APA Transmission Pty Limited

Flora and Fauna Assessment Crib Point Pakenham Pipeline Project

10 September 2018

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EXECUTIVE SUMMARY

1. Background

APA Transmission Pty Limited, a wholly owned subsidiary of the APA Group (together referred to as APA) is proposing to construct and operate a high pressure gas pipeline which will connect AGL's proposed Gas Import Jetty at Crib Point to the Victorian Transmission System (VTS), near Pakenham.

Upon completion, APA transmission pipeline and AGL's Gas Import Jetty will increase energy security and supply stability to Victoria. In addition, the pipeline will present other long-term opportunities for the supply of gas to residential and industrial growth areas along the alignment and the potential for future power generation opportunities across the design life of the pipeline. The pipeline will also be designed in manner that will enable reverse flow from the main VTS connection at Pakenham to future customers connected to the pipeline.

Monarc Environmental (Parent company being LogiCamms Pty Ltd) was engaged by APA to undertake a flora and fauna survey and impact assessment of the project. The purpose of the assessment was to identify any risks to significant flora and fauna values within the construction footprint and provide a review against significant impact criteria under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and other relevant Victorian legislation. Management and mitigation recommendations to reduce impacts on native flora and fauna were also to be summarised.

The following terms are used to describe areas associated with the project in this report.

- Right of Way (ROW) - Corridor generally of 30m width centred on the alignment.
- Alignment - The centreline of the ROW
- Construction footprint - The area of land directly disturbed for construction of the project consisting of the ROW excluding areas where disturbance is avoided such as HDD locations, extra work spaces, temporary access tracks and any other ancillary facilities required to construct the pipeline.
- Study area - The area within and immediately adjacent to the Right of Way. The extent surveyed outside of the ROW included areas of habitat and remnant vegetation that were deemed important environmental features (e.g. large trees, vegetation patches or waterways) that may be impacted by the construction footprint.

2. Methods summary

Assessment methods used to detect flora, fauna and vegetation communities within and adjacent to the ROW included:

- A review of information from Victoria's Planning Schemes Online, including Planning Zones, Land Use, Overlays and topographic features.
- A review of public databases maintained by the Commonwealth Department of the Environment and Energy (DoEE) and the Victorian Department of Environment, Land Water and Planning (DELWP) to determine potential significant flora and fauna and vegetation communities in the area. These included a Protected Matters Search Tool (PMST) report, the Groundwater Dependent Ecosystem (GDE) Atlas, the Victorian Biodiversity Atlas (VBA) database and Victorian Nature Kit mapping.
- A review of publicly available reports relating to flora and fauna studies in the project area.

- Flora assessments of the project area, to identify native and non-native species, vegetation communities (EVCs) and possible threatened flora habitat and species.
- Fauna assessments of the project area, to identify the species present and suitable fauna habitat such as logs, debris, long grass, rocks, tree perches and waterways. The fauna assessments included targeted surveys for the Southern Brown Bandicoot (SBB), Growling Grass Frog, Southern Toadlet, Swamp Skink, aquatic surveys of 16 waterways and waterbodies, and a list of bird species observed.

3. Results

In general, extensive historical clearing associated with agriculture and horticulture has resulted in most of the construction footprint and surrounding land being largely devoid of remnant native vegetation.

Flora

Database searches indicated 57 rare or threatened flora species may be present within the construction footprint. This included 14 species listed on the EPBC Act, 18 listed as protected on the Victorian FFG Act and 33 additional species listed on the Advisory List of Rare or Threatened Plants in Victoria.

During field surveys, 201 flora species were recorded. This included 118 indigenous species, 13 non-indigenous natives and 70 introduced species.

One flora species listed as threatened under state and federal legislation was detected during field surveys. An individual Strzelecki Gum was recorded within the construction footprint at KP21, near Langwarrin Creek.

Three EPBC listed threatened flora species are considered to have a high likelihood of occurrence in the construction footprint, as follows:

- Dense Leek-orchid (Vulnerable - EPBC Act) in Damp Heathy Woodland between KP 1 to 2 as known populations exist in similar habitat nearby at Crib Point and Stony Point.
- Swamp Fireweed (Vulnerable - EPBC Act) in suitable habitat at KP 33.5 as known populations exist nearby at Muddy Gates Lane and Manks Road, and the South Gippsland Railway line.
- Swamp Everlasting (Vulnerable - EPBC Act) in suitable habitat along KP 33.5 as known populations exist nearby at Muddy Gates Lane and Manks Road, and the South Gippsland Railway line.

Ecological Vegetation Classes (EVCs)

The field assessments identified predominantly fragmented and largely degraded patches of native vegetation remaining within the construction footprint. These patches often contained a mixture of native and introduced weeds. The ROW was found to intersect 91 patches of remnant vegetation. Of these, 46 will be impacted by the construction footprint, and 45 patches will be avoided using Horizontal Directional Drilling (HDD) and other design modifications.

Clearing of the construction footprint will require removal of 6.802ha of remnant vegetation. Areas of remnant vegetation impacted by the construction footprint are as follows:

- 3.29ha of Endangered EVCs (Swamp Scrub, Swampy Riparian Woodland and Grassy Woodland)
- 2.444ha of Vulnerable EVCs (Damp Heathy Woodland)
- 1.098ha of Least Concern EVCs (Coastal Saltmarsh and Heathy Woodland)

Thirty seven scattered trees require removal within the construction footprint. The Victorian guidelines for the removal of native vegetation require conversion of scattered trees to be removed into an equivalent area of vegetation communities. This equates to an additional 1.457ha of vegetation clearing under the Victorian guidelines.

One EPBC Act community was recorded along the alignment during field surveys and vegetation quality assessments. The Subtropical and Temperate Coastal Saltmarsh ecological community was recorded between KP19 - 19.5, associated with Watson Creek. The construction footprint entirely avoids this community by using HDD to cross Watson Creek.

Fauna

The most common habitat types intersected by the construction footprint are: introduced grassland/pasture with occasional remnant native species, areas of vegetable production, remnant patches of native woodland, native forest, scattered trees and aquatic/riparian habitats provided by waterways and dams.

Introduced grassland/pasture and vegetable cropping areas are the most common habitat types, and are generally considered of low habitat value for native fauna. However, some of the native vegetation and introduced vegetation intersected by the construction footprint has been found to provide habitat for species or communities of conservation significance, such as the Southern Brown Bandicoot, Growling Grass Frog, Dwarf Galaxias and Australian Grayling.

Database searches indicated 12 threatened fauna species that have a "High" likelihood of occurrence within the construction footprint. Nine of these listed species were recorded during field surveys, these were: Growling Grass Frog, Southern Toadlet, Australasian Shoveler, Cattle Egret, Eastern Great Egret Hardhead, Lewin's Rail, Southern Brown Bandicoot and the Glossy Grass Skink.

- The Southern Brown Bandicoot (Endangered - EPBC Act) was recorded at eight locations and the species has been assumed to occur at a further 10 locations based on recent records. These 18 locations extend from the South Gippsland Highway (KP30.3) to the Princes Freeway (KP54.4)
- The Growling Grass Frog (Vulnerable - EPBC Act) was recorded at Cardinia Creek South – Bloomfield Lane (KP 40-40.3, site CPT105) but is also assumed present at Cardinia Creek, Ballarto Road (also KP 40-40.3, site CPT106) given both sites are hydrologically connected and in very close proximity.

A total of 3 Commonwealth and/or State listed fish species were identified from the desktop review to have the potential to be present, or their habitat to be present, at watercourses crossed by the alignment. None of these species, which are listed below, were recorded during field surveys:

- Australian Grayling (Vulnerable - EPBC Act) has a 'High' to 'Moderate' likelihood of occurring, due to nearby records, in Cardinia Creek.
- Dwarf Galaxias (Vulnerable - EPBC Act) has a 'High' to 'Moderate' likelihood of occurring in 11 watercourses crossed by the alignment, due to nearby records.
- Flatback Mangrove Goby (Not listed under the EPBC Act but listed under the FFG Act) has a 'High' likelihood of occurrence in the Western Outfall Drain and 'Moderate' likelihood in Watson Creek.

4. EPBC Impacts

The removal of a single Strzelecki Gum is not considered to be a significant impact to this species. There is also unlikely to be a significant impact to River Swamp Wallaby Grass, Dwarf Galaxias, Australian Grayling and Growling Grass Frogs with implementation of mitigation measures identified for the project.

The Swamp Fireweed, Dense Leek-orchid and Swamp Everlasting are assumed to occur within suitable habitat present within the construction footprint, however surveys during appropriate seasons have not yet been completed for these species. To mitigate potential impacts to these species it is proposed to undertake surveys during Spring 2018 and to avoid any detected populations by using HDD or by slight modifications to the construction alignment. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. With these measures in place the risk of a significant impact is considered low.

The Southern Brown Bandicoot population along the construction footprint will be subjected to a temporary impact of habitat fragmentation during construction. Implementation of a Construction EMP to control direct impacts and rehabilitation followed by the implementation of an Operational EMP to manage the construction footprint after construction will reduce the risk of significant impact to low.

The Subtropical and Temperate Coastal Saltmarsh ecological community recorded along the shoreline of Western Port Bay at KP19 - 19.5 will be avoided through HDD. As such, the project is not expected to result in a significant impact to this community.

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1 INTRODUCTION

1.1 Project Overview

APA Transmission Pty Limited, a wholly owned subsidiary of the APA Group (together referred to as APA) is proposing to construct and operate a high pressure gas pipeline which will connect AGL's proposed Gas Import Jetty at Crib Point to the Victorian Transmission System (VTS), near Pakenham.

Upon completion, APA transmission pipeline and AGL's Gas Import Jetty will increase energy security and supply stability to Victoria. In addition, the pipeline will present other long term opportunities for the supply of gas to residential and industrial growth areas along the alignment and the potential for future power generation opportunities across the design life of the pipeline. The pipeline will also be designed in manner that will enable reverse flow from the main VTS connection at Pakenham to future customers connected to the pipeline.

The proposed AGL gas importing jetty project will consist of a Floating Storage and Regasification Unit (FSRU) continuously moored at the existing Crib Point Jetty. The FSRU will vapourise the natural gas from a visiting Liquefied Natural Gas (LNG) carrier that will moor directly adjacent to the FSRU. The natural gas will then be transferred to APA's Crib Point Receiving Facility via a marine loading arm and jetty piping. The high pressure gas pipeline will transfer the generated gas from the Crib Point Receiving Facility to the APA Pakenham Delivery Facility where it is conditioned to maintain the operating parameters of the VTS before injection.

Construction is currently planned to commence at the Receiving and Delivering Facilities in June –July 2019 subject to obtaining relevant environmental approvals and granting of a Pipeline License. The pipeline construction is planned to commence in October 2019 with the pipeline system planned to be operational by March 2020. The exact timing is dependent on a number of factors including timing of the required approvals, access agreements with relevant stakeholders and weather conditions.

The construction schedule is driven by the Project objective to receive and transport gas from AGL's first LNG cargo scheduled for first quarter of 2020.

The following terms are used to describe areas associated with the project in this report.

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- Alignment - The centreline of the ROW
- Construction footprint - The area of land directly disturbed for construction of the project consisting of the ROW excluding areas where disturbance is avoided such as HDD locations, extra work spaces, temporary access tracks and any other ancillary facilities required to construct the pipeline.
- Study area - The area within and immediately adjacent to the Right of Way. The extent outside of the ROW is dependent on the boundary of intersected habitats or environmental features (e.g. large trees, vegetation patches or waterways).

1.2 Project Description

The Crib Point Pakenham Pipeline project (the project) consists of the following components:

- Approximately 56km of high pressure gas transmission pipeline with a diameter of 600mm with a minimum cover of 1.2 m from ground level.
- Crib Point Receiving Facility situated at landside of the Crib Point Jetty managed by Port of Hastings Development Authority (PoHDA) which includes metering, pigging facility, nitrogen storage and injection, odourant plant, gas analysers and a vent stack.
- Pakenham Delivery Facility situated adjacent to the Pakenham East Rail Depot, which is within land owned by Public Transport Victoria and include a scraper station, filtration, metering, heating, pigging facility and a vent stack.
- Two mainline valves (MLVs) will be situated along the pipeline at kilometre point (KP)12 and KP40, subject to successfully obtaining tenure. MLVs are provided as a means to isolate the pipeline in segments for maintenance, repair, operation, and for the minimisation of gas loss in the event that pipeline integrity is lost. Once isolated, the gas from the relevant pipeline section may be vented prior maintenance taking place. A typical MLV site comprises of 10 m x 10 m fenced compound.
- Cathodic protection (CP) is to be provided via a combination of crossbonds to existing CP system and the installation of an impressed current system at either of the MLVs which will be determined during detailed design. The pipeline primary corrosion protection system shall be its external coating.

