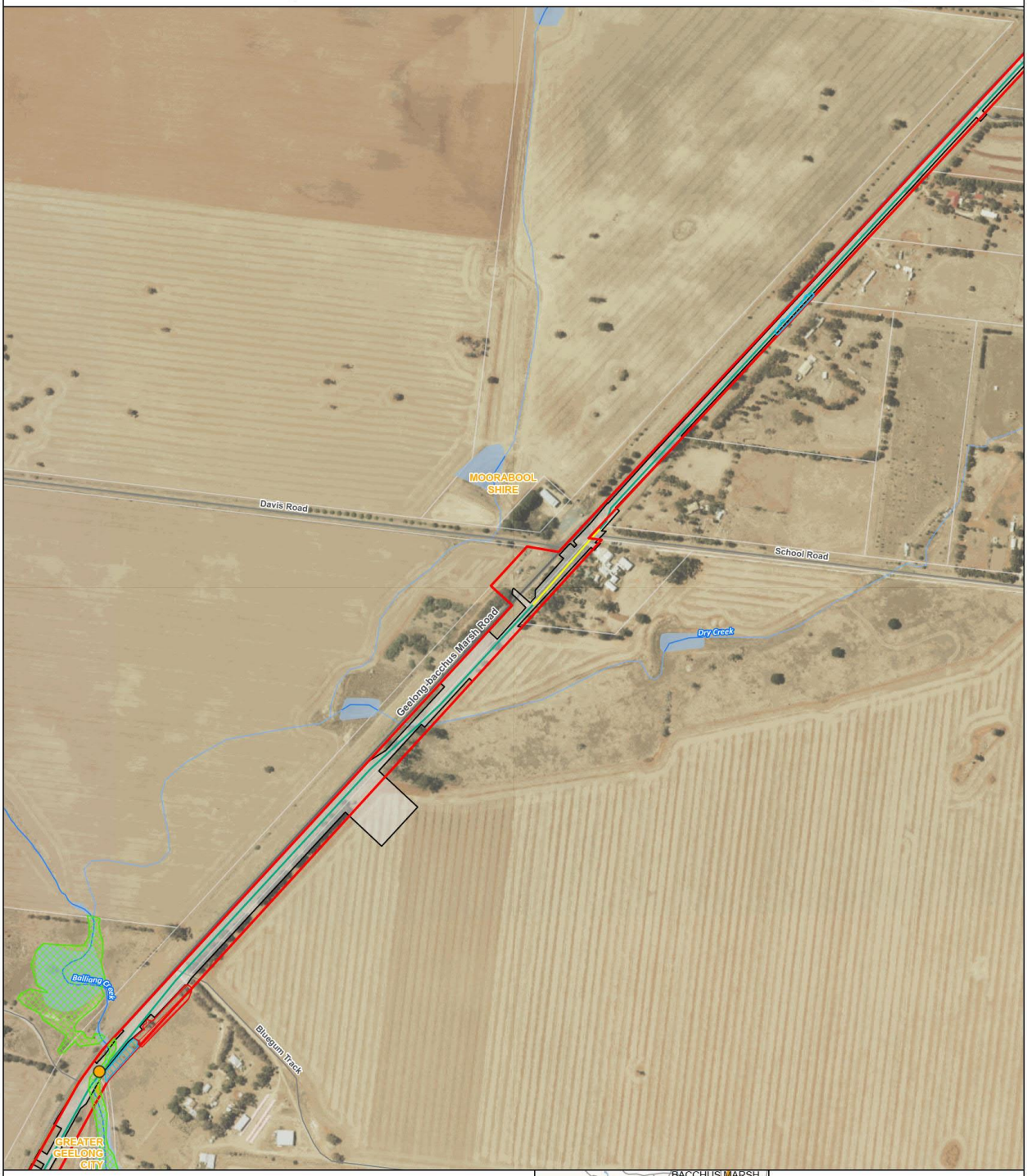
MNES - Fauna Habitat: Map 4 of 8

Parwan-Balliang Irrigation District



Legend

- GGF Survey locations
- GSM & SLL Habitat - Med-High Quality
- GSM & SLL habitat – Low Quality
- GGF Habitat – Low quality
- Assessment area

Project area

- Open trenching extent
- Directional boring extent
- Construction Corridor
- Major Road
- Minor Road
- Watercourse Stream
- Connector
- Waterbody
- Cadastre
- LGA Boundary

IS305300

N

0 100 200

Metres

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MNES - Fauna Habitat: Map 5 of 8

Parwan-Balliang Irrigation District

Legend

- GSM & SLL habitat – Low Quality
- Assessment area

Project area

- Open trenching extent
- Construction Corridor
- Major Road
- Minor Road
- Watercourse Stream
- Connector
- Waterbody
- Cadastre
- LGA Boundary

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Metres

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MNES - Fauna Habitat: Map 6 of 8

Parwan-Balliang Irrigation District

Legend

- SLL surveys 2019-2020
- GSM & SLL habitat – Low Quality
- Assessment area

Project area

- Open trenching extent
- Directional boring extent
- Construction Corridor
- Major Road
- Minor Road
- Waterbody
- Cadastre
- LGA Boundary

IS305300

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Metres

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MNES - Fauna Habitat: Map 7 of 8
Parwan-Balliang Irrigation District
MOORABOOL SHIRE
Schultz Road
Parwan South Road
Legend
GSM & SLL habitat – Low Quality
Assessment area
Project area
Open trenching extent
Construction Corridor
Minor Road
Waterbody
Cadastre
LGA Boundary
CH2M Beca
BACCHUS MARSH
MELTON
Bacchus Marsh Road
Western Freeway
MOORABOOL
MELTON
Geelong-Bacchus Marsh Road
Bacchus Marsh-werribee Road
WYNDHAM
GREATER GEELONG
0 5 10 km
IS305300
N
0 100 200
Metres
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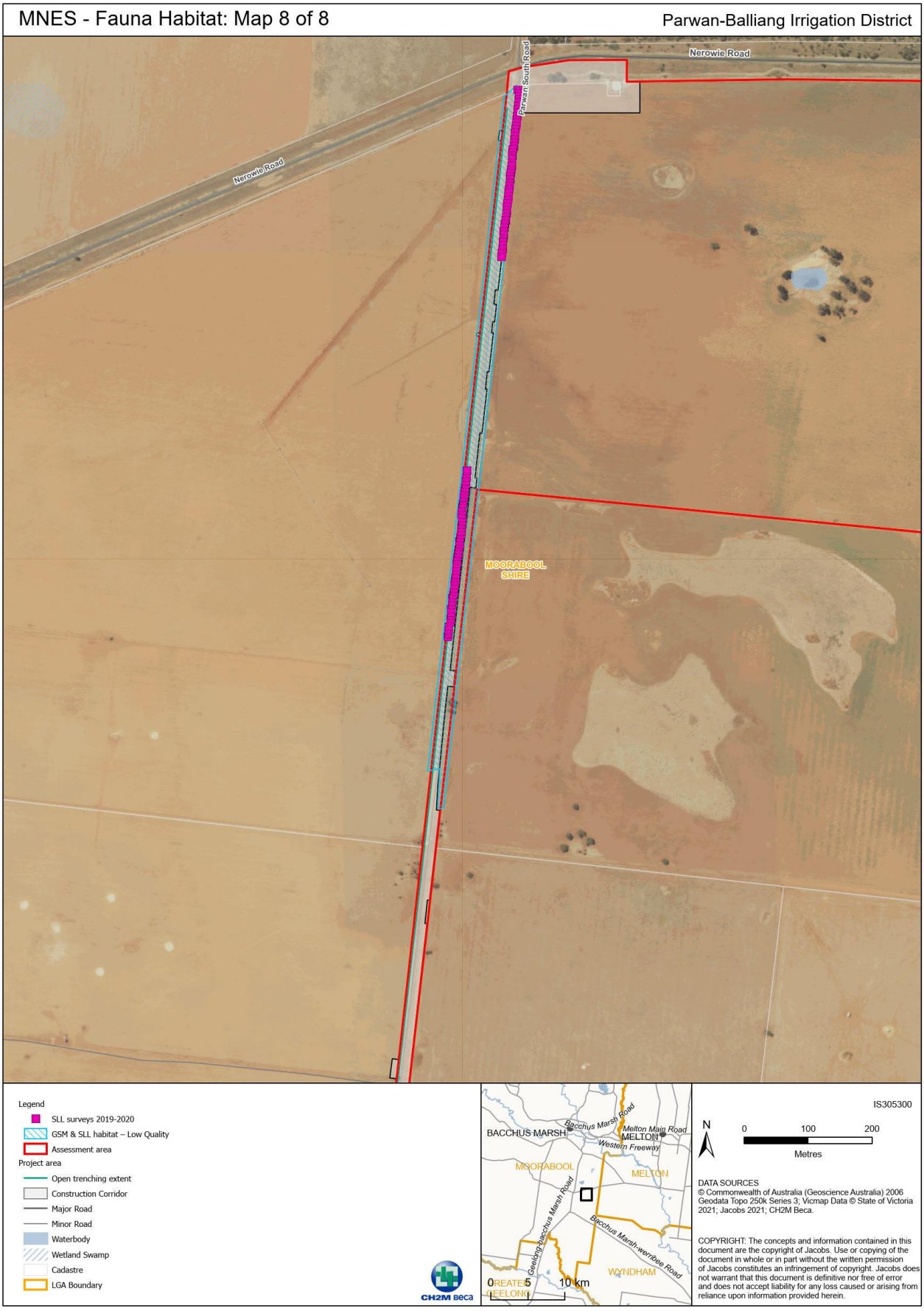
MNES - Fauna Habitat: Map 8 of 8
Parwan-Balliang Irrigation District
Nerowie Road
Parwan South Road
Nerowie Road
MOORABOOL SHIRE
Legend
SLL surveys 2019-2020
GSM & SLL habitat – Low Quality
Assessment area
Project area
Open trenching extent
Construction Corridor
Major Road
Minor Road
Waterbody
Wetland Swamp
Cadastre
LGA Boundary
CH2M Beca
BACCHUS MARSH
Bacchus Marsh Road
Melton Main Road
MELTON
Western Freeway
MOORABOOL
MELTON
Geelong-Bacchus Marsh Road
Bacchus Marsh-werribee Road
WYNDHAM
GREATER GEELONG
0 5 10 km
IS305300
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Metres
DATA SOURCES
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3.1.3 Migratory species

The PMST (Appendix D) modelled fourteen listed migratory species as potentially occurring within 5 km of the Assessment Area. Due to marginal grassland and woodland habitat present, and the absence of any significant aquatic habitat, the Assessment Area is not considered to contain important habitat for listed migratory species and as such, listed migratory species are considered unlikely to be significantly impacted by works within the Construction Corridor.

3.1.4 Ramsar wetlands

The PMST (Appendix D) modelled the Wetland of International Importance (Ramsar Wetland) Port Phillip Bay (western shoreline) and Bellarine Peninsula as occurring 10-20 km downstream of the Assessment Area. Works within the Construction Corridor are unlikely to significantly impact on this wetland.

3.2 State values

3.2.1 Native vegetation

Native vegetation is classified into EVCs for mapping and conservation management purposes. During the desktop assessment DELWP's database NatureKit indicated three EVCs modelled to occur within the Assessment Area:

- Creekline Grassy Woodland (EVC 68)
- Plains Grassy Wetland (EVC 125)
- Plains Grassland (EVC 132).

Following detailed field assessment, the predominant EVC across the Assessment Area is Plains Grassland (EVC 132_61 Heavier soils), which occurs on fertile cracking basalt soils prone to seasonal waterlogging in areas receiving at least 500 mm annual rainfall (DELWP 2020b). The EVCs mapped throughout the Assessment Area include:

- Plains Grassland (EVC 132_61)
- Plains Grassy Woodland (EVC 55_61)
- Tall Marsh (EVC 821)
- Creekline Grassy Woodland (EVC 68)
- Plains Grassy Wetland (EVC 125).

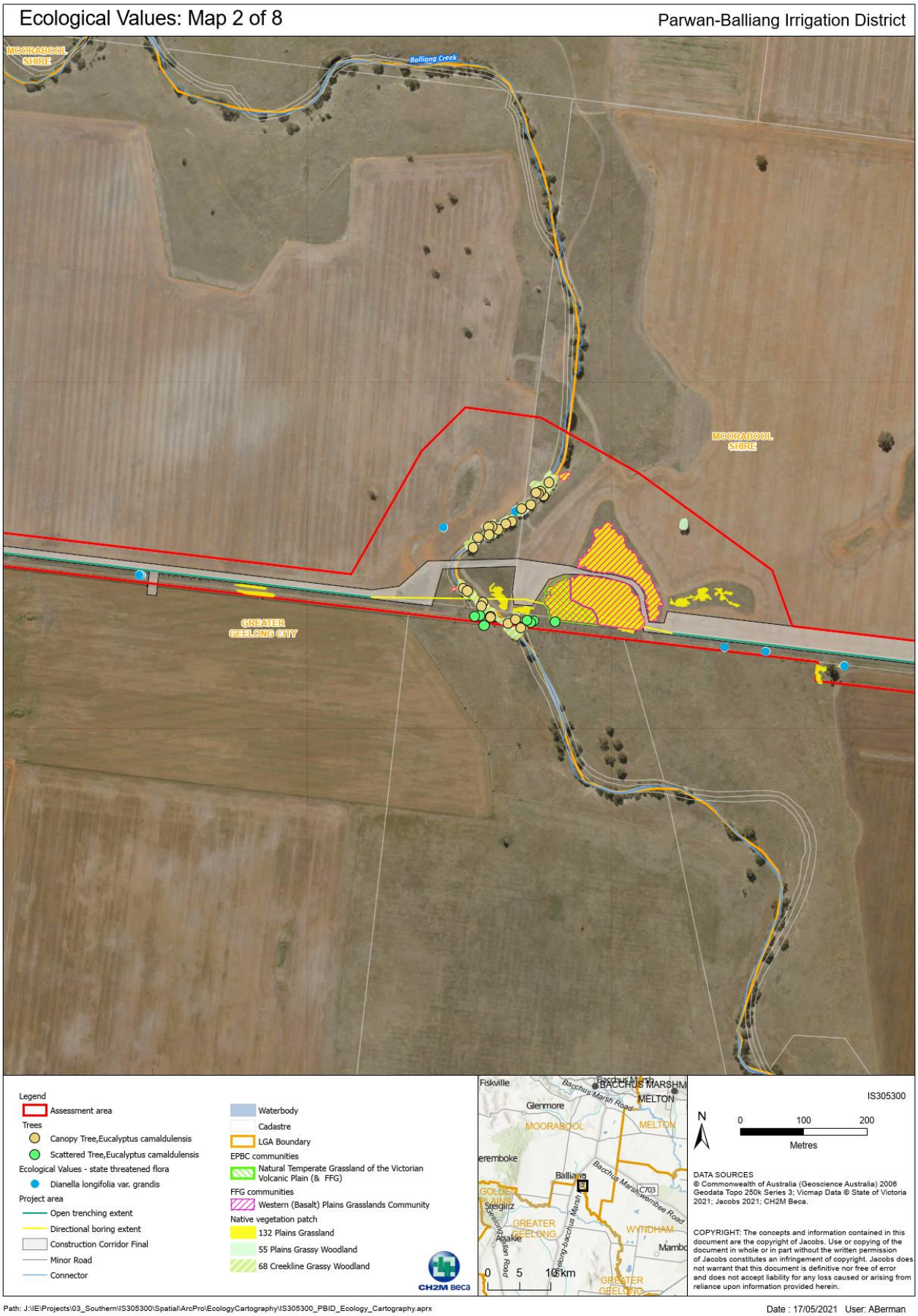
The extent of each EVC mapped within the Assessment Area can be viewed in Table 3-6 and is shown in Figure 3-9.

A brief description of each EVC within the Assessment Area is provided below. The extent of patches of EVC are shown on the maps in Figure 3-9, including identification of high quality patches qualifying as either EPBC Act or FFG Act listed ecological communities. Results of the vegetation quality (Habitat Hectare) assessment for each patch is detailed in Appendix Gand a full list of flora species observed throughout the Assessment Area during all surveys for the Project is in Appendix H.

Table 3-6 EVC extent within the Assessment Area and Construction Corridor

EVC no.	EVC name	Bioregional conservation status	Extent within the Assessment Area (ha)	Extent intersecting the Construction Corridor (ha)
EVC 68	Creekline Grassy Woodland	Endangered	0.5903	0.0000
EVC 55_61	Plains Grassy Woodland	Endangered	0.3192	0.0474
EVC 821	Tall Marsh	Endangered	0.0284	0.0237
EVC 125	Plains Grassy Wetland	Endangered	0.0560	0.0374
EVC 132_61	Heavier Soils Plains Grassland	Endangered	8.7250	1.7561
Total:			**9.7189**	**1.8646**

Figure 3-9 Native vegetation mapped across the Assessment Area, including EPBC Act and FFG Act listed ecological community classifications.


Ecological Values: Map 2 of 8
Parwan-Balliang Irrigation District
MOORABOOL SHIRE
Balliang Creek
MOORABOOL SHIRE
GREATER GEELONG CITY
Legend
Assessment area
Trees
Canopy Tree,Eucalyptus camaldulensis
Scattered Tree,Eucalyptus camaldulensis
Ecological Values - state threatened flora
Dianella longifolia var. grandis
Project area
Open trenching extent
Directional boring extent
Construction Corridor Final
Minor Road
Connector
Waterbody
Cadastre
LGA Boundary
EPBC communities
Natural Temperate Grassland of the Victorian Volcanic Plain (& FFG)
FFG communities
Western (Basalt) Plains Grasslands Community
Native vegetation patch
132 Plains Grassland
55 Plains Grassy Woodland
68 Creekline Grassy Woodland
CH2M Beca
Fiskville
Bacchus Marsh
BACCHUS MARSH
MELTON
Glenmore
MOORABOOL
MELTON
Balliang
GREATER GEELONG
WYNDHAM
GREATER GEELONG
0 5 10 km
IS305300
N
0 100 200
Metres
DATA SOURCES
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Ecological Values: Map 3 of 8

Parwan-Balliang Irrigation District

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Ecological Values: Map 4 of 8

Parwan-Balliang Irrigation District

Legend

- Assessment area
- Ecological Values - state threatened flora
  - Allocasuarina luehmannii
- Flora species
  - Allocasuarina luehmannii
- Project area
  - Open trenching extent
  - Directional boring extent
  - Construction Corridor Final
  - Major Road
  - Minor Road
  - Watercourse Stream
  - Connector
- Waterbody
- Cadastre
- LGA Boundary
- EPBC communities
  - Natural Temperate Grassland of the Victorian Volcanic Plain (& FFG)
- FFG communities
  - Western (Basalt) Plains Grasslands Community
- Native vegetation patch
  - 125 Plains Grassy Wetland
  - 132 Plains Grassland
  - 55 Plains Grassy Woodland
  - 821 Tall Marsh

IS305300

N

0 100 200

Metres

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Date : 17/05/2021 User: ABerman

Ecological Values: Map 5 of 8

Parwan-Balliang Irrigation District

Legend

- Assessment area
- Flora species
- Allocasuarina luehmannii
- Project area
- Open trenching extent
- Construction Corridor Final
- Major Road
- Minor Road
- Watercourse Stream
- Connector
- Waterbody
- Cadastre
- LGA Boundary
- EPBC communities
- Natural Temperate Grassland of the Victorian Volcanic Plain (& FFG)
- FFG communities
- Western (Basalt) Plains Grasslands Community
- Native vegetation patch
- 125 Plains Grassy Wetland
- 132 Plains Grassland

CH2M Beca

IS305300

N

0 100 200

Metres

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Ecological Values: Map 6 of 8
Parwan-Balliang Irrigation District
Geelong-Bacchus Marsh Road
Schultz Road
MOORABOOL SHIRE
Ballan Road
Springhill Road
Agars Road
Legend
Assessment area
Ecological Values - state threatened flora
Convolvulus angustissimus subsp. omnigracilis
Project area
Open trenching extent
Directional boring extent
Construction Corridor Final
Major Road
Minor Road
Waterbody
Cadastre
LGA Boundary
EPBC communities
Natural Temperate Grassland of the Victorian Volcanic Plain (& FFG)
FFG communities
Western (Basalt) Plains Grasslands Community
Native vegetation patch
132 Plains Grassland
CH2M Beca
BACCHUS MARSH
Bacchus Marsh Road
Western Freeway
Melton Main Road
MELTON
Ballan
WYNDHAM
GREATER GEELONG
Mambourin
0 5 10 km
IS305300
N
0 100 200
Metres
DATA SOURCES
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Ecological Values: Map 7 of 8

Parwan-Balliang Irrigation District

Legend

- Assessment area
- Trees
  - Scattered Tree,Eucalyptus melliodora
  - Scattered Tree,Eucalyptus camaldulensis
  - Lost tree
  - TPZ Impacted
- Project area
  - Open trenching extent
  - Construction Corridor Final
- Minor Road
- Waterbody
- Cadastre
- LGA Boundary
- FFG communities
  - Western (Basalt) Plains Grasslands Community
- Native vegetation patch
  - 132 Plains Grassland

IS305300

N

0 100 200

Metres

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Ecological Values: Map 8 of 8
Parwan-Balliang Irrigation District
Nerowie Road
Parwan South Road
MOORABOOL SHIRE
Legend
Assessment area
Trees
Canopy Tree,Eucalyptus microcarpa
Scattered Tree,Eucalyptus melliodora
Scattered Tree,Eucalyptus microcarpa
Scattered Tree,Eucalyptus camaldulensis
Planted Trees
Acacia melanoxylon
Eucalyptus cladocalyx
Eucalyptus leucoxylon
Pinus radiata
Unknown
Lost tree
TPZ Impacted
Ecological Values - state threatened flora
Dianella longifolia var. grandis
Flora species
Dianella longifolia var. grandis
Project area
Open trenching extent
Construction Corridor Final
Major Road
Minor Road
Waterbody
Wetland Swamp
Cadastre
LGA Boundary
EPBC communities
Natural Temperate Grassland of the Victorian Volcanic Plain (& FFG)
FFG communities
Western (Basalt) Plains Grasslands Community
Native vegetation patch
132 Plains Grassland
55 Plains Grassy Woodland
CH2M Beca
Colmadai
Diggers Rest-colmadai Road
Western Freeway
BACCHUS MARSH
MELTON
Melton
Bacchus Marsh Road
Melton Highway
Glenmore
MELTON
Balliang
Geelong-Bacchus Marsh Road
Bacchus Marsh-Werribee Road
WYNDHAM
GREATER GEELONG
Mambourin
0 5 10 km
IS305300
N
0 100 200
Metres
DATA SOURCES
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3.2.1.1 EVC 68 Creekline Grassy Woodland

Creekline Grassy Woodland was present along the southern most intersection of Balliang Creek of the Assessment Area, within private property accessed via the paper road (i.e. around Balliang Creek Crossing 2). The patches were dominated by River Red Gums with many being large canopy trees. The understorey included sporadic native pockets of Kangaroo Grass and Ruby Saltbush (*Enchylaena tomentosa*). Herbs present were Sheep's Burr (*Acaena echinata*) and Grassland Wood-sorrel (*Oxalis perennans*). However, the cover of these herb species was low (≤ 5 %) and often lacking completely in some patches. Aquatic species were also lacking, with Rush (*Juncus* spp.) present at a maximum of 5 % cover. The creekline showed signs of extensive disturbance through erosion, artificial barriers including vehicle crossings, and rock piling. The patches were dominated by exotic species African Boxthorn (*Lycium ferocissimum*), Toowoomba Canary-grass (*Phalaris aquatica*) and Water Couch. A representative photo of the EVC can be viewed in Figure 3-4.

3.2.1.2 EVC 55_61 Plains Grassy Woodland

Plains Grassy Woodland was present at two locations within the Assessment Area at the southern end of the Assessment Area, near Balliang Creek Crossing 2. Present within small, uncropped sections, both patches were formed by Eucalyptus canopy, with River Red Gum (Figure 3-10) within one patch and three Grey Box (*Eucalyptus microcarpa*) forming the other patch. A shrub layer was absent and some ground layer species were present in low numbers, such as Common Raspwort (*Gonocarpus tetragynus*), Nodding Saltbush (*Einadia nutans*), Ivy-leaved Violet (Viola hederacea) and Berry Saltbush (*Atriplex semibaccata*). A native grass layer was sporadically present, with species such as Rough Spear-grass (*Austrostipa scabra*), Windmill-grass (*Chloris truncata*) and Common Wallaby Grass (*Rytidosperma caespitosum*). Although the ground-layer of this EVC was dominated by exotic weeds, such as Galenia (*Galenia pubescens*) and pasture grasses, including Toowoomba Canary-grass, Brome (*Bromus* spp.) and Wild Oat (*Avena barbata*).

Figure 3-10 Representative image of EVC 55_61 Plains Grassy Woodland with a River Red Gum canopy in paper road near Agars Road.

3.2.1.3 EVC 125 Plains Grassy Wetland

Plains Grassy Wetland was present within the Geelong-Bacchus Marsh Road part of the Assessment Area, where wet depressions had formed due to prior road and driveway construction (Figure 3-11). Plains Grassland has merged into relatively small patches of Plains Grassy Wetland in the road reserve where water frequently pools. A mix of Common Spike-rush (*Eleocharis acuta*), Mud Dock (*Rumex bidens*) and Common Wallaby-grass were present, with the patches dominated by *Juncus* spp. and Common Spike-rush (80 % cover).

Figure 3-11 Plains Grassy Wetland within the road reserve of Geelong-Bacchus Marsh Road.

3.2.1.4 EVC 132_61 Heavier Soils Plains Grassland

Plains Grassland is the most prevalent EVC within the Assessment Area, particularly along the road reserve of Geelong-Bacchus Marsh Road. Within the Assessment Area, Plains Grassland can be broadly described as occurring in areas of either high or low quality.

High quality Plains Grassland patches within the Assessment Area were consistent with the EPBC Act listed threatened ecological community NTGVVP, and the FFG Act listed threatened community, Western (Basalt) Plains Grasslands Community (Figure 3-1). These patches have been described in Section 3.1.1, notably dominated by native grass species such as Kangaroo Grass, Windmill Grass, Spear-grasses, Wallaby grasses, Common Wheat-grass and Red-leg Grass. Many supported herbaceous plains grassland species including Sheep's Burr, Bluebell, Common New Holland Daisy, Slender Bindweed, Kidney Weed and Jersey Cudweed.

Within lower quality patches, native grasses were observed in low densities (as little as 25%). However, these patches were typically dominated by weeds and exotic pasture grasses. Common coloniser species included Toowoomba Canary-grass, Wild Oat, Common Couch (*Elymus repens*), Greater Quaking-grass (*Briza maxima*), Ribwort (Plantago lanceolata), Clover (*Trifolium subterraneum*), Rye Grass (*Lolium perrene*) and Cat's Ear (*Hypochoeris radicata*) (Figure 3-12). Patches of this lower quality Plains Grassland commonly occurred throughout the Assessment Area, particularly within the road reserve of Geelong-Bacchus Marsh Road.

Figure 3-12 Image characteristic of lower quality Plains Grassland present across the Assessment Area.

3.2.1.5 EVC 821 Tall Marsh

Tall Marsh was observed only at the crossing of Geelong-Bacchus Marsh Road with Balliang Creek (Creek Crossing 1), in areas of marshy inundated depression. The vegetation was noted to be of low diversity, comprising chiefly of Common Reed (*Phragmites australis*) and Rushes (Figure 3-5).

3.2.2 Large trees within patches

A total of 29 large trees (canopy trees) were recorded within patches of native vegetation within the Assessment Area, of which two have been assessed as impacted by works in the Construction Corridor.

Table 3-7 Large trees present within patches across the Assessment Area.

Species	DBH (cm)	Trees to be retained / removed
Eucalyptus camaldulensis	131	Retained
Eucalyptus camaldulensis	67	Retained
Eucalyptus camaldulensis	99	Retained
Eucalyptus camaldulensis	74	Retained
Eucalyptus camaldulensis	46	Retained
Eucalyptus camaldulensis	27	Retained
Eucalyptus camaldulensis	87	Retained
Eucalyptus camaldulensis	154	Retained
Eucalyptus camaldulensis	70	Retained
Eucalyptus camaldulensis	74	Retained
Eucalyptus camaldulensis	75	Retained
Eucalyptus camaldulensis	101	Retained
Eucalyptus camaldulensis	90	Retained
Eucalyptus camaldulensis	73	Retained
Eucalyptus camaldulensis	83	Retained
Eucalyptus camaldulensis	105	Retained
Eucalyptus camaldulensis	154	Retained
Eucalyptus camaldulensis	140	Retained
Eucalyptus camaldulensis	89	Retained
Eucalyptus camaldulensis	113	Retained
Eucalyptus camaldulensis	141	Retained
Eucalyptus camaldulensis	66	Retained
Eucalyptus camaldulensis	58	Retained
Eucalyptus camaldulensis	71	Retained

Species	DBH (cm)	Trees to be retained / removed
Eucalyptus camaldulensis	69	Retained
Eucalyptus camaldulensis	80	Lost
Eucalyptus camaldulensis	111	Lost
Eucalyptus camaldulensis	132	Retained
Eucalyptus microcarpa	48	Retained

3.2.3 Scattered trees

A total of 34 scattered trees (includes small and large) were identified within the Assessment Area, with five assessed as impacted by works in the Construction Corridor. Scattered trees are considered to require offsetting under the Guidelines if they are proposed to be removed or more than 10% of the TPZ is to be impacted.