The total area of the construction footprint required for the project is approximately 153ha. Following construction, the easement for the Right of Way (ROW) for the pipeline will be approximately 74ha.

The Crib Point Pakenham pipeline has a design life of 60 years. The design life of other pipeline equipment and sub-systems ranges from 15 to 25 years, but with ongoing integrity management, and subject to appropriate commercial drivers, the operational life is expected to be longer.

1.3 Purpose of this report

Monarc Environmental (Parent company being LogiCamms Ltd) was engaged by APA to undertake a flora and fauna survey and impact assessment of the construction footprint. The purpose of the assessment was to identify any risks to significant flora and fauna values within the construction footprint and provide a review against significant impact criteria under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*, and other relevant Victorian legislation. Management and mitigation recommendations to reduce impacts on native flora and fauna were also to be summarised.

1.4 Study Area

An overview of the Study Area is provided in **Figure 1**. From the APA Crib Point Receiving Facility immediately north of the existing jetty facilities (KP0), the alignment generally follows existing oil and gas pipeline infrastructure corridors to the south of Hastings. These infrastructure corridors are followed for the first 5km of the alignment to Reid Parade, Hastings including a 1.7km crossing of Warringine Park, a local conservation reserve managed by the Mornington Peninsula Shire Council. Through Hastings, the alignment generally follows Frankston-Flinders Road, with the exception of where the Stony Point Rail Line corridor is wide enough to accommodate the pipeline for approximately 500m. Within Hastings where the pipeline is co-located with Frankston-Flinders Road, the alignment has been located within the adjacent service road of the main carriageway where possible.

From Graydens Road to the north of Hastings, the alignment is generally located within private property following the crossing of the Stony Point Rail Line and Frankston-Flinders Road (KP9.8). Between KP10.1 and KP29.9 the pipeline is generally co-located adjacent to the Esso Australia oil and gas pipeline corridor. In a number of instances, the alignment diverges from this existing linear infrastructure corridor to avoid social and environmental constraints or to facilitate the proposed construction methodology. The alignment is located to the south of the Western Port Highway and the townships of Tyabb and Pearcedale, with the crossing of Baxter-Tooradin Road at KP25.3. Through the area between KP13 to 25, the alignment is close to Western Port and the associated Ramsar Wetland and the Yaringa Marine National Park.

Following the crossing of Baxter-Tooradin Road (KP25.1), the pipeline is generally located in more open agricultural land and the pipeline diverges from the Esso Australia oil and gas pipeline corridor prior to the crossing of the South Gippsland Highway (KP30.4) to take a more direct route to the east of Pakenham. The pipeline crosses the dis-used Leongatha Rail Line at KP33.7. Between the South Gippsland Highway (KP30.4) and Pakenham South (approximately KP50), the pipeline traverses the low-lying Koo Wee Rup swamp area and several significant drainage features that are maintained by Melbourne Water. Western Contour Drain (KP31), Cardinia Creek (KP40.2), Deep and Toomuc Creeks (KP41.5) are three of the most significant drainage features that the pipeline crosses in between South Gippsland Highway and Pakenham South.

Towards Pakenham, the pipeline crosses the Gippsland Rail Line (KP54.2), prior to reaching the proposed Pakenham Delivery Facility. From this facility, the pipeline then follows Oakview Lane and Mt Ararat Road to reach the terminal point on the Longford-Dandenong Pipeline on the northern side of the Princes Highway. For this to occur there are two significant road crossings of both the Princes Freeway (KP54.9) and the Princes Highway (KP55.9).

Pipeline construction footprint

The construction footprint will comprise a 30m wide construction area, and extra work spaces for temporary facilities to support construction. These extra work spaces will include:

- Access tracks (upgrade of existing and construction of new)
- Additional work areas (turn-around points, additional work space for crossings, Horizontal Directional Drilling (HDD) rig set up and, if required, storage areas)

- Water supply tanks and temporary dams for storing water required for dust suppression and hydrostatic testing (pressure testing) of the pipeline.

The width of the construction footprint may be reduced in areas such as sensitive environments and/or water courses. In some cases due to the presence of high conservation value ecosystems or agricultural land, APA will implement a construction methodology such as Horizontal Directional Drilling (HDD) that will negate the need for a construction footprint.

APA is proposing to HDD 16 locations across the alignment. The HDD location and reasoning for the method is described in Table 1.

Table 1: Location of HDD across the project

#	KP	Location of HDD	Feature Description	Max. Depth of HDD (mAHD)
1	4 – 4.4	Warringine Park	HDD to avoid significant flora	14.5
2	4.6-5	Warringine Creek	HDD under Warringine Creek	12
3	7.25 – 7.75	Kings Creek	HDD under Kings Creek and Hastings Leisure Centre Reserve – Significant vegetation avoidance	8.5
4	8.9-9	Craydens Road	HDD under Road crossing Craydens Road to avoid a number of essential services	6
5	9.9-10.4	BlueScope Properties	HDD under Bluescope Properties to avoid ESSO underground pipelines	11
6	14.6-15.2	Significant Flora	HDD under Significant habitat and vegetation	12.5
7	17.1- 17.4	Whitneys Road	HDD under Whitneys Road and avoidance of private infrastructure	10
8	18.7- 19.6	Watson Creek	HDD under Ramsar Wetland and EPBC listed salt marsh vegetation community	14
9	22.7-23.1	Vowell Road Wetland	HDD under significant aquatic habitat	14
10	26.8 – 27.3	Fisheries Road crossing	HDD under Fisheries Road and avoidance of large trees	6
11	29.7 – 30.3	South Gippsland Hwy and high value agricultural land	HDD to avoid high value farm land and safely cross under South Gippsland Hwy dual carriage.	16
12	40 -40.3	Cardinia Creek	HDD under significant ecosystem	17
13 & 14	41.45 – 41.9	Deep Creek and Toomuc Creek – Ballarto Road	HDD under MW asset and significant aquatic habitat	16
15	54.4 – 54.7	Princes Fwy Crossing	HDD under Princes Fwy dual carriage	14
16	55.1 - 55.4	Princes Hwy Crossing	HDD under Princes Hwy dual carriage	12

Watercourse Crossing

Four watercourse crossings proposed to be open-cut (Oliver Creek, Langwarrin Creek, Rutherford Creek, Western Outfall Drain) may have the potential for low water-flow during the proposed construction period. Some of the construction mitigation measures that would be implemented through the CEMP for these features include:

- Installation of flume pipes across access tracks to allow flow and minimise damage to the bed and banks of the waterway;
- Installation of steel plates to block the flow across the water crossing together with high or low flow pumps to maintain flow during the installation of the pipeline. A grate, mesh or similar will be installed over the pump head to reduce the potential for vegetation disturbance or fish to travel into the pipe;
- Salvage of aquatic fauna after plates have been installed and prior to construction or excavation;
- Divert water to a dam or back to the waterway through a filtration system to prevent turbidity and sedimentation (e.g. rock drain or drain lined in geofabric).
- Implementation of suitable sedimentation control measures (such as silt curtains) where appropriate to minimise impacts to water quality; and
- Reinstate works area and re-establish vegetation as soon as possible.

The use of these measures is considered on a case-by-case basis appropriate to the requirements of the waterway and in consultation between environmental and construction site personnel. All waterway crossings will be restored after pipe installation. Restoration of these crossings may use a range of methods to ensure the area is stabilised after construction is complete and the reinstated works are in accordance with any requirements of Melbourne Water as the relevant Catchment Management Authority.

The design of the pipeline is such that its alignment and depth will not impact on the hydrology of the catchment. The remaining risks are limited to the construction phase, thus will be at a local scale and temporarily limited.

Timing the construction to coincide with the times of the year where the waterway crossing points are dry, or have very low flows, will be expected to result in minimal environmental impact during construction. The impact to stream flows is short-term as excavation works for open cut crossing are completed between three to six weeks. The excavation depth is generally to 2.7m to prevent long term erosion impacts and integrity.

The construction footprint and all temporary facilities, temporary access tracks and extra work areas will be progressively decommissioned and reinstated on completion of the construction phase.

Following construction of the pipeline, landowners will be able to resume use of the land. Excavating or erecting permanent structures or buildings over the buried pipeline will be prohibited in accordance with the requirements under the relevant legislation and pursuant to agreements with the landowners. Pipeline markers will be provided at fences, road crossings and other locations as required by Australian Standard 2885 Pipelines - Gas and Liquid Petroleum (AS 2885).

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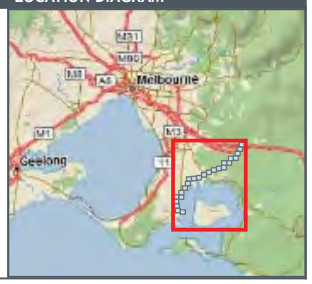
LEGEND

LOCATION DIAGRAM

Crib Point Pakenham Pipeline Project
Figure 1: Overview of Pipeline Alignment

Pipeline Alignment



WORK REQUEST NUMBER: 31-02984.00

DATA SOURCES:
Service Layer Credits: Reference/World_Boundaries_and_Places: Esri, HERE, Garmin
DeLorme World Basemap: Copyright:© 2018 Garmin
World_Imagery: Earthstar Geographics, CNES/Airbus DS

ISSUE DATE	AUTHOR	QA CHECK	APPROVED	MAP REV.	REVISION NOTE
20/08/2018	AB	JH	MV	B	Issued for Review
09/07/2018	KH	JH	CC	A	Issued for Review

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1.5 Scope of Works

Monarc was commissioned to prepare a consolidated flora and fauna report for the project that included:

- A desktop assessment of ecological values within the construction footprint,
- Field surveys and results for flora and fauna within the construction footprint,
- A summary of targeted species survey results that had been prepared for the construction footprint,
- A permitted native vegetation clearing assessment under Victorian legislation and policy
- An assessment of impacts against the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 significant impact guidelines for Matters of National Environmental Significance,
- A summary of potential mitigation actions to reduce impacts on native flora and fauna.

2 METHODS

This Section provides detail on the assessment methods used to detect flora, fauna and vegetation communities within the construction footprint.

2.1 Desktop Assessment

Literature relevant to this assessment was reviewed prior to field assessments to guide active searing for native flora and fauna. This literature review accessed publicly available databases and on-line information that included:

- Planning Zones, Land Use, Overlays and topographic features along the construction footprint from Victoria's Planning Schemes Online (www.planning-schemes.delwp.vic.gov.au).
- Public databases such as those maintained by the Commonwealth Department of the Environment and Energy (DoEE) and the Victorian Department of Environment, Land Water and Planning (DELWP) to determine potential significant flora and fauna and vegetation communities in the area. Databases included:
    - A Protected Matters Search Tool (PMST) report was generated in relation to species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) with a buffer of 5km either side of the alignment for listed species and vegetation communities that may occur in the construction footprint.
    - A review of the Groundwater Dependent Ecosystem (GDE) Atlas (http://www.bom.gov.au/water/groundwater/gde/map.shtml) hosted by the Australian Bureau of Meteorology was undertaken to inform the presence or otherwise of GDEs along the construction footprint.
    - The Victorian Biodiversity Atlas (VBA) database (including a buffer of 5km either side of the alignment) was searched and a list of flora and fauna species previously recorded was generated. The VBA database records sightings of all species reported to DELWP (including the locality and date of sighting) along the species conservation status under Commonwealth and Victorian legislation.
    - The Victorian Nature Kit mapping that records and highlights recorded and modelled native vegetation in the form of Ecological Vegetation Classes (EVCs) was searched (http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit).
- Public reports relating to flora and fauna studies of the project area.
- Discussion with Mornington Peninsula Shire council officers and other relevant authorities, such as DELWP officers to determine potential environmental sensitivities of the area such as significant species or land parcels.