Table 3-8 Scattered trees present across the Assessment Area

Scientific name	DBH (cm)	Trees to be retained / removed
Eucalyptus camaldulensis	100	Retained
Eucalyptus camaldulensis	81	Retained
Eucalyptus camaldulensis	123	Retained
Eucalyptus camaldulensis	20	Lost
Eucalyptus camaldulensis	16	Retained
Eucalyptus camaldulensis	13	Retained
Eucalyptus camaldulensis	15	Retained
Eucalyptus camaldulensis	17	Retained
Eucalyptus camaldulensis	14	Retained
Eucalyptus camaldulensis	21	Retained
Eucalyptus camaldulensis	42	Lost
Eucalyptus camaldulensis	10	Retained
Eucalyptus camaldulensis	15	Retained
Eucalyptus camaldulensis	10	Retained
Eucalyptus camaldulensis	10	Retained

Scientific name	DBH (cm)	Trees to be retained / removed
Eucalyptus camaldulensis	82	Retained
Eucalyptus camaldulensis	78	Lost
Eucalyptus melliodora	20	Lost
Eucalyptus melliodora	44	Lost
Eucalyptus microcarpa	74	Retained
Eucalyptus microcarpa	76	Retained
Eucalyptus microcarpa	75	Retained
Eucalyptus microcarpa	56	Retained
Eucalyptus microcarpa	65	Retained
Eucalyptus microcarpa	43	Retained
Eucalyptus microcarpa	49	Retained
Eucalyptus microcarpa	42	Retained
Eucalyptus microcarpa	68	Retained
Eucalyptus microcarpa	74	Retained
Eucalyptus microcarpa	40	Retained
Eucalyptus microcarpa	44	Retained
Eucalyptus microcarpa	68	Retained
Eucalyptus microcarpa	64	Retained
Eucalyptus microcarpa	55	Retained

3.2.4 FFG Act listed threatened ecological communities

Rather than being defined by explicit criteria (as with EPBC Act listed threatened ecological communities), FFG Act listed threatened communities are identified by distinguishing characteristics. Two FFG Act communities were modelled to occur within the Assessment Area. These FFG Act listed communities and their likelihood of occurrence within the Assessment Area are described in Table 3-9. The location of mapped FFG Act communities can be viewed in Figure 3-9.

Table 3-9 Likelihood of FFG Act listed ecological communities being present in the Assessment Area

FFG Act listed community	Associated EVC mapped within the Assessment Area	CH2MBeca-determined likelihood of occurrence
Western (Basalt) Plains Grassland.	EVC 132: Plains Grassland.	**Present** Several patches within the Assessment Area are classified as the FFG Act listed threatened community, Western (Basalt) Plains Grassland. The majority of patches classified as this FFG Act listed community were also classified as the EBPC Act listed TEC, NTGVVP. Alternatively, some Plains Grassland patches that did not meet the condition thresholds to classify as NTGVVP, still qualified as Western (Basalt) Plains Grassland, where herb diversity increased and native grass cover reached 70-80 %. A total of 4.837 ha of native vegetation patches within the Assessment Area qualified as the FFG Act listed community, of which 0.7109 ha is located within the Construction Corridor impacted by the Project.
Western Basalt Plains (River Red Gum) Grassy Woodland	EVC 68: Creekline Grassy Woodland EVC 55 Plains Grassy Woodland	**Not present** The Assessment Area contains some a woodland areas of poor quality, residing in private property along the paper road section of the alignment. These patches (some EVC 68 & EVC 55) are significantly degraded and do not meet the specific characteristic requirements for this community. Some patches do contain a River Red Gum overstorey. However, a complete lack of mid-storey and ground layer indicates the conditions to qualify as the FFG Act listed community are not met.

3.2.5 FFG Act listed threatened species

The desktop assessment for FFG Act listed flora and fauna species previously recorded within 5 km of the Assessment Area is presented in Appendix E.

Four FFG Act listed flora species, were considered to have a moderate or higher likelihood of occurring within the Assessment Area, including the three EPBC Act listed flora species described in Section 3.1.2 along with Buloke (*Allocasuarina luehmannii*). Buloke was one of two FFG Act listed species observed within the Assessment Area during detailed field assessment, with the other being Salt Copperbur (*Sclerolaena ventricosa*) (Figure 3-13). Neither of these species were located within the Construction Corridor. The location of mapped FFG Act listed flora species can be viewed in Figure 3-9.

Nine FFG Act listed fauna species, were considered to have a moderate or higher likelihood of occurring within the Assessment Area, including the four EPBC Act listed fauna species described in Section 3.1.2 along with *Ardea alba* (Great Egret), *Egretta garzetta* (Little Egret), *Falco subniger* (Black Falcon), *Stagonopleura guttata* (Diamond Firetail), and *Tyto novaehollandiae* (Masked Owl). No FFG Act listed fauna were recorded during detailed field assessments. Apart from the EPBC Act listed fauna species considered in Section 3.1.2, the FFG Act listed fauna potentially occurring in the Assessment Area are all highly mobile

bird species that may fly over the area or occasionally utilise treed habitats or waterbodies nearby the Assessment Area.

3.2.6 VicAdv listed rare or threatened species

The desktop assessment for VicAdv listed rare or threatened flora and fauna species previously recorded within 5 km of the Assessment Area is presented in Appendix E.

An additional six VicAdv only listed rare or threatened flora species were considered to have a moderate or higher likelihood of occurring within the Assessment Area:

- *Amyema linophylla subsp. orientalis* (Buloke Mistletoe) (vu)
- *Dianella longifolia var. grandis* (Flax-lily) (vu)
- *Eucalyptus leucoxylon subsp. connata* (Melbourne Yellow-Gum) (vu)
- *Nicotiana suaveolens* (Austral Tobacco) (r)
- *Podolepis linearifolia* (Basalt Podolepis) (en)
- *Tripogonella loliiformis* (Rye Beetle-grass) (r).

Three VicAdv only listed flora species were observed within the Assessment Area during field surveys:

- Flax-lily *(Dianella longifolia var. grandis)* (vu) – including one individual recorded within the Construction Corridor.
- Slender Bindweed *(Convolvulus angustissimus ssp. omnigracilis)* (k) – several individuals within the Construction Corridor
- Black Roly-poly *(Sclerolaena muricata var. muricata)(*k).

An additional five VicAdv only listed rare or threatened fauna species were considered to have a moderate or higher likelihood of occurring within the Assessment Area.

- *Climacteris picumnus* (Brown Treecreeper) (nt)
- *Platalea regia* (Royal Spoonbill) (nt)
- *Pseudemoia pagenstecheri* (Tussock Skink) (vu)
- *Sminthopsis crassicaudata* (Fat-tailed Dunnart) (nt)
- *Turnix velox* (Little Button-quail) (nt).

Except for Fat-tailed Dunnart and Tussock Skink, these VicAdv listed rare or threatened fauna species are birds that require treed habitats for foraging and nesting or wetlands with aquatic vegetation; habitats that are lacking across the Assessment Area. These listed bird species may fly over the Assessment Area but are unlikely to reside in the Assessment Area permanently. Little Button Quail were not observed within grassland patches. Ground-dwelling birds were flushed when traversing higher quality grassland areas within private properties, but were found to be Australasian Pippet (*Anthus novaeseelandiae*).

Suitable habitat for Fat-tailed Dunnart and Tussock Skink is present in the Assessment Area and these species remain moderately likely to occur within grassland habitat of medium-high quality, as per Table 2-2 classifications. These locations can be viewed in Figure 3-8. Previous targeted Striped Legless Lizard surveys observed Fat-tailed Dunnart within Geelong-Bacchus Marsh Road, outside of the Assessment Area. (EHP 2017b, EHP 2018). Tussock Skink were not observed, but given the quality of the grassland habitat at the paper road, the species may persist in these locations.

3.2.7 FFG Act protected flora

Protected flora under the FFG Act observed within the Assessment Area were:

- Common Everlasting (*Chrysocephalum apiculatum*)
- Common New Holland Daisy (*Vittadinia cuneata)*
- Woolly New Holland Daisy (*Vittadinia gracilis*)

- Blackwood (*Acacia melanoxylon*)
- Salt Copperburr (*Sclerolaena ventricosa*)
- Sifton Bush (*Cassinia sifton*).

Of these species, four were observed within the Construction Corridor including:

- Common New Holland Daisy
- Woolly New Holland Daisy
- Blackwood
- Sifton Bush.

In addition, flora species associated with the FFG Act listed threatened community, Western (Basalt) Plains Grasslands Community, which is present within the Assessment Area and Construction Corridor, are also classified as protected flora under the FFG Act.

Figure 3-13 A remnant Buloke (*Allocasuarina luehmannii*) within the southern paper road section of the Assessment Area.

3.2.8 DELWP mapped wetlands

A search of DELWP mapped wetlands across Victoria confirmed that the Assessment Area does not intersect with or indirectly impact any mapped wetlands.

3.2.9 Waterways

One named waterway, Balliang Creek, is present within the Assessment Area. As previously discussed, overall, Balliang Creek is highly degraded, with limited water present throughout the year. Balliang Creek is diverted across Geelong-Bacchus Marsh Road at a culvert, where it drains into two farm dams either side of the road. These farm dams are not within the Assessment Area.

Two farm dams are present within the Assessment Area. One is present at corner of Schultz Road and Geelong-Bacchus Marsh Road (Figure 3-14) and is located in the Construction Corridor. The other is at the northern end of the Assessment Area near Nerowie Road. The northern dam is surrounded by remnant River Red Gum, and is likely to have once been a swamp. However, the dam has been dredged and is surrounded by agricultural crops and is not located in the Construction Corridor. All farm dams within or near the Assessment Area are characterised by a lack of native aquatic vegetation.

Figure 3-14 Farm dam present on the corner of Schultz Road and Geelong-Bacchus Marsh Road

3.2.10 Other vegetation

Much of the vegetation that occurs throughout the Assessment Area was determined to be introduced or planted vegetation. Examples included:

- Areas dominated by exotic grasses and weeds
- Ornamental plantings of exotic and native species, typically trees – often associated with farm windrows or roadside areas
- Conservation planting at Agars Road.

Ornamental plantings mainly pertain to Geelong-Bacchus Marsh Road. Plantings consists of native, non-indigenous *Eucalyptus* spp., such as stands of Sugar Gum (*Eucalyptus cladocalyx*), with a mixture of indigenous shrub species, such as Silver Wattle (*Acacia dealbata*) and Drooping Sheoak (*Allocasuarina verticillata*) and non-indigenous shrubs, such as Cootamundra Wattle (*Acacia baileyana*) and Pin-cushion Hakea (*Hakea laurina*), a common garden plant (Figure 3-15). Most amenity planting occurred over remnant native grasslands dominated by Wallaby Grass (*Rytidosperma* spp.). Rows of Radiata Pine (*Pinus radiata*) were also present.

Conservation plantings occurred within the Assessment Area on both sides of Agars Road. The main planting east of Agars Road consists of Black Sheoak (*Allocasuarina littoralis*), Spear-grass and Common Tussock-grass (*Poa labillardierei* var. *labillardierei*), within the fenced-off paper road. Black Sheoak is also planted intermittently and in rows west of Agars Road within the paper road.

These areas do not require approval for removal under the EPBC Act or FFG Act and are not required to be offset in accordance with the Guidelines. However, other legislation may apply (see Section 4.6).

Figure 3-15 A stand of Sugar Gum (*Eucalyptus cladocalyx*) at the corner of Geelong-Bacchus Marsh Road and School Road

3.2.11 Weeds and pest species

Nine noxious weed species, listed as Regionally Controlled in the Port Phillip and Westernport catchment under the CaLP Act, were detected within the Assessment Area:

- Patterson's Curse (*Echium plantagineum*)
- African Boxthorn (*Lycium ferocissimum*)
- Prickly Pear (*Opuntia stricta*)
- Blackberry (*Rubus fruticosus* L. sp. agg.)

- Serrated Tussock (*Nassella trichotoma*)
- Spear Thistle (*Cirsium vulgare*)
- Artichoke Thistle (*Cynara cardunculus*)
- Variegated Thistle (*Silybum marianum*)
- Stinkwort (*Dittrichia graveolens*).

Exotic pasture grasses and herbaceous weeds not listed under the CaLP Act were prominent within the landscape, which has been largely disturbed over time in agricultural land use.

Evidence of European Foxes (*Vulpes vulpes*) and European Rabbits were observed in the landscape, which has been largely disturbed over time in agricultural land use. Other pest animals likely to be within the Assessment Area include:

- Domestic Cat (*Felis catus*)
- European Hare (*Lepus europaeus*)
- House Mouse (*Mus musculus*)
- Brown Rat (*Rattus norvegicus*)
- European Rat (*Rattus rattus*)
- Wild Dog (*Canis lupus familiaris*).

4 Discussion and recommendations

This section highlights the potential impacts to ecological values within the confirmed Construction Corridor that may occur should the proposed works take place without undertaking any mitigation measures. Mitigation measures are subsequently described as a means of further avoiding or minimising these impacts. In addition to these measures, progressive design refinement of the Construction Corridor has also taken place to finalise the current Construction Corridor.

4.1 Potential impacts

The construction of the Project has the potential to impact the ecological values present within the Construction Corridor and adjacent areas of the Assessment Area. Potentially impacting processes include:

- The direct removal of native vegetation, threatened communities, threatened species or species habitat through construction activities
- Increased edge effects to species habitat
- Degradation of waterways through erosion and sedimentation of waterways
- Spreading weed species and diseases.

Without undertaking mitigation measures, it is likely that the ecological values within the Construction Corridor will be impacted. To mitigate the risk of impact, a number of measures to be undertaken throughout the design and construction phase are recommended and are provided in Section 4.2.

4.2 Mitigation measures

A number of mitigation measures are detailed in Table 4-1 below to minimise the risk of impacts to ecological values. If these mitigation measures are not implemented within the Construction Environmental Management Plan (CEMP) the assessment of impacts will require updating. Guidance on mitigation measures and CEMP development can be obtained from the DELWP Guidance on CEMPs (DELWP 2020a).

Table 4-1 Mitigation measures proposed to minimise the risk of impact to ecological values

Mitigation measure	Description	Target outcomes for ecological values
Avoid and minimise encroachment of the Construction Corridor upon ecological values	This mitigation measure includes the following actions: • Confine all works (and ancillary activities) to the Construction Corridor. Utilise previously cleared, highly disturbed areas for ancillary works, such as soil stockpiling, laydowns and site offices. • Where partial patch removal or directional boring are to occur, particularly along Geelong-Bacchus Marsh Road, avoidance measures should be implemented. No-go Zones should be established and exclusion fencing should be placed around the vegetation (planted & native) to remain, incorporating TPZ, to reduce the extent of vegetation removal. • Avoidance efforts should be particularly focussed on the large areas of threatened fauna habitat and threatened ecological communities.	• Minimisation of native and amenity vegetation removal. • Minimisation of removal of habitat that may be utilised by threatened fauna species

Mitigation measure	Description	Target outcomes for ecological values
	• Where EPBC Act and/ or FFG Act communities are to be retained, high visibility para-web fencing or temporary mesh fencing will be erected around native vegetation in proximity to the works area and signed as a 'No-go' zone. • No-go Zones are to be included on all site maps within the CEMP. • Where planned and approved for removal, ensure all required native vegetation offsets, in accordance with the Guidelines, are in place prior to removal. • Where scattered or large, canopy trees are to be retained in close proximity to proposed work sites, tree protection plans are to be prepared by a qualified arborist that will ensure that trees proposed to be retained are adequately protected from the impact of construction or related activities, prior to those works being undertaken. Tree protection plans are to be developed in accordance with AS4970-2009 Protection of Trees on Development Sites (Australian Standards 2009) in consultation with key stakeholders. • Should the arborist determine that the works cannot proceed without impacting on the survivability of an indigenous tree, the tree will be required to be offset in accordance with the Guidelines (DELWP 2017c). • Disturbance is currently minimised thought the use of low-impact construction techniques, such as under-boring rather than trenching.	
Avoid and minimise encroachment of the Construction Corridor upon fauna habitat, including Striped Legless Lizard and Golden Sun Moth habitat.	This mitigation measure includes the following actions: • Areas identified as medium-high quality Striped Legless Lizard habitat have been avoided in design as much as possible. Areas not able to be avoided have been considered in this impact assessment. • Where possible, incorporate appropriate buffer zones of at least 50 m around the known or potential habitat or use trenchless installation of pipelines by subterranean tunnelling at a depth of >0.5 m. • Wherever possible, habitat has been marked as 'No-go' Zones. Striped Legless Lizard Habitat is mapped in Figure 3-8. Where Striped Legless Lizard habitat has been identified adjacent to the Construction Corridor, for example at Balliang Creek Crossing 2, the delineation of the Construction Corridor is to be fenced using either high visibility mesh bunting or temporary	• Minimisation of native and amenity vegetation removal. • Minimisation of removal of habitat that may be utilised by threatened fauna species. • Minimisation of direct and indirect impacts to threatened fauna species.

Mitigation measure	Description	Target outcomes for ecological values
	construction fencing (including erosion fencing if necessary) and marked as a 'No-go' zone. • Determine areas for revegetation prior to the removal of any occupied habitat. • Ensure that any surface and/or embedded rocks, or other refuge sites (e.g. logs) are not removed from the site. Where possible, reintroduce or increase the cover of surface refuges to augment existing habitat. • Sufficiently fence the site to restrict vehicular and pedestrian access, using a fencing design that allows lizard movement where appropriate. • Erect Golden Sun Moth-appropriate mesh fencing at the boundary fences of the paper road and Bluegum Track to prevent potential flight of the species into the Construction Corridor. Fencing is not required to be erected along the stone wall south of the paper road as this wall provides an existing barrier. This fencing should also be placed either side of the access track at Creek Crossing 2 (i.e. wherever medium-high quality habitat is mapped) to prevent the same action. Fencing should still allow movement of lizards and other fauna throughout the landscape.	
Tree protection is to be undertaken in accordance with AS4970-2009 Protection of Trees on Development Sites (Australian Standards 2009)	Where trees are to be retained within the Construction Corridor, or adjacent, the TPZ is to be designated as a No-go Zone, with exclusion fencing, bunting and signage to be installed to ensure trees to be retained are adequately protected.	• Prevention of damage or destruction of trees that are to be retained.
Tree felling to be undertaken in accordance with the *Wildlife Act*	In accordance with the Wildlife Act, an ecologist or wildlife handler holding the appropriate authorisation under the Wildlife Act is to be present during tree felling to ensure no fauna are injured, particularly for removal of hollow-bearing trees. All necessary authorisations must be obtained prior to removing native fauna.	• Fauna species utilising trees within the Assessment Area will not be impacted.

Mitigation measure	Description	Target outcomes for ecological values
Any native vegetation removal is to be supervised by a suitably qualified ecologist/wildlife handler	Where native vegetation is to be cleared and an ecologist determines that fauna may be displaced along Geelong-Bacchus Marsh Road, all works are to be supervised by an ecologist or wildlife handler to ensure fauna species displaced by the works do not stray onto adjacent roads causing injury or death. Staged construction fencing to avoid fauna dispersal onto the road along Geelong-Bacchus Marsh Road is recommended. Speed limits should also be reduced where works are occurring.	• Prevention of causing displacement or destruction of fauna species including protected species.
Weed and biosecurity management will be implemented during construction in accordance with the CaLP Act	This mitigation measure includes the following actions: • The spread of declared weeds must be controlled and managed through a CEMP. • Vehicles and machinery will access the Construction Corridor through defined entry and exit points. • Construction stockpiles, machinery, roads, and other infrastructure should be placed away from areas supporting native vegetation and waterways; and placed in previously cleared or hardstand areas. • Standard Chytrid Fungus controls should be implemented where works to connected waterbodies or waterways are occurring.	• Prevention of harm to flora and fauna species or the degradation of native vegetation through the spread of weeds and disease.
Measures to maintain the health of waterways and wetlands are to be implemented in accordance with the Water Act, EP Act and Fisheries Act.	Specific controls must be enacted such that: • Works in, on, under and adjacent to Balliang Creek are to be undertaken in accordance with Melbourne Water requirements and any necessary works on waterways permits obtained prior to commencing works. • There is no change in current water quality of any waterway caused by the proposed works. • There is no reduction in suitability of fish passage through any waterway during and following construction based on the current status of Balliang Creek. • The works do not cause 'environmental harm' to any waterway through other means. • Directional boring is recommended for Balliang Creek Crossing 1. If not possible, works should be undertaken during no/low flow periods and revegetation of the creekline is to occur following construction. • Erosion and sediment control measures are to be implemented in accordance with EPA Victoria	• No change in the water quality, hydrology, or suitability for native aquatic species of Balliang Creek. • The proposed works do not cause 'environmental harm' through any other means to any waterway or waterbody.

Mitigation measure	Description	Target outcomes for ecological values
	construction guidelines (Publications 275, 480 and 960), to be implemented. • High visibility para-web fencing or temporary mesh fencing will be erected around Balliang Creek (Crossing 2) in proximity to the works area and delineate the access track over the creekline. This exclusion fencing should be signed as a 'No-go' zone. • Where the dam at Schultz Road is to be removed, an ecologist or wildlife handler is to be present, in accordance with the Wildlife Act, to ensure no aquatic fauna, such as Snake-necked Turtle (*Chelodina longicollis*), are injured. Fauna must be relocated to the nearest suitable waterbody. • All of these controls will be implemented through a CEMP prior to construction.	

4.3 Impact assessment

The current estimate of impact to ecological values assumes that a number of mitigation measures will be implemented during construction. Where there are significant changes to design or implementation of mitigation measures, then likely extent of impacts will need to be re-assessed.

4.3.1 Proposed works

Refinements in the design process have resulted in considerable avoidance and minimisation of impacts (see Section 2.1). Multiple iterations of the pipeline alignment have occurred to avoid ecological values, including directional boring at ecologically sensitive areas and minimisation of the Construction Corridor width within and adjacent to higher quality native vegetation and habitat areas. A risk assessment of several alignment options was undertaken at Balliang Creek Crossing 2, to understand the ecological values present in the area and to select a preferred alignment that avoided significant impacts. The following MNES were determined as present within this area:

- NTGVVP
- Striped Legless Lizard assumed present and habitat observed
- Golden Sun Moth habitat (no individuals observed during targeted survey).

Following the initial risk assessment and confirmation of the presence of NTGVVP and suitable habitat for Striped Legless Lizard and Golden Sun Moth after targeted surveys, Balliang Creek Crossing 2 will now being bored. An access track will be required for construction machinery, including heavy vehicles, through the middle of two grassland patches. However, the access track being utilised here was historically established by the property owner to access cropped areas and is used on an ongoing basis for farming purposes. Heavy vehicles have previously been tracked along this track and pesticides use was also evident to reduce vegetative biomass along the track. As such, ground disturbance has been minimised through the use of under-boring and use of an existing access track. As a result, impacts to ecological values, including MNES values, will be minimal.

Directional boring will not be utilised at Balliang Creek Crossing 1 on Geelong-Bacchus Marsh Road. However, minimal ecological values are found to be present within the extent of Balliang Creek in the Construction Corridor. It is expected that drainage lines will be re-instated and revegetation occur where aquatic vegetation is removed at this location.

4.3.2 Vegetation removal

Areas of native vegetation that are to be removed or impacted due to the Project works will require approval and offsetting under the Guidelines (DELWP 2017c) as invoked by the P&E Act through Clause 52.17 (Native vegetation) of the Victoria Planning Provisions contained within all planning schemes.

Associated with the previous studies and EPBC Act Referral submission (SMEC 2019), native vegetation removal under the Guidelines has previously been approved for this VicRoads Geelong-Bacchus Marsh Road Upgrade Project. The removal of this vegetation along Geelong-Bacchus Marsh Road corresponds with direct removal of native vegetation for the current PBID Project. As such, part of the corresponding native vegetation removal could be removed under the VicRoads permit. An agreement to this effect would need to be made with VicRoads and accepted by DELWP. Once a decision is made on the approach to the vegetation removal application, the Native Vegetation Removal (NVR) Report will be sent to DELWP for finalisation.

4.3.2.1 Determination of assessment pathway

The Guidelines provide a risk-based level of assessment for approval to remove native vegetation. Based on the potential for biodiversity loss, the risk-based level of assessment identified the level of risk posed by the Project works to Victoria's biodiversity and required an appropriately detailed level of assessment to be conducted to inform determining authorities in making approval decisions.

The risk-based level of assessment (basic, intermediate or detailed) is determined by considering the Location Category, Extent and number of Large Trees of the proposed native vegetation clearing. There are three location categories that indicate the potential risk to biodiversity from removing a small amount of native vegetation. These location categories are Location 1, 2 or 3 (DELWP 2017c).

Where a site occupies a broad area, various location categories may return. In such cases the highest category is applied to the entire application. The proposed alignment is determined to be in Location 3, and as more than 0.5 ha of native vegetation is being removed the Detailed assessment pathway will apply.

Table 4-2 Determining the assessment pathway (from page 19 of DELWP (2017c))

Extent of native vegetation	Location Category		
	Location 1	Location 2	Location 3
Less than 0.5 ha and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 ha and including one or more large trees	Intermediate	Intermediate	Detailed
0.5 ha or more	Detailed	Detailed	Detailed

4.3.3 Application of the three-step principle

Under the Guidelines, a general three step principle is required to be followed to achieve no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation. The three steps and their relevance to the Project are:

Avoid

As detailed, an extensive process has been completed in consultation with the Design Team to complete a design that avoids the removal of native vegetation where possible. Time has been spent reconfiguring the design to avoid the location of threatened flora communities, habitat for the Striped Legless Lizard and patches of high-quality vegetation.

A design has been selected that would require the least removal of ecological values, including native vegetation, where this was compatible with other design constraints. Laydown areas, site compounds/ offices and access tracks have been accounted for in the Construction Corridor or will be located in areas not supporting native vegetation if additional areas are required. Further discussion of impact avoidance through design is provided in Section 2.1.

Minimise

Where possible, the extent of native vegetation removal will be minimised to the smallest amount necessary. Works required are both open cut and directional boring of recycled water pipeline. These works will require minor clearing to enable the installation of pipeline infrastructure along one side of the road reserve. Where possible, pipeline infrastructure has been located to avoid the removal of native vegetation and based on the established Construction Corridor. The losses calculated are intended to be indicative of the current design and would require further refinement in the event of any design changes. Further discussion of impact minimisation through design is provided in Section 2.1.

Offset

Where native vegetation is unable to be retained, an offset is required to compensate for the loss to biodiversity from that removal. An application to remove native vegetation must include an offset strategy, including evidence that an offset that meets the offset requirements for the proposed native vegetation removal is available, and explaining how the offset will be secured if a permit is granted. This is detailed further in Section 4.3.3.3.

4.3.3.1 Extent of vegetation loss

The detailed field assessment identified the following extents of native vegetation within the Construction Corridor as detailed in the NVR report:

- 2.108 ha of native vegetation (inclusive of tree buffers)
- Five scattered trees
- Two large canopy trees.

Further avoidance of native vegetation is recommended where possible. The extent of proposed native vegetation loss has been calculated in accordance with the methodology provided in Section 4.3.3.

The resulting extent of impacts (removal) to native vegetation based on removal with and without the VicRoads agreement, required to be offset under the Guidelines, is provided below. The extent of native vegetation removal in comparison to the previously mapped VicRoads data is presented in Appendix F, Figure F-1.

Table 4-3 Total extent of vegetation removal based on the two 'removal' scenarios.

Values	Full removal (no agreement)	Excluded VicRoads removal (agreement approved)
Creekline Grassy Woodland	0.0000 ha	0.0000 ha
Plains Grassy Woodland	0.0474 ha	0.0326 ha
Tall Marsh	0.0237 ha	0.0225 ha
Plains Grassy Wetland	0.0374 ha	0.0173 ha
Heavier Soils Plains Grassland	1.7561 ha	1.2465 ha
Scattered trees	5	5
Patch canopy trees	2	2
Large trees	5	5
Total	Patches: 1.8646	Patches: 1.3189
	Scattered trees: 5	Scattered trees: 5
	Patch canopy trees: 2	Patch canopy trees: 2
	Large trees: 5	Large trees: 5

Based on these calculations, the Native Vegetation Removal (NVR) Report (Ensym) Scenario Tests are provided in Appendix I. Confirmation of which vegetation removal scenario the proponent would like to follow will be required prior to sending the NVR (Ensym) data to DELWP for final determination of removal extents and offsetting requirements.

4.3.3.2 Native vegetation offsets

Based on the NVR Report, summaries of both of the offset targets are provided below. These are Scenario Tests only. Results will be confirmed once a vegetation removal scenario is finalised and NVR (Ensym) data to DELWP for final determination of offsetting requirements.

Table 4-4 Offset requirement for 'full removal' if a Planning Permit is granted.

General offset amount	0.631 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or the Moorabool Local Government Area (north of Balliang Creek Crossing 1 and east of Balliang Creek Crossing 2) and Greater Geelong Local Government Area (south of Balliang Creek Crossing 1 and west of Balliang Creek Crossing 2).
Minimum strategic biodiversity value score	0.407
Large trees	5 large trees

Table 4-5 Offset requirement for 'VicRoads data exclusion' if a Planning Permit is granted.

General offset amount	0.439 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or the Moorabool Local Government Area (north of Balliang Creek Crossing 1 and east of Balliang Creek Crossing 2) and Greater Geelong Local Government Area (south of Balliang Creek Crossing 1 and west of Balliang Creek Crossing 2).
Minimum strategic biodiversity value score	0.349
Large trees	5

4.3.3.3 Offset statement

As only general habitat units of relatively low Strategic Biodiversity Value are required, they are likely to be readily available to purchase from an accredited Offset Broker. The required offset will be purchased and allocated to the Project, prior to any native vegetation removal taking place.

4.4 EPBC Act listed threatened ecological communities and species

Given the results of targeted surveys, only MNES considered present or potentially present within the Construction Corridor have been tested for significance using the significant impact criteria specified in the Matters of National Environmental Significance, Significant Impact Guidelines 1.1 (DoE 2013) and the species-specific impact assessment guidelines (DEWHA 2009). Significant Impact Assessments are presented in Appendix J, Table J-1 (NTGVVP), Table J-2 (Growling Grass Frog), Table J-3 (Golden Sun Moth) and Table J-4 (Striped Legless Lizard). A summary is provided in Table 4-6 below.

VicRoads are currently constructing the Geelong-Bacchus Marsh Road Upgrade Project approved under EPBC Act Referral 2017/8018. Current works are occurring between the Ripley Road paper road and School Road. Removal of NTGVVP occurs within Geelong-Bacchus Marsh Road. The NTGVVP currently mapped for this Project does not cross-over with NTGVVP patches mapped as part of VicRoads Project Referral 2017/8018.

Table 4-6 Summary of potentially significant impacts to MNES within the Construction Corridor

Species or ecological community	EPBC Act status	Results of field assessment	Outcome	Recommendation
NTGVVP	Critically Endangered	Present	Following the implementation of mitigation measures, 0.253 ha of NTGVVP will be removed from the Construction Corridor. Although considered a minor removal, due to the listing status, any reduction in the extent of the ecological community is likely to qualify as a Significant Impact.	Referral recommended

Species or ecological community	EPBC Act status	Results of field assessment	Outcome	Recommendation
Striped Legless Lizard	Vulnerable	Assumed presence in medium-high quality species habitat.	Following the implementation of mitigation measures, removal of the majority of moderate-high quality habitat is avoided. A small extent (0.0089 ha) of habitat is included in the Construction Corridor at the paper road. The vegetation is not expected to be removed but may be driven over. This location is considered highly modified as it is adjacent to an existing farm access track and cropping paddocks. However, a 50 m buffer from suitable habitat, as recommended in the Significant Impact Guidelines, cannot be established (DSEWPaC 2011b).	Referral recommended
Growling Grass Frog	Vulnerable	Not observed	Species not considered present.	No action required.
Golden Sun Moth	Critically Endangered	Not observed	Species not considered present.	No action required.

4.5 FFG Act listed threatened ecological communities and species

A summary of the likely presence of each of the matters prescribed under the FFG Act are considered in Table 4-7.

Table 4-7 Assessment of issues relevant to the FFG Act associated with the Assessment Area

Matters	Presence	Impacts
Threatened Communities of Flora and Fauna	One threatened community, Western (Basalt) Plains Grassland, is present within the Assessment Area, including the Construction Corridor. A total of 4.837 ha was mapped within the Assessment Area.	The removal of 0.7109 ha of the Western (Basalt) Plains Grassland threatened community within the Construction Corridor is proposed.

Matters	Presence	Impacts
Threatened Species	Two FFG Act listed threatened flora species were observed within the Assessment Area: • Buloke • Salt Copperbur. One fauna species listed under the FFG Act, Striped Legless Lizard, is assumed present in the Assessment Area. Habitat for Growling Grass Frog and Golden Sun Moth was determined to be present, but neither species were observed during targeted survey.	Buloke and Salt Copperbur do not fall within the Construction Corridor. The proposed works area largely avoids medium to high quality grassland fauna habitat (Figure 3-8). Due to continued disturbance of low quality fauna habitat mapped within the Construction Corridor, Striped Legless Lizard, Golden Sun Moth and Growling Grass Frog are not expected to persist.
Threatening Processes	Three listed threatening processes have been identified that may be exacerbated by the Project: • Invasion of native vegetation by Blackberry *Rubus fruticosus* L. agg • Habitat fragmentation as a threatening process for fauna in Victoria • Invasion of native vegetation by 'environmental weeds.'	Appropriate mitigation measures will be implemented in a CEMP.
Protected Flora	Six protected flora species were observed within the Assessment Area. Species protected as part of a threatened FFG Act community, Western (Basalt) Plains Grasslands Community, are present within the Assessment Area and Construction Corridor.	Four protected flora species were observed within the Construction Corridor including: • Common New Holland Daisy • Woolly New Holland Daisy • Blackwood • Sifton Bush. A 'Permit to Take' protected flora will be required for the Project where removal of these species or flora associated with the threatened FFG Act community, Western (Basalt) Plains Grasslands Community is to be undertaken on public land (e.g. road reserves, along Balliang Creek).

4.6 VicAdv listed species

One VicAdv listed rare or threatened flora species was recorded in the Assessment Area during detailed field assessments – Flax-lily (*Dianella longifolia* var. *grandis*) (vu). One individual of this species was recorded within the Construction Corridor.

Two other poorly known flora species listed on the VicAdv were also recorded in the Assessment Area: Slender Bindweed (*Convolvulus angustissimus* ssp. *omnigracilis*) (k) and Black Roly-poly (*Sclerolaena muricata* var. *muricata*)(k). Several Slender Bindweed were recorded within the Construction Corridor during detailed field assessments.

4.7 Wetlands and waterway habitats

Balliang Creek Crossing 1 will be open trenched to fit the pipeline. Minimal native vegetation is present at this creek crossing, although impacts are considered moderate, due to the construction method employed and the time of year works are likely to occur. As Balliang Creek is a named waterway a Works on Waterways permit will be required for construction on Balliang Creek. Complete removal of the farm dam is considered a high level of impact. Impacts to waterbodies and Balliang Creek within the Construction Corridor are detailed below in Table 4-8.

Table 4-8 Waterways within the Assessment Area, and Ramsar wetlands identified as relevant to the Assessment Area

Waterway	Significance	Likelihood of impact	Discussion
Ramsar wetlands			
Port Phillip Bay (Western Shoreline) and Bellarine Peninsula.	Protected under the EPBC Act	**Negligible**	Due to the distance to the Ramsar site and current degradation of Balliang Creek, the Ramsar site is unlikely to be impacted. Balliang Creek generally lacks flowing water. In addition to the mitigation measures to be implemented, any changes in hydrology or sedimentation are not predicted to occur due to the Project works, or flow into the Ramsar site. As such, impacts to the Ramsar site are considered negligible.
Waterways			
Balliang Creek	In Victoria, waterways are protected under various policies and legislative instruments, including the Water Act.	**Moderate**	Open trenching of the pipeline will occur at Balliang Creek Crossing 1. An access track is currently present here and is expected to be utilised by the contractor. Limited ecological values are present along the creekline within the Construction Corridor, although it does provide a drainage pathway via culverts under the Geelong-Bacchus Marsh Road. The pipeline will be installed by under-boring at Balliang Creek Crossing 2 to avoid impacts to the Creek. An existing access track will be utilised at this location to cross Balliang Creek to minimise impacts.

Waterway	Significance	Likelihood of impact	Discussion
			Construction of the pipeline across the creekline is not expected to have additional impacts to natural values along the creek outside of what has already been assessed as lost through the Construction Corridor, and mitigation measures to be implemented. Assuming mitigation measures are implemented, impacts to Balliang Creek Crossing 1 are likely to be moderate. Construction during no/low flow periods is recommended where practicable and re-vegetation works will occur along within disturbed areas following construction, A Sedimentation Management Plan should be implemented by the construction contractor.
Farm Dam – corner Schultz Road and Geelong-Bacchus Marsh Road.		**Moderate**	The farm dam is being removed to install the pipeline. Removal of the dam is not expected to have additional impacts to natural values outside of what has already been assessed as lost through the Construction Corridor, and mitigation measures to be implemented. No native vegetation, including native aquatic vegetation, is present. However, non-threatened, native fauna species considered under the Wildlife Act, may be present. Due to direct removal, impacts valued as moderate.

5 Legislative and policy requirements

Commonwealth and State legislation relevant to the Project and associated approval requirements, are listed below. Project actions assume the mitigation measures presented in Section 4.2 are implemented and the resulting Impact Assessment is as provided in Section 4.3.

Table 5-1 Relevant environmental legislation and policy

Legislation/ policy	Actions
Commonwealth	
EPBC Act	Significant impacts may occur as a result of the proposed works for removal of the Critically Endangered NTGVVP threatened ecological community and habitat for the Vulnerable Striped Legless Lizard. Any reduction in the area of occupancy of a Critically Endangered ecological community may be considered a significant impact based on the criteria specified in the Significant Impact Guidelines 1.1. As such, a referral for the removal of NTGVVP is recommended. Minor removal (0.0089 ha) of medium-high quality Striped Legless Lizard habitat is proposed for the Project. Given the assumption that the species is present in these higher quality habitat areas, and may comprise an important population in the absence of targeted surveys, a referral is recommended for potential impacts to Striped Legless Lizard. Further details are provided in Appendix J.
State	
EE Act	Substantially less than 10 ha of native vegetation removal is proposed as part of the Project (total removal 2.108 ha as per the NVR report, including both patch and tree removal) and limited impacts to FFG Act values or other State listed threatened species are predicted to occur based on implementation of proposed avoidance and mitigation measures. No significant impacts to any wetlands listed on the Ramsar Convention or A Directory of Important Wetlands in Australia are likely to occur. A referral under the EE Act is not required specifically for this Project based on the ecological referral criteria. Further information is provided in Section 5.1, Table 5-2.
FFG Act	No FFG Act listed threatened flora species have been recorded in the areas proposed to be impacted by the Project following targeted surveys. A small area (0.0089 ha) of medium to high quality habitat for the FFG Act listed Striped Legless Lizard is proposed to be removed within the Construction Corridor. As no targeted surveys have been undertaken in this habitat, the presence of this species is assumed and therefore impacts may occur. However, these impacts are minimal given the small area of habitat impacted combined with other mitigation measures.

Legislation/ policy	Actions
	The Project will impact 0.7109 ha of the FFG Act listed Western (Basalt) Plains Grassland threatened community within the Construction Corridor. FFG Act protected flora will be impacted by the Project, including flora species associated with the FFG Act listed ecological community Western (Basalt) Plains Grassland, along with four other protected flora species also recorded throughout the grassland patches. As a public authority, Western Water has a duty of care to avoid and reduce impacts to FFG Act values in accordance with the objectives of the Act. The avoidance and minimisation approach described in Section 2.1 are consistent with this duty of care. If protected Western (Basalt) Plains Grassland and the species protected within this community are to be removed from public land, a 'permit to take' from DELWP will need to be obtained prior to construction beginning. The amended threatened species list and protected flora list are not yet available but may change the approval requirements contained in this report if the new lists come into effect before the development proceeds.
VicAdv	The following species were observed within the Assessment Area: • Flax-lily (vu) • Black Roly-poly (k) • Slender Bindweed (k). One Flax-lily and several Slender Bindweed fall within the Construction Corridor. A species offset may be prescribed for native vegetation removal under the Guidelines and will be detailed in the NVR Report, if applicable (DELWP 2017c). Consideration of impacts to threatened species are incorporated into any permit application under the Guidelines following the detailed pathway under Clause 52.17 of the planning scheme.
P&E Act	A permit will be required for the removal of 2.108 ha of native vegetation (inclusive of large tree buffers under the NVR Report) under Clause 52.17 (Native vegetation) of the Moorabool and Greater Geelong Planning Schemes, the majority of this removal occurring in Moorabool LGA. To support the planning permit application, assessment and offsetting will be required in accordance with the Guidelines (DELWP 2017c) (see below). In addition, the following overlays relating to protection of biodiversity values apply to the Construction Corridor under the Moorabool and Greater Geelong Planning Schemes: **Moorabool Planning Scheme** • Environmental Significance Overlay (Schedule 2 – Waterway Protection) (ESO2) – applies to Balliang Creek, including both Creek Crossing 1 and 2. • Environmental Significance Overlay (Schedule 7 – Grasslands within the Werribee Plains Hinterland) (ESO7) – applies to most of Geelong-Bacchus Marsh Road and all of the paper road, including adjoining private property in the Moorabool LGA, but does not apply to Parwan South Road or Schultz Road.

Legislation/ policy	Actions
	Greater Geelong Planning Scheme • Environmental Significance Overlay (Schedule 4 – Grasslands within the Werribee Plains Hinterland) (ESO4) applies to all of Geelong-Bacchus Marsh Road and the paper road in Greater Geelong LGA, including adjoining private property. A planning permit is required under Clause 42.01 (ESO) to remove native vegetation in Moorabool ES07 and Greater Geelong ESO4. A planning permit is required under Clause 42.10 (ESO) to remove native and non-native vegetation in the Moorabool ESO2. Further detail is provided in Section 5.2.
The Guidelines (DELWP 2017c)	Native vegetation in the form of remnant patches and scattered trees has been identified in the Construction Corridor. A permit application under Clause 52.17 will be required for the removal of this vegetation. Native vegetation offsets are to be provided for removal of the native vegetation. The offset requirement will be finalised once an agreement (if required) is made with VicRoads to utilise the existing permit to remove.
CaLP Act	CaLP Act listed noxious weeds and pest animals are present in the Assessment Area. It is the responsibility of the proponent to implement measures to prevent the spread of noxious weeds and pest animals during construction of the Project. Weed and biosecurity management measures are to be included in the Project CEMP.
Wildlife Act	To facilitate construction of the Project, it is necessary, as per the mitigation measures, to engage an Ecologist or qualified wildlife handler to relocate wildlife to a suitable habitat outside of the Construction Corridor, when the farm dam and large trees will be removed and works to Balliang Creek Crossing 1 occur. Any persons engaged by the Project to relocate or otherwise handle wildlife will need to hold the appropriate authorisation under the Wildlife Act. This requirement will need to be addressed by the relevant construction contractor and should be included in the Project CEMP.
Water Act	Balliang Creek is a designated waterway. A works on waterways permit in accordance with section 188 of the Water Act will be required from Melbourne Water prior to construction. Aquatic ecologists should be engaged to undertake the application process.
Fisheries Act	Design, construction and operation of the Project should seek to avoid creating obstructions to fish passage, otherwise authorisation may be required under the Fisheries Act. The drainage line of Balliang Creek at Creek Crossing 1 does not provide a viable pathway for fish movement through the road culvert. The capture, handling or translocation of fish may be required during construction (e.g. removal of farm dam and works on Balliang Creek Crossing 1) of the Project and persons undertaking these activities will need to hold the appropriate permit or licence under the Fisheries Act. This requirement will need to be addressed by the relevant construction contractor and should be included in the Project CEMP.

Legislation/ policy	Actions
EP Act	Discharges and emissions during construction, operation and decommissioning of the Project must comply with the applicable SEPPs, including: • State Environment Protection Policy (Waters) • State Environment Protection Policy (Prevention and Management of Contamination of Land) • Noise from industry in regional Victoria: Recommended maximum noise levels from commerce, industry and trade premises in regional Victoria (NIRV; EPA publication 1411) • State Environment Protection Policy (Ambient Air Quality) • State Environment Protection Policy (Air Quality Management). These requirements will need to be addressed by the relevant construction contractor and should be included in the Project CEMP. Design, construction, operation and decommissioning of the Project will need to implement measures to comply with the new general environmental duty and any new Regulations that are introduced to support the 2017 Act.

5.1 EE Act

The EE Act provides for the assessment of works that can have a significant effect on the environment. Triggers requiring a referral under the EE Act include long term impacts to native vegetation, threatened species, listed wetlands, freshwater, estuarine or marine ecosystems, community health and greenhouse gas emissions. Triggers for an EES referral relating to ecology have been assessed and are presented in Table 5-2 below (DSE 2006).

Table 5-2 Terrestrial and aquatic ecological EE Act referral triggers relating to the proposed works

Trigger	Comment
Individual criteria	
Potential clearing of more than 10 ha of native vegetation from an area that: • Is an Endangered EVC (DNRE 2002) • Is of Very High conservation significance (DNRE 2002)	An estimated maximum removal of native vegetation is 1.8646 ha of native vegetation (or 2.108 ha inclusive of tree buffers under the NVR Report). All EVCs to be removed by the Project are classified as Endangered. Further reduction in the amount of vegetation removal will be confirmed by the design team. Current estimate of impact is below the 10 ha threshold. **Criterion is not met.**
Potential loss of a significant proportion of known remaining habitat or population of a threatened species within Victoria	Removal of a significant proportion of known habitat for threatened species is not predicted to occur for the Project as proposed. **Criterion is not met**

Trigger	Comment
Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia'	No qualifying wetlands are located within the Assessment Area. The nearest listed wetlands are located more than 10-20km downstream of the Assessment Area and are not likely to be impacted. **Criterion is not met**
Combined criteria	
Potential clearing of 10 ha or more of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan.	A total of 1.8646 ha of native vegetation patches is proposed to be removed (or 2.108 ha inclusive of tree buffers under the NVR Report), along with 2 canopy trees and 5 scattered trees which add a nominal 0.295 ha of native vegetation removal for the Project. **Criterion is not met**
Potential loss of a significant area of a listed ecological community	A total of 0.7109 ha of the FFG Act listed threatened community (Western (Basalt) Plains Grassland) is unavoidable. The total area of removal of this community is considered to be relatively small, compared to that throughout the landscape. Further, it is noted that a total of 4.837 ha of Western (Basalt) Plains Grassland was mapped within the Assessment Area meaning design of the Project has avoided impacts to 4.1261 ha of this listed community within the Assessment Area. **Criterion is not met**
Potential loss of a genetically important population of an endangered or threatened species	No genetically important population of an endangered or threatened species are predicted to be impacted by the proposed Project. **Criterion is not met**
Potential loss of critical habitat	No areas of critical habitat are predicted to be impacted by the proposed Project. **Criterion is not met**
Potential significant effects on habitat values of a wetland supporting migratory bird species	No wetlands supporting migratory birds are predicted to be impacted by the Project. **Criterion is not met**

5.2 P&E Act

The Project is subject to both the Moorabool Local Government Area (LGA) (north of Balliang Creek Crossing 1 and east of Balliang Creek Crossing 2) and Greater Geelong LGA (south of Balliang Creek Crossing 1 and west of Balliang Creek Crossing 2). Approval from both Councils under the *Planning and Environment Act 1987*, pursuant to Clause 52.17 (Native vegetation), is required to remove, destroy or lop native vegetation in Victoria, unless an exemption applies.

Both Council planning schemes identify additional overlays relevant to vegetation removal that are applicable to the Project. The discussion of how these overlays apply to the Project is detailed below in Table 5-3.

Table 5-3 Applicability of ecology-related planning scheme overlays in the Construction Corridor.

LGA	Overlays	Location	Outcome
Moorabool	ESO2 – Waterway protection	Balliang Creek Crossing 1 and 2	**Action required:** One patch of the EVC 821 Tall Marsh is mapped within the Construction Corridor where the ESO applies. The remaining vegetation consists of introduced, weed species. A permit is required from Council under Clause 42.01.
	ESO7 – Grasslands within the Werribee Plains Hinterland	Encompasses the Construction Corridor: • from north of Balliang Creek Crossing 1 to just south of Schultz Road, including the Geelong-Bacchus Marsh Road reserve and adjoining private property. • along the paper road and adjoining private property east of Balliang Creek Crossing 2.	**Action required:** Native vegetation is to be removed across the extent of this overlay where it applies to the Construction Corridor. Native vegetation is not being removed at Balliang Creek Crossing 2. A permit is required from Council under Clause 42.01.
Greater Geelong	ESO4 – Grasslands within the Werribee Plains Hinterland	Encompasses the Construction Corridor along Geelong-Bacchus Marsh Road south of Balliang Creek Crossing 1 and along the paper road east to Balliang Creek Crossing 2, including where the Construction Corridor is on private property.	**Action required:** Native vegetation is to be removed across the extent of this overlay where it applies to the Construction Corridor. Native vegetation is not being removed at Balliang Creek Crossing 2. A permit is required from Council under Clause 42.01.

A very small area of Vegetation Protection Overlay (Schedule 1 – Significant Roadsides and Linear Reserves) (VPO1) applying to Geelong-Bacchus Marsh Road south of the paper road, extends into the Assessment Area but will not be impacted by works in the Construction Corridor.

6 Conclusion and next steps

6.1 Summary of key biodiversity values and constraints

The purpose of this ecological assessment was to identify the ecological values within the Project Assessment Area, and the potential impact the Project may have on the ecological values identified in relation to relevant biodiversity legislation and policy requirements.

The following ecological values were identified within the Assessment Area:

- Two threatened ecological communities:
  - 1.945 ha of EPBC Act listed Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) (Critically Endangered); and
  - 4.837 ha of FFG Act listed Western (Basalt) Plains Grassland.
- Three threatened flora species:
  - Buloke (FFG Act – listed, VicAdv - endangered)
  - Salt Copperbur (FFG Act – listed, VicAdv - endangered)
  - Flax-lily (VicAdv - vulnerable).
- Six FFG Act protected flora species
- Habitat for rare or threatened fauna species:
  - Growling Grass Frog (EPBC Act – Vulnerable, FFG Act – listed, VicAdv – endangered)
  - Striped Legless Lizard (EPBC Act – Vulnerable, FFG Act – listed, VicAdv – endangered)
  - Golden Sun Moth (EPBC Act – Critically Endangered, FFG Act – listed, VicAdv – critically endangered)
  - Tussock Skink (VicAdv – vulnerable)
  - Fat-tailed Dunnart (VicAdv – near threatened).
- A total of 9.7189 ha of native vegetation across the Assessment Area, 29 large canopy trees and 34 scattered trees assessable under the Guidelines.
- One waterway (Balliang Creek) and one farm dam, but no mapped wetlands.

A Construction Corridor has been designated for construction of the Project including ancillary works (e.g. temporary laydown areas). Where practicable, the location of the Construction Corridor has been positioned to minimise the impact to ecological values, with a significant reduction in impacts achieved through the avoidance and minimisation approach to design described in this report. Impacts to the large majority of native vegetation, threatened ecological communities and threatened species habitat, particularly medium to high quality habitat, within the Assessment Area have been avoided through design and establishment of No-go Zones.

Based on the location of the works area the proposed impact to ecological values is as follows:

- Direct removal of 1.8646 ha of native vegetation patches (not excluding VicRoads data), 2 large canopy trees and 5 scattered trees, inclusive of:
  - 0.253 ha of EPBC Act listed NTGVVP threatened ecological community
  - 0.7109 ha of FFG Act listed Western (Basalt) Plains Grassland threatened ecological community
  - 0.0089 ha of medium-high quality Striped Legless Lizard habitat

  - Four FFG Act listed protected flora species
  - Two VicAdv listed species: one individual of Flax-lily (vulnerable) and several individuals of Slender Bindweed (poorly known).

- A total removal extent of 2.108 ha inclusive of tree buffers under the NVR Report (not excluding VicRoads data).
- Temporary disturbance to the bed and banks (non-native vegetation) of Balliang Creek where it crosses Geelong-Bacchus Marsh Road (Balliang Creek Crossing 1) during open-trenching for pipeline installation, and the removal of a farm dam (no native or aquatic vegetation).

6.2 Conclusions and next steps

The following conclusions are made on the need for approvals and next steps required for the proposed works:

- With the implementation of mitigation measures, two MNES are assessed as potentially having a Significant Impact under the EPBC Act, including Striped Legless Lizard and NTGVVP. A referral under the EPBC Act is recommended.
- The potential clearing of native vegetation and impacts to matters listed under the FFG Act for the proposed works will not trigger the ecological criteria for a referral under the EE Act.
- An FFG Act permit to take will be required to account for the removal of protected (but not threatened) flora species on public land. This is applied for once planning approval for the Project is achieved.
- An offset of a maximum of 0.631 general habitat units and 5 large trees, with a minimum strategic biodiversity score of 0.407 (not excluding VicRoads data) within the Moorabool Shire (north of Balliang Creek), City of Greater Geelong Council (south of Balliang Creek) or Port Phillip and Westernport CMA are required to account for the anticipated removal of native vegetation in accordance with the Guidelines.
- Consult with VicRoads and the appropriate regulatory bodies to agree upon joint use of previously approved permit to remove native vegetation under the Guidelines.
- Seek advice from planning specialists to confirm the necessity of additional permits under ESOs and VPOs under both the Moorabool and Greater Geelong Planning Schemes as relevant to the Project. Permits under Clause 52.17 and Clause 42.01 are required under both of the planning schemes.
- Engage aquatic ecology specialists to develop the works on waterways permit under the Water Act to be obtained prior to construction.
- CEMP must be prepared, detailing how to implement the necessary management and mitigation measures to maintain and further reduce potential impacts to the environment during construction of the Project.