2.2 Flora Assessment

A preliminary survey was undertaken on 20 December 2017 to gain an understanding of the type and variability of vegetation and habitats from publicly accessible areas and roadside. Flora assessments were then conducted over 10 days between the 21 February 2018 and the 7 March 2018 to identify native and non-native species, vegetation communities (EVCs) and possible threatened flora habitat and species. The approximately 56km alignment was walked where entry to properties was accessible (see Section 2.5 for limitations). All species recorded and vegetation communities mapped. Habitat Hectare assessments of present EVCs were undertaken in line with DELWPs Vegetation Quality Assessment Guidelines (DSE, 2004).

2.2.1 Likelihood of Flora Occurrence Method

Habitat requirements of significant flora species previously recorded within 5km of the alignment, or that may potentially occur within the construction footprint, were assessed to determine their likelihood of occurrence within the construction footprint. The likelihood of a species occurring within the construction footprint was then ranked as Negligible, Low, Moderate or High.

Only those species listed under the EPBC Act, listed under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act) or considered endangered or vulnerable on the DELWP Advisory Lists (DEPI 2014; DSE 2013; DSE 2009) were assessed to determine their likelihood of occurrence. Descriptions of criteria utilised by Monarc to rank the likelihood of occurrence of flora and fauna within the construction footprint are summarised in **Table 2**. Species that area assessed as having a High likelihood of occurrence were then addressed in the impact assessment.

An assessment of impacts of the project to EPBC or FFG listed threatened species assessed as having a High or Moderate likelihood of occurrence were then undertaken. This assessment followed the EPBC significant impact assessment guidelines (DoE, 2013). The Victorian FFG Act does not have associated significant impact guidelines to refer to for consideration of impact. In these cases, a permit application process is followed for impacts to FFG Act listed or protected species present on public land.

Table 2: The Likelihood of Occurrence Criteria for Threatened Flora Species

Likelihood of Occurrence	Criteria
High	Recent reputable records of the species in the local vicinity (i.e. within the last 10 years) e.g. VBA
	Known resident in the area based on site observations, database records or expert advice and/or the construction footprint contains high quality habitat
Moderate	Previous reputable records of the species in the local vicinity (e.g. VBA); and/or the construction footprint contains moderate quality habitat
Low	Limited previous records of the species in the local vicinity; and/or, the construction footprint contains poor or limited habitat. May also be considered low if other environmental factors, such as the fragmented or isolated nature of the habitat, are present
Negligible	No suitable habitat and/or outside species range within construction footprint

2.3 Fauna Assessment

A preliminary survey was undertaken on the 20 December 2017 to gain an understanding of the type and variability of fauna and habitats within and adjacent to the construction footprint. General fauna assessments were conducted by foot along the alignment over 10 days between the 21 February 2018 and the 7 March 2018 to identify species. Suitable fauna habitat such as logs, debris, long grass, under rocks, tree perches and waterways within the construction footprint were actively searched. A list of observed bird species was also documented.

2.3.1 Likelihood of Fauna Occurrence Method

Habitat requirements of significant fauna species previously recorded within 5km of the alignment, or that may potentially occur within the construction footprint, were assessed to determine their likelihood of occurrence within the construction footprint. The likelihood of a species occurring within the construction footprint will then ranked as Negligible, Low, Moderate or High.

Only those species listed under the EPBC Act, listed under the FFG Act or considered endangered or vulnerable on the DELWP Advisory Lists (DEPI 2014; DSE 2013; DSE 2009) were assessed to determine their likelihood of occurrence. Descriptions of criteria utilised by Monarc to rank the likelihood of occurrence of fauna within the construction footprint are summarised in **Table 3**. These categories are then used in Appendix G and Section 3.3 to determine likelihood of occurrence.

An assessment of impacts of the project to EPBC or FFG listed threatened species assessed as having a High or Moderate likelihood of occurrence were then undertaken. This assessment followed the EPBC significant impact assessment guidelines (DoE, 2013). The Victorian FFG Act does not have associated significant impact guidelines to refer to for consideration of impact. In these cases, a permit application process is followed for impacts to FFG Act listed or protected species present on public land.

Table 3: The Likelihood of Occurrence Criteria for Threatened Fauna Species

Likelihood of Occurrence	Code	Criteria
High	H1	Known resident in the area based on site observations, database records or expert advice
	H2	Recent reputable records (within 5 years) of the species in the local area e.g. VBA
	H3	The construction footprint contains the species' preferred habitat
Moderate	M1	The species is likely to visit the area regularly (i.e. at least seasonally)
	M2	Previous reputable records of the species in the local area e.g. VBA
	M3	The construction footprint contains some characteristics of the species' preferred habitat
Low	L1	The species is likely to visit the area occasionally or opportunistically whilst en-route to more suitable sites
	L2	There are only limited or historical records of the species in the local area (i.e. more than 20 years old)
	L3	The construction footprint contains few or no characteristics of the species' preferred habitat
Negligible	N1	No previous records of the species in the local area; or

Likelihood of Occurrence	Code	Criteria
	N2	Previous records of the species in the local area (eg VBA) but >30 years
	N3	The species may fly over the area when moving between areas of more suitable habitat
	N4	Out of the species' range
	N5	No suitable habitat present within construction footprint
	N6	Species regionally extinct

2.3.2 Targeted surveys

Targeted fauna surveys for threatened species listed under the EPBC Act, FFG Act or the DELWP Advisory Lists was directed by first determining the presence of suitable habitat for such species (See Section 3.3) and then combined with the assessment of species that have a moderate to high likelihood of occurrence. This resulted in targeted surveys being undertaken for the following species:

- Southern Brown Bandicoot (*Isoodon obesulus*), (Endangered - EPBC Act, Listed – FFG Act, Advisory List – Near threatened)
- Growling Grass Frog (*Litoria raniformis*), (Vulnerable - EPBC Act, Listed – FFG Act, Advisory List – Endangered)
- Southern Toadlet (*Pseudophryne semimarmorata*), (Advisory List – Vulnerable)
- Swamp Skink (*Lissolepis coventryi*), (Listed – FFG Act, Advisory List – Vulnerable)
- Various aquatic fauna such as Dwarf Galaxia (*Galaxiella pusilla*).

Specific methods used to detect these species is provided in the below sub-sections.

2.3.2.1 Southern Brown Bandicoot

Surveys for the Southern Brown Bandicoot (SBB) were conducted in accordance with the Commonwealth's EPBC Act guidelines for surveying threatened mammals (DSEWPaC, 2011; DoEE, 2018a). Surveys were undertaken through February, March, April, May-June, July and August of 2018. Surveys consisted of:

- Daytime searches for potentially suitable habitat, such as areas with a dense understorey and thick ground-cover.
- Daytime searches for signs of activity, including tracks, scats, nests and diggings.
- Baited camera traps using one camera per 5 ha in affected areas greater than 30ha (DoEE, 2018a). A minimum of two surveys, each of 14-day duration was conducted, timed at least one month apart and one undertaken following significant rainfall.
- The survey effort presented in this report equates to 35 cameras and 134 survey weeks within the 153ha construction footprint. Based on this area, the DoEE (2018a) recommended survey effort would be 33 cameras (1 per 5ha) and 132 survey weeks.

Further detail can be found in the Southern Brown Bandicoot Targeted Survey Report (Monarc, 2018a).

2.3.2.2 Growling Grass Frog

Growling Grass Frog surveys were undertaken in accordance with Commonwealth EPBC Act Policy Statement 3.14 – Significant Impact Guidelines for the vulnerable Growling Grass Frog (Commonwealth Guidelines) (DEWHA 2009a) which include the following survey condition requirements:

- Nocturnal surveys are to be undertaken between November and March (calling primarily takes place between November and December however the frogs may still be active in March);
- Daytime temperatures prior to survey are to be greater than 15oC with moderate to no wind;
- Night temperatures during survey are to be greater than 12oC with moderate to no wind.
- A minimum of two nights of survey under ideal conditions.

Surveys were conducted at suitable locations along the construction footprint between 2100hrs and 0200 hrs on the 15 March 2018, 16 March 2018, 19 March 2018, 20 March 2018, 23 March 2018, 24 March 2018, 27 March 2018, 28 March 2018. Standard methods including using a combination of active searching with spotlights in appropriate habitat, call recording and call playback (using the advertising call of the male) and a search of banks and emergent vegetation where appropriate. The number of nocturnal surveys undertaken was increased to four to increase chances of detection since March 2018 was at the tail end of the recommended survey period for the species (Heard et al. 2010). Further detail can be found in the Growling Grass Frog Targeted Survey Report (Monarc, 2018b).

2.3.2.3 Southern Toadlet

Southern Toadlet surveys were undertaken in accordance with the methodology prescribed in the Biodiversity Precinct Structure Planning Kit (DSE 2010) which include the following survey condition requirements:

- Survey from March to July.
- Survey techniques include listening for calls/call-playback/active searching/spotlighting.
- Survey two areas for 90 minutes in areas of suitable habitat.

Experienced field zoologists and ecologists from Monarc Environmental conducted nocturnal surveys within the study area on 23 May and 24 May 2018 at eight locations containing suitable habitat. Surveys were conducted between 5:30pm and 01:00am using a combination of listening, call playback (using the advertising calls of male Southern Toadlet), recording and active searching with spotlights in appropriate habitat. This included a search of banks and emergent vegetation where appropriate. Further detail can be found in the Targeted Southern Toadlet Survey Report (Monarc, 2018c).

2.3.2.4 Swamp Skink

The Biodiversity Precinct Structure Planning Kit (DSE 2010) recommends Swamp Skink surveys are undertaken between October and March and that the use of baited Elliott traps should occur over a five-day period.

Targeted surveys for Swamp Skink were conducted from late February to mid-March 2018 using both infra-red, motion sensing cameras and Elliott Traps in three locations. Two of the locations were within Warringine Park at Hastings (a known location for this species) while the third was a strip of swamp scrub adjacent to a coastal environment. Further detail can be found in the Targeted Swamp Skink Report (Monarc 2018d).

2.3.3 Aquatic Assessment

Aquatic surveys were undertaken using a combination of visual observation dip-netting, bait traps, fyke netting and electrofishing (backpack) targeting for species such as Dwarf Galaxia (*Galaxiella pusilla*) and the Australian Grayling (*Prototroctes maraena*). Surveys were undertaken on the 16 and 17 April 2018, 14 and 15 May 2018, and the 25, 26, 27 June 2018. The following 16 waterways and waterbodies were surveyed:

- Warringine Creek KP4.98;
- Watson Creek KP19.12;
- Pearcedale South Creek KP19.5;
- Langwarrin Creek KP21.08;
- Lachies Marsh KP21.21;
- Farm Dam and connected drainage channel KP21.65;
- Vowell Drive KP23.0 – 1st Constructed Wetland to the north of Vowell Drive;
- Vowell Drive KP23.0 – 2nd Constructed Wetland to the north of Vowell Drive;
- Craigs Lane KP23.95 – drainage channel;
- Rutherford Creek KP29.78;
- Western Outfall Drain KP31.06;
- Cardinia Creek KP40. 1st location (Ballarto Road);
- Cardinia Creek KP40. 2nd location (Bloomfield Lane);
- Toomuc Creek KP41.45;
- Deep Creek KP41.5;
- Pakenham Creek KP48.2.

Further detail can be found in the Aquatic Assessment Report (Monarc, 2018e).

2.4 Permitted Clearing Assessment (the Guidelines)

This section describes the Victorian permitted clearing guidelines and methods of applying those guidelines.

Note: The *Pipelines Act 2005* provides an exemption for clearing native vegetation under the *Planning and Environment Act 1987* but does require the principles of sustainable development (being 'biological diversity should be protected and ecological integrity maintained) to be applied (Clause 4(2)c). This is discussed further in Section 6.4.2.1. Given this link back to sustainable development in the *Pipelines Act 2005*, the Victorian permitted clearing guidelines were still applied to this project.

2.4.1 Risk-based Pathway

In Victoria, a permit is required to remove, destroy or lop native vegetation under Clause 52.17 of the Victorian Planning Provisions (VPP) empowered by the Victorian *Planning and Environment Act 1987*. These provisions are outlined in various guidelines discussed below.