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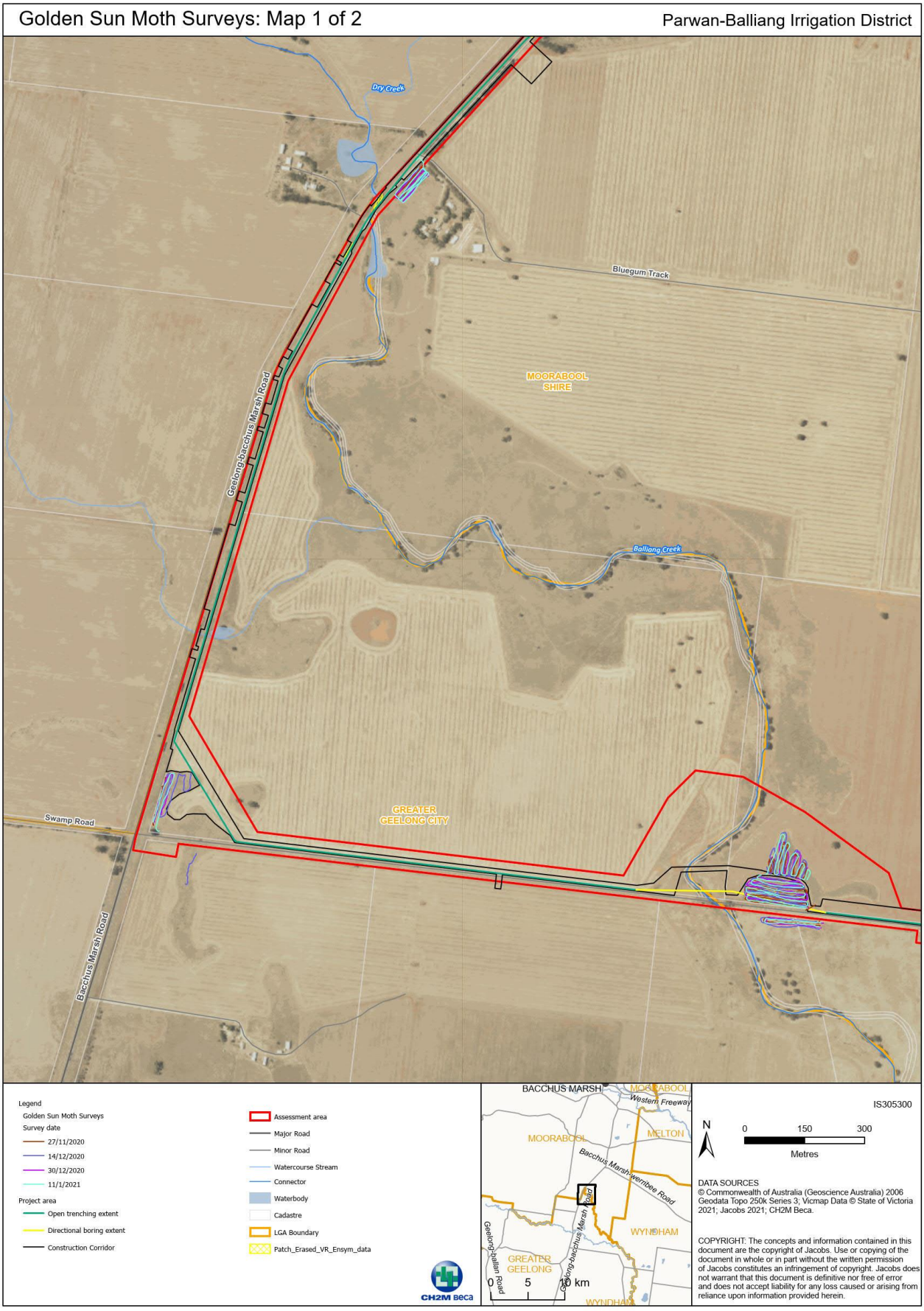
Appendix A. Golden Sun Moth survey transects

Figure A-1 Golden Sun Moth survey locations and walking transects


Golden Sun Moth Surveys: Map 1 of 2
Parwan-Balliang Irrigation District
Dry Creek
Bluegum Track
MOORABOOL SHIRE
Geelong-Bacchus Marsh Road
Balliang Creek
Swamp Road
GREATER GEELONG CITY
Bacchus Marsh Road
Legend
Golden Sun Moth Surveys
Survey date
27/11/2020
14/12/2020
30/12/2020
11/1/2021
Project area
Open trenching extent
Directional boring extent
Construction Corridor
Assessment area
Major Road
Minor Road
Watercourse Stream
Connector
Waterbody
Cadastre
LGA Boundary
Patch_Erased_VR_Ensym_data
CH2M Beca
BACCHUS MARSH
MOORABOOL
Western Freeway
MELTON
Bacchus Marsh-Werribee Road
WYNDHAM
GREATER GEELONG
Geelong-Ballan Road
0 5 10 km
IS305300
N
0 150 300
Metres
DATA SOURCES
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Path: J:\IE\Projects\03_Southern\IS305300\Spatial\ArcPro\EcologyCartography\IS305300_PBID_Ecology_Cartography.aprx
Date : 23/03/2021 User: ABerman

Golden Sun Moth Surveys: Map 2 of 2

Parwan-Balliang Irrigation District

Legend

Golden Sun Moth Surveys

Survey date

- 27/11/2020
- 14/12/2020
- 30/12/2020
- 11/1/2021

Project area

- Open trenching extent
- Directional boring extent
- Construction Corridor
- Assessment area
- Major Road
- Minor Road
- Waterbody
- Cadastre
- LGA Boundary
- Patch_Erased_VR_Ensym_data

CH2M Beca

IS305300

N

0 150 300

Metres

DATA SOURCES

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Date : 23/03/2021 User: ABerman

Appendix B. Weather conditions of targeted surveys

Table B-1 Weather conditions during targeted Growling Grass Frog surveys

Date	Time	Temp (°C)	Average wind speed (km/h)	Humidity (% RH)	Rain (past 24 hours)	Cloud cover (%)	Species Observed
13/01/2021	9:56 PM	18.3	2.4	82.7	0	1	None
21/01/2021	10:43 AM	2.4	0.0	66.0	0	1	None

Table B-2 Weather conditions during targeted Golden Sun Moth surveys

Date	Temp (°C)	Average wind speed (km/h)	Humidity (% RH)	Rain (past 24 hours)	Cloud cover (%)	Species Observed
27/11/2020	32.9	4.5	42.5	0	0	None
14/12/2020	29.4	12	28	0	0	None
30/12/2020	21.5	6.8	54	0	7	None
11/01/2021	35.3	9.5	24.6	0	0	None

Table B-3 Weather conditions during targeted Striped Legless Lizard surveys

Date	Time	Temp (°C)	Average wind speed (km/h)	Humidity (% RH)	Rain (past 24 hours)	Cloud cover (%)	Species Observed
7/10/2019	11:21 AM	14.2	4.8	53	0	75	None
22/10/2019	10:43 AM	17.4	3.3	51	0	0	None
8/11/2019	11:46 AM	21.4	8.9	45	0	66	None
22/11/2019	2:04 PM	25	4	31	0	0	None
5/12/2019	11:27 AM	20.3	9.2	44	0	66	None
17/12/2019	2:29 PM	30.7	8	24	0	30	None
16/01/2019	10:34 AM	17	12.7	68	0	100	None
30/01/2019	9:02 AM	26.8	6.5	28	0	0	None

Date	Time	Temp (°C)	Average wind speed (km/h)	Humidity (% RH)	Rain (past 24 hours)	Cloud cover (%)	Species Observed
18/02/2019	1:33 PM	22.3	2.3	82	1.4	100	None
12/03/2020	3:00 PM	28.3	20	34	0	0	None
25/03/2020	2:50 PM	17	22	55	0	70	None
03/04/2020	1:04 PM	24.0	1.7	46	0	60	None

Appendix C. Summary of environmental legislation and policy

Table C-1 Relevant environmental legislation and policy

Legislation/policy	Description
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act provides for the listing of nationally threatened species, threatened ecological communities and key threatening processes; and provides the legal framework to protect and manage nine matters of national environmental significance (MNES): world heritage properties; national heritage places; wetlands of international importance (Ramsar); listed threatened species and communities; listed migratory species; Commonwealth marine areas; the Great Barrier Reef Marine Park; nuclear actions; and water resources, in relation to coal seam gas and large coal mining development. Any Project, not covered by an approved strategic assessment, that is likely to have a significant impact on MNES, is required to be referred to the Commonwealth Minister for Environment via the Department of Agriculture, Water and the Environment (DAWE) for a decision on whether the Project is a 'controlled action' requiring assessment and approval under the EPBC Act. The Project does not fall within the Melbourne Strategic Assessment (MSA); a strategic assessment approved under the EPBC Act.
State	
Environment Effects Act 1978 (EE Act)	The EE Act provides for the assessment of actions that are capable of having a significant effect on the environment. A Project is required to be referred to the Victorian Minister for Planning for a decision on whether an Environment Effects Statement (EES) is required, if the Project triggers one individual or at least two combination referral criteria specified in the 'Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978' (DSE, 2006) (Ministerial Guidelines). Biodiversity referral criteria include potential clearing of 10 ha or more of native vegetation (particularly endangered EVCs), potentially significant impacts on species or ecological communities threatened in Victoria, and potentially significant impacts on the ecological character of internationally or nationally important wetlands. The EE Act also allows an applicant to write to the Secretary of the DELWP to confirm no EES is required. The assessment process under this Act is not an approval process itself, rather it enables statutory decision-makers to make decisions about whether a Project with potentially significant environmental effects should proceed. If an EES is required, statutory approval decisions (e.g. planning permit, FFG Act permit) are put on hold until the EES process is complete.

Legislation/policy	Description
Flora and Fauna Guarantee Act 1988 (FFG Act)	The FFG Act provides a framework for biodiversity conservation in Victoria, including providing for the listing of threatened species and communities of flora and fauna, as well as threatening processes. A number of non-threatened flora species are also listed as protected under the FFG Act. A permit to take is required to remove protected flora, including listed threatened and non-threatened flora, from public land. The FFG Act Amendment Act 2019 came into effect on 1 June 2020. As part of the amendments, all species of flora and fauna currently listed under the FFG Act, along with all species on the VicAdv lists (except those that are 'poorly known' or 'near threatened') and any species nominated by public submissions, are currently being assessed in accordance with the common assessment method by a Scientific Advisory Committee overseen by DELWP. On completion of this process, all flora and fauna species assessed as Extinct, Critically Endangered, Endangered or Vulnerable at a state level, will be added to a new, statutory FFG Act Threatened List and the VicAdv lists will then be revoked. It was anticipated that this process would be completed in early 2021. All flora and fauna listed as threatened at a national level under the EPBC Act will be included in a separate national section of the new FFG Act Threatened List along with their status under the EPBC Act. The FFG Act lists of threatened communities and threatening processes are not currently being reviewed. The FFG Act Amendment Act 2019 also introduces changes to the categories of protected flora and the way they are regulated, including introducing two categories: 'restricted use protected flora' and 'generally protected flora'. Restricted use protected flora are exclusively threatened by take for commercial/personal use, and the taking of these species incidental to clearing for development works, will not require a permit to take. Generally protected flora are threatened by take for reasons other than or additional to commercial/personal use (e.g. development clearing) and will require a permit to take for any purpose. The protected flora list is currently being reviewed, but for now, all protected flora are classified as generally protected flora. Under the amended FFG Act, public authorities have a duty of care to consider potential biodiversity impacts when exercising their functions, including giving proper attention to the objectives of the FFG Act.
DELWP Victorian Advisory Lists (VicAdv)	The VicAdv are not a statutory list of threatened species, but rather a list of species for which conservation management is recommended by DELWP. The VicAdv lists are comprised of: • the Advisory List of Rare or Threatened Plants in Victoria – 2014 (DEPI 2014); • the Advisory List of Threatened Vertebrate Fauna in Victoria – 2013 (DEPI 2013); and • the Advisory List of Threatened Invertebrate Fauna in Victoria – 2009 (DSE 2009).

Legislation/policy	Description
	The presence, or likely presence, of a species listed on the VicAdv is used to determine whether species specific habitat is required to offset those specific biodiversity losses. All species of flora and fauna currently listed on the VicAdv lists (except those that are 'poorly known' or 'near threatened') are currently being assessed in accordance with the common assessment method by a Scientific Advisory Committee overseen by DELWP. On completion of this process, any VicAdv listed species assessed as Extinct, Critically Endangered, Endangered or Vulnerable will be added to a new statutory FFG Act Threatened List and the VicAdv lists will then be revoked. It is anticipated that this process will be completed in early 2021.
Planning and Environment Act 1987 (P&E Act)	The P&E Act regulates the use and development (including works involving vegetation removal) of land in Victoria, and provides the framework and procedures for preparing and amending planning schemes, obtaining planning permits and enforcing compliance with planning schemes. Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines) (DELWP 2017c) - Clause 52.17 The planning permit assessment process and offset requirements for impacts to native vegetation associated with Clause 52.17 (Native vegetation) of the planning scheme are undertaken in accordance with the Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017c). The Guidelines guide how impacts on biodiversity should be considered, including whether a permit should be granted when assessing a planning permit application. The primary objective of the Guidelines is to achieve no net loss of native vegetation, through a three-step approach of avoid and minimise impacts, and offset unavoidable losses through the protection and ongoing management of an area proportional to their importance in Victoria's biodiversity. Depending on the location and scale of native vegetation removal, the planning permit application may require statutory referral to DELWP.
Catchment and Land Protection Act 1994 (CaLP Act)	The CaLP Act defines requirements to: • Avoid land degradation; • Conserve soil; • Protect water resources; and • Eradicate and prevent the spread and establishment of noxious weed and pest animal species. The CaLP Act defines four categories of noxious weeds: State Prohibited Weeds, Regionally Prohibited Weeds, Regionally Controlled Weeds and Restricted Weeds. Noxious weed species and the category they are placed in is specific to individual CMA regions.

Legislation/policy	Description
Wildlife Act 1975 (Wildlife Act)	The Wildlife Act establishes procedures to protect and conserve Victoria's wildlife. It is an offence under the Wildlife Act to kill, take, control or harm wildlife or to damage, disturb or destroy wildlife habitat unless authorised to do so under the Act or associated Wildlife Regulations 2013. Approval to damage, disturb or destroy wildlife habitat is not required under this Act where authorised under another Act (e.g. permit to remove native vegetation under the P&E Act). Section 28A of the Act empowers the Secretary of DELWP (or delegate) to provide an individual written authorisation to take wildlife for a range of purposes, including for protection and enabling the care of sick, injured or orphaned wildlife. Such authorisation generally comes with strict terms and conditions which the individual must comply with.
Water Act 1989 (Water Act)	The Water Act provides a framework for managing Victoria's water resources to promote the orderly, equitable and efficient use of water resources to make sure that water resources are conserved and properly managed for sustainable use for the benefit of present and future Victorians. The Water Act regulates impacts to surface water and groundwater resources. Works in, on, under or above a designated waterway requires either a licence under section 67 or a works on waterways permit under section 188, administered by the relevant waterway management authority (CMA or Melbourne Water) under a by-law established under the Water Act. A licence under section 51 of the Water Act is required to take and use water, including surface and groundwater.
Fisheries Act 1995 (Fisheries Act)	The Fisheries Act provides a framework for the regulation, management and conservation of Victorian fisheries. A person must not take fish from marine waters or inland waters; or use or possess recreational fishing equipment in or next to Victorian water unless authorised to do so by a licence. Section 119 of the Fisheries Act requires that a person must not create an obstruction across a watercourse or water body that would obstruct the free passage of fish, leave fish stranded, or destroy immature fish without authorisation under the Act.
Environment Protection Act 1970 (EP Act)	The EP Act provides the framework for protecting the environment in Victoria. The EP Act establishes the powers, duties and functions of the Environment Protection Authority (EPA), which include administration and enforcement of the Act, recommending State Environment Protection Policies (SEPPs) and industrial waste management policies, issuing works approvals, licences, permits, pollution abatement notices and implementing National Environment Protection Measures. SEPPs are subordinate legislation made under the provisions of the EP Act to provide more detailed requirements and guidance. The SEPPs seek to

Legislation/policy	Description
	safeguard environmental values and human activities (beneficial uses) from the effect of pollution and waste, including values relating to surface waters, groundwaters, air quality, noise and contamination of land. The Environment Protection Act 2017 will fully come into effect on 1 July 2021 and will establish a new general environmental duty introduced through the Environment Protection Amendment Act 2018. The new general environmental duty will require that: “A person who is engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste must minimise those risks, so far as reasonably practicable.”

Appendix D. PMST search results

Australian Government

Department of Agriculture, Water and the Environment

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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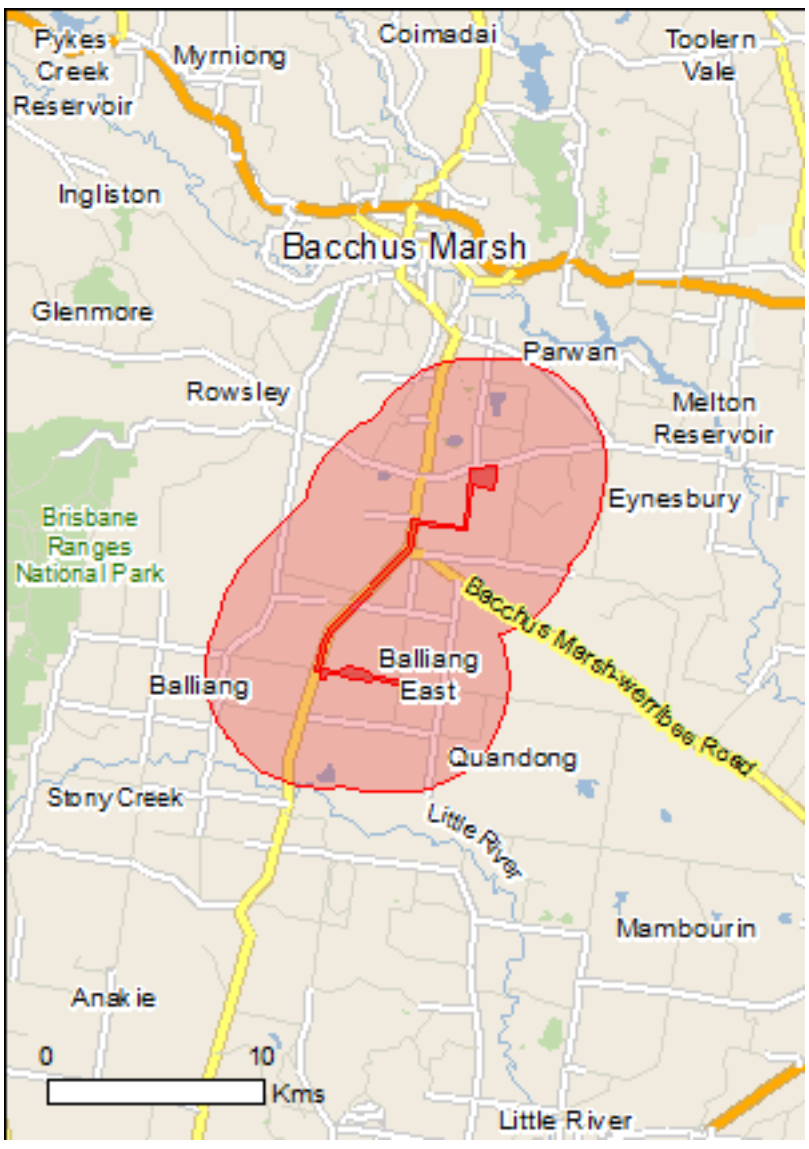
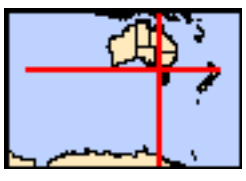


This map may contain data which are ©Commonwealth of Australia (Geoscience Australia), ©PSMA 2015

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:	5
Listed Threatened Species:	33
Listed Migratory Species:	14

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
Australian Marine Parks:	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:	1
Regional Forest Agreements:	1
Invasive Species:	39
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	10 - 20km upstream

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
Grey Box (Eucalyptus microcarpa) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	Endangered	Community may occur within area
Natural Temperate Grassland of the Victorian Volcanic Plain	Critically Endangered	Community likely to occur within area
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	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 may occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Foraging, feeding or related behaviour may occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat likely to occur within area
Grantiella picta Painted Honeyeater [470]	Vulnerable	Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	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

Name	Status	Type of Presence
Pedionomus torquatus		
Plains-wanderer [906]	Critically Endangered	Species or species habitat known to occur within area
Rostratula australis		
Australian Painted Snipe [77037]	Endangered	Species or species habitat known to occur within area
Thinornis cucullatus cucullatus		
Hooded Plover (eastern), Eastern Hooded Plover [90381]	Vulnerable	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
Prototroctes maraena		
Australian Grayling [26179]	Vulnerable	Species or species habitat likely to occur within area
Frogs		
Litoria raniformis		
Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog, Golden Bell Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Insects		
Synemon plana		
Golden Sun Moth [25234]	Critically Endangered	Species or species habitat known to occur within area
Mammals		
Dasyurus maculatus maculatus (SE mainland population)		
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	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
Dianella amoena		
Matted Flax-lily [64886]	Endangered	Species or species habitat known to occur within area
Diuris basaltica		
Small Golden Moths Orchid, Early Golden Moths [64654]	Endangered	Species or species habitat likely to occur within area
Dodonaea procumbens		
Trailing Hop-bush [12149]	Vulnerable	Species or species habitat likely to occur within area
Glycine latrobeana		
Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat known to occur within area
Lachnagrostis adamsonii		
Adamson's Blown-grass, Adamson's Blowngrass [76211]	Endangered	Species or species habitat may occur within area
Lepidium hyssopifolium		
Basalt Pepper-cress, Peppercress, Rubble Pepper-cress, Pepperweed [16542]	Endangered	Species or species habitat likely to occur within area
Leucochrysum albicans subsp. tricolor		
Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat likely to occur within area

Name	Status	Type of Presence
[Pimelea spinescens subsp. spinescens](#) Plains Rice-flower, Spiny Rice-flower, Prickly Pimelea [21980]	Critically Endangered	Species or species habitat known to occur within area
[Prasophyllum frenchii](#) Maroon Leek-orchid, Slaty Leek-orchid, Stout Leek-orchid, French's Leek-orchid, Swamp Leek-orchid [9704]	Endangered	Species or species habitat likely to occur within area
[Pterostylis cucullata](#) Leafy Greenhood [15459]	Vulnerable	Species or species habitat may occur within area
[Rutidosis leptorhynchoides](#) Button Wrinklewort [67251]	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
[Xerochrysum palustre](#) Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area
Reptiles		
[Delma impar](#) Striped Legless Lizard, Striped Snake-lizard [1649]	Vulnerable	Species or species habitat known to occur within area
[Tympanocryptis pinguicolla](#) Grassland Earless Dragon [66727]	Endangered	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]	Vulnerable	Species or species habitat known to occur within area
[Monarcha melanopsis](#) Black-faced Monarch [609]		Species or species habitat likely 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 habitat may occur within area
[Calidris acuminata](#) Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area

Name	Threatened	Type of Presence
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 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 likely to 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 may 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 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
Chrysococcyx osculans Black-eared Cuckoo [705]		Species or species habitat likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area

Name	Threatened	Type of Presence
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat likely to occur within area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat likely 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 likely 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
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 likely to 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 known to occur within area
Thinornis rubricollis rubricollis Hooded Plover (eastern) [66726]	Vulnerable*	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

State and Territory Reserves [Resource Information]

Name	State
Little River, Ripley SS.R.	VIC

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
Pycnonotus jocosus Red-whiskered Bulbul [631]		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		
Bos taurus Domestic Cattle [16]		Species or species habitat likely to occur within area
Canis lupus familiaris Domestic Dog [82654]		Species or species habitat likely to occur within area
Capra hircus Goat [2]		Species or species habitat likely to occur within area

Name	Status	Type of Presence
Felis catus Cat, House Cat, Domestic Cat [19]		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
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		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
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
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

Name	Status	Type of Presence
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Opuntia spp. Prickly Pears [82753]		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

-37.819984 144.433694,-37.819849 144.433093,-37.818493 144.422879,-37.819306 144.421849,-37.817679 144.409318,-37.816933 144.408803,-37.816255 144.403567,-37.818425 144.40288,-37.818154 144.400391,-37.816052 144.401164,-37.815577 144.397988,-37.805134 144.402194,-37.801269 144.405026,-37.774951 144.437384,-37.766266 144.438758,-37.768641 144.460215,-37.749302 144.463133,-37.748827 144.463992,-37.748419 144.474206,-37.755817 144.472403,-37.754799 144.46382,-37.769659 144.461589,-37.767284 144.440646,-37.774815 144.439273,-37.777189 144.436869,-37.801811 144.406829,-37.805134 144.404511,-37.814967 144.400134,-37.815984 144.408631,-37.814221 144.412665,-37.815306 144.420819,-37.817543 144.422278,-37.818764 144.434037,-37.819984 144.433694

Acknowledgements

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-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 E. VBA records and likelihood of presence assessment

Commonwealth and State-listed threatened flora and fauna previously recorded within 5 km of the Assessment Area in the VBA or having modelled habitat present within 5 km of the Assessment Area in the PMST, are presented in Table E-3 (flora) and Table E-4 (fauna). The threatened species tables within this appendix (threatened flora and threatened fauna) detail all species flagged during the desktop phase as well as their conservation status (refer to Table E-1), habitat values and the date of the last record of this species (if any). The tables also detail the likelihood of presence of each species based on the findings of the field assessment.

A search area of 5 km was used to query the VBA and PMST databases in order to identify records of mobile species that have the potential to use habitat available in the Assessment Area.

The criteria presented in Table E-2 have been used to assess the likelihood of each species being present at the Project area. Species with a state status of Poorly known (k) or data deficient (dd) only have not been included in the assessment.

Notes to table:

Table E-1 Key to species conservation status

Key to species conservation status	
Status under the EPBC Act	
CR	Critically Endangered
EN	Endangered
VU	Vulnerable
Mar	Listed marine species
Mig	Listed Migratory species
Status under the FFG Act	
L	Listed
Status under the VicAdv List	
cr	Critically Endangered
e	Endangered
v	Vulnerable
nt	Near Threatened
r	Rare
k	Unknown (All ‘k’ species have been removed from the assessment).

Table E-2 Key to species likelihood of presence

Key to species conservation status	
Confirmed • Species recorded within the Assessment Area by the present study.	**High** • Recent records of the species in the vicinity, and/or • The Assessment Area contains areas of high-quality habitat for the species.
Moderate • Limited or historic records of the species in the vicinity, and/or • The Assessment Area contains habitat.	**Low** • No previous records of the species in the vicinity, and/or • The Area contains limited or no suitable habitat for the species, and/or • The species was not observed during targeted surveys for the species, and/or • The Assessment Area lies outside the geographic range of the species.
Absent • Conditions within the Assessment Area are incongruous with requirements of the species (e.g. marine pelagic species could not occur in a terrestrial area), and/or • The species has been deemed absent after sufficient survey effort (criterion generally reserved for particularly conspicuous species).	**Negligible** • Legislation protecting threatened species does not apply to the species within the Assessment Area, and/or: • The Assessment Area is outside the natural range of the species, and • The species is present for non-conservation purposes (e.g., planted for amenity, or has become naturalised in the area).

Table E-3 Likelihood of threatened flora being present within the Assessment Area

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Commonwealth								
Amphibromus fluitans (River Swamp Wallaby-grass)	VU			Largely confined to permanent swamps, principally along the Murray River between Wodonga and Echuca, uncommon to rare in the south (e.g. Casterton, Moe, Yarram), probably due to historic drainage of wetlands (RBGV 2016). Largely restricted in greater Melbourne to seasonal wetlands and mudflats of River Red Gum swamps of the Lower Yarra and Plenty/Merri volcanic plains north of Melbourne (Cam Beardsell pers. comm.).	PMST		**Low**	Permanent swamp habitat is not present within the Assessment Area, and the species known to be rare in the south of the state.
Dianella amoena (Matted Flax-lily)	EN	L	en	Largely confined to drier grassy woodland and grassland communities south of the Dividing Range and now much depleted through its range (RBGV 2017).	PMST	3/03/2020	**Moderate**	The Assessment Area supports suitable habitat for the species, particularly in less modified locations. It was not observed during spring surveys.
Diuris basaltica (Small Golden Moths)	EN	L	en	Plains Grassland on Victorian Basalt Plains. Known from records in Laverton and Altona. Flowers Sep.-Oct (Gray and Knight 2001).	PMST	3/03/2020	**Low**	While the Assessment Area supports suitable habitat for the species, it was not observed during spring surveys. The species is unlikely to occur within the Assessment Area.
Dodonaea procumbens (Trailing Hop-bush)	VU		vu	Grows in low-lying, often winter-wet areas in woodland, low open-forest and grassland on sands and clays (Walsh and Entwisle 1996).	PMST		**Low**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.
Glycine latrobeana (Clover Glycine)	VU	L	vu	Widespread but of sporadic occurrence and rarely encountered. Grows mainly in grasslands and grassy woodlands (Walsh and Entwisle 1996).	PMST	3/03/2020	**Low**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.
Lachnagrostis adamsonii (Adamson's Blown-grass)	EN	L	vu	Occurs in and around saline depressions on the Volcanic Plain where recorded from Portarlington west almost to the South Australian border (RBGV 2015).	PMST		**Low**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.
Lepidium hyssopifolium s.s. (Basalt Peppercress)	EN	L	en	Collected from scattered sites on the volcanic plain, but now much reduced from its former range and recorded recently only from e.g. Moorabool, Winchelsea, Bacchus Marsh, Woodend, Trentham. Most recent collections are from disturbed, rather weedy sites. One collection from near Port Fairy is noteworthy for its occurrence in a slightly saline estuary amongst saltmarsh and fringing sedgeland. Flowers mostly summer-autumn (RBGV 2019).	PMST		**Low**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.
Leucochrysum albicans subsp. *Tricolor* (White Sunray)	EN	L	en	Very rare in Victoria, the only recent collections from volcanic grassland remnants in the Wickliffe, Willaura, Streatham, Inverleigh and Creswick districts. All other Victorian collections were made last century, from e.g. Mt Cole, the Grampians and the Port Fairy district. Collections from the Victorian alps have been attributed to this subspecies, but they may be the result of hybridisation between Leucochrysum alpinum and Leucochrysum albicans subsp. albicans. Flowers Nov.-Dec (RBGV 2017).	PMST		**Low**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.
Pimelea spinescens subsp. *spinescens* (Spiny Rice-flower)	CR	L	en	Grows in grassland, open shrubland and occasionally woodland, often on basalt-derived soils. Mostly west of Melbourne (to near Horsham), but extending as far north as Echuca (RBGV 2017).	PMST	3/03/2020	**Moderate**	Suitable grassland habitat is present within the Assessment Area. The species was not identified during targeted flora surveys.
Prasophyllum frenchii (Maroon Leek-orchid)	EN	L	en	Widespread across southern Victoria, but rare. Occurs in grassland, heathland and open forest on well-drained or water-retentive sand or clay loams (RBGV 2018).	PMST		**Low**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.
Pterostylis cucullata (Leafy Greenhood)	VU	L	en	Widely distributed but disjunct, mostly occurring in small groups in coastal areas, sometimes near inland watercourses. Two subspecies have been assigned to this species: subsp. culcutta is scattered in near coastal scrub, often on sand dunes (endangered in VicAdv) and subsp. sylvicola is known from East Gippsland where it occurs along water courses among shrubs in tall forests, on rich loamy soils (rare in VicAdv) (RBGV 2019).	PMST		**Low**	The species was not identified during targeted flora surveys, and despite the cryptic nature of orchids it is unlikely to occur within the Assessment Area.
Rutidosis leptorhynchoides (Button Wrinklewort)	EN	L	en	In Victoria confined to basaltic grasslands between Rokewood and Melbourne where endangered due to loss of habitat (formerly occurring as far west as Casterton, and on the Gippsland Plain near Newry) (RBGV 2015).	PMST		**Low**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.
Senecio macrocarpus (Large-fruit Fireweed)	VU	L	en	In Victoria largely confined to remnant *Themeda* grasslands on loamy clay soils derived from basalt from near Melbourne west to Skipton area. Also known from auriferous ground near Stawell. Formerly recorded from near Horsham and Casterton, but apparently long extinct from these areas (Walsh and Entwisle 1999).	PMST	3/03/2020	**Moderate**	The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area. Disturbance and weed cover of grassland patches of higher quality within the Assessment Area indicate the species is unlikely to persist.
Xerochrysum palustre (Swamp Everlasting)	VU	L	vu	Occurs in lowland swamps, usually on black cracking clay soils, scattered from near the South Australian border north-west of Portland to Bairnsdale district, but rare due to habitat depletion (RBGV 2018).	PMST		**Low**	No suitable habitat present. The species was not identified during targeted flora surveys. The species is unlikely to occur within the Assessment Area.

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
State								
Allocasuarina luehmannii (Buloke)		L	en	Usually growing in woodland with Eucalyptus microcarpa, on non-calcareous soils. Mainly distributed north of Great Dividing Range throughout north-central and north-western Victoria, with a few sites on the western outskirts of Melbourne (Walsh and Entwisle 1996).		3/03/2020	**Confirmed Present**	*Allocasuarina luehmannii* has been confirmed present within the Assessment Area, but is not located within the Construction Corridor.
Amyema linophylla subsp. *orientalis* (Buloke Mistletoe)			vu	Widespread in western Victoria but scarce due to the depletion of its main host plant Allocasuarina luehmannii (Buloke) (RBGV 2020).		3/03/2020	**High**	*Allocasuarina luehmannii* is confirmed to be present within the Assessment Area, however *Amyema linophylla* subsp. *orientalis* was not observed during the field assessment. Due to the species close relationship with Buloke, it is highly likely that the Assessment Area may support the species.
Austrostipa exilis (Heath Spear-grass)			r	Largely confined in Victoria to drier woodlands near Mt Cottrell, Melton, and Bacchus Marsh, but also collected from near Bendigo and Mt Langi Ghiran; possibly overlooked elsewhere. Flowers Oct.-Dec (RBGV 2017).		26/10/2006	**Low**	Suitable dry woodland habitat is limited in the Assessment Area, which has been largely cleared for agricultural and road developments. While common species of Spear-grass were observed, this rare species was not identified during field assessment.
Dianella longifolia var. *grandis* (Flax-lily)			vu	Occurs in lowland plains grassland and grassy woodlands (e.g. Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes than the var. longifolia. Flowers Nov.–Dec (RBGV 2018).		3/03/2020	**Confirmed Present**	*Dianella longifolia var. grandis* has been confirmed present within the Assessment Area, including one individual recorded in the Construction Corridor.
Eleocharis plana (Flat Spike-sedge)			vu	In moist areas. Similar to E. acuta. Flowers spring-summer (Walsh and Entwisle 1994).		1/04/2010	**Low**	Permanent swampy or aquatic habitat is not present within the Assessment Area, and the species known to be rare in the south of the state.
Eucalyptus baueriana subsp. *thalassina* (Werribee Blue-box)			en	Restricted to the Werribee River catchment around the Bacchus Marsh area, grows close to watercourses in alluvial soils (RBGV 2020).		3/03/2020	**Absent**	While the Assessment Area supports suitable habitat for the species, it was not observed during spring surveys. The species was not observed within the Assessment Area.
Eucalyptus leucoxylon subsp. *connata* (Melbourne Yellow-Gum)		R	vu	The main concentration of E. leucoxylon subsp. connata is in the Brisbane Ranges between Bacchus Marsh and Geelong, where it grows on skeletal soils. Also grows on skeletal soils at Long Forest between Bacchus Marsh and Melton, and at Studley Park at Kew (in Melbourne) where it grows on soil derived from Silurian sandstone (RBGV 2018).		3/03/2020	**High**	Eucalyptus species are present within or near the Assessment Area. Species was observed in the original vegetation surveys within proximity to the Assessment Area (SMEC 2019).
Goodenia macbarronii (Narrow Goodenia)		L	vu	Rare in Victoria, where apparently confined to forests and grassy areas between Wedderburn and Euroa, north to the Murray River, usually in damp sandy soils. Flowers mainly Oct.-Mar (Walsh and Entwisle 1999).		16/12/2008	**Low**	The Assessment Area is well outside of the species natural distribution. It is unlikely to occur within the Assessment Area.
Microseris scapigera s.s. (Plains Yam-daisy)			vu	Widespread and often locally common in Victoria, and occupying a wide range of habitats. Flowers mainly through Spring and Summer (Walsh and Entwisle 1994).		3/03/2020	**Low**	The species once widespread in moist depressions of the basalt plain is now rare due to loss of habitat. The species was not identified during spring surveys. The species is unlikely to occur within the Assessment Area.
Nicotiana suaveolens (Austral Tobacco)			r	Fast growing annual herb, widespread but rare, prefers dry rocky places (RBGV 2018).		3/03/2020	**Moderate**	The species preference is for drier soils which may be rocky, and the Assessment Area supports appropriate habitat.
Podolepis linearifolia (Basalt Podolepis)			en	Usually grows on heavy clay soils in grasslands but also recorded for grassy woodlands, open forests and around swamps. Flowers Sep.–Dec (RBGV 2018).		3/03/2020	**Moderate**	The species preference is for heavy clay soils in grasslands, and the Assessment Area supports appropriate habitat.
Pterostylis conferta (Leprechaun Greenhood)		L	en	Endemic to Victoria where formerly widespread in basalt plains grassland north and west of Melbourne and now apparently confined to two sites, on stony rise country near Mortlake, and in Eucalyptus microcarpa grassy woodland near Bacchus Marsh. Soils are red-brown clay loams (RBGV 2018).		3/03/2020	**Low**	Suitable *Eucalyptus microcarpa* woodland habitat is limited in the Assessment Area, which has been largely cleared for agricultural and road developments. This species was not identified during field assessment, and despite the cryptic nature of orchids it is unlikely to occur within the Assessment Area.
Pterostylis sp. aff. bicolor (Woorndoo) (Dense Greenhood)		L	en	Endemic to Victoria where confined to basalt plains grasslands in the vicinity of Bacchus Marsh, Maldon, Sutton Grange, Taradale and possibly Woorndoo (RBGV 2019).		3/03/2020	**Low**	The species was not identified during spring surveys, and despite the cryptic nature of orchids it is unlikely to occur within the Assessment Area.

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Pterostylis truncata (Brittle Greenhood)		L	en	Restricted to south central Victoria, within 100 km of Melbourne, in basalt plains grasslands and woodlands or granite outcrops, on well-drained soils. Flowers Feb.–Jul (RBGV 2015).		17/06/2005	**Low**	The species was not identified during spring surveys, and despite the cryptic nature of orchids it is unlikely to occur within the Assessment Area.
Rhagodia parabolica (Fragrant Saltbush)			r	Confined to rocky slopes and broad ridges between Sunbury and Geelong - but locally common where present. Flowers, not foliage are fragrant. Flowers mostly Sep-Jan (Walsh and Entwisle 1996).		3/03/2020	**Low**	The species favours steep rocky slopes and broad ridges, of which habitat is limited within the Assessment Area. The species is unlikely to occur within the Assessment Area.
Tripogonella loliiformis (Rye Beetle-grass)			r	An uncommon grass of scattered occurrence throughout the state, including rocky areas and the Basalt Plain (Walsh and Entwisle 1994).		3/03/2020	**Moderate**	The species preference is for drier shallow soils, and the Assessment Area supports appropriate habitat.

Table E-4 Likelihood of threatened fauna species being present within the Assessment Area

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Commonwealth								
Prototroctes maraena (Australian Grayling)	VU	L	vu	Predominately a freshwater fish but is considered diadromous because the fry have a marine phase. The majority of its life is spent in freshwater, inhabiting rivers and streams, usually in cool (5-26°C), clear waters with a gravel substrate and alternating pool and riffle zones but it has also been recorded to occur in turbid water with muddy-bottomed, heavily silted habitat as well. Grayling can penetrate well inland, and have been reported over 100 km upstream from the sea, provided there are no barriers to movement (SWIFFT 2020).	PMST		**Negligible**	Species requires larger rivers to support population viability. No suitable habitat present within Assessment Area.
Rostratula australis (Australian Painted-snipe)	EN, Mar	L	cr	Well-vegetated shallows and margins of wetlands, dams, sewage ponds; wet pastures, marshy areas, irrigation systems, lignum, tea-tree scrub, open timber (Pizzey and Knight 2012).	PMST	18/11/1989	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Numenius madagascariensis (Eastern Curlew)	CR, Mig, Mar	L	vu	Estuaries, tidal mudflats, sandspits, saltmarshes, mangroves; occasionally fresh or brackish lakes; bare grasslands near water (Pizzey and Knight 2012).	PMST		**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Pedionomus torquatus (Plains-wanderer)	CR	L	cr	Sparse, treeless, lightly grazed native grasslands/herbfields with bare ground, old cereal crops, short Lucerne, sparse saltbush, low shrubland (Pizzey and Knight 2012).	PMST	1/01/1988	**Low**	Species may fly over the site or occasionally utilise cropped areas. However, available habitat is limited within the Assessment Area.
Pteropus poliocephalus (Grey-headed Flying-fox)	VU	L	vu	Camps of this species are found in gullies, typically not far from water and usually in vegetation with a dense canopy (Van Dyck and Strahan 2008).	PMST		**Moderate**	Species home range spans widely, however there are no known roosts within the Assessment Area.
Lathamus discolor (Swift Parrot)	CR	L	en	Open grassy woodland, with dead trees, near permanent water and forested hills, coastal heaths, pastures with exotic grasses, weeds, roadsides, orchards (Pizzey and Knight 2012).	PMST	29/07/1988	**Low**	Species may fly over the site or occasionally utilise vegetation present. However, available habitat is limited for foraging within the Assessment Area.

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Litoria raniformis (Growling Grass Frog)	VU	L	en	A largely aquatic species found among vegetation within or at the edges of permanent water – streams, swamps, lagoons, farm dams and ornamental ponds. Often found under debris on low, often flooded river flats. Frequently active by day (Cogger 2014).	PMST	6/12/2018	**Moderate**	Marginal dispersal habitat is potentially available along Balliang Creek near the paper road however, this is unlikely to comprise breeding habitat for this species and mitigation measures could avoid impacts. Previous targeted surveys for the Geelong-Bacchus Marsh Road Project targeted Balliang Creek and other culverts within the vicinity of the Assessment Area and no Growling Grass Frog were detected (EHP 2017). No Growling Grass Frog were detected in the current targeted survey.
Gallinago hardwickii (Latham's Snipe)	Mar, Mig		nt	Freshwater or brackish wetlands, preferring to be close to protective vegetation cover (Pizzey and Knight 2012).		18/02/1990	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Grantiella picta (Painted Honeyeater)	VU	L	vu	Mistletoes in eucalypt forests/woodlands; black box on watercourses; box-ironbark-yellow gum woodlands; paperbarks, Casuarinas; mulga, other acacias; trees on farmland; gardens (Pizzey and Knight 2012).	PMST		**Low**	Suitable foraging habitat in the form of Eucalypt mistletoes was not observed within the Assessment Area.
Hirundapus caudacutus (White-throated Needletail)	VU, Mar, Mig	L	vu	Airspace over forests, woodlands, farmlands, plains, lakes, coasts, towns, feeding companies frequency patrol back and forward along favoured hilltops and timbered ranges (Pizzey and Knight 2012).	PMST	26/03/1990	**Low**	Species may fly over the site or occasionally utilise vegetation present. However, available habitat is limited within the Assessment Area.
Calidris ferruginea (Curlew Sandpiper)	CR, Mar, Mig	L	en	Tidal mudflats; saltmarsh, saltfields; fresh, brackish or saline wetlands; sewage ponds (Pizzey and Knight 2012).	PMST		**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Ardea alba (Great Egret)	Mar	L	vu	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands; sewage ponds, irrigation areas, larger dams etc (Pizzey and Knight 2012).		2000	**Moderate**	Species may fly over the site or occasionally utilise periodically inundated area, particularly larger wet depressions in un-cropped farm paddocks.
Gallinago hardwickii (Latham's Snipe)	Mar, Mig		nt	Freshwater or brackish wetlands, preferring to be close to protective vegetation cover (Pizzey and Knight 2012).		18/02/1990	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, suitable habitat is limited within the Assessment Area.
Galaxiella pusilla (Dwarf Galaxias)	VU	L	en	In streams, burrow in moist soil, in yabby burrows, ground water and underground streams (Hawking et al. 2009).	PMST		**Low**	No suitable aquatic habitat is available within the Assessment Area.
Botaurus poiciloptilus (Australasian Bittern)	EN	L	en	Narrow habitat preferences, preferring shallow, vegetated freshwater or brackish swamps (Pizzey and Knight 2012).	PMST	29/05/1990	**Low**	No suitable aquatic habitat is available within the Assessment Area.

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Anthochaera phrygia (Regent Honeyeater)	CR	L	cr	Dry open forest, woodlands, or red ironbark, yellow box, white and yellow gum, mistletoe on river she-oaks, trees in farmlands, streets, gardens (Pizzey and Knight 2012).	PMST		**Low**	Species may rarely fly over the site or rarely utilise vegetation present. Species mainly restricted to breeding habitat in Northern Victoria.
Tympanocryptis pinguicolla (Grassland Earless Dragon)	EN	L	cr	Found in naturally treeless native tussock grassland preferring unglazed or lightly grazed grasslands on gentle slopes (Cogger 2014).	PMST		**Negligible**	Species considered extinct within Victoria.
Thinornis cucullatus (Hooded Plover)	VU	L	vu	A small Australian beach nesting bird. It mainly occurs on wide beaches backed by dunes with large amounts of seaweed and jetsam, creek mouths and inlet entrances. Nests are found above the high water mark on flat beaches, on stony terraces, or on sparsely vegetated dunes (DAWE 2020a).	PMST		**Low**	The species requires beach and dune environments not supported by the Assessment Area. No suitable aquatic habitat is available within the Assessment Area.
Synemon plana (Golden Sun Moth)	CR	L	cr	Native temperate grassland and open grassy woodlands, may also be found in degraded grasslands dominated by exotic Chilean Needlegrass (DAWE 2020b).	PMST	8/01/2014	**Moderate**	This species has been recently recorded near the Assessment Area, approximately 2 km south at Birds Road (SMEC 2019) and suitable habitat is available.
Dasyurus maculatus maculatus (Spot-tailed Quoll)	EN	L	en	Has a wide range of habitats, including rainforest, open forest, woodland, coastal heathland and inland riparian forest (Van Dyck and Strahan 2008).	PMST		**Low**	Suitable habitat in the form of inland forest or woodland is not supported by the Assessment Area.
Dasyurus viverrinus (Eastern Quoll)	EN	L	rx	A range of open forests, woodlands and grasslands, where they would build a den amongst fallen logs or rock piles (Van Dyck and Strahan 2008).		20/03/2013	**Low**	Suitable habitat in the form of inland forest or woodland is not supported by the Assessment Area.
Delma impar (Striped Legless Lizard)	VU	L	en	A grassland specialist, potential habitat for the Striped Legless Lizard includes all areas which have, or once had, native grasslands or grassy woodlands (including derived grasslands) across the historical range of the species, provided that area retains suitable tussock structure, the soil is of appropriate type and structure, and the site has not had major disturbance such as ploughing (DAWE 2020a).	PMST	27/09/2016	**High**	This species has been recently recorded near the Assessment Area and limited suitable habitat is available. Targeted surveys have been completed along Parwan South Road as part of a separate alignment phase and surey have previously been undertaken along Geelong-Bacchus Marsh Road by another ecology consultancy. . Suitable habitat was observed and areas of habitat classified as of medium-high quality have been avoided by the Construction Corridor. It is here that species presence in assumed.
Falco hypoleucos (Grey Falcon)	VU	L	en	Lightly treed inland plains, gibber deserts, sandridges, pastoral lands, timber watercourses; seldom in driest deserts (Pizzey and Knight 2012).	PMST		**Low**	Predominantly inhabits arid and semi-arid environments. Species considered absent south of the Great Dividing Range in Victoria.
State								
Antigone rubicunda (Brolga)		L	vu	Freshwater swamps flooded grasslands, margins of billabongs, lagoons, dry floodplains, irrigated pastures; occasionally estuaries (Pizzey and Knight 2012).		2/11/1987	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area. No suitable breeding habitat present. Species now mainly restricted to western Victoria.

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Aythya australis (Hardhead)			vu	Deep, permanent wetlands, large open waters, brackish coastal swamps, farm dams, ornamental lakes , sewage ponds (Pizzey and Knight 2012).		30/12/2005	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Biziura lobata (Musk Duck)			vu	Well-vegetated swamps, wetlands, both brackish and fresh, lakes, reservoirs, shallow bays, inlets; occasionally at sea (Pizzey and Knight 2012).		21/10/2005	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Chlidonias hybrida (Whiskered Tern)			nt	Vegetated and open wetlands; brackish, saline lakes; saltfields, irrigated lands, sewage ponds; occasionally offshore (Pizzey and Knight 2012).		25/11/1987	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Circus assimilis (Spotted Harrier)			nt	Grassy plains, crops and stubblefields; bluebush, saltbush, spinifex associations; scrublands, mallee, heathlands; open, grassy woodlands (Pizzey and Knight 2012).		8/03/2019	**Low**	Species favours arid and semi-arid areas, however may utilise open farming areas for hunting activities.
Climacteris picumnus (Brown Treecreeper)			nt	Drier forests/woodlands/scrubs, with fallen branches; particularly River Red Gum lined water courses (Pizzey and Knight 2012).		14/03/2014	**Moderate**	Species may utilise River Red Gum lined watercourses, however available habitat is limited within the Assessment Area.
Dromaius novaehollandiae (Emu)			nt	Found in plains, scrublands, open woodlands, coastal heaths, alpine pastures, semi-deserts, margins of lakes, pastoral and cereal growing areas. Mostly absent from closely settled parts, common in pastoral and cropping regions, state forests and national parks (Pizzey and Knight 2012).		24/03/2017	**Low**	Landscape surrounding the Assessment Area is largely fenced farmland which would limit the movement of this species into the Assessment Area.
Dromaius novaehollandiae (Emu)			nt	Found in plains, scrublands, open woodlands, coastal heaths, alpine pastures, semi-deserts, margins of lakes, pastoral and cereal growing areas. Mostly absent from closely settled parts, common in pastoral and cropping regions, state forests and national parks (Pizzey and Knight 2012).		24/03/2017	**Low**	Landscape surrounding the Assessment Area is largely fenced farmland which would limit the movement of this species into the Assessment Area.
Egretta garzetta (Little Egret)		L	en	Tidal mudflats, saltmarshes, mangroves, freshwater wetlands, sewage ponds (Pizzey and Knight 2012).		29/03/1990	**Moderate**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area. May intermittently use wet depression, particularly in farm paddocks, across the Assessment Area.
Falco subniger (Black Falcon)		L	vu	Plains, grasslands, foothills, timbered watercourses, wetland environs; crops; occasionally over towns and cities (Pizzey and Knight 2012).		5/10/2018	**Moderate**	Species may fly over the site or occasionally utilise vegetation present. However, available habitat is limited within the Assessment Area.
Melanodryas cucullata (Hooded Robin)		L	nt	Drier Eucalypt forests, woodlands, scrubs with fallen logs, debris, mallee, Casuarina, cypress pine, mulga, cleared paddocks, Banksia dominated coastal scrubs (Pizzey and Knight 2012).		29/05/1990	**Low**	Limited woodland habitat is available within the Assessment Area.

Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Ninox strenua (Powerful Owl)		L	vu	Pairs occupy a large, probably permanent, home range in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands, scrubs, exotic pine plantations, large trees in private/public gardens, some in cities (Pizzey and Knight 2012).		16/02/1983	**Low**	Species may fly over the site or occasionally utilise farmland for hunting activities. However, preferred forest habitat is limited within the Assessment Area.
Nycticorax caledonicus (Nankeen Night-Heron)			nt	Shallow margins of rivers, wetlands, mangrove-lined estuaries, offshore islands, floodwaters, garden trees (Pizzey and Knight 2012).		30/12/2005	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Oxyura australis (Blue-billed Duck)		L	en	Found on temperate, fresh to saline, terrestrial wetlands including sewerage ponds, rivers, salt lakes and saltpans. Preferring deep, permanent open water within or near dense vegetation (Pizzey and Knight 2012).		21/02/2019	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Phalacrocorax varius (Pied Cormorant)			nt	Coastal waters with sloping shorelines; estuaries, bays, tidal inlets, large inland lakes and rivers, irrigation ponds, coastal mangroves and offshore islands (Pizzey and Knight 2012).		1/03/2000	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Phascogale tapoatafa (Brush-tailed Phascogale)		L	vu	Well developed dry forest and woodland areas, with stringybarks and trees with hollows (Van Dyck and Strahan 2008).		8/04/2018	**Low**	No woodland habitat of large enough size is present in the Assessment Area or within the adjacent landscape.
Platalea regia (Royal Spoonbill)			nt	Larger shallow waters, inland and coastal, well-vegetated shallow freshwater wetlands, saltfields, mangroves, islands, farm dams occasionally (Pizzey and Knight 2012).		30/12/2005	**Moderate**	Species may fly over the site or occasionally utilise periodically inundated area, or intermittently use larger wet depression, particularly in farm paddocks. However, available habitat is limited within the Assessment Area.
Porzana pusilla (Baillon's Crake)		L	vu	Vegetated freshwater wetlands, waterside trees and shrubs (Pizzey and Knight 2012).		25/11/1987	**Low**	Species may fly over the site or occasionally utilise periodically inundated areas. However, available habitat is limited within the Assessment Area.
Pseudemoia pagenstecheri (Tussock Skink)			vu	Tussock grasslands with few or no trees from highlands in ne Victoria to low-altitude basalt plains of sthn Vic (Wilson and Swan 2008).		16/08/2017	**Moderate**	Species may utilise native grassland vegetation present. However, available habitat is limited within the Assessment Area.
Pseudophryne bibronii (Brown Toadlet)		L	en	Found below rocks in logs in wet and dry sclerophyll forest, in proximity to seasonally inundated areas (Cogger 2014).		29/05/1990	**Low**	Limited suitable habitat available across the Assessment Area.
Pyrrholaemus sagittatus (Speckled Warbler)		L	vu	Drier woodlands with tussocks, branches and rocks (Pizzey and Knight 2012).		29/05/1990	**Low**	Limited woodland habitat is available within the Assessment Area.
Sminthopsis crassicaudata (Fat-tailed Dunnart)			nt	Open woodland, low shrublands of saltbush and bluebush, tussock grasslands on clay or sandy soils, gibber plain and farmlands (Van Dyck and Strahan 2008).		4/04/2011	**Moderate**	Species may utilise native grassland vegetation present, where undisturbed.

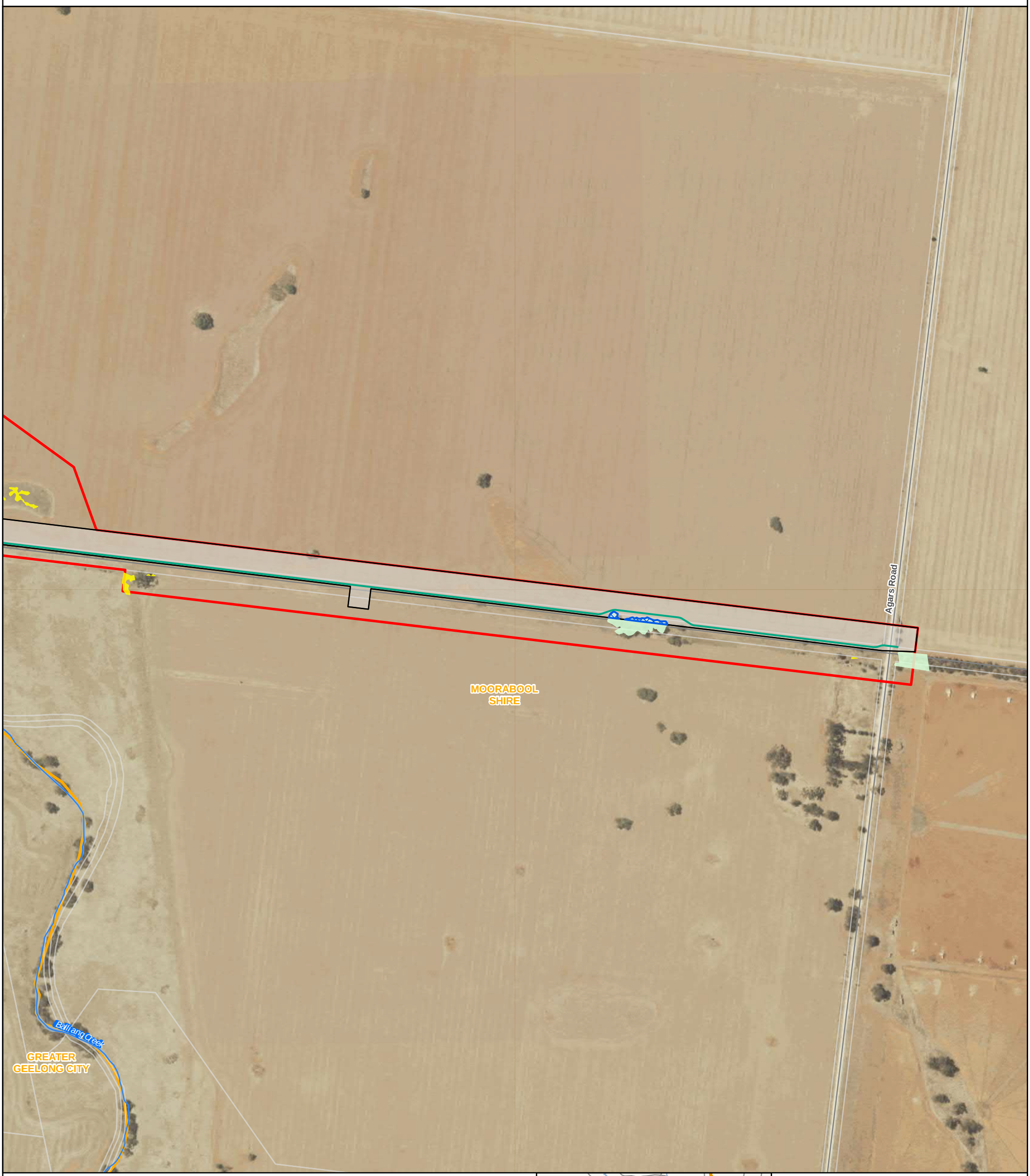
Taxon	Conservation status			Habitat description	PMST	Last record	Likelihood of presence	Reasoning
	EPBC	FFG	VicAdv					
Spatula rhynchotis (Australasian Shoveler)			vu	Larger waters, fresh and saline lakes, well-vegetated freshwater wetlands, coastal inlets, sewage ponds, floodwaters (Pizzey and Knight 2012).		21/02/2019	**Low**	Limited aquatic habitat is available within the Assessment Area.
Stagonopleura guttata (Diamond Firetail)		L	nt	Open Eucalypt forests/woodlands; River Red Gum, Mallee, Buloke, Cypress Pine (Pizzey and Knight 2012).		27/08/2008	**Moderate**	Species may fly over the site or occasionally utilise vegetation present. However, available habitat is limited within the Assessment Area.
Stictonetta naevosa (Freckled Duck)		L	en	Large, well vegetated swamps; in dry periods moves to open lakes (Pizzey and Knight 2012).		12/12/1996	**Low**	Limited aquatic habitat is available within the Assessment Area.
Turnix pyrrhothorax (Red-chested Button-quail)		L	vu	Grasslands, open woodlands, native pine, mulga, Spinifex between mallee ridges, Lucerne, cereal stubbles with weeds, thistles (Pizzey and Knight 2012).		5/02/1990	**Low**	Species may fly over the site or occasionally utilise cropped areas. However, available habitat is limited within the Assessment Area. Historical records only.
Turnix velox (Little Button-quail)			nt	Grassy plains, creek flats, woodlands, burned areas, saltbush, spinifex, mulga, mallee, margins of wetlands, crops, pastures and stubble (Pizzey and Knight 2012).		4/03/2011	**Moderate**	Species may fly over the site or occasionally utilise vegetation present. However, available habitat is limited within the Assessment Area.
Tyto novaehollandiae (Masked Owl)		L	en	Forests, open woodlands, farmlands with large trees, partly forested coastal plains, paperbark woodlands, caves (Pizzey and Knight 2012).		1/02/1992	**Moderate**	Species may fly over the site or occasionally utilise vegetation present. However, available habitat is limited within the Assessment Area. Larger woodland fragments are not present across the landscape or within the Assessment Area.