In December 2017, the Victorian State Government released a set of reforms to replace the former Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI 2013a). The new Guidelines use risk-based pathways, based on the extent of vegetation removed and the location risk, to regulate the approval and conditions association with vegetation clearing.

The *Guidelines for the removal, destruction or lopping of native vegetation* (the Guidelines) outline how impacts on Victoria's biodiversity are assessed and the appropriate risk based pathway when an application to remove native vegetation is lodged (DELWP 2017a). The Guidelines are an incorporated document in all Victorian Planning Schemes and are applied alongside other requirements of the planning scheme when an application for a permit to remove native vegetation is considered by the responsible authority.

The risk based pathway approach categorises an application into one of three pathways. Taken from DELWP 2017a:

- Basic – limited impacts on biodiversity.
- Intermediate – could impact on large trees, endangered EVCs, and sensitive wetlands and coastal areas.
- Detailed – could impact on large trees, endangered EVCs, sensitive wetlands and coastal areas, and could significantly impact on habitat for rare or threatened species.

The location of the vegetation removal is then assessed in terms of significance for biodiversity. Three location categories have been assigned by DELWP (2007a) and in terms of importance include:

- Location 3 – includes locations where the removal of less than 0.5 hectares of native vegetation could have a significant impact on habitat for a rare or threatened species.
- Location 2 – includes locations that are mapped as endangered EVCs and/or sensitive wetlands and coastal areas (section 3.2.1) and are not included in Location 3.
- Location 1 – includes all remaining locations in Victoria.

Once the risk pathway and the location significance are known the application assessment pathway can be determined using Table 4.

Table 4: Native vegetation removal pathway

Extent of native vegetation to be removed	Location category		
	Location 1	Location 2	Location 3
Less than 0.5 hectares and not including any large trees	Basic	Intermediate	Detailed
Less than 0.5 hectares and including one or more large trees	Intermediate	Intermediate	Detailed
0.5 hectares or more	Detailed	Detailed	Detailed

The vegetation removal pathway then determines the level of assessment and information required in an application to remove, lop or destroy native vegetation. Under the Detailed pathway a site vegetation assessment would be required as outlined in Section 2.4.2.

2.4.2 Vegetation Assessment

From the desktop assessment, Monarc ecologists determined that the construction footprint would be likely to have greater than 0.5ha of native vegetation and that the detailed assessment pathway (Section 2.4.1) would be triggered. Therefore, vegetation was assessed in accordance with the methods outlined in this section.

Native vegetation along the construction footprint was defined under two categories in accordance with the Vegetation Quality Assessment Manual (DSE, 2004) and the Assessors Handbook for assessing applications to remove, destroy or lop native vegetation (DELWP, 2017a). These forms were either as 'remnant patch of native vegetation' or as a 'scattered tree'.

Patches are further defined (DELWP 2017a) as:

- an area of vegetation where at least 25 per cent of the total perennial understorey plant cover is native, or
- any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or
- any mapped wetland included in the current wetlands layer available in NVIM and other DELWP systems.

A scattered tree is defined as

- a native canopy tree that does not form part of a patch.
- Scattered trees have two sizes, small and large:
    - a small scattered tree is less than the large tree benchmark for the species in the relevant EVC
    - a large tree is equal to or greater than the large tree benchmark for the species in the relevant EVC

- a standing dead tree that does not form part of a patch is treated as a large scattered tree if it has a trunk diameter of 40 centimetres or more at a height of 1.3 metres above the ground.

Recorded patches of remnant native vegetation and native scattered trees are described in Section 3.2, Existing Conditions.

2.4.3 Avoid and Minimise

Efforts to avoid and minimise removal of remnant native vegetation are a priority under the assessment Guidelines (DELWP 2017a). In accordance with these Guidelines an Avoid and Minimise Statement is required that:

- describes any efforts to avoid the removal of, and minimise the impacts on the biodiversity and other values of native vegetation, and how these efforts focussed on areas of native vegetation that have the most value.
- The statement should include a description of the following:
  - Strategic level planning – any regional or landscape scale strategic planning process that the site has been subject to that avoided and minimised impacts on native vegetation across a region or landscape
  - Site level planning – how the proposed use or development has been sited or designed to avoid and minimise impacts on native vegetation.
  - That no feasible opportunities exist to further avoid and minimise impacts on native vegetation without undermining the key objectives of the proposal.

Efforts to avoid and minimise removal of remnant native vegetation and scattered native trees is addressed in Section 4.

2.4.4 Offset

Native vegetation permitted to be cleared may be offset with approval of Responsible Authority by planting, protection and management of other native vegetation. Under the new Guidelines, these offsets are required to be secured before clearing is approved either:

- Via a security agreement for the offset site that includes an onsite management plan.
- Evidence of a secured third-party offset, such as an allocated credit register extract from the native vegetation credit register.

2.4.5 Biodiversity Impact and Offset Requirements (BIOR) Report

Permits for the removal of native vegetation will include conditions from the Responsible Authority that outline any offset requirements. The Offset requirements are determined by DELWPs Environmental Systems Modelling platform (EnSym), and reported in a Biodiversity Impact and Offset Requirements (BIOR) Report. A draft ENSYM report has been prepared for the construction footprint and is discussed in Section 4.2.

2.5 Limitations

LogiCamms Consulting Pty Ltd t/a Monarc Environmental (Monarc) has prepared this report on behalf of APA for the Crib Point and Pakenham pipeline project.

The report includes a review of certain information that was obtained from the sources and contacts noted by methods described in the report, including information obtained from APA.

Land access was not available for seven properties (CPT046 & 047, CPT049, CPT075, CPT088, CPT128 & CPT129.), which comprise ~5km of the approximately 56km alignment. Modelled native vegetation available in NatureKit (DELWP 2018b) was utilised to determine native vegetation in these properties.

Surveys provide a sampling of flora at a given time only (February to August in this case). Different seasonal conditions may provide more flora species. While every effort has been taken to identify the significant species that may be expected to occur in the area and, subsequently, to examine parts of the alignment at times appropriate to the flowering of the significant species identified, some other flora species may not have been visible due to dormancy (e.g. orchids or certain herbaceous species which leaf and flower during certain periods of the year but remain underground at other times) or their presence during the survey period as seeds only (e.g. annuals whose life cycle is completed within one season). Targeted surveys for spring flowering orchids identified as having a moderate to high likelihood of occurrence will occur in spring 2018.

Monarc has exercised care in checking and interpreting the data and information referred to in this report. The report program has been designed and managed in good faith and in a manner that seeks to confirm the information available and test its accuracy and completeness. However, Monarc cannot guarantee the accuracy or completeness of that data and information. Accordingly, while our conclusions are based on the information available to us during our assessment of the work area, some of those conclusions could be different if the information upon which they are based is determined to be inaccurate or incomplete.

This report has been prepared specifically for APA for the purpose of understanding their environmental obligations relating to flora and fauna values associated with the Crib Point Pakenham Pipeline project. Any other persons seeking to rely upon this report should only do so after seeking approval from APA and independent expert advice from an Environmental Auditor accredited by DELWP or other appropriately qualified person.

Therefore, any representation, statement, opinion or advice expressed or implied in this report is made in good faith but on the basis, that Monarc, its agents and employees are not liable to any other person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above.

Monarc disclaims any obligation to update the report for events taking place or information becoming available or known to us, after the preparation of this report.

3 RESULTS

This section provides information gathered through the desktop reviews and site assessments. Information on natural values including flora, native vegetation communities and fauna is provided along with any relevant conservation status of these values. Appendix H provides detailed figures and mapping of ecological values found along the construction footprint.

3.1 Vegetation communities

This section describes the vegetation communities modelled along and recorded within the construction footprint in terms of Victorian Ecological Vegetation Classes, FFG Act listed communities and EPBC Act listed communities.

3.1.1 Ecological Vegetation Classes

3.1.1.1 Pre-1750 Ecological Vegetation Classes

DELWP pre-1750 modelled EVC mapping (Table 6) for the Gippsland Plains Bioregion shows that the construction footprint and the immediate surrounds would have originally been dominated by Swamp Scrub (EVC_53) from approximately KP30.0 onwards. In the Western Port area, a variety of EVC's existed to varying extents with Grassy Woodland (EVC_175), Heathy Woodland (EVC_48) and Damp Sands Herb-rich Woodland (EVC_3) having the largest extent. Swampy Riparian Woodland (EVC_83) occurred along the various water courses while Coastal Saltmarsh (EVC_9) was found close to the coast in areas of tidal influence. Lowland Forest (EVC-16) had extensive areas to the west of Hastings and two small areas towards Crib Point. These vegetation types are summarised below in Table 5 (DELWP 2018c). The last 1200m of the alignment is within the Highlands-Southern Fall Bioregion and modelled as Swampy Woodland (EVC_937).

Due to extensive clearing for agriculture and the draining of swamps, historic EVC classes have been vastly reduced in size, distribution and quality, resulting in habitat fragmentation and loss of biodiversity. Extant (2005) EVC mapping shows most of the alignment has been cleared of remnant vegetation and remaining vegetation patches are primarily Heathy Woodland with occurrences of Swamp Scrub (DELWP 2018c).

Table 5: DELWP modelled pre-1750 Ecological Vegetation Classes within the local area.

Bioregion	EVC Number and Name	DELWP Status	Occurrence
Gippsland Plain	3 Damp Sands Herb-rich Woodland	Vulnerable	Common
	9 Coastal Saltmarsh	Least Concern	Common
	16 Lowland Forest	Vulnerable	Common
	48 Heathy Woodland	Least Concern	Common
	53 Swamp Scrub	Endangered	Common
	83 Swampy Riparian Woodland	Endangered	Common
	175 Grassy Woodland	Endangered	Common
	793 Damp Heathy Woodland	Vulnerable	Naturally Restricted

Bioregion	EVC Number and Name	DELWP Status	Occurrence
Highlands-Southern Fall	937 Swampy Woodland	Endangered	Naturally Restricted

3.1.1.2 Recorded Ecological Vegetation Classes

The field assessments identified predominantly fragmented and largely degraded patches of native vegetation that remain along the construction footprint and these often contained a mixture of native and introduced weeds.

In general, extensive historical clearing associated with agriculture and horticulture has resulted in most of the construction footprint and surrounding land largely devoid of remnant native vegetation. However, during the field surveys the construction footprint was found to intersect many small patches of remnant vegetation, 91 individual patches were recorded (See Appendix C).

Of the 91 patches, 46 will be impacted by the construction footprint, as 45 patches will be avoided through the use of HDD and other design modifications. Clearing of 6.832 ha of remnant vegetation will be required for the construction footprint comprised of:

- 3.29ha of Endangered EVCs
- 2.444ha of Vulnerable EVCs
- 1.098ha of Least Concern EVCs

This remnant vegetation is summarised in **Table 6** and presented in detailed maps in Appendix H.

Table 6: Remnant patches of native vegetation identified during the field assessments.

Bioregion	EVC Number and Name	DELWP Status	Area within construction footprint (ha)
Gippsland Plain	9 Coastal Saltmarsh**	Least Concern	0
	48 Heathy Woodland	Least Concern	1.098
	53 Swamp Scrub	Endangered	2.615
	83 Swampy Riparian Woodland	Endangered	0.264
	175 Grassy Woodland	Endangered	0.412
	793 Damp Heathy Woodland	Vulnerable	2.444

** EPBC Act listed community Subtropical and Temperate Coastal Saltmarsh is included to show there is no impact

The presence of these EVC's was determined based on vegetation composition, soil types and location. The larger areas of remnant vegetation occurred in the reserves (eg Warringine Park, Western Port Coastal Park) and two private properties towards the southern end of the alignment. The remaining remanent patches largely occurred within roadside vegetation and along creek lines and low-lying areas.

Many indigenous scattered trees were also identified either on the alignment, or near the edge of the alignment.

A description of each recorded EVC is provided below.

EVC_9: Coastal Saltmarsh:

Coastal Saltmarsh within the *Gippsland Plain Bioregion* is described as occurring on and immediately above marine and estuarine tidal flats and contains distinct floristic communities as bands or zones in the same location, depending on the positioning of the various floristic communities in relation to the saline environment. This EVC consists of a range of life forms including succulent herbs, low succulent shrubs, rushes and sedges (DELWP 2018c).