Appendix F. Extent of native vegetation removal

Figure F-1 Extent of native vegetation removal (patches) compared to VicRoads previously mapped data.

Native vegetation to be removed: Map 1 of 8

Parwan-Balliang Irrigation District



Legend

- Assessment area
- Project area
- Open trenching extent
- Directional boring extent
- Construction Corridor
- Vegetation to be removed
- Native vegetation patch
- 132 Plains Grassland
- 55 Plains Grassy Woodland
- Minor Road
- Connector
- Waterbody
- Cadastre
- LGA Boundary

IS305300

0 100 200

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data © State of Victoria 2021; Jacobs 2021; CH2M Beca.

CH2M Beca

Native vegetation to be removed: Map 2 of 8

Parwan-Balliang Irrigation District

MOORABOOL SHIRE

Balliang Creek

MOORABOOL SHIRE

GREATER GEELONG CITY

Legend

- Assessment area

Project area

- Open trenching extent
- Directional boring extent
- Construction Corridor
- Vegetation to be removed

Native vegetation patch

- 132 Plains Grassland
- 55 Plains Grassy Woodland
- 68 Creekline Grassy Woodland
- Minor Road
- Connector
- Waterbody
- Cadastre
- LGA Boundary

CH2M Beca

IS305300

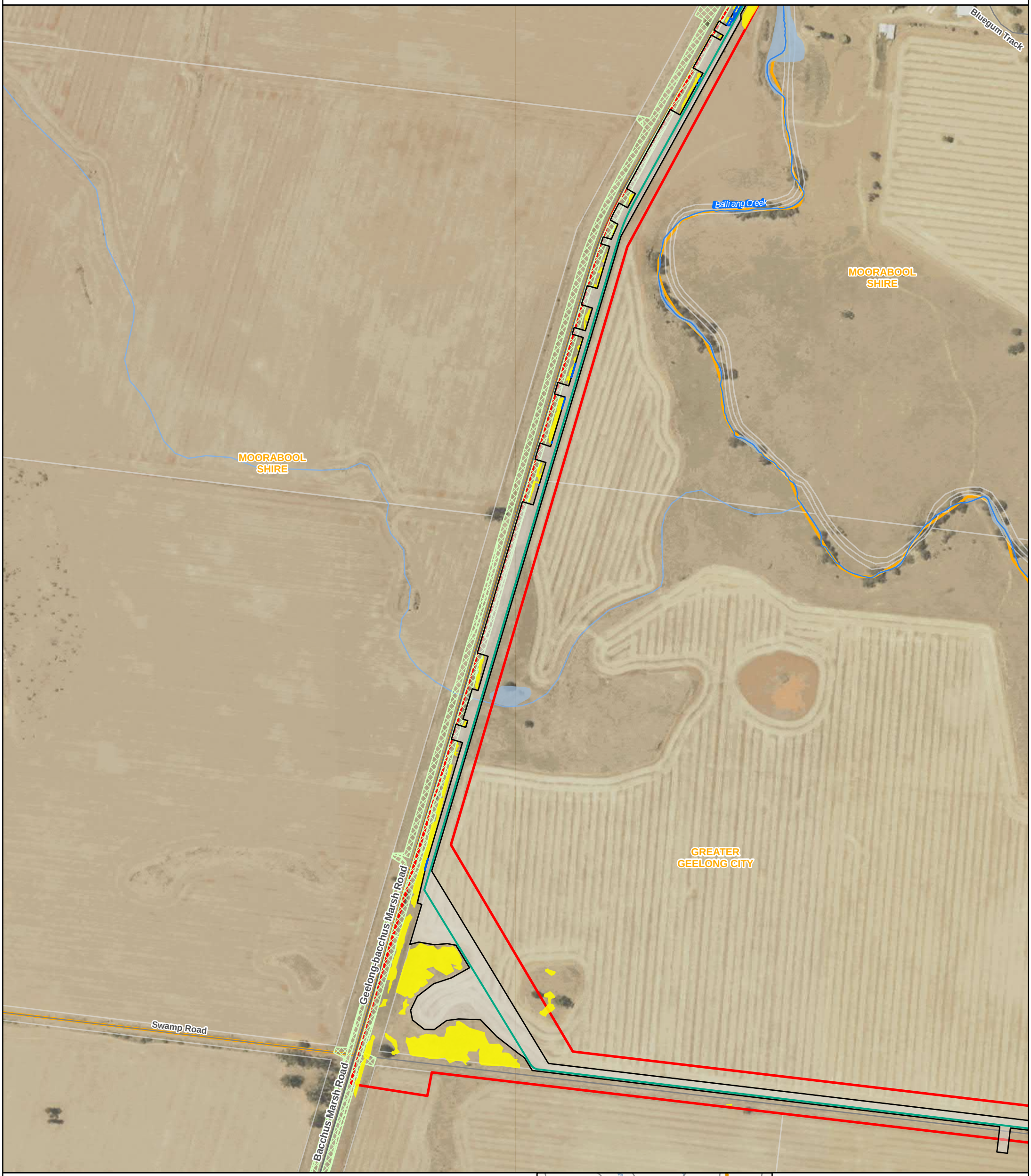
0 100 200

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data © State of Victoria 2021; Jacobs 2021; CH2M Beca.

Native vegetation to be removed: Map 3 of 8

Parwan-Balliang Irrigation District



Legend

- Assessment area

Project area

- Open trenching extent
- Directional boring extent
- Construction Corridor
- Vegetation to be removed
- VicRoads- Vegetation Removal

Native vegetation patch

- 132 Plains Grassland

- Major Road
- Minor Road
- Watercourse Stream
- Connector
- Waterbody
- Cadastre
- LGA Boundary

CH2M Beca

IS305300

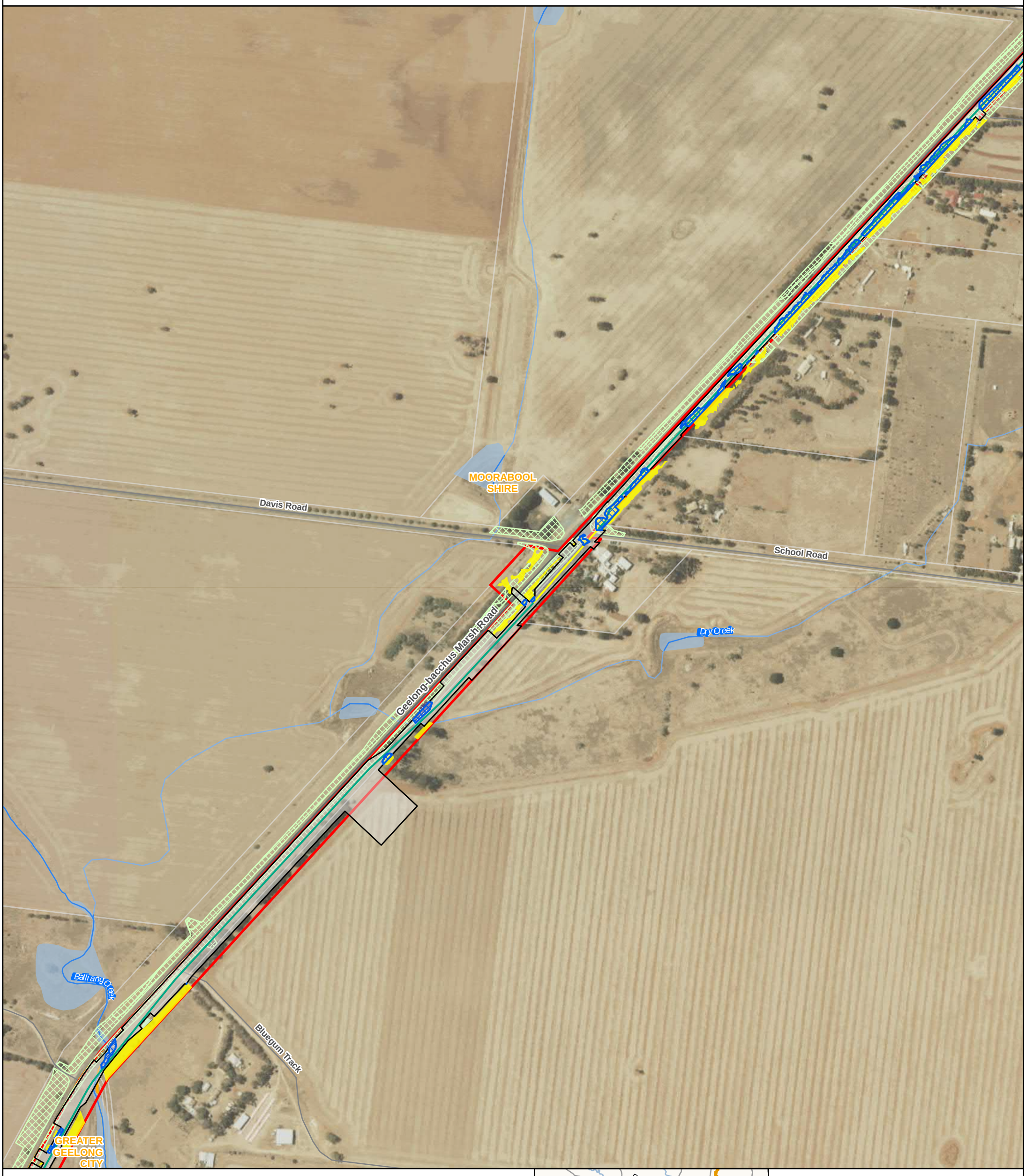
0 100 200

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data © State of Victoria 2021; Jacobs 2021; CH2M Beca.

Native vegetation to be removed: Map 4 of 8

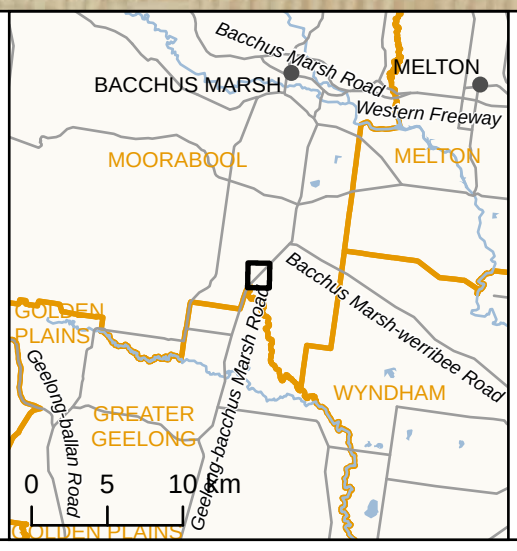
Parwan-Balliang Irrigation District



Legend

- Assessment area
- Project area
  - Open trenching extent
  - Directional boring extent
  - Construction Corridor
  - Vegetation to be removed
  - VicRoads- Vegetation Removal
- Native vegetation patch
  - 125 Plains Grassy Wetland
  - 132 Plains Grassland
  - 55 Plains Grassy Woodland
  - 821 Tall Marsh
- Major Road
- Minor Road
- Watercourse Stream
- Connector
- Waterbody
- Cadastre
- LGA Boundary

CH2M Beca



IS305300

0 100 200

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006
Geodata Topo 250k Series 3; Vicmap Data © State of Victoria 2021; Jacobs 2021; CH2M Beca.

Native vegetation to be removed: Map 5 of 8

Parwan-Balliang Irrigation District

MOORABOOL SHIRE

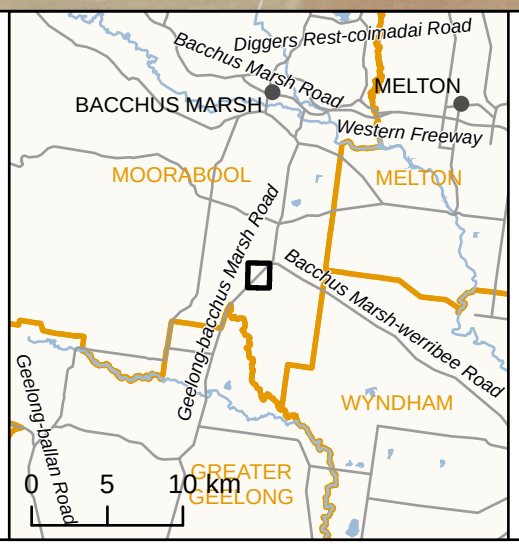
Dry Creek

Wilsons Lane

Geelong-bacchus Marsh Road

Legend

- Assessment area
- Project area
  - Open trenching extent
  - Directional boring extent
  - Construction Corridor
  - Vegetation to be removed
  - VicRoads- Vegetation Removal
- Native vegetation patch
  - 125 Plains Grassy Wetland
  - 132 Plains Grassland
- Major Road
- Minor Road
- Watercourse Stream
- Connector
- Waterbody
- Cadastre
- LGA Boundary



CH2M Beca

IS305300

0 100 200

Metres

DATA SOURCES
© Commonwealth of Australia (Geoscience Australia) 2006 Geodata Topo 250k Series 3; Vicmap Data © State of Victoria 2021; Jacobs 2021; CH2M Beca.

Native vegetation to be removed: Map 6 of 8

Parwan-Balliang Irrigation District

Schultz Road
Geelong-bacchus Marsh Road
MOORABOOL SHIRE
Ballan Road
Springhill Road
Agars Road

Legend

Assessment area

Project area

Open trenching extent
Directional boring extent
Construction Corridor
Vegetation to be removed
VicRoads- Vegetation Removal

Native vegetation patch

132 Plains Grassland
Major Road
Minor Road
Waterbody
Cadastre
LGA Boundary

CH2M Beca

IS305300

0 100 200

Metres

Native vegetation to be removed: Map 7 of 8

Parwan-Balliang Irrigation District

MOORABOOL SHIRE

Schultz Road

Parwan South Road

Legend

- Assessment area

Project area

- Open trenching extent
- Directional boring extent
- Construction Corridor
- Vegetation to be removed

Native vegetation patch

- 132 Plains Grassland
- Minor Road
- Waterbody
- Cadastre
- LGA Boundary

IS305300

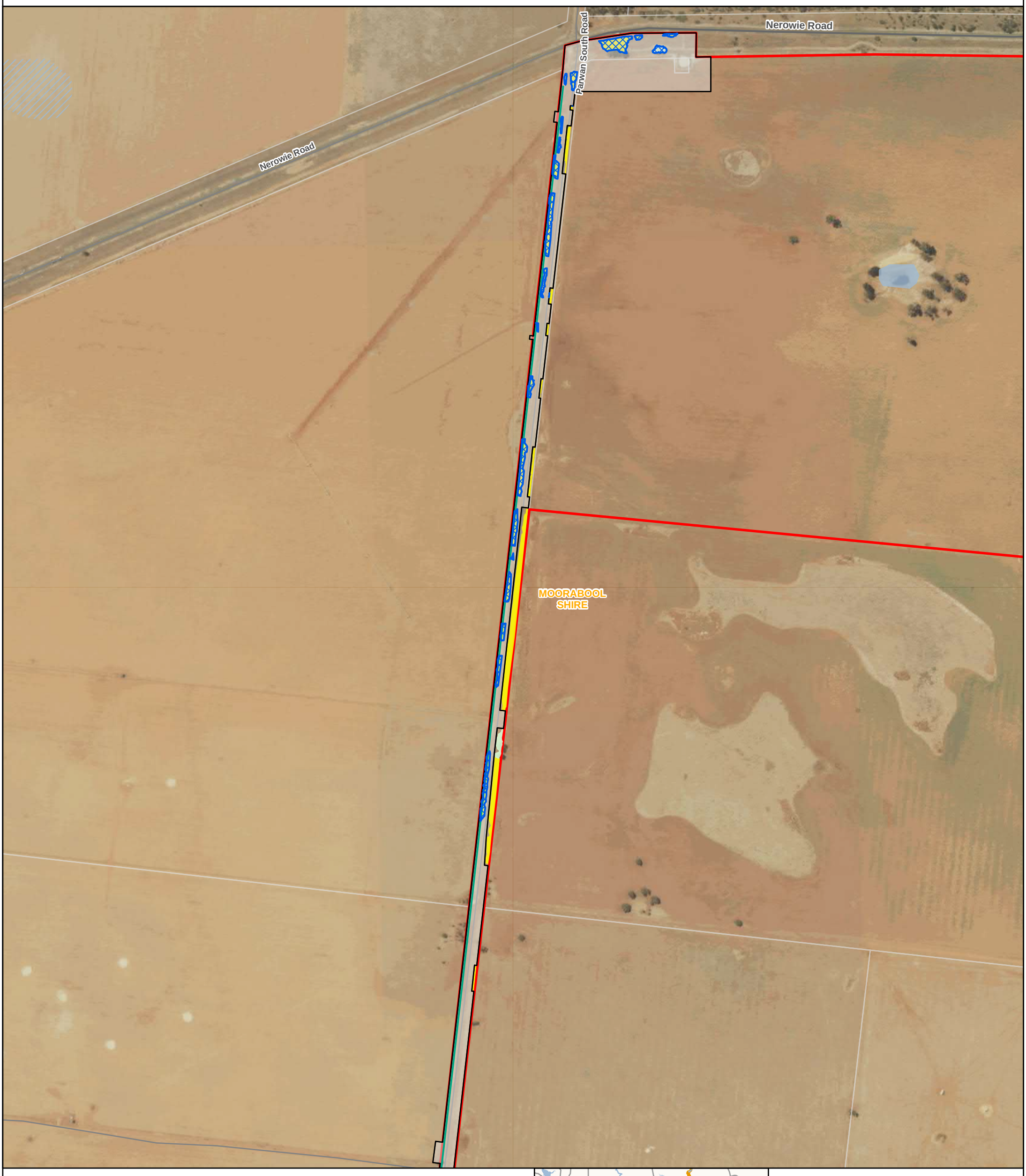
0 100 200

Metres

CH2M Beca

Native vegetation to be removed: Map 8 of 8

Parwan-Balliang Irrigation District



Legend

- Assessment area
- Project area
  - Open trenching extent
  - Directional boring extent
  - Construction Corridor
  - Vegetation to be removed
- Native vegetation patch
  - 132 Plains Grassland
  - 55 Plains Grassy Woodland
- Major Road
- Minor Road
- Waterbody
- Wetland Swamp
- Cadastre
- LGA Boundary

CH2M Beca

IS305300

0 100 200

Metres

Appendix G. VQA (Habitat Hectare) Assessment

Table G-1 VQA Assessment results

Habitat Zone			1	2	3	4	5	6	7	8	9	10	11	12	13	14
Bioregion			Victorian Volcanic Plain													
EVC #, name			132_61 Plains Grassland	55_61 Plains Grassy Woodland	132_61 Plains Grassland	55_61 Plains Grassy Woodland	132_61 Plains Grassland	125 Plains Grassy Wetland	68 Creekline Grassy Woodland	132_61 Plains Grassland	821 Tall Marsh	55_61 Plains Grassy Woodland	132_61 Plains Grassland	55_61 Plains Grassy Woodland	55_61 Plains Grassy Woodland	132_61 Plains Grassland
	Component	Max score														
Site Condition	Large trees	10	N/A	0	N/A	0	N/A	N/A	10	N/A	N/A	0	N/A	3	0	N/A
	Canopy cover	5	N/A	0	N/A	0	N/A	N/A	3	N/A	N/A	3	N/A	5	0	N/A
	Understorey	25	5	5	10	5	10	10	10	5	5	0	15	5	5	5
	Lack of weeds	15	4	0	7	0	7	4	0	4	0	15	7	0	6	4
	Recruitment	10	3	3	3	0	3	3	3	6	0	0	3	3	3	3
	Organic Litter	5	4	5	3	3	4	5	5	4	0	5	5	0	5	5
	Logs	5	0	0	0	0	0	0	3	0	0	0	0	3	0	0
	Total score	75/ 60 (treeless)	16/60	13	23/60	7	24/60	22/60	34	19/60	5/60	20	30/60	16	19	17/60
Landscape value		25	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Habitat Score		100/ 75 (treeless)	18	15	33.33	9.0	26.0	32.0	36	28	9.33	22	42.66	19.0	21	25.33
Habitat points = #/100		1	0.24	0.150	0.333	0.090	0.260	0.320	0.360	0.280	0.093	0.220	0.426	0.190	0.210	0.253

Appendix H. Flora species list

Table H-1 Flora species observed throughout the Assessment Area.

Scientific name	Common name	Status
Indigenous species		
Acacia dealbata	Silver Wattle	
Acacia implexa	Lightwood	
Acacia mearnsii	Black Wattle	
Acacia melanoxylon	Blackwood	
Acaena echinata	Sheep's Burr	
Acaena novae-zelandiae	Bidgee-widgee	
Allocasuarina littoralis	Black Sheoak	
Allocasuarina luehmannii	Buloke	L, en
Allocasuarina verticillata	Drooping Sheoak	
Anthosachne scabra s.s.	Common Wheat-grass	
Asperula conferta	Common Woodruff	
Atriplex semibaccata	Berry Saltbush	
Austrostipa bigeniculata	Kneed Spear-grass	
Austrostipa scabra	Rough Spear-grass	
Austrostipa stipoides	Prickly Spear-grass	
Bothriochloa macra	Red-leg Grass	
Bromus spp.	Brome	
Carex spp.	Sedge	
Cheilanthes tenuifolia s.l.	Rock Fern	
Chloris truncata	Windmill Grass	
Chrysocephalum apiculatum s.s.	Common Everlasting	
Convolvulus angustissimus subsp. omnigracilis	Slender Bindweed	k
Convolvulus spp.	Bindweed	
Dianella longifolia var. grandis	Flax-lily	vu
Dichelachne crinita	Long-hair Plume-grass	
Dichondra repens	Kidney-weed	
Einadia nutans	Nodding Saltbush	
Eleocharis acuta	Common Spike-sedge	
Enchylaena tomentosa var. tomentosa	Ruby Saltbush	
Erodium crinitum	Blue Heron's-bill	
Eucalyptus camaldulensis	River Red-gum	
Eucalyptus leucoxylon subsp. leucoxylon	Yellow Gum	
Eucalyptus microcarpa	Grey Box	
Glycine tabacina s.s.	Variable Glycine	
Gonocarpus tetragynus	Common Raspwort	
Juncus spp.	Rush	
Lachnagrostis filiformis s.s.	Common Blown-grass	

Scientific name	Common name	Status
Laphangium luteoalbum	Jersey Cudweed	
Lomandra filiformis	Wattle Mat-rush	
Melicytus dentatus s.s.	Tree Violet	
Oxalis perennans	Grassland Wood-sorrel	
Phragmites australis	Common Reed	
Pimelea glauca	Smooth Rice-flower	
Poa labillardierei var. labillardierei	Common Tussock-grass	
Ptilotus spp.	Pussy Tails	
Rumex bidens	Mud Dock	
Rytidosperma caespitosum	Common Wallaby-grass	
Rytidosperma racemosum var. racemosum	Slender Wallaby-grass	
Rytidosperma setaceum	Bristly Wallaby-grass	
Rytidosperma spp.	Wallaby Grass	
Sclerolaena diacantha	Grey Copperburr	
Sclerolaena muricata var. muricata	Black Roly-poly	k
Sclerolaena ventricosa	Salt Copperburr	L, en
Senecio quadridentatus	Cotton Fireweed	
Taraxacum spp.	Dandelion	
Themeda triandra	Kangaroo Grass	
Viola hederacea sensu Entwisle (1996)	Ivy-leaf Violet	
Vittadinia cuneata var. cuneata	Fuzzy New Holland Daisy	
Vittadinia gracilis	Woolly New Holland Daisy	
Wahlenbergia stricta subsp. stricta	Tall Bluebell	
Introduced species		
Acacia baileyana	Cootamundra Wattle	*
Aira spp.	Hair Grass	*
Anthyllis vulneraria	Kidney Vetch	*
Arctotheca calendula	Cape Weed	*
Avena barbata	Bearded Oat	*
Avena fatua	Wild Oat	*
Brassica spp.	Turnip	*
Briza maxima	Large Quaking-grass	*
Cassinia sifton	Drooping Cassinia	*
Casuarina glauca	Swamp Oak	*
Cenchrus spp.	Burr Grass	*
Conium maculatum	Hemlock	*
Cucumis myriocarpus subsp. myriocarpus	Paddy Melon	*
Cynara cardunculus subsp. flavescens	Artichoke Thistle	*
Echium plantagineum	Paterson's Curse	*
Ehrharta erecta	Panic Veldt-grass	*
Erodium spp.	Heron's Bill	*

Scientific name	Common name	Status
Eucalyptus cladocalyx	Sugar Gum	*
Fumaria bastardii	Bastard's Fumitory	*
Galenia pubescens var. pubescens	Galenia	*
Hakea laurina	Pincushion Hakea	*
Hypochaeris radicata	Flatweed	*
Lepidium draba	Hoary Cress	*
Lolium perenne	Perennial Rye-grass	*
Lolium spp.	Rye Grass	*
Lycium ferocissimum	African Box-thorn	*
Marrubium vulgare	Horehound	*
Medicago polymorpha	Burr Medic	*
Nassella neesiana	Chilean Needle-grass	*
Nassella trichotoma	Serrated Tussock	*
Opuntia stricta	Common Prickly-pear	*
Paspalum dilatatum	Paspalum	*
Paspalum distichum	Water Couch	*
Petrorhagia dubia	Velvety Pink	*
Phalaris aquatica	Toowoomba Canary-grass	*
Pinus radiata	Radiata Pine	*
Plantago lanceolata	Ribwort	*
Reseda luteola	Weld	*
Romulea rosea	Onion Grass	*
Rosa rubiginosa	Sweet Briar	*
Silybum marianum	Variegated Thistle	*
Solanum nigrum s.s.	Black Nightshade	*
Sonchus oleraceus	Common Sow-thistle	*
Trifolium subterraneum	Subterranean Clover	*
Vulpia spp.	Fescue	*
Xanthium spinosum	Bathurst Burr	*

Appendix I. Native Vegetation Removal (NVR) Reports – Scenario testing

I.1. Total Construction Corridor

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: **09/03/2021**
Time of issue: **12:19 pm**

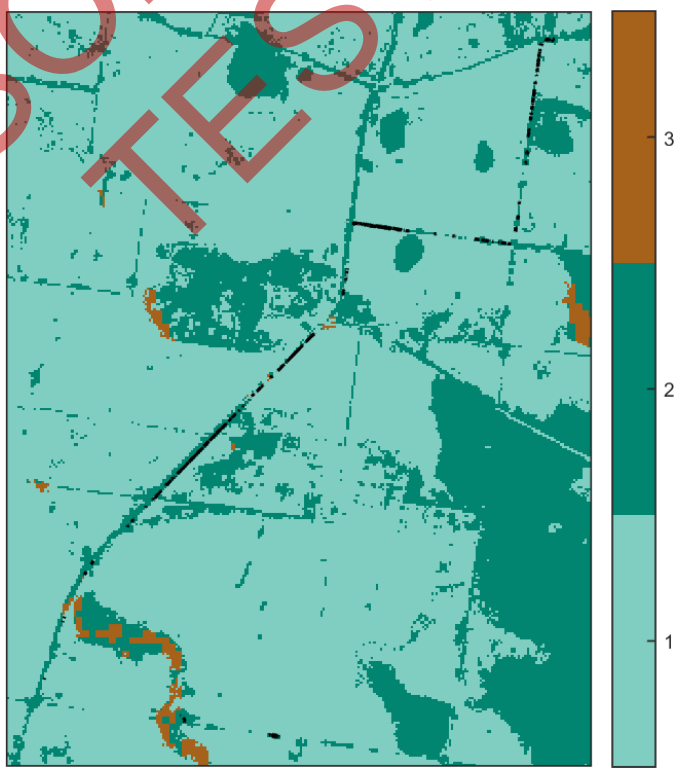
Report ID: Scenario Testing

Project ID	IS305300_PBID_EnsymVegAll_VG94

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	2.108 ha
Extent of past removal	0.000 ha
Extent of proposed removal	2.108 ha
No. Large trees proposed to be removed	5
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species.The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map).

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]	0.631 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Greater Geelong City, Moorabool Shire Council
Minimum strategic biodiversity value score[2]	0.407
Large trees	5 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
8-P	Patch	vvp_0132_61	Endangered	0	no	0.240	0.006	0.006	0.650		0.002	General
9-S	Patch	vvp_0132_61	Endangered	0	no	0.240	0.005	0.005	0.650		0.002	General
9-T	Patch	vvp_0132_61	Endangered	0	no	0.240	0.065	0.065	0.650		0.019	General
9-U	Patch	vvp_0132_61	Endangered	0	no	0.240	0.016	0.016	0.270		0.004	General
9-V	Patch	vvp_0132_61	Endangered	0	no	0.240	0.004	0.004	0.270		0.001	General
9-W	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.270		0.000	General
9-X	Patch	vvp_0132_61	Endangered	0	no	0.240	0.005	0.005	0.270		0.001	General
8-B	Patch	vvp_0132_61	Endangered	0	no	0.240	0.005	0.005	0.270		0.001	General
8-C	Patch	vvp_0132_61	Endangered	0	no	0.240	0.019	0.019	0.270		0.004	General
8-D	Patch	vvp_0132_61	Endangered	0	no	0.240	0.049	0.049	0.270		0.011	General
8-E	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.270		0.000	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
8-F	Patch	vvp_0132_61	Endangered	0	no	0.240	0.013	0.013	0.270		0.003	General
8-G	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.270		0.000	General
8-H	Patch	vvp_0132_61	Endangered	0	no	0.240	0.014	0.014	0.261		0.003	General
8-I	Patch	vvp_0132_61	Endangered	0	no	0.240	0.017	0.017	0.800		0.006	General
8-J	Patch	vvp_0132_61	Endangered	0	no	0.240	0.012	0.012	0.800		0.004	General
8-K	Patch	vvp_0132_61	Endangered	0	no	0.240	0.020	0.020	0.800		0.006	General
8-L	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.800		0.001	General
8-M	Patch	vvp_0132_61	Endangered	0	no	0.240	0.025	0.025	0.240		0.006	General
8-N	Patch	vvp_0132_61	Endangered	0	no	0.240	0.042	0.042	0.240		0.009	General
8-Q	Patch	vvp_0132_61	Endangered	0	no	0.240	0.008	0.008	0.410		0.002	General
9-D	Patch	vvp_0132_61	Endangered	0	no	0.240	0.009	0.009	0.440		0.002	General
9-E	Patch	vvp_0132_61	Endangered	0	no	0.240	0.010	0.010	0.410		0.003	General
9-F	Patch	vvp_0132_61	Endangered	0	no	0.240	0.015	0.015	0.432		0.004	General
9-G	Patch	vvp_0132_61	Endangered	0	no	0.240	0.003	0.003	0.400		0.001	General
9-H	Patch	vvp_0132_61	Endangered	0	no	0.240	0.004	0.004	0.400		0.001	General
8-A	Patch	vvp_0132_61	Endangered	0	no	0.240	0.029	0.029	0.406		0.007	General
9-I	Patch	vvp_0132_61	Endangered	0	no	0.240	0.008	0.008	0.460		0.002	General
9-J	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.440		0.001	General
9-K	Patch	vvp_0132_61	Endangered	0	no	0.240	0.001	0.001	0.440		0.000	General
12-G	Patch	vvp_0132_61	Endangered	0	no	0.333	0.002	0.002	0.430		0.001	General
12-I	Patch	vvp_0132_61	Endangered	0	no	0.333	0.002	0.002	0.430		0.001	General
9-L	Patch	vvp_0132_61	Endangered	0	no	0.240	0.017	0.017	0.250		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
12-K	Patch	vvp_0132_61	Endangered	0	no	0.333	0.000	0.000	0.250		0.000	General
9-M	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.250		0.000	General
12-L	Patch	vvp_0132_61	Endangered	0	no	0.333	0.004	0.004	0.470		0.002	General
12-M	Patch	vvp_0132_61	Endangered	0	no	0.333	0.102	0.102	0.443		0.037	General
12-O	Patch	vvp_0132_61	Endangered	0	no	0.333	0.049	0.049	0.226		0.015	General
9-N	Patch	vvp_0132_61	Endangered	0	no	0.240	0.031	0.031	0.220		0.007	General
9-O	Patch	vvp_0132_61	Endangered	0	no	0.240	0.008	0.008	0.220		0.002	General
9-P	Patch	vvp_0132_61	Endangered	0	no	0.240	0.019	0.019	0.740		0.006	General
9-Q	Patch	vvp_0132_61	Endangered	0	no	0.240	0.036	0.036	0.860		0.012	General
12-E	Patch	vvp_0132_61	Endangered	0	no	0.333	0.013	0.013	0.860		0.006	General
9-R	Patch	vvp_0132_61	Endangered	0	no	0.240	0.060	0.060	0.474		0.016	General
12-H	Patch	vvp_0132_61	Endangered	0	no	0.333	0.043	0.043	0.750		0.019	General
8-R	Patch	vvp_0132_61	Endangered	0	no	0.240	0.015	0.015	0.247		0.003	General
8-S	Patch	vvp_0132_61	Endangered	0	no	0.240	0.006	0.006	0.460		0.002	General
8-T	Patch	vvp_0132_61	Endangered	0	no	0.240	0.027	0.027	0.430		0.007	General
12-F	Patch	vvp_0132_61	Endangered	0	no	0.333	0.253	0.253	0.328		0.084	General
12-P	Patch	vvp_0132_61	Endangered	0	no	0.333	0.001	0.001	0.230		0.000	General
8-U	Patch	vvp_0132_61	Endangered	0	no	0.240	0.013	0.013	0.230		0.003	General
8-V	Patch	vvp_0132_61	Endangered	0	no	0.240	0.011	0.011	0.220		0.002	General
12-Q	Patch	vvp_0132_61	Endangered	0	no	0.333	0.002	0.002	0.222		0.001	General
14-A	Patch	vvp_0125	Endangered	0	no	0.320	0.005	0.005	0.230		0.001	General
14-C	Patch	vvp_0125	Endangered	0	no	0.320	0.009	0.009	0.740		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
12-A	Patch	vvp_0132_61	Endangered	0	no	0.333	0.115	0.115	0.818		0.052	General
8-W	Patch	vvp_0132_61	Endangered	0	no	0.240	0.060	0.060	0.808		0.019	General
8-X	Patch	vvp_0132_61	Endangered	0	no	0.240	0.058	0.058	0.850		0.019	General
12-B	Patch	vvp_0132_61	Endangered	0	no	0.333	0.040	0.040	0.845		0.019	General
8-Y	Patch	vvp_0132_61	Endangered	0	no	0.240	0.043	0.043	0.537		0.012	General
8-Z	Patch	vvp_0132_61	Endangered	0	no	0.240	0.072	0.072	0.640		0.021	General
9-A	Patch	vvp_0132_61	Endangered	0	no	0.240	0.014	0.014	0.850		0.005	General
9-B	Patch	vvp_0132_61	Endangered	0	no	0.240	0.041	0.041	0.757		0.013	General
9-C	Patch	vvp_0132_61	Endangered	0	no	0.240	0.001	0.001	0.850		0.000	General
9-W	Patch	vvp_0132_61	Endangered	0	no	0.240	0.009	0.009	0.640		0.003	General
9-Z	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.690		0.001	General
10-A	Patch	vvp_0132_61	Endangered	0	no	0.240	0.003	0.003	0.690		0.001	General
10-B	Patch	vvp_0132_61	Endangered	0	no	0.240	0.009	0.009	0.220		0.002	General
14-B	Patch	vvp_0125	Endangered	0	no	0.320	0.024	0.024	0.710		0.010	General
15-A	Patch	vvp_0821	Endangered	0	no	0.093	0.024	0.024	0.832		0.003	General
12-C	Patch	vvp_0132_61	Endangered	0	no	0.333	0.000	0.000	0.830		0.000	General
10-C	Patch	vvp_0132_61	Endangered	0	no	0.240	0.013	0.013	0.840		0.004	General
10-D	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.890		0.000	General
10-E	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.722		0.000	General
10-F	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.210		0.000	General
16-B	Patch	vvp_0132_61	Endangered	0	no	0.426	0.000	0.000	0.410		0.000	General
17-A	Patch	vvp_0055_61	Endangered	3	no	0.190	0.033	0.033	0.250		0.006	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
8-O	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.220		0.000	General
13-A	Patch	vvp_0132_61	Endangered	0	no	0.260	0.033	0.033	0.714		0.011	General
12-J	Patch	vvp_0132_61	Endangered	0	no	0.333	0.039	0.039	0.366		0.013	General
16-A	Patch	vvp_0132_61	Endangered	0	no	0.426	0.008	0.008	0.415		0.004	General
11-A	Patch	vvp_0055_61	Endangered	0	no	0.150	0.015	0.015	0.650		0.003	General
18-B	Patch	vvp_0132_61	Endangered	0	no	0.253	0.004	0.004	0.470		0.001	General
12-D	Patch	vvp_0132_61	Endangered	0	no	0.333	0.000	0.000	0.230		0.000	General
18-A	Patch	vvp_0132_61	Endangered	0	no	0.253	0.062	0.062	0.470		0.017	General
10-G	Patch	vvp_0132_61	Endangered	0	no	0.253	0.000	0.000	0.230		0.000	General
1-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.026	0.670		0.007	General
2-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.026	0.670		0.007	General
3-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.031	0.623		0.008	General
4-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.031	0.450		0.007	General
5-B	Canopy Tree	vvp_0055_61	Endangered	1	no	0.200	0.070	0.051	0.250		0.009	General
6-B	Canopy Tree	vvp_0055_61	Endangered	1	no	0.200	0.070	0.048	0.250		0.009	General
7-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.031	0.250		0.006	General

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

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

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Small Golden Moths	*Diuris basaltica*	501473	Endangered	Dispersed	Habitat importance map	0.0007
Heath Spear-grass	*Austrostipa exilis*	503984	Rare	Dispersed	Habitat importance map	0.0006
Bacchus Marsh Wattle	*Acacia rostriformis*	505136	Vulnerable	Dispersed	Habitat importance map	0.0005
Fragrant Saltbush	*Rhagodia parabolica*	502929	Rare	Dispersed	Habitat importance map	0.0005
Brittle Greenhood	*Pterostylis truncata*	502821	Endangered	Dispersed	Habitat importance map	0.0003
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*	504484	Vulnerable	Dispersed	Habitat importance map	0.0003
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	12922	Critically endangered	Dispersed	Habitat importance map	0.0003
Werribee Blue-box	*Eucalyptus baueriana subsp. thalassina*	507580	Endangered	Dispersed	Top ranking map	0.0002
Button Wrinklewort	*Rutidosis leptorhynchoides*	502982	Endangered	Dispersed	Habitat importance map	0.0002
Basalt Podolepis	*Podolepis linearifolia*	504658	Endangered	Dispersed	Habitat importance map	0.0002
Large-headed Fireweed	*Senecio macrocarpus*	503116	Endangered	Dispersed	Habitat importance map	0.0002
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	504823	Endangered	Dispersed	Habitat importance map	0.0002
Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	503624	Endangered	Dispersed	Habitat importance map	0.0001
Austral Tobacco	*Nicotiana suaveolens*	502275	Rare	Dispersed	Habitat importance map	0.0001
Brackish Plains Buttercup	*Ranunculus diminutus*	504314	Rare	Dispersed	Habitat importance map	0.0001
Velvet Daisy-bush	*Olearia pannosa subsp. cardiophylla*	502317	Vulnerable	Dispersed	Habitat importance map	0.0001
Small Scurf-pea	*Cullen parvum*	502773	Endangered	Dispersed	Habitat importance map	0.0001
Clumping Golden Moths	*Diuris gregaria*	504887	Endangered	Dispersed	Habitat importance map	0.0001

Cane Spear-grass	*Austrostipa breviglumis*	503268	Rare	Dispersed	Habitat importance map	0.0001
Snowy Mint-bush	*Prostanthera nivea var. nivea*	502746	Rare	Dispersed	Habitat importance map	0.0001
Werribee Blue-box	*Eucalyptus baueriana subsp. thalassina*	507580	Endangered	Dispersed	Habitat importance map	0.0001
Shiny Leionema	*Leionema lamprophyllum subsp. obovatum*	505478	Rare	Dispersed	Habitat importance map	0.0001
Large-flower Crane's-bill	*Geranium sp. 1*	505342	Endangered	Dispersed	Habitat importance map	0.0001
Tough Scurf-pea	*Cullen tenax*	502776	Endangered	Dispersed	Habitat importance map	0.0001
Rye Beetle-grass	*Tripogon loliiformis*	503455	Rare	Dispersed	Habitat importance map	0.0001
Pale-flower Crane's-bill	*Geranium sp. 3*	505344	Rare	Dispersed	Habitat importance map	0.0001
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0001
Arching Flax-lily	*Dianella sp. aff. longifolia (Benambra)*	505560	Vulnerable	Dispersed	Habitat importance map	0.0001
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0001
Rosemary Grevillea	*Grevillea rosmarinifolia subsp. rosmarinifolia*	504066	Rare	Dispersed	Habitat importance map	0.0001
Dark Wire-grass	*Aristida calycina var. calycina*	503630	Rare	Dispersed	Habitat importance map	0.0001
Branching Groundsel	*Senecio cunninghamii var. cunninghamii*	503104	Rare	Dispersed	Habitat importance map	0.0000
Golden Cowslips	*Diuris behrii*	501061	Vulnerable	Dispersed	Habitat importance map	0.0000
Narrow Goodenia	*Goodenia macbarronii*	501513	Vulnerable	Dispersed	Habitat importance map	0.0000
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0000
Small Milkwort	*Comesperma polygaloides*	500798	Vulnerable	Dispersed	Habitat importance map	0.0000
Golden Sun Moth	*Synemon plana*	15021	Critically endangered	Dispersed	Habitat importance map	0.0000
Hairy Tails	*Ptilotus erubescens*	502825	Vulnerable	Dispersed	Habitat importance map	0.0000
Waterbush	*Myoporum montanum*	502240	Rare	Dispersed	Habitat importance map	0.0000
Late-flower Flax-lily	*Dianella tarda*	505085	Vulnerable	Dispersed	Habitat importance map	0.0000

Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0000
Buloke	*Allocasuarina luehmannii*	500678	Endangered	Dispersed	Habitat importance map	0.0000
Silky Kidney-weed	*Dichondra sp. 1*	505786	Rare	Dispersed	Habitat importance map	0.0000
Dwarf Brooklime	*Gratiola pumilo*	503753	Rare	Dispersed	Habitat importance map	0.0000
Buloke Mistletoe	*Amyema linophylla subsp. orientalis*	500217	Vulnerable	Dispersed	Habitat importance map	0.0000
Austral Crane's-bill	*Geranium solanderi var. solanderi s.s.*	505337	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0000
Brolga	*Grus rubicunda*	10177	Vulnerable	Dispersed	Habitat importance map	0.0000
Yellow Burr-daisy	*Calotis lappulacea*	500598	Rare	Dispersed	Habitat importance map	0.0000
Painted Honeyeater	*Grantiella picta*	10598	Vulnerable	Dispersed	Habitat importance map	0.0000
Australian Painted Snipe	*Rostratula australis*	10170	Critically endangered	Dispersed	Habitat importance map	0.0000
Australian Little Bittern	*Ixobrychus dubius*	10195	Endangered	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Elegant Parrot	*Neophema elegans*	10307	Vulnerable	Dispersed	Habitat importance map	0.0000
Slender Mint-bush	*Prostanthera saxicola var. bracteolata*	502750	Rare	Dispersed	Habitat importance map	0.0000
Striped Legless Lizard	*Delma impar*	12159	Endangered	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

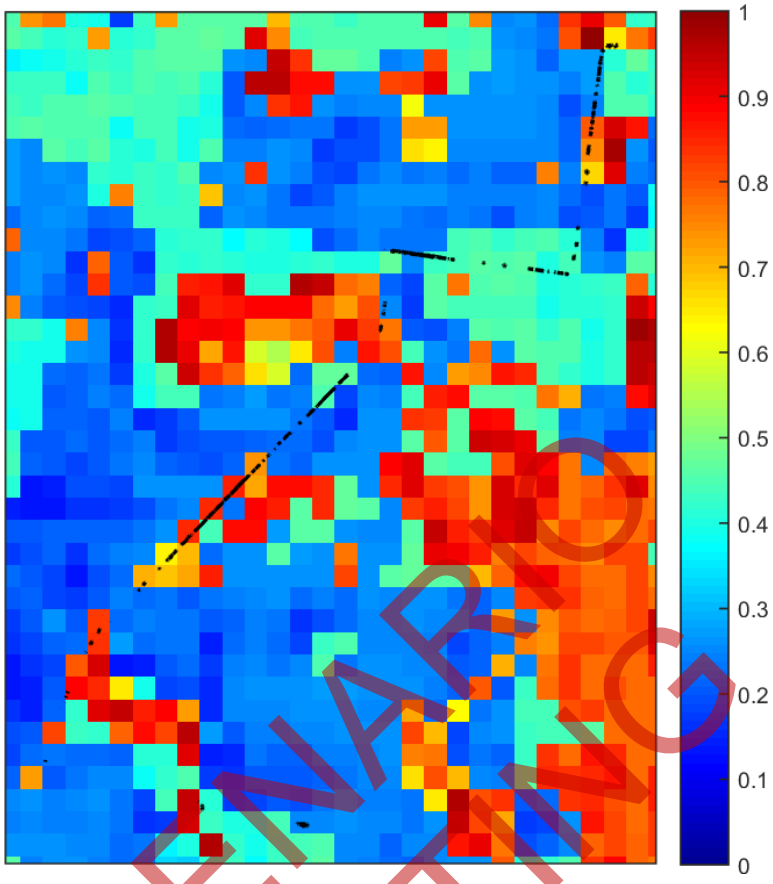
Habitat impacted

- 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



SCENARIO TESTING

I.2. Total Construction Corridor (excluding VicRoads approved vegetation removal)

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).

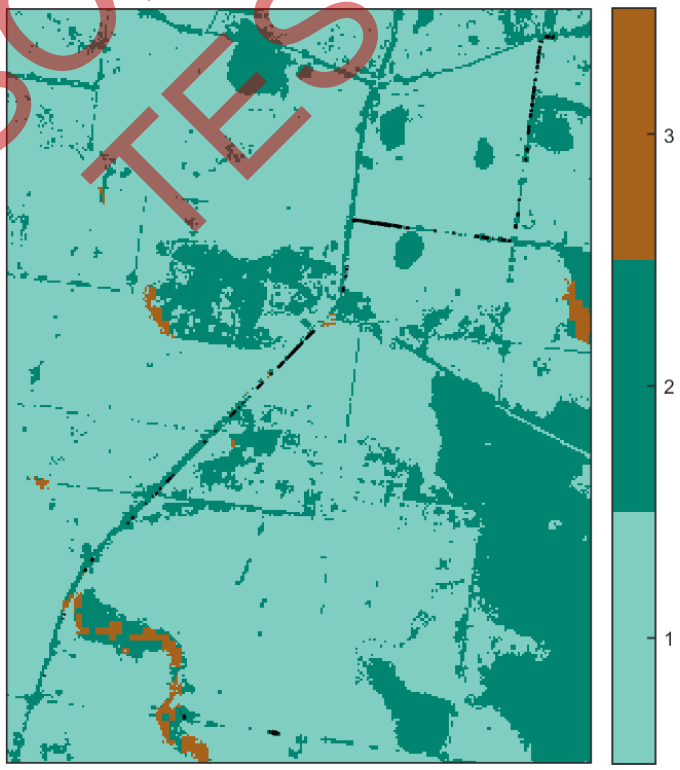
Date of issue: **09/03/2021** **Report ID: Scenario Testing**
Time of issue: **1:14 pm**

Project ID	IS305300_PBID_EnsymVeg_ErasedVR_VG94

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	1.563 ha
Extent of past removal	0.000 ha
Extent of proposed removal	1.563 ha
No. Large trees proposed to be removed	5
Location category of proposed removal	Location 3 The native vegetation is in an area where the removal of less than 0.5 hectares could have a significant impact on habitat for one or more rare or threatened species.The native vegetation is also in an area mapped as an endangered Ecological Vegetation Class (as per the statewide EVC map).

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]	0.439 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Greater Geelong City, Moorabool Shire Council
Minimum strategic biodiversity value score[2]	0.349
Large trees	5 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
8-P	Patch	vvp_0132_61	Endangered	0	no	0.240	0.006	0.006	0.650		0.002	General
9-S	Patch	vvp_0132_61	Endangered	0	no	0.240	0.005	0.005	0.650		0.002	General
9-T	Patch	vvp_0132_61	Endangered	0	no	0.240	0.065	0.065	0.650		0.019	General
9-U	Patch	vvp_0132_61	Endangered	0	no	0.240	0.016	0.016	0.270		0.004	General
9-V	Patch	vvp_0132_61	Endangered	0	no	0.240	0.004	0.004	0.270		0.001	General
9-W	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.270		0.000	General
9-X	Patch	vvp_0132_61	Endangered	0	no	0.240	0.005	0.005	0.270		0.001	General
8-B	Patch	vvp_0132_61	Endangered	0	no	0.240	0.005	0.005	0.270		0.001	General
8-C	Patch	vvp_0132_61	Endangered	0	no	0.240	0.019	0.019	0.270		0.004	General
8-D	Patch	vvp_0132_61	Endangered	0	no	0.240	0.049	0.049	0.270		0.011	General
8-E	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.270		0.000	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
8-F	Patch	vvp_0132_61	Endangered	0	no	0.240	0.013	0.013	0.270		0.003	General
8-G	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.270		0.000	General
8-H	Patch	vvp_0132_61	Endangered	0	no	0.240	0.014	0.014	0.261		0.003	General
8-I	Patch	vvp_0132_61	Endangered	0	no	0.240	0.017	0.017	0.800		0.006	General
8-J	Patch	vvp_0132_61	Endangered	0	no	0.240	0.012	0.012	0.800		0.004	General
8-K	Patch	vvp_0132_61	Endangered	0	no	0.240	0.020	0.020	0.800		0.006	General
8-L	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.800		0.001	General
8-M	Patch	vvp_0132_61	Endangered	0	no	0.240	0.025	0.025	0.240		0.006	General
8-N	Patch	vvp_0132_61	Endangered	0	no	0.240	0.042	0.042	0.240		0.009	General
8-Q	Patch	vvp_0132_61	Endangered	0	no	0.240	0.008	0.008	0.410		0.002	General
9-D	Patch	vvp_0132_61	Endangered	0	no	0.240	0.009	0.009	0.440		0.002	General
9-E	Patch	vvp_0132_61	Endangered	0	no	0.240	0.010	0.010	0.410		0.003	General
9-F	Patch	vvp_0132_61	Endangered	0	no	0.240	0.015	0.015	0.432		0.004	General
9-G	Patch	vvp_0132_61	Endangered	0	no	0.240	0.003	0.003	0.400		0.001	General
9-H	Patch	vvp_0132_61	Endangered	0	no	0.240	0.004	0.004	0.400		0.001	General
8-A	Patch	vvp_0132_61	Endangered	0	no	0.240	0.029	0.029	0.406		0.007	General
9-I	Patch	vvp_0132_61	Endangered	0	no	0.240	0.008	0.008	0.460		0.002	General
9-J	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.440		0.001	General
9-K	Patch	vvp_0132_61	Endangered	0	no	0.240	0.001	0.001	0.440		0.000	General
12-G	Patch	vvp_0132_61	Endangered	0	no	0.333	0.002	0.002	0.430		0.001	General
12-I	Patch	vvp_0132_61	Endangered	0	no	0.333	0.002	0.002	0.430		0.001	General
9-L	Patch	vvp_0132_61	Endangered	0	no	0.240	0.017	0.017	0.250		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
12-K	Patch	vvp_0132_61	Endangered	0	no	0.333	0.000	0.000	0.250		0.000	General
9-M	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.250		0.000	General
12-L	Patch	vvp_0132_61	Endangered	0	no	0.333	0.004	0.004	0.470		0.002	General
12-M	Patch	vvp_0132_61	Endangered	0	no	0.333	0.102	0.102	0.443		0.037	General
12-O	Patch	vvp_0132_61	Endangered	0	no	0.333	0.049	0.049	0.226		0.015	General
9-N	Patch	vvp_0132_61	Endangered	0	no	0.240	0.017	0.017	0.220		0.004	General
9-P	Patch	vvp_0132_61	Endangered	0	no	0.240	0.017	0.017	0.740		0.005	General
9-Q	Patch	vvp_0132_61	Endangered	0	no	0.240	0.001	0.001	0.860		0.000	General
9-R	Patch	vvp_0132_61	Endangered	0	no	0.240	0.004	0.004	0.230		0.001	General
12-H	Patch	vvp_0132_61	Endangered	0	no	0.333	0.043	0.043	0.750		0.019	General
8-R	Patch	vvp_0132_61	Endangered	0	no	0.240	0.015	0.015	0.247		0.003	General
8-S	Patch	vvp_0132_61	Endangered	0	no	0.240	0.006	0.006	0.460		0.002	General
8-T	Patch	vvp_0132_61	Endangered	0	no	0.240	0.027	0.027	0.430		0.007	General
12-F	Patch	vvp_0132_61	Endangered	0	no	0.333	0.253	0.253	0.328		0.084	General
12-P	Patch	vvp_0132_61	Endangered	0	no	0.333	0.000	0.000	0.230		0.000	General
8-U	Patch	vvp_0132_61	Endangered	0	no	0.240	0.011	0.011	0.230		0.002	General
8-V	Patch	vvp_0132_61	Endangered	0	no	0.240	0.010	0.010	0.220		0.002	General
12-Q	Patch	vvp_0132_61	Endangered	0	no	0.333	0.002	0.002	0.222		0.001	General
14-A	Patch	vvp_0125	Endangered	0	no	0.320	0.003	0.003	0.230		0.001	General
14-C	Patch	vvp_0125	Endangered	0	no	0.320	0.006	0.006	0.740		0.002	General
12-A	Patch	vvp_0132_61	Endangered	0	no	0.333	0.001	0.001	0.860		0.001	General
8-X	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.850		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
8-Z	Patch	vvp_0132_61	Endangered	0	no	0.240	0.021	0.021	0.640		0.006	General
9-A	Patch	vvp_0132_61	Endangered	0	no	0.240	0.007	0.007	0.850		0.002	General
9-B	Patch	vvp_0132_61	Endangered	0	no	0.240	0.028	0.028	0.769		0.009	General
9-C	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.850		0.000	General
9-W	Patch	vvp_0132_61	Endangered	0	no	0.240	0.006	0.006	0.640		0.002	General
9-Z	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.690		0.001	General
10-A	Patch	vvp_0132_61	Endangered	0	no	0.240	0.002	0.002	0.690		0.001	General
10-B	Patch	vvp_0132_61	Endangered	0	no	0.240	0.009	0.009	0.220		0.002	General
14-B	Patch	vvp_0125	Endangered	0	no	0.320	0.008	0.008	0.710		0.003	General
15-A	Patch	vvp_0821	Endangered	0	no	0.093	0.023	0.023	0.832		0.003	General
12-C	Patch	vvp_0132_61	Endangered	0	no	0.333	0.000	0.000	0.830		0.000	General
10-C	Patch	vvp_0132_61	Endangered	0	no	0.240	0.013	0.013	0.840		0.004	General
10-D	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.890		0.000	General
10-E	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.722		0.000	General
10-F	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.210		0.000	General
16-B	Patch	vvp_0132_61	Endangered	0	no	0.426	0.000	0.000	0.410		0.000	General
17-A	Patch	vvp_0055_61	Endangered	3	no	0.190	0.033	0.033	0.250		0.006	General
8-O	Patch	vvp_0132_61	Endangered	0	no	0.240	0.000	0.000	0.220		0.000	General
13-A	Patch	vvp_0132_61	Endangered	0	no	0.260	0.033	0.033	0.714		0.011	General
12-J	Patch	vvp_0132_61	Endangered	0	no	0.333	0.039	0.039	0.366		0.013	General
16-A	Patch	vvp_0132_61	Endangered	0	no	0.426	0.008	0.008	0.415		0.004	General
11-A	Patch	vvp_0132_61	Endangered	0	no	0.150	0.015	0.015	0.650		0.003	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-B	Patch	vvp_0132_61	Endangered	0	no	0.253	0.004	0.004	0.470		0.001	General
12-D	Patch	vvp_0132_61	Endangered	0	no	0.333	0.000	0.000	0.230		0.000	General
18-A	Patch	vvp_0132_61	Endangered	0	no	0.253	0.062	0.062	0.470		0.017	General
10-G	Patch	vvp_0132_61	Endangered	0	no	0.253	0.000	0.000	0.230		0.000	General
1-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.026	0.670		0.007	General
2-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.026	0.670		0.007	General
3-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.031	0.623		0.008	General
4-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.031	0.450		0.007	General
5-B	Canopy Tree	vvp_0055_61	Endangered	1	no	0.200	0.070	0.051	0.250		0.009	General
6-B	Canopy Tree	vvp_0055_61	Endangered	1	no	0.200	0.070	0.048	0.250		0.009	General
7-A	Scattered Tree	vvp_0055_61	Endangered	0	no	0.200	0.031	0.031	0.250		0.006	General