The occurrence of Coastal Saltmarsh was confined to tidal creeks, especially Watson Creek (KP19.1). The Coastal Saltmarsh at Watson Creek (CPT052) was characterised by Shrubby Glasswort *Tecticornia arbuscular*, a shrubby succulent, Beaded Glasswort *Sarcocornia quinqueflora,* Marsh Saltbush *Atriplex paludosa* subsp. *paludosa,* Sea Rush *Juncus krausii,* Rounded Noon-flower *Disphyma crassifolium* ssp. *clavellatum,* Shiny Swamp-mat *Selliera radicans,* Prickly Spear-grass *Austrostipa stipoides,* and Australian Salt-grass *Distichlis distichophylla.*

EVC_48: Heathy Woodland:

Heathy Woodland within the *Gippsland Plain Bioregion* is described spanning a variety of geologies but is generally associated with nutrient-poor soils including deep uniform sands (aeolian or outwash) and Tertiary sand/clay which has been altered to form quartzite gravel. Eucalypt-dominated low woodland to 10 m tall lacking a secondary tree layer and generally supporting a diverse array of narrow or ericoid-leaved shrubs except where frequent fire has reduced this to a dense cover of bracken. Geophytes and annuals can be quite common but the ground cover is normally fairly sparse (DELWP 2018c).

A large contiguous patch of Heathy Woodland was assessed on private property (CPT044 – CPT045) centred around KP15.00. This patch consisted of an overstorey Narrow-leaf Peppermint *Eucalyptus radiata* and Coast Manna Gum *E. viminalis* ssp. *pryoriana*. The understorey of this patch is comparatively intact with a large portion of indigenous understorey species present including Common Heath *Epacris impressa,* Prickly Tea-tree *Leptospermum continentale,* Common Correa *Correa reflexa,* Red-fruit Saw-sedge *Gahnia sieberiana,* Spiny-headed Mat-rush *Lomandra longifolia,* Small Grass Tree *Xanthorrhoea minor,* Small Mosquito-orchid *Acianthus pusillus* and Weeping Grass *Microlaena stipoides.* Weed species in this patch included Radiata Pine *Pinus radiata,* Bluebell Creeper *Billardieria heterophylla,* Bridal Creeper *Asparagus asparagoides* and Boneseed *Chrysanthemoides monilifera.*

EVC_53: Swamp Scrub:

Swamp Scrub within the *Gippsland Plain Bioregion* is a closed scrub to 8 m tall at low elevations on alluvial deposits along streams or on poorly drained sites with higher nutrient availability. The EVC is dominated by Swamp Paperbark *Melaleuca ericifolia* (or sometimes Woolly Tea-tree *Leptospermum lanigerum*) which often forms a dense thicket, out-competing other species. Occasional emergent eucalypts may be present. Where light penetrates to ground level, a moss/lichen/liverwort or herbaceous ground cover is often present. Dry variants have a grassy / herbaceous ground layer (DELWP 2018c).

Swamp Scrub was mapped at many locations across the alignment, varying in both age and quality between Warringine Park (KP3.2) to approximately KP52.3, on private property. (Appendix D3). The best examples of Swamp Scrub in all its forms were from Warringine Park. Dense, mature Swamp Scrub, with limited understorey except for areas of sun penetration, can be found around KP4.0 – KP4.3 while lower, more open areas supporting a variety of groundcover species are nearby. In the mature stands, logs were common, and the soil showed signs of inundation. The more open areas contained a variety of woody and non-woody species including Prickly Currant-bush *Coprosma quadrifida,* Angled Lobelia *Lobelia anceps,* Shiny Swamp-mat *Selliera radicans,* Swamp Crassula *Crassula helmsii,* Tall Rush *Juncus procerus* and Common Reed *Phragmites australis*.

In some patches, there was a moderate to high coverage of weeds including Sweet Pittosporum *Pittosporum undulatum,* Bridal Creeper, Spear Thistle *Cirsium vulgare,* Blackberry *Rubus fruticosus* agg. and a mixture of pasture grasses. This was especially relevant to linear strips of Swamp Scrub along roadsides and adjacent to paddocks used for grazing livestock.

The presence of Swamp Scrub and a coastal environment can highlight the potential for the FFG Act threatened community of Coastal Moonah Woodland to be present in the area. This community is dominated by Moonah (*Melaleuca lanceolata subsp. lanceolata*) and is thought to have once occupied over 12,500ha on the Mornington Peninsula pre-European settlement but is now restricted to less than 1000ha for its entire Victorian distribution (DSE, 2003). Field surveys did not record the key indicator species of this community within the alignment so it has been determined not to be present.

EVC_83: Swampy Riparian Woodland:

Swampy Riparian Woodland within this bioregion is described as woodland to 15 m tall generally occupying low energy streams of the foothills and plains. The lower strata are variously locally dominated by a range of large and medium shrub species on the stream levees in combination with large tussock grasses and sedges in the ground layer (DELWP 2018c).

Most of the remnants of this EVC were of a small size, however one large patch totalling approximately 0.7ha in size was assessed in the northern part of Warringine Park (KP4.7), centring on Warringine Creek southwards towards the fire access track.

This example had an overstorey of Swamp Gum *Eucalyptus ovata* with understorey trees of Swamp Paperbark and a mixture of shrubs including Sweet Bursaria *Bursaria spinosa* and Prickly Tea-tree. The ground layer was a mixture of graminoids including Tall Rush, Kangaroo Grass *Themeda triandra, Austrostipa* spp., Wattle Mat-rush *Lomandra filiformis* and Weeping Grass. Austral Bracken *Pteridium esculentum* was also present in some areas. This patch had been burnt recently leading to cover of medium shrubs being around 200% of benchmark cover for this lifeform.

EVC_175: Grassy Woodland:

Grassy Woodland within the *Gippsland Plain* is a variable open eucalypt woodland to 15 m tall or occasionally Sheoak woodland to 10 m tall over a diverse ground layer of grasses and herbs. The shrub component is usually sparse. It occurs on sites with moderate fertility on gentle slopes or undulating hills on a range of geologies (DELWP 2018c).

Remnant vegetation most attributable to this EVC was found in many locations across the construction footprint, including parts of the Frankston Flinders Road reserve. The best example of this community was identified in the northern part of Warringine Park (KP5.0), north of Warringine Creek. This patch,

nearly half a hectare in size, had an overstorey of Eucalypts with Cherry Ballart *Exocarpos cupressiformis,* Black Wattle *Acacia mearnsii* and Black Sheoak *Allocasuarina littoralis* being the characteristic understorey tree species. The shrub layer made up 40% of the cover, being over the benchmark for this community, most probably due in part to recent fire history and being ecotonal with the Swampy Riparian Woodland along Warringine Creek. The shrub species recorded included Hedge Wattle *Acacia paradoxa*, Common Cassinia *Cassinia aculeata*, Cranberry Heath *Astroloma humifusum*, Honey-pots *Acrotriche serrulata* and Prickly Tea-tree. All of these are typical for this community. Groundcovers of herbs and graminoids were also present including Common Raspwort *Gonocarpus tetragynus*, Spiny-headed and Wattle Mat-rushes, Thatch Saw-sedge *Gahnia radula*, Kangaroo Grass, Weeping Grass, Austral Bracken and Apple-berry *Billardiera* sp. Again, these ground cover species are typical of this vegetation community.

Weeds within this patch included the "High Threat" Sweet Vernal Grass *Anthoxanthum odoratum* and other grasses like the Large Quaking Grass *Briza maxima* and Paspalum *Paspalum dilatatum.*

EVC_793: Damp Heathy Woodland:

Damp Heathy Woodland within this bioregion is described as woodland to 10 m tall with tall dense heathy understorey which becomes tall scrub if long unburnt in high rainfall areas. The ground layer consists of grasses, herbs, small shrubs and tough-leaved monocots. Developed on sandy soils of moderate to low fertility, typically wet in winter due to impeding layer in soil and dry in summer (DELWP 2018c).

This community was identified in a small number of locations, with all the patches within the first 2.5km of the construction footprint. These patches had Swamp Gum in the overstorey, where an overstorey was present, Prickly Tea-tree, Burgan *Kunzea* sp. and several other shrub species in the understorey. The ground layer had typically characteristic species including Common Raspwort, Scented Sun-dew *Drosera aberrans*, Kangaroo Grass, Sword-sedge *Lepidosperma* sp. and the scrambler, Slender Dodder-laurel *Cassytha glabella.*

Weeds across these areas included Sweet Vernal Grass, Kikuyu *Cenchrus clandestinus,* blackberry and invasive non-indigenous natives like Sweet Pittosporum and Coast Wattle *Acacia longifolia* subsp. *sophorae.*

3.1.1.3 Scattered Indigenous Trees

The construction footprint was found to contain 37 scattered indigenous trees (Table 7). Of the 37 scattered indigenous trees, 11 were large, the remaining were small scattered trees. Each scattered tree is given a tree protection zone in hectares of the EVC the tree would have once contributed towards. This area is then used to calculate the associated offset along with the number of scattered trees proposed for removal. The tree protection zone area of the 37 scattered trees was equal to 1.418ha consisting of:

- 0.874ha of an Endangered EVC
- 0.14ha of a Vulnerable EVC
- 0.404ha of a Least Concern EVC

Table 7: Scattered Tree Results

Identifier	Type	BioEVC	BioEVC Conservation Status	Large trees	Partial Removal	Condition Score	Polygon Extent	Extent without overlap. Equivalent removal (ha)
3-CPP-ST	Scattered Tree	gipp0048	Least Concern	1	no	0.2	0.07	0.0700
4-CPP-ST	Scattered Tree	gipp0048	Least Concern	1	no	0.2	0.07	0.0700
5-CPP-ST	Scattered Tree	gipp0048	Least Concern	0	no	0.2	0.031	0.0000
6-CPP-ST	Scattered Tree	gipp0049	Least Concern	0	no	0.2	0.031	0.0000
8-CPP-ST	Scattered Tree	gipp0048	Least Concern	0	no	0.2	0.031	0.0310
9-CPP-ST	Scattered Tree	gipp0048	Least Concern	1	no	0.2	0.07	0.0700
11-KOJH-ST	Scattered Tree	gipp0049	Least Concern	1	no	0.2	0.07	0.0700
18-KOJH-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0310
28-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0310
29-CPP-ST	Scattered Tree	gipp0175	Endangered	1	no	0.2	0.07	0.0560
29- KOJH-ST	Scattered Tree	gipp0175	Endangered	1	no	0.2	0.07	0.0560
30-KOJH-ST	Scattered Tree	gipp0175	Endangered	1	no	0.2	0.07	0.0700
31-KOJH-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0310
32-KOJH-ST	Scattered Tree	gipp0175	Endangered	1	no	0.2	0.07	0.0700
44-KOJH-ST	Scattered Tree	gipp0083	Endangered	0	no	0.2	0.031	0.0260
45-KOJH-ST	Scattered Tree	gipp0083	Endangered	0	no	0.2	0.031	0.0260
56-KOJH-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0290
57-KOJH-ST	Scattered Tree	gipp0175	Endangered	1	no	0.2	0.07	0.0550
58-KOJH-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0100
59-KOJH-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0310
60-KOJH-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0310
65-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0310
67-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0270
68-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0270
69-CPP-ST	Scattered Tree	gipp0003	Vulnerable	1	no	0.2	0.07	0.0700
75-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0290
79-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0290
80-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0280
81-CPP-ST	Scattered Tree	gipp0175	Endangered	0	no	0.2	0.031	0.0280
82-CPP-ST	Scattered Tree	gipp0003	Vulnerable	1	no	0.2	0.07	0.0700
96-CPP-ST	Scattered Tree	gipp0048	Least Concern	0	no	0.2	0.031	0.0310
100-CPP-ST	Scattered Tree	gipp0048	Least Concern	0	no	0.2	0.031	0.0310
141-CPP-ST	Scattered Tree	hsf_0937	Endangered	0	no	0.2	0.031	0.0310
142-CPP-ST	Scattered Tree	hsf_0937	Endangered	0	no	0.2	0.031	0.0300

Identifier	Type	BioEVC	BioEVC Conservation Status	Large trees	Partial Removal	Condition Score	Polygon Extent	Extent without overlap. Equivalent removal (ha)
143-CPP-ST	Scattered Tree	hsf_0937	Endangered	0	no	0.2	0.031	0.0300
144-CPP-ST	Scattered Tree	hsf_0937	Endangered	0	no	0.2	0.031	0.0310
146-CPP-ST	Scattered Tree	gipp0048	Least Concern	0	no	0.2	0.031	0.0310
Total				**11**				**1.418**

3.1.1.4 Planted Native Vegetation

Planted native vegetation was recorded at various locations along the construction footprint. Offsets associated with the removal of planted native vegetation, if required, will be determined by APA in consultation with relevant landowners and DELWP.

3.1.1.5 Non-native Vegetation

Under the CaLP Act, landholders have a duty to prevent the growth and spread of regionally controlled weeds (non-native vegetation) on their property and on adjoining roadsides and to eradicate regionally prohibited weeds. Declaration and management of weed issues within these catchments are undertaken by PPWCMA.

The field surveys noted the prevalence of opportunistic weed infestations throughout the proposed construction footprint and surrounding areas, particularly in agricultural properties. These include common and widely distributed weed species like Plantain *Plantago* spp. and Sheep Sorrel *Acetosella vulgaris*. Declared noxious weeds (Agriculture Victoria, 2018) such as Blackberry *Rubus fruticosa* agg, Gorse *Ulex europaeus* and Spear Thistle *Cirsium vulgare* were also present. These weeds are listed as regionally controlled within the Port Phillip and Western Port catchment (**Table 8** below). Other species may be used as pasture but considered a weed species outside of these areas, such examples include Phalaris *Phalaris* spp. and Oats *Avena* spp. which have invaded many roadside areas with remnant native vegetation. The success of invasive weed species is expected to persist with current land use.

Table 8: Summary of Declared Noxious Weeds occurring in construction footprint

Scientific Name	Common Name	Declared Noxious Weed Status PPWCMA
Allium triquetrum	Angled Onion	Regionally Restricted
Asparagus asparagoides	Bridal Creeper	Regionally Restricted
Chrysanthemoides monilifera	Boneseed	Regionally Controlled
Cirsium vulgare	Spear Thistle	Regionally Controlled
Crataegus monogyna	Hawthorn	Regionally Controlled
Cysticus scoparius	English Broom	Regionally Controlled
Genista linifolia	Flax-leafed Broom	Regionally Controlled
Genista monspessulana	Cape Broom	Regionally Controlled

Scientific Name	Common Name	Declared Noxious Weed Status PPWCMA
Lycium ferocissimum	African Boxthorn	Regionally Controlled
Oxalis pes-caprae	Soursob	Regionally Restricted
Rosa rubiginosa	Sweet Briar	Regionally Controlled
Rubus fruticosa spp. agg.	Blackberry	Regionally Controlled
Salix sp.	Willow	Regionally Restricted
Ulex europeus	Gorse	Regionally Controlled
Watsonia meriana var *bulbilifera*	Wild Watsonia	Regionally Controlled
Xanthium spinosum	Bathurst Burr	Regionally Controlled

Four of the above noxious weeds are also identified as Weeds of National Significance (WoNS) (DOEE 2018). These are Bridal Creeper, Boneseed, Blackberry and Gorse.

Weeds can impact on both agricultural productivity and biodiversity. Appropriate measures to manage the potential spread or introduction of weeds during construction will be required and included in the Construction Environment Management Plan to be prepared for the project.

3.1.2 FFG Act listed communities

One FFG Act listed community was identified with the potential to occur within the ROW. This community is known as:

Herb rich Plains Grassy Wetland (West Gippsland) Community

The Herb rich Plains Grassy West Gippsland) Community typically occurs in shallow (less than 50cm deep) seasonal wetlands that fill in winter and spring and are dry by summer. Some may retain water for longer periods, but typically only have surface water for up to six months. The community contains a rich plant association of grasses, sedges and aquatic herbs.

It is estimated that less than 70 ha of this community still exists, including degraded areas. Remnants occur at Barnbam Swamp at Lyndhurst, along the fringe of the former Carrum Carrum Swamp, on private land at Braeside Park, and along rail reserves between Dandenong and Cranbourne, Dandenong and Berwick and Clyde and Tooradin. The Clyde to Tooradin rail reserve crosses Manks Road and Muddy Gates Lane at the point where the pipeline crosses at KP33.5.

The site assessment of the alignment within the rail reserve between Muddy Gates Lane and Manks Road found this area of the construction footprint to be almost exclusively Phalaris, Common Reed, blackberries and a mixture of pasture grasses.

However, adjacent to and North of the construction footprint, and south of the rail line, there is a shallow depression that held water at the time of the last site visit. It is likely this area that is outside the construction footprint may be Herb rich Plains Grassy Wetland.

One of the characteristic species, Water Ribbons *Triglochin procerum,* of this community was observed to be present during a brief visit in early August 2018. The presence of Herb rich Plains Grassy Wetland

West Gippsland) Community will be confirmed or when the additional flora surveys are undertaken in Spring 2018.

3.1.3 EPBC Act listed communities

Three EPBC Act listed communities have potential to occur along the construction footprint based on the EPBC Act Protected Matters Search Tool (Appendix B). These are:

- Natural Damp Grassland of the Victorian Coastal Plains – Critically Endangered
- Subtropical and Temperate Coastal Saltmarsh - Vulnerable
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland - Critically Endangered

One of these communities, Subtropical and Temperate Coastal Saltmarsh, was detected during field surveys and vegetation quality assessments, using the thresholds provided in the relevant Policy document (DSEWPaC 2013b).

The description of each of the EPBC Act listed communities used to assess presence or absence is provided below.

Natural Damp Grassland of the Victorian Coastal Plains:

The Natural Damp Grassland of the Victorian Coastal Plains is a type of grassland dominated by tussock grasses, typically with a sparse presence of trees and shrubs. It is generally found at elevations less than 100 metres above sea level, on heavy grey silty–loamy soils that are poorly draining, often damp and sometimes waterlogged. The ecological community is limited to southern Victoria, and has a disjunct distribution on the coastal plains. There are known occurrences in south Gippsland, the head of Western Port Bay, Philip Island, Mornington Peninsula and the Bellarine Peninsula. The Natural Damp Grassland of the Victorian Coastal Plain corresponds to EVC 132_62 Plains Grassland (South Gippsland) Community (FFG Act).

The grassland generally is dominated by tussock grasses, notably *Themeda triandra* (kangaroo grass) on drier sites, or *Poa labillardierei* (tussock grass) on wetter sites. The range of grasses and forbs present includes species associated with damp sites. (DoE 2015c). The diagnostic tussock grasses were not recorded along the ROW in a density that represents Natural Damp Grassland of the Victorian Coastal Plains.

Subtropical and Temperate Coastal Saltmarsh:

The Subtropical and Temperate Coastal Saltmarsh ecological community occurs on the coastal margin, along estuaries and coastal embayments and on low wave energy coasts. It is typically found on sandy or muddy substrate and may include coastal clay pans or similar areas. It occurs in places with at least some tidal connection, including rarely-inundated supratidal areas, intermittently opened or closed lagoons, and groundwater tidal influences. The ecological community may also include areas that have groundwater connectivity to tidal water bodies.

The ecological community consists of dense to patchy areas of mainly salt-tolerant vegetation (halophytes) including: grasses, herbs, sedges and shrubs that may also include bare sediment as part of the mosaic). Characteristic plant species include *Gahnia filum, G. trifida*, *Juncus kraussii*, *Samolus*

repens, *Sarcocornia quinqueflora*, *Sporobolus virginicus*, *Suaeda australis*, *Tecticornia pergranulata*, *T. arbuscula*, *Triglochin striata*, *Wilsonia backhousei* and *W. rotundifolia*.

Succulent herbs, shrubs and grasses generally dominate and vegetation is generally of less than 0.5 m height (with the exception of some reeds and sedges). Many species of non-vascular plants are also found in saltmarsh including epiphytic algae, diatoms and cyanobacterial mats.

The ecological community is inhabited by a wide range of fauna such as prawns, fish and water birds. The dominant marine residents are benthic invertebrates, including molluscs and crabs.

The Subtropical and Temperate Coastal Saltmarsh ecological community corresponds with two EVCs (EVC 9 Coastal Saltmarsh aggregate & EVC 10 Estuarine Wetland) that are limited to the coastal bioregions in Victoria (DoE 2018). This community exists along the shoreline of Western Port Bay at KP 19.0- 19.5 where it will be avoided through the use of HDD.

White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland:

This listed community can occur either as woodland or grassland from which the trees have been removed. It has a ground layer dominated by native tussock grasses and herbs (that is, greater than 50%) and a sparse, scattered shrub layer (less than 30%). White Box (*Eucalyptus albens*), Yellow Box (*E. melliodora*) or Blakely's Red Gum (*E. blakelyi*) dominate the community where a tree layer still occurs (DEH 2006a).

In Victoria, the community tends to occur on the slopes and tablelands on the northern side of the Great Dividing Range (GDR). The EVCs that may correspond to this community include Valley Grassy Forest (EVC 47) and Grassy Woodland (EVC 175).

3.2 Flora

Database searches identified a total of 67 rare or threatened flora species of relevance to the construction footprint. These comprised 14 species listed on the EPBC Act, 18 listed as protected on the Victorian FFG Act and 33 species listed on the Advisory List of Rare or Threatened Plants in Victoria.

A total of 201 flora species were recorded during field surveys. These comprised of 118 indigenous species, 13 non-indigenous natives and 70 introduced species.

One threatened flora species was recorded during field surveys. A single *Eucalyptus strzeleckii* was recorded within the construction footprint at KP21 near Langwarrin Creek.

Flora surveys were undertaken during Summer, Autumn and Winter 2018. This timing and some delayed access to properties were not ideal to detect the EPBC Act listed Dense Leek-orchid, Swamp Fire Weed, Swamp Everlasting or FFG Act listed Merran's Sun Orchid. These species are considered to have a high likelihood of occurrence in the construction footprint at the following locations:

- Dense Leek-orchid (Vulnerable - EPBC Act) in Damp Heathy Woodland between KP 1 to 2 as known populations exist in similar habitat nearby at Crib Point and Stony Point.
- Swamp Fireweed (Vulnerable - EPBC Act) in suitable habitat at KP 33.5 as known populations exist nearby at Muddy Gates Lane and Manks Road, and the South Gippsland Railway line.

- Swamp Everlasting (Vulnerable - EPBC Act) in suitable habitat along KP 33.5 as known populations exist nearby at Muddy Gates Lane and Manks Road, and the South Gippsland Railway line.
- Merran's Sun Orchid (Listed FFG Act) in Damp Heathy Woodland between KP 1 to 2 as known populations exist in similar habitat nearby at Crib Point.

Further surveys for these species in areas of suitable habitat are proposed to be undertaken:

- November – March for Swamp Fire Weed and Swamp Everlasting
- September – November for Dense Leek-orchid and Merran's Sun Orchid

A detailed list of all flora species identified by database searches and recorded during field surveys is provided in **Appendix C**.

The likelihood of occurrence assessment identified 15 rare or threatened flora species with high or moderate likelihood of occurring within the construction footprint, as listed in **Table 9**. A detailed analysis of the likelihood of rare or threatened species occurrence is provided in **Appendix D**.

Table 9: Threatened Flora identified as having a "High" to "Moderate" likelihood of occurrence in the construction footprint.

Common Name	Scientific Name	Status
		EPBC/FFG/DELWP
River Swamp Wallaby-grass	*Amphibromus fluitans*	VU
Marsh Saltbush	*Atriplex paludosa ssp paludosa*	r
Grey Mangrove	*Avicennia marina*	r
Creeping Rush	*Juncus revolutus*	r
Salt Lawrencia	*Lawrencia spicata*	r
Dense Leek-orchid	*Prasophyllum spicatum*	VU / en
Swamp Fireweed	*Senecio psilocarpus*	VU / vu
Marsh Sun-orchid	*Thelymitra longiloba*	en
Hoary Sun-orchid	*Thelymitra orientalis*	vu
Pallid Sun-orchid	*Thelymitra pallidiflora*	en
Crested Sun-orchid	*Thelymitra X irregularis*	r
Crimson Sun-orchid	*Thelymitra X macmillanii*	vu
Merran's Sun-orchid	*Thelymitra X merraniae*	L / en
Swamp Everlasting	*Xerochrysum palustre*	VU/ L / en
Strzelecki Gum*	*Eucalyptus strzeleckii*	VU / L / vu

Legend:
*recorded
EPBC Act: CE = critically endangered, EN = endangered, VU = vulnerable

FFG Act: L = Listed, X = rejected, N = nominated
Victorian Rare or Threatened list (VROT): en = endangered, r = rare, vu = vulnerable, ex = presumed extinct

3.3 Fauna

The construction footprint is considered to support six broad habitat types: introduced grassland/pasture with occasional remnant native species, areas of vegetable production, remnant patches of native woodland (Heathy Woodland, Grassy Woodland and Damp Heathy Woodland), scattered trees and aquatic/riparian habitats (Coastal Saltmarsh, Swamp Scrub and Swampy Riparian Woodland) provided by waterways and dams (See Table 6 for areas within the construction footprint).

Introduced grassland/pasture and vegetable cropping areas are the most common habitat in the construction footprint and are generally considered of low habitat value for native fauna. However, some of the native vegetation and introduced vegetation intersected by the construction footprint has been found to provide habitat for species or communities of conservation significance such as the Southern Brown Bandicoot.

Database searches identified a total of 42 rare or threatened fauna species of relevance to the construction footprint. These comprised 16 species listed on the EPBC Act, 20 listed as protected on the Victorian FFG Act and 6 species listed on the Victorian Advisory List of Threatened Vertebrate Fauna.

A total of 145 fauna species were recorded during field surveys. This included two macroinvertebrates, eight amphibians, 101 birds, 10 fish, 19 mammals and five reptiles. Twenty-three of the recorded fauna species were introduced species.

A detailed list of all fauna species identified by database searches and recorded during field surveys is provided in **Appendix E**.

The likelihood of occurrence assessment, determined by the suitability of habitat and recent records, identified 16 rare or threatened fauna species with high or moderate likelihood of occurring within the construction footprint, as listed in Table 10. A detailed analysis of the likelihood of rare or threatened species occurrence is provided in **Appendix F**.

Table 10: Threatened Fauna identified as having "High" or "Moderate" likelihood of occurrence or occurred in the construction footprint.

Common Name	Scientific Name	Recorded in the construction footprint	Conservation Status		
			EPBC	FFG	VTVF
Australasian Shoveler	*Anas rhynchotis*	Y			vu
Australian Grayling	*Prototroctes maraena*		VU	L	vu
Baillons Crake	*Porzana pusilla palustris*		Mr	L	vu
Blue-billed Duck	*Oxyura australia*			L	en
Cattle Egret	*Ardea ibis*	Y	Mr		
Dwarf Galaxis	*Galaxiella pusilla*		VU	L	en
Eastern Great Egret	*Ardea modesta*	Y	Mr	L	vu
Glossy Grass Skink	*Pseudemoia rawlinsoni*	Y			vu

Common Name	Scientific Name	Recorded in the construction footprint	Conservation Status		
			EPBC	FFG	VTVF
Growling Grass Frog	*Litoria raniformis*	Y	VU	L	en
Hardhead	*Aythya australis*	Y			vu
Latham's Snipe	*Gallinago hardwickii*		M, Mr		nt
Lewin's Rail	*Lewinia pectoralis pectoralis*	Y		L	vu
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	Y	EN	L	nt
Southern Toadlet	*Pseudophryne semimarmorata*	Y			vu
Swamp Skink	*Lissolepis coventryi*			L	vu
White-throated Needletail	Hirundapus caudacutus		M, Mr		vu

Legend:
Y = recorded during survey,
EPBC Act: CE = critically endangered, EN = endangered, VU = vulnerable, M = migratory, Mr = marine
FFG Act: L = Listed, X = rejected, N = nominated
Victorian Advisory List of Threatened Vertebrate Fauna (VTVF): en = endangered, r = rare, vu = vulnerable, ex = presumed extinct, nt = near threatened

3.4 Targeted Threatened Fauna Surveys

This section describes the results of the Targeted fauna surveys along the construction footprint.

3.4.1 Southern Brown Bandicoot

Southern Brown Bandicoots were recorded at eight of the 35 locations were camera surveys were undertaken. In addition, presence of the species has been assumed at a further eight locations based on recent records. These 16 locations extend from the South Gippsland Highway (KP30.3) to the Princes Freeway (KP54.4) (See Table 11). Two of the assumed present sites, East of Koo Wee Rup Road (near KP 46.5) and McDonalds Drain Road Reserve (near KP 48.5), are outside of the ROW.

Table 11: Southern Brown Bandicoot Survey Results

Easement Number	KP	Location	Brief Description	Presence
CPT085	33.4	Muddy Gates Drain	A mixture of exotic and native grasses	A
Road reserve	33.4	Muddy Gates Lane(adjacent to CPT086)	Under a thick Cypress Hedge	A
CPT087	33.5	South Gippsland Railway Line (inactive)	A mixture of exotic and native grasses	A
CPT088	34.6	Adjacent to Manks Road	Planted Vegetation along fenceline	R
CPT091	35.4	Adjacent to Tooradin Station Road	Fallen pine tree in a heavily grassed roadside plantation	R

Easement Number	KP	Location	Brief Description	Presence
CPT097	37.1	Tooradin Inlet Drain	Blackberries and Phalaris on top of drain bank	R
CPT098	37.5	Adjacent to Ridgeways Drain	Hawthorn hedge with blackberries	A
CPT106	40.0	Cardinia Creek (Bloomfield Lane)	Heavily planted creek embankment	R
CPT105	40.4, 40.8, 41.3	Lower Scrub Gum Creek east of and adjacent to the construction footprint	Heavily planted creek embankment	R
CPT108	41.6	Deep Creek	The heavily grassed area adjacent to a watercourse	R
CPT 111	43.0	Paddock drain (adjacent on the southern boundary of CPT111, south of Soldiers Road)	A narrow strip dense vegetation along a paddock drain.	R
CPT118	46.25	Hagelthornes Drain	Dense phalaris beside drain with Phragmites and blackberries	A
CPT120 (1)	46.3	East of Koo Wee Rup Rd (#1)	Adjacent to Swamp Scrub in the road reserve	R
CPT120 (2)	46.5	East of Koo Wee Rup Rd (#2)	Adjacent the dense phalaris and Phragmites and **outside of the ROW**.	A
CPT125	48.4	Pakenham Creek	On levee bank of creek amongst gorse and swamp scrub	A
Road reserve	48.4	McDonalds Drain Road (Adjacent to CPT126)	In road reserve amongst blackberries and **outside of ROW**	A

Key: R = recorded, A = assumed present

Habitat where the Southern Brown Bandicoot was recorded or is likely to occur in variable habitat ranging from intact native vegetation to highly disturbed patches in agricultural or semi-urban areas, where weeds dominate the vegetation.

Further detail can be found in the Targeted Southern Brown Bandicoot Survey Report (Monarc 2018a).

3.4.2 Growling Grass Frog

Growling Grass Frog was recorded at Cardinia Creek South – Bloomfield Lane (KP 40-40.3, site CPT105) but is also assumed present at Cardinia Creek, Ballarto Road (also KP 40-40.3, site CPT106) given both sites are hydrologically connected and in very close proximity. These sites will be avoided from impact using Horizontal Directional Drilling (HDD) techniques.

Growling Grass Frogs tend to be associated with permanent still or slow flowing waterbodies such as streams, farm dams and billabongs. They can also use temporarily inundated waterbodies for breeding purposes, provided that they contain water over the breeding season. Typically, the species prefers well vegetated water bodies that support extensive areas of emergent, submerged and floating vegetation as these provide both basking sites and protection from predators as well as areas for egg deposition (DEWHA 2009b). Growling Grass Frogs were not recorded but may be present at the following locations which provide suitable habitat for the species:

- KP 20.32
- KP 23.05 – avoided by HDD
- KP 31.1
- KP 41.5 – avoided by HDD
- KP 48.55

Further detail can be found in the Targeted Growling Grass Frog Survey Report (Monarc 2018b).

3.4.3 Southern Toadlet

The Southern Toadlet was observed under leaf litter on the western side of the pond at CPT009 (KP2.25) and is outside of the construction footprint (See map 2 of24). The pond at this location was devoid of aquatic vegetation, however, shrubby vegetation such as Swamp Paperbark and Hedge Wattle, adjacent to the pond, supplied leaf litter on the pond's edge.

Further detail can be found in the Targeted Southern Toadlet Survey Report (Monarc 2018c).

3.4.4 Swamp Skink

Swamp Skink was not physically recorded during the targeted survey. However, recent records from the VBA indicate that Swamp Skinks have been recorded within 300m of the construction footprint as recently as January 2018. Suitable habitat includes wetlands or swampy heaths with dense vegetation, including both freshwater and saltmarsh habitats (Clemann, Chapple & Wainer 2004) or swamp margins, tea-tree thickets and even tidal saltmarshes (Wilson & Swan 2013).

Further detail can be found in the Targeted Swamp Skink Survey Report (Monarc 2018d).

3.4.5 Aquatic Survey

A total of 3 Commonwealth and/or State listed fish species were identified from the desktop review to have the potential to be present, or their habitat to be present, in the region that the crossings were located.

- Australian Grayling (Vulnerable - EPBC Act) has a 'High' to 'Moderate' likelihood of occurring, due to nearby records, in Cardinia Creek (Ballarto Road and Bloomfield Lane ends)
- Dwarf Galaxias (Vulnerable - EPBC Act) has a 'High' to 'Moderate' likelihood of occurring, due to nearby records.
- Flatback Mangrove Goby (Not listed under the EPBC Act but listed under the FFG Act) has a 'High' likelihood of occurrence in the Western Outfall Drain (recent records) and 'Moderate' likelihood in Watson Creek (possible regular visitor).

None of these species were recorded during the surveys, however, all three are relatively cryptic, difficult to survey and the timing of the surveys did not necessarily fall within the optimal time for detection.

Dwarf Galaxias (Vulnerable - EPBC Act) has a "High' to 'Moderate' likelihood of occurrence, due to either being a known resident, having recent records (<5 years) or there being suitable habitat in the 10 watercourses listed below. Note that impacts to five watercourses are avoided by HDD:

- KP 4.98 - Warringine Creek – avoided by HDD
- KP 19.12 – Watson Creek* - avoided by HDD
- KP 19.5 - Pearcedale South Creek
- KP 21.08 - Langwarrin Creek
- KP 21.21 CPT 60 (dam and Lachies Marsh)
- KP 23.95 - Craigs Lane Drain
- KP 31.06 - Western Outfall Drain
- KP 40 - Cardinia Creek (Ballarto Road and Bloomfield Lane ends) – avoided by HDD
- KP 41.45 - Toomuc Creek – avoided by HDD
- KP 41.5 - Deep Creek - avoided by HDD
- KP 48.2 - Pakenham Creek

*The likelihood of occurrence of Dwarf Galaxia in Watson Creek is likely to be low. However, considering the Dwarf Galaxia Action Statement (DELWP 2015c) refers to historical records in Watson Creek as an important population, it has been included in this list for the low probability that it may be present during construction of the pipeline. Nonetheless, impact on this species will be avoided by HDD.

The surveys of the waterbodies resulted in the identification of 17 species including;

The surveys of the waterbodies resulted in the identification of 17 species including;

- 6 species of indigenous native freshwater fish
- 1 native, but not indigenous species of fish (i.e. introduced and indigenous to Qld/NSW)
- 1 species of estuarine/marine fish
- 7 species of introduced fish including 2 species that are listed as noxious under Section 75 of the Fisheries Act (European Carp and Gambusia)
- 2 species of common freshwater crustacean (shield and glass shrimp)
- 1 species of common estuarine/marine crustacean (crab)
- Likely 1 species of native aquatic mammal (as determined by the identification of an active and likely native water rat burrow)

The greatest numbers of fish retrieved were all introduced species, with Gambusia being collected from nine waterways and waterbodies. No Commonwealth or State listed species were recorded.

The presence of predatory and competitive fish such as Gambusia and Redfin Perch may impact on the likely presence of native species. It should be noted that several waterways were dry at the time of surveys and they weren't investigated or surveyed for signs of habitat characteristics that may suit Dwarf Galaxias (i.e. crayfish burrows). Being dry does not significantly reduce the likelihood of Dwarf Galaxias occurring or utilising these sites during wetter times of the year. The watercourses include:

- KP 33.4 - Muddy Gates Drain
- KP 45.01 - Hagelthornes Drain
- KP 37.1 - Tooradin Inlet Drain.

3.5 Ramsar Wetlands

The EPBC Act Protected Matters Search Tool (Appendix A) identifies the presence of the Western Port Ramsar site adjacent to the construction footprint. The boundary of the Western Port Ramsar site has been identified by the Victorian Government (DEPI 2013) and largely follows the landward boundary of the Saltmarsh, and mudflats of Western Port Bay. Neither of these communities are subject to removal as part of this project. This Ramsar boundary is within 20-50m to the construction footprint near Crib Point but the construction footprint doesn't intrude into the Ramsar site.

At KP18.7-19.6 the alignment intersects Watson Creek that feeds into the Ramsar wetland. At this location Watson Creek is proposed to be crossed using a HDD technique to avoid impacts to the wetland.

3.6 Groundwater Dependent Ecosystems

There were no known subterranean Groundwater Dependent Ecosystems found along the construction footprint. The groundwater dependent ecosystem mapping which is supported by the Bureau of Meteorology, shows aquatic and terrestrial GDE's across much of Australia, however only Queensland and Tasmania have been mapped for subterranean GDE's.

Aquatic and Terrestrial Groundwater Dependent Ecosystems were identified along the construction footprint however these GDEs are not listed on the EPBC Act.

4 PERMITTED CLEARING ASSESSMENT

This section is based on Victorian vegetation clearing policy.

4.1 Risk-based Pathway

Calculation of the extent of native vegetation removal equates to 8.259ha and 43 Large Trees. Note that the 43 Large Trees was the total generated by EnSym after integrating the Large Tree components of the habitat patches to be removed, in addition to the 37 Scattered Trees identified within the construction footprint (Appendix G). The construction footprint is within Location 3, which refers to:

> 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); and a wetland designated under the Convention on Wetlands of International Importance (the Ramsar Convention); and an internationally important site for Migratory Shorebirds of the East Asian-Australasian Flyway

Therefore, the Detailed Assessment Pathway is required.

4.2 Offset Targets

The detailed Scenario test – native vegetation removal (EnSym) report is found in Appendix G with a summary in **Table** 12. Detail on the individual scattered tree and remnant patch offsets are provided.

This EnSym report provides information for internal testing of different proposals to remove native vegetation and is not the formal application to remove, destroy or lop native vegetation under Clause 52.16 or 52.17 of planning schemes in Victoria. A report will be obtained from the Department of Environment, Land, Water and Planning (DELWP) for the final alignment.

Table 12: Summary of EnSym results for the alignment.

EnSym calculations	
General offset amount	**0.577 general habitat units**
Vicinity	**Port Phillip and Western Port Catchment Management Authority (CMA) or Cardinia Shire, Mornington Peninsula Shire Council**
Minimum strategic biodiversity value score	**0.340**
Large trees*	**22 large trees**
Species offset amount	**3.423 species units of habitat for Coast Fescue,** *Poa billardierei* **4.853 species units of habitat for Coast Twin-leaf,** *Zygophyllum billardierei*

	4.669 species units of habitat for Coast Wirilda, *Acacia uncifolia* **4.515 species units of habitat for Coast Bitter-bush,** *Adriana quadripartita*
Large trees*	**21 trees**
*** The total number of large trees that the offset must protect**	**43 large trees to be protected in either the general, species or combination across all habitat units protected**

The EnSym calculations include species offset amounts for most of the scattered tree offsets. Discussion with DELWP is recommended as many of these scattered trees are within disturbed road reserves and paddocks that contain pasture and the species offset amounts may not apply.

5 POTENTIAL IMPACTS

This section identifies the potential impacts of the project on the biodiversity values of the study area (Section 1.4) and construction footprint.

5.1 Impacts summary

The direct impacts outlined in Table 13 are expected to occur because of the project, following measures to avoid and minimise impacts on biodiversity values have already been implemented through eight versions of route selection.

Table 13: Summary of direct impact to biodiversity values

Biodiversity Values	Level of Direct Impact
Native vegetation	Removal of 6.823 hectares comprising 4 EVCs (remnant patches and areas of scattered trees) within the project construction footprint, as follows: • 3.29ha of Endangered EVCs • 2.444ha of Vulnerable EVCs • 1.098ha of Least Concern EVCs • 11 Large Scattered Trees • 26 Small Scattered Trees
TECs listed under the Commonwealth EPBC Act	No direct impacts to TECs listed under the EPBC Act have been determined for the construction footprint.
EBPC Act listed flora species	Removal of 1 Strzelecki Gum.
EBPC Act listed fauna species	Removal of habitat for the following EPBC act listed species: • Southern Brown Bandicoot • Growling Grass Frog • Dwarf Galaxias • Australian Grayling
Aquatic habitats	Short-term localised impact of trenching to banks and beds of waterways not crossed by HDD.

Table 14 provides a summary of the indirect impacts on biodiversity values considered likely to occur because of the project.

Table 14: Summary of indirect impact to biodiversity values

Biodiversity Values	Level of Indirect Impact
Native vegetation and fauna habitat	Removal of 6.832ha of native vegetation that potentially provides habitat for threatened and non-threatened mobile fauna species either now or into the future.
Unexpected threatened species	Potential impacts on threatened species not recorded during the field surveys. Further targeted surveys at specific locations are proposed to assess impacts to certain threatened species, as described in section 3.2 and include: • Dense Leek-orchid – listed as Vulnerable, EPBC Act • Swamp Fireweed – listed as Vulnerable, EPBC Act • Swamp Everlasting – listed as Vulnerable, EPBC Act CEMP measures should be developed to mitigate potential impacts on Dwarf Galaxias in the locations identified in Section 3.4.5.
Landscape connectivity	The project will result in disturbance of a 153ha construction footprint and maintenance of a 30m wide ROW to exclude re-growth of trees along a 56.2Km alignment through the Peri-urban East of Melbourne and the Peninsula of Western Port Bay, Victoria. In areas, this will reduce landscape connectivity and increase fragmentation and isolation for less mobile species especially in more heavily vegetated areas at: • KP1 to KP2 • KP3 to KP 5 Short term Impacts to Southern Brown Bandicoot habitat connectivity will occur between: • KP 30.3 to 54.4 Short term impacts to Growling Grass Frog habitat connectivity will occur at locations where HDD is not planned: • KP20.32 • KP31.1 • KP48.55 Short term impacts to Dwarf Galaxias habitat connectivity will be avoided in many locations due to the use of HDD but may still occur at the waterways and drainage lines identified in Section 3.4.5 that are not proposed for HDD: Short term impacts to Australian Grayling habitat connectivity will be avoided by using HDD at the Cardinia Creek, KP40-40.3:
Waterways	Potential short term increase in sediment levels of waterways during trenching works preventable through installation of standard erosion and sedimentation controls.
Weed, pests and soil pathogens	Potential introduction and spread of weeds, pests and new pathogens across the landscape preventable through proper implementation of hygiene principles.
Native fauna	Injury and/or mortality to native fauna utilising the habitat provided by vegetation to be removed, or caught in the trench. These impacts can be mitigated through the presence of spotter/catchers during clearing works and for regular trench inspections. Temporary increases in noise and dust levels from construction equipment, leading to disturbance of fauna, especially during breeding seasons.

6 OFFSET AND MITIGATION MEASURES

A brief discussion of offset and mitigation is provided in this section

6.1 Offsets for Impacts

Offsets under Commonwealth legislation may, and State environmental legislation, will, apply to this project so are discussed below.

6.1.1 Federal (EPBC Act)

Any required offsets under the EPBC Act will be determined in consultation between APA and DoE.

6.1.2 State (The Guidelines)

Offsets will be required to achieve the gains outlined in the EnSYM report discussed in Section 4.2 and Appendix G. Achieving the required species offset amount will require negotiation with DELWP to ascertain the best way forward for this project.

6.2 Mitigation Measures

Detailed mitigation measures will be addressed in the Construction Environmental Management Plan and Operational Environmental Management Plan prepared by APA. To mitigate impacts on flora and fauna the following principles apply:

1. Clearing of woody vegetation will be undertaken with a suitably qualified spotter/catcher present to:
    a. Inspect habitat in advance of clearing and remove fauna.
    b. Advise on clearing techniques that will minimise fauna impact.
    c. Keep records of all fauna interactions, listing the species concerned, the nature of the interaction and its GPS coordinates.
2. Vegetation along the construction footprint will be cleared to create a scalped area that is unfavorable for native animal foraging during construction works. A bund consisting of the cleared soil and vegetation will be placed on each side of the construction footprint to act as a barrier to animal entrance into the construction footprint.
3. Potential for fauna mortality due to entrapment within the pipeline trench will be minimised by:
    a. Minimising to the extent practicable the period of time the trench is open.
    b. Provide opportunities for fauna to egress the trench such as trench plugs or other appropriate mechanisms.

c. Regular surveys of open trenches, by suitably qualified personnel to remove trapped fauna as required.

4. A suitably qualified animal catcher shall be on call to remove and treat injured animals in accordance with appropriate ethics approval. Injured animals shall be treated by a qualified carer or vet.

5. A targeted survey will be undertaken during Spring and early Summer 2018 to determine if Dense Leek-orchid *Prasophyllum spicatum*, Swamp Everlasting *Xerochrysum palustre,* and Swamp Fireweed *Senecio psilocarpus* are present in the construction footprint, at the locations identified in Section 3.2. If the species is found to be present during field surveys, impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring.

6. Induction of employees and contractors prior to the commencement of works to highlight ecological and water quality issues which may be encountered during construction.

7. If construction in or near a waterway cannot be avoided (i.e. open trenching),

    a. Stage construction so that works in the vicinity of waterways are undertaken during the drier time of year (typically December to March), where practicable.

    b. Pre-clearance fish and other aquatic fauna salvage should be undertaken in all waterways and waterbodies discussed in this report, where they have standing water or flows, and where they will be open cut during construction.

    c. While the construction ROW is being dewatered, an ecologist will also salvage aquatic fauna trapped in any instream structures (i.e. coffer dams) and release them downstream of the work area (at designated locations).

    d. For any near-waterway or temporary works/structures, erosion and sediment controls are to be in place to minimise the amount of sediment transport during construction.

    e. Reinstate works areas and re-establish vegetation immediately after completion of temporary or permanent works near waterways.

8. All fuel, oil and chemicals are to be stored 50m away from waterways and in a suitably bunded and protected location.

9. All refilling of vehicles, machinery and equipment are to be filled 50m away from the waterway.

10. Any fixed machinery/plant located near a waterway are to be bunded to contain any spilt fuel/oil.

11. Ensure emergency response/s are in place in the event of a significant rainfall event and/or incident that impacts water quality or aquatic habitat (e.g. a spill or sediment release).

7 LEGISLATIVE AND POLICY IMPLICATIONS

This section of the report provides a review of project impacts against relevant Commonwealth and Victorian flora and fauna legislation and policy. Appendix H provides detailed figures and mapping of ecological values including threatened species found along the alignment and construction footprint.

7.1 Environment Protection and Biodiversity Conservation Act 1999 (Commonwealth)

This section of the report provides an assessment of potential impacts from the construction footprint to Matters of National Environmental Significance. **Table 15** below is a summary of relevant MNES to the project while the succeeding sections details the significant impact assessment of specific MNES. This table has been generated from the Protected Matters Search Tool results in Appendix A.

Table 15: List of MNES categories and their relevance to the project.

Matters of National Environmental Significance	Comments
World Heritage Properties	Not present in the construction footprint
National Heritage Places	Not present in the construction footprint
Wetlands of International Importance	Western Port Ramsar wetland adjacent to the construction footprint
Great Barrier Reef Marine Park	Not present in the construction footprint
Commonwealth Marine Area	Not present in the construction footprint
Listed Threatened Ecological Communities	3 communities assessed for likelihood of occurrence