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

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

Species common name	Species scientific name	Species number	Conservation status	Group	Habitat impacted	% habitat value affected
Bacchus Marsh Wattle	*Acacia rostriformis*	505136	Vulnerable	Dispersed	Habitat importance map	0.0005
Small Golden Moths	*Diuris basaltica*	501473	Endangered	Dispersed	Habitat importance map	0.0005
Heath Spear-grass	*Austrostipa exilis*	503984	Rare	Dispersed	Habitat importance map	0.0005
Fragrant Saltbush	*Rhagodia parabolica*	502929	Rare	Dispersed	Habitat importance map	0.0004
Werribee Blue-box	*Eucalyptus baueriana subsp. thalassina*	507580	Endangered	Dispersed	Top ranking map	0.0002
Brittle Greenhood	*Pterostylis truncata*	502821	Endangered	Dispersed	Habitat importance map	0.0002
Melbourne Yellow-gum	*Eucalyptus leucoxylon subsp. connata*	504484	Vulnerable	Dispersed	Habitat importance map	0.0002
Large-headed Fireweed	*Senecio macrocarpus*	503116	Endangered	Dispersed	Habitat importance map	0.0001
Grassland Earless Dragon	*Tympanocryptis pinguicolla*	12922	Critically endangered	Dispersed	Habitat importance map	0.0001
Button Wrinklewort	*Rutidosis leptorhynchoides*	502982	Endangered	Dispersed	Habitat importance map	0.0001
Spiny Rice-flower	*Pimelea spinescens subsp. spinescens*	504823	Endangered	Dispersed	Habitat importance map	0.0001
Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	503624	Endangered	Dispersed	Habitat importance map	0.0001
Basalt Podolepis	*Podolepis linearifolia*	504658	Endangered	Dispersed	Habitat importance map	0.0001
Austral Tobacco	*Nicotiana suaveolens*	502275	Rare	Dispersed	Habitat importance map	0.0001
Brackish Plains Buttercup	*Ranunculus diminutus*	504314	Rare	Dispersed	Habitat importance map	0.0001
Velvet Daisy-bush	*Olearia pannosa subsp. cardiophylla*	502317	Vulnerable	Dispersed	Habitat importance map	0.0001
Werribee Blue-box	*Eucalyptus baueriana subsp. thalassina*	507580	Endangered	Dispersed	Habitat importance map	0.0001
Small Scurf-pea	*Cullen parvum*	502773	Endangered	Dispersed	Habitat importance map	0.0001

Cane Spear-grass	*Austrostipa breviglumis*	503268	Rare	Dispersed	Habitat importance map	0.0001
Large-flower Crane's-bill	*Geranium sp. 1*	505342	Endangered	Dispersed	Habitat importance map	0.0001
Snowy Mint-bush	*Prostanthera nivea var. nivea*	502746	Rare	Dispersed	Habitat importance map	0.0001
Shiny Leionema	*Leionema lamprophyllum subsp. obovatum*	505478	Rare	Dispersed	Habitat importance map	0.0001
Clumping Golden Moths	*Diuris gregaria*	504887	Endangered	Dispersed	Habitat importance map	0.0001
Tough Scurf-pea	*Cullen tenax*	502776	Endangered	Dispersed	Habitat importance map	0.0001
Rye Beetle-grass	*Tripogon loliiformis*	503455	Rare	Dispersed	Habitat importance map	0.0001
Pale-flower Crane's-bill	*Geranium sp. 3*	505344	Rare	Dispersed	Habitat importance map	0.0001
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0001
Arching Flax-lily	*Dianella sp. aff. longifolia (Benambra)*	505560	Vulnerable	Dispersed	Habitat importance map	0.0000
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0000
Rosemary Grevillea	*Grevillea rosmarinifolia subsp. rosmarinifolia*	504066	Rare	Dispersed	Habitat importance map	0.0000
Dark Wire-grass	*Aristida calycina var. calycina*	503630	Rare	Dispersed	Habitat importance map	0.0000
Narrow Goodenia	*Goodenia macbarronii*	501513	Vulnerable	Dispersed	Habitat importance map	0.0000
Branching Groundsel	*Senecio cunninghamii var. cunninghamii*	503104	Rare	Dispersed	Habitat importance map	0.0000
Small Milkwort	*Comesperma polygaloides*	500798	Vulnerable	Dispersed	Habitat importance map	0.0000
Golden Cowslips	*Diuris behrii*	501061	Vulnerable	Dispersed	Habitat importance map	0.0000
Late-flower Flax-lily	*Dianella tarda*	505085	Vulnerable	Dispersed	Habitat importance map	0.0000
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0000
Hairy Tails	*Ptilotus erubescens*	502825	Vulnerable	Dispersed	Habitat importance map	0.0000
Golden Sun Moth	*Synemon plana*	15021	Critically endangered	Dispersed	Habitat importance map	0.0000
Waterbush	*Myoporum montanum*	502240	Rare	Dispersed	Habitat importance map	0.0000
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0000

Dwarf Brooklime	*Gratiola pumilo*	503753	Rare	Dispersed	Habitat importance map	0.0000
Austral Crane's-bill	*Geranium solanderi var. solanderi s.s.*	505337	Vulnerable	Dispersed	Habitat importance map	0.0000
Buloke	*Allocasuarina luehmannii*	500678	Endangered	Dispersed	Habitat importance map	0.0000
Silky Kidney-weed	*Dichondra sp. 1*	505786	Rare	Dispersed	Habitat importance map	0.0000
Buloke Mistletoe	*Amyema linophylla subsp. orientalis*	500217	Vulnerable	Dispersed	Habitat importance map	0.0000
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0000
Yellow Burr-daisy	*Calotis lappulacea*	500598	Rare	Dispersed	Habitat importance map	0.0000
Brolga	*Grus rubicunda*	10177	Vulnerable	Dispersed	Habitat importance map	0.0000
Australian Painted Snipe	*Rostratula australis*	10170	Critically endangered	Dispersed	Habitat importance map	0.0000
Painted Honeyeater	*Grantiella picta*	10598	Vulnerable	Dispersed	Habitat importance map	0.0000
Australian Little Bittern	*Ixobrychus dubius*	10195	Endangered	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Elegant Parrot	*Neophema elegans*	10307	Vulnerable	Dispersed	Habitat importance map	0.0000
Slender Mint-bush	*Prostanthera saxicola var. bracteolata*	502750	Rare	Dispersed	Habitat importance map	0.0000
Striped Legless Lizard	*Delma impar*	12159	Endangered	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

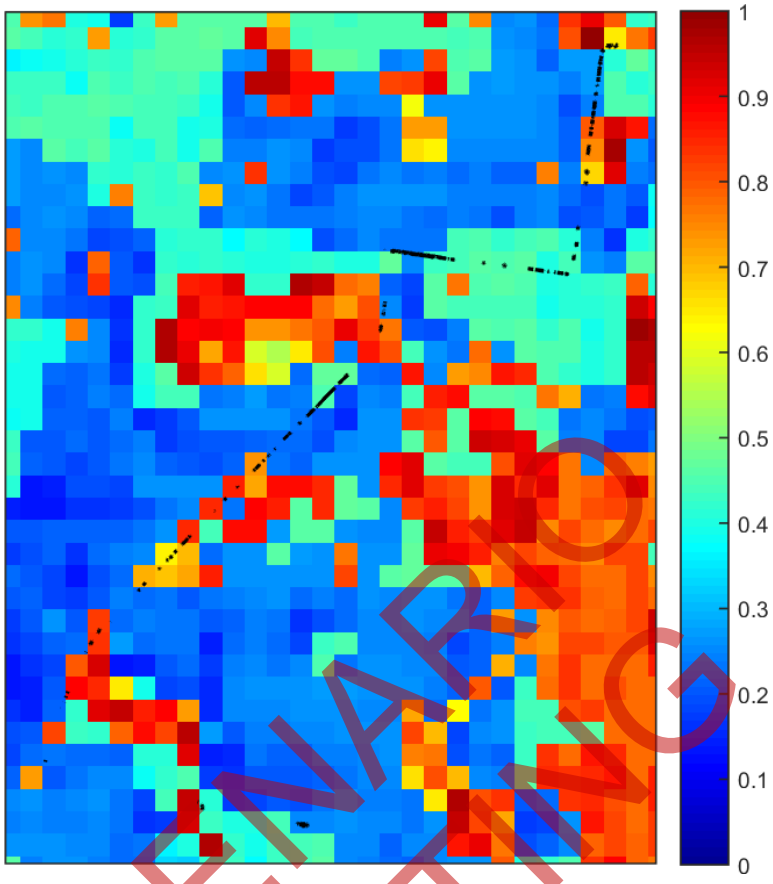
Habitat impacted

- 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.

SCENARIO TESTING

Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map



SCENARIO TESTING

Appendix J. Assessment of MNES against the Significant Impact Guidelines 1.1

This appendix assesses the likelihood of the Project having a significant impact on MNES. The following MNES that were identified in Section 4.4 as being subject to detailed assessment against the Significant Impact Guidelines 1.1(DoE 2013) are assessed in the tables below:

- Listed threatened ecological communities: Natural Temperate Grasslands of the Victorian Volcanic Plain (Critically Endangered)
- Listed threatened species: Growling Grass Frog (Vulnerable), Striped Legless Lizard (Vulnerable) and Golden Sun Moth (Critically Endangered).

Table J-1 Significant Impact Assessment for NTGVVP (Critically Endangered) threatened ecological community

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Reduce the extent of an ecological community	A total of 1.945 ha of NTGVVP was mapped across the Assessment Area. Removal of which would reduce the extent of the ecological community across the local landscape.	**High**	Directional boring has been utilised to avoid impacts to larger remnant patches of NTGVVP. All works (and ancillary activities) will be confined to the Construction Corridor. The Construction Corridor has been realigned or reduced to avoid impacts to native vegetation, particularly NTGVVP, and in some locations has been moved into cropped paddocks. Where partial patch removal or directional boring are to occur, particularly along Geelong-Bacchus Marsh Road, avoidance measures should be implemented. No-go Zones should be established and exclusion fencing should be placed around the vegetation (planted & native)	Following the implementation of the relevant mitigation measures 0.253 ha of NTGVVP will be removed. As such, a reduction in the extent of the ecological community is occurring, but to a reduced extent.	**Moderate**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
			to remain, incorporating TPZ, to reduce the extent of vegetation removal.		
Fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines	The NTGVVP mapped throughout the Assessment Area is highly fragmented due to being present in a road reserves, intersected by drainage works and driveways or surrounded by crops. Additional clearing is not resulting in further fragmentation, but will reduce the extent of occurrence as noted above.	**Moderate**	As above	To reduce impacts to NTGVVP the Construction Corridor has been reduced as much as possible. In some instances, this has resulted in the edges of some of the NTGVVP patches along Geelong-Bacchus Marsh Road being removed. This will not fragment patches, but will reduce the extent of occurrence and edge effects.	**Moderate**
Adversely affect habitat critical to the survival of an ecological community	Reduction in the extent of NTGVVP patches is likely to increase the potential for weed invasion and degradation of the remaining patches. Road corridors are considered conduits for weed dispersal and as such, the Geelong-Bacchus Marsh Road reserve has a high	**Moderate**	Weed and biosecurity management will be implemented during construction in accordance with the CaLP Act. No-go Zones and fencing along the Construction Corridor will be implemented.	The implementation of weed and biosecurity control measures and other relevant mitigation measures are likely to effectively reduce the potential increase in weed invasion caused by the Project to the current level imposed by	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
	cover of weeds, particularly at the road edge (≥ 3 m). The addition of cropped paddock along the adjacent boundary to the road reserve again increases weed invasion capacity, with pasture grasses invading the road reserve.			the environment (surrounding road and cropping).	
Modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns	Negligible. It is not expected that the works will have substantial impacts on abiotic factors above that already imposed from the current activities in the Assessment Area, such as cropping and road use, including pollution run-off. However, surface works at Balliang Creek Crossing 1 may temporarily alter surface water drainage patterns. There are no patches of NTGVVP located within the Balliang Creek Crossing 1 but some patches	**Low**	Work on Waterways permit will be obtained prior to works on Balliang Creek commencing. Construction of works at Balliang Creek Crossing 1 will be timed to occur during no/low flow periods where practicable, and drainage lines will be re-instated following works, including re-vegetation. Sedimentation will be managed through a CEMP.	No residual risk. Temporary alterations in the surface water and drainage of Balliang Creek Crossing 1 is not expected to modify or destroy abiotic factors critical to the survival of NTGVVP nearby.	N/A

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
	occur on more elevated land nearby.				
Cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting	Changes in species composition may occur through increased potential of weed invasion via spreading construction machinery. Management practices are not expected to change following construction.	**Low**	Weed and biosecurity management will be implemented during construction in accordance with the CaLP Act. No-go Zones and fencing along the Construction Corridor will be implemented.	No residual risk. Following the implementation of the relevant mitigation measures it is unlikely that compositional species changes will occur beyond current levels.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: assisting invasive species, that are harmful to the listed ecological community, to become established, or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which	Reduction in the extent of NTGVVP patches is likely to increase the potential for weed invasion and degradation of the remaining patches. However, the Construction Corridor is historically highly modified. Road corridors are considered conduits for weed dispersal and as such, the Geelong-Bacchus Marsh Road reserve has a high cover of weeds, particularly at the road edge (≥ 3 m) and where access tracks have been formed. The addition of cropped paddock along the adjacent boundary to the road reserve again increases weed invasion capacity, with pasture grasses invading the road reserve.	**Moderate**	Weed and biosecurity management will be implemented during construction in accordance with the CaLP Act. No-go Zones and fencing along the Construction Corridor will be implemented.	The implementation of weed and biosecurity control measures and other relevant mitigation measures are likely to effectively reduce the potential increase in weed invasion caused by the Project to the current level imposed by the environment (surrounding road and cropping).	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
kill or inhibit the growth of species in the ecological community, or					
Interfere with the recovery of an ecological community.	Negligible. The Construction Corridor is highly modified, further modification of this nature is unlikely to interfere with the recovery of the NTGVVP present. None of the NTGVVP patches are currently being actively managed.	**Low**	N/A	N/A	N/A

Table J-2 Significant Impact Assessment for Growling Grass Frog (Vulnerable), as per the Significant Impact Guidelines for the Vulnerable Growling Grass Frog (DEWHA 2009c).

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Permanent removal or degradation of terrestrial habitat (for example between ponds, drainage lines or other temporary/permanent habitat) within 200 metres of a water body in temperate regions, or 350 metres of a water body in semi-arid regions, that results in the loss of dispersal or overwintering opportunities for an important population.	Balliang Creek Crossing 1 is considered of low-negligible habitat quality for Growling Grass Frog and highly degraded. Targeted survey has not observed the species at this location over several years. The drainage line within the Construction Corridor is highly degraded and most commonly dry, with an access track currently running through this location. Balliang Creek Crossing 2 is also of low quality, with extensive barriers reducing dispersal ability of the species. This location will be under-bored.	**Low**	Sediment and erosion controls within the surrounding works area will be implemented in the CEMP. Established access tracks will be utilised.	No residual risks. The reinstatement of the drainage line following the works, including revegetation may increase habitat quality for the species.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Alteration of aquatic vegetation diversity or structure that leads to a decrease in habitat quality	The pipeline at Balliang Creek Crossing 1 will be trenched at the eastern extent of the Construction Corridor, where an access track is present. Therefore, limited aquatic vegetation removal will not lead to a decrease in habitat quality. Common Reed was the only aquatic species present, included in a small patch of Tall Marsh EVC. A total of 2.2215 ha of low quality Growling Grass Frog habitat was mapped within the Assessment Area, with 0.072 ha proposed to be removed.	**Low**	Sediment and erosion controls within the surrounding works area will be implemented in the CEMP. Established access tracks will be utilised. Reinstatement of the drainage line and revegetation are proposed.	No residual risks. The reinstatement of the drainage line following the works, including revegetation may increase habitat quality for the species.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Alteration to wetland hydrology, diversity and structure (for example any changes to timing, duration or frequency of flood events) that leads to a decrease in habitat quality	Negligible. A lack of water at Balliang Creek Crossing 1 and limited drainage through the existing road culvert, indicates that the works will not permanently alter the hydrology of the creek line or adjacent farm dams.	**Low**	N/A	N/A	N/A
Introduction of predatory fish and/or disease agents.	Negligible. A lack of permanent water at Balliang Creek Crossing 1 within the Construction Corridor and limited drainage through the existing road culvert indicate that the works will not increase the likelihood of disease or predatory fish at this location. *Chytrid fungus* is a major threat to the Growling Grass Frog. This disease is spread through machinery and equipment that may have contacted the disease from previous job sites.	**Low**	Construction stockpiles, machinery, roads, and other infrastructure should be placed away from areas supporting native vegetation and waterways; and placed in previously cleared or hardstand areas. Standard Chytrid Fungus controls should be implemented where works to connected waterbodies or waterways are occurring.	No residual risks.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Net reduction in the number and/or diversity of water bodies available to an important population.	Negligible. An important population of Growling Grass Frog is not considered present within the Assessment Area or wider local landscape of Balliang Creek, and no individuals were observed during surveys. The farm dam being removed at Schultz Road is not considered habitat for the species.	**Low**	In accordance with the Wildlife Act, an ecologist or wildlife handler is to be present during dam removal at Schultz Road to ensure no aquatic fauna, such as Snake-necked Turtle (*Chelodina longicollis*), are un-injured. Fauna must be relocated to the nearest suitable waterbody.	No residual risks.	**Low**
Removal or alteration of available terrestrial or aquatic habitat corridors (including alteration of connectivity during flood events).	Negligible. There will be no net reduction in the availability of suitable habitat for the species. Any temporary blockage of Balliang Creek Crossing 1 during works are not likely to impact species dispersal during the breeding season as the species is not considered present.	**Low**	Construction of works at Balliang Creek Crossing 1 will be timed to occur during no/low flow periods where practicable, and drainage lines will be re-instated following works, including re-vegetation.	No residual risks.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Construction of physical barriers to movement between water bodies, such as roads or buildings.	Negligible. Construction of permanent barriers to movement are not proposed for this Project. On completion of works at Balliang Creek Crossing 1, the pipeline infrastructure will be below bed level. The pipeline at Balliang Creek Crossing 2 will be under-bored and below bed level.	**Low**	N/A	N/A	**N/A**

Table J-3 Significant Impact Assessment for Golden Sun Moth (Critically Endangered[1]), as per Significant Impact Guidelines for the Critically Endangered Golden Sun Moth (DEWHA 2009a).

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Large or contiguous habitat area (>10 ha) **Impact threshold:** Habitat loss, degradation or fragmentation >0.5 ha	Negligible. The following habitat extents were mapped across the Assessment Area: 4.614 ha medium-high quality habitat 6.045 ha low quality habitat. Within the Construction Corridor, a total of 0.0089 ha of medium-high quality habitat and 2.297 ha of low quality habitat is present. No Golden Sun Moth were observed during targeted surveys, and as such, low quality habitat was not expected to support the species.	**Low**	Construction Corridor reduced to mostly avoid removal of medium-high quality habitat No-go Zones to be implemented.	No residual impacts. Medium-high quality habitat loss is not over 0.5 ha.	N/A

[1] Golden Sun Moth threatened species status is proposed to be revised under the EPBC Act from Critically Endangered to Vulnerable. The assessment in this Report is based on the current threatened species listing. If listing status does change prior to development of an Offset Management Plan, for example, the new status will be incorporated into that assessment

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Small or fragmented habitat area (<10 ha) **Impact threshold:** Habitat loss, degradation or fragmentation >0.5 ha	Negligible. Habitat was graded as medium-high where surveys occurred, and areas of low quality at Schultz Road. No Golden Sun Moth were observed and historic records are absent from the Assessment Area. Low quality habitat occurred along Geelong-Bacchus Marsh Road, Schultz Road and Parwan South Road. However, due to current and historical modification of the grassland patches, the species is not expected to persist.	**Low**	Construction Corridor reduced to mostly avoid medium-high quality habitat No-go Zones to be implemented.	No residual impacts. Medium-high quality habitat loss is not over 0.5 ha.	N/A
Habitat connectivity **Impact threshold:** Fragmentation of a population through the introduction of a barrier to dispersal	Not applicable. A population of Golden Sun Moth are not considered present within the Construction Corridor or Assessment Area.	**Negligible**	N/A	N/A	N/A

Table J-4 Significant Impact Assessment for Striped Legless Lizard (Vulnerable), as per Referral Guidelines for the Vulnerable Striped Legless Lizard, Delma impar (DSEWPaC 2011b).

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
High Risk of Significant Impact					
Important population detected during survey: any fragmentation, loss or long term modification of habitat that may result in the population becoming non-viable or that may restrict breeding, dispersal or recruitment (see Section 3).	Important populations of the species are considered those with high population numbers (E.g. 600 at Iramoo Wildlife Reserve). Presence of the species was assumed within higher quality grassland patches along the paper road. No surveys were undertaken, as such numbers cannot be determined. Previous surveys along Geelong-Bacchus Marsh Road did not observe the species and habitat present is not considered to support the species. The minimum patch size threshold for medium to long-term habitat and population viability is ≥ 0.5 hectares (DSEWPaC 2011b), from which an important population can be	**Moderate**	Directional boring is being utilised within areas of medium-high habitat quality where species presence is assumed. No-go Zones will be established around habitat where presence assumed An established access track adjacent to medium-high quality habitat is being used during construction to avoid construction of new access tracks.	Directional boring avoids impacts to the majority of the habitat patches. Use of the existing access track between these two patches, may result in marginal removal of patch edges. The patch edges are more degraded, with an increase in Wild Oat cover, and a reduction in inter-tussock space. Soil compaction from heavy vehicles is also likely upon the edges of patches, used as turning circles or for reversing. There is also evidence of pesticide use to maintain the existing access track.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
	assumed (confirmed present, or potentially present). The two patches of moderate-high habitat quality are over 0.5 ha each. As such, the population (if present) can be inferred to qualify as important at this stage. Of the 10.659 ha (4.614 ha medium-high quality) habitat mapped within the Assessment Area, 2.3059 ha, including 0.0089 ha of medium-high quality habitat, are to be removed within the Construction Corridor.				
Important population not detected, but site occurs in Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP)5 : Removal or modification of 0.5 hectares or more of known habitat, or habitat	Areas of medium-high suitable habitat for the species do qualify as NTGVVP. However, these areas do not fall within the Construction Corridor. Low quality habitat across the Construction Corridor is not considered to support the	**Low**	As above	No residual impacts.	N/A

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
that has a moderate to high potential to support the species (see Section 3).	species due to long-term disturbance and fragmentation. Less than 0.5 ha of medium-high quality habitat for Striped Legless Lizard is being removed.				
Significant change to management regime (e.g. burning, grazing, pest management, weed spraying) in habitat that supports or has high potential to support an important population (see Section 3).	Negligible. No change to the management regime will occur as a result of the proposed works.	**Low**	N/A	N/A	N/A
Introduction of threats, such as introduced predators or weeds, which may impact on or spread to an important population or affect the species as a whole.	Weed invasion to the extent that it reduces inter-tussock space may affect species persistence as a whole. The long-term disturbance and degradation within the Construction Corridor, including extensive agricultural cropping, indicate that the proposed works	**Moderate**	Weed and biosecurity management will be implemented during construction, including vehicle washdown, in accordance with the CaLP Act.	The implementation of weed and biosecurity control measures and other relevant mitigation measures are likely to effectively reduce the potential increase in weed invasion caused by the Project to the current level imposed by the environment	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
	will not significantly increase weed invasion relative to existing levels. Road corridors are considered conduits for weed dispersal and as such, the Geelong-Bacchus Marsh Road reserve already has a high cover of weeds, particularly at the road edge (≥3 m). The addition of cropped paddock along the adjacent boundary to the road reserve again increases weed invasion capacity, with pasture grasses invading the Construction Corridor. Construction machinery may also act to spread weed through the site.		No-go Zones and fencing along the Construction Corridor will be implemented.	(surrounding road and cropping).	

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Limiting dispersal between populations or habitat patches, such as through removal of a vegetated corridor or creation of a physical barrier	Fragmentation of current patches is not proposed to occur as part of the proposed works, rather grassland fragments (low quality) present will be reduced in size longitudinally along the road reserve. Suitable habitat (medium-high) is currently restricted to discrete fragments. The established access tracks to be utilised for the Project are considered established physical barriers to species movements.	**Low**	Directional boring is being utilised within areas of medium-high habitat quality where species presence is assumed. No-go zones will be established around habitat where presence assumed, An established access track adjacent to medium-high quality habitat is being used during construction to avoid construction of new access tracks.	No residual risk.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Changes in soil structure and terrestrial cover (such as removal of rocks and/or fallen timber) in habitat supporting an important population.	Surface rock removal is not expected to occur within suitable species habitat. The small extent of medium-high habitat being removed in the paper road section, may need surface rock removed for vehicle access. Surface rock was not observed within low quality habitat patches along Geelong-Bacchus Marsh Road.	**Low**	Surface rock, if removed, will be translocated into the mapped areas of suitable habitat.	No residual risk	**Low**
Uncertainty - Referral recommended					
Actions which do not directly affect striped legless lizards, but which have the potential for indirect impacts such as, but not limited to, altering hydrology or connectivity, introducing non-indigenous species or increasing introduced predators.	Negligible. Alteration in hydrology or connectivity are not expected to occur due to the proposed works. Increased weed invasion may occur as detailed above.	**Low**	Weed and biosecurity management, erosion and sedimentation, will be implemented during construction, including vehicle washdown, in accordance with the CaLP Act and EP Act.	No residual risk	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Long-term modification of habitat within a 50 m buffer of known or potential habitat.	Modification of suitable habitat will occur within 50 m of areas where species presence is assumed. However, modification is restricted to the edge of a single patch, where an established access track is present.	**Moderate**	Directional boring is being utilised within areas of moderate-high habitat quality where species presence is assumed. No-go Zones will be established around habitat where presence assumed An established access track adjacent to medium-high quality habitat is being used during construction to avoid construction of new access tracks.	Minor modification (i.e. driving over) of species habitat within the Construction Corridor may occur along the track/patch interface. This is considered a minor impact given the historical use of the access track. Further restriction of the access track corridor width is not considered feasible due to safety and efficiency of construction vehicle movement.	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
Low risk of Significant Impact					
Proposed actions that will not directly or indirectly affect Striped Legless Lizard important populations, suitable habitat or the species as a whole.	The proposed works, as detailed above, have minor impacts on an assumed important population	N/A	N/A	N/A	N/A
Actions that occur outside the mapped distribution of the species.	Not applicable. The Project does fall within known species distribution.	N/A	N/A	N/A	N/A
Actions that retain buffers of 50 m or more to important populations of Striped Legless Lizard and adopt relevant mitigation measures recommended in Table 2.	A 50 m buffer is not maintained during the proposed works. However, the buffer is not utilised as the activity involves utilising an existing access track. The existing access track is located between two medium-high quality habitat fragments where species presence is assumed. A small area of one of these patches does fall within the designated access track and	**Moderate**	Directional boring is being utilised within areas of medium-high habitat quality where species presence is assumed. No-go Zones will be established around habitat where presence assumed	Minor modification (i.e. driving over) of species habitat within the Construction Corridor may occur along the track/patch interface. This is considered a minor impact given the historical use of the access track. Further restriction of the access track corridor width is not considered feasible due to safety and efficiency of	**Low**

Significant Impact Criterion	Risk to MNES without undertaking mitigation measures	Likelihood of Significant Impact without mitigation measures	Specific mitigation measures	Residual Risk to MNES with mitigation measures applied	Likelihood of Significant Impact with mitigation measures applied
	is likely to be driven over during works.		An established access track adjacent to medium-high quality habitat is being used during construction to avoid construction of new access tracks.	construction vehicle movement.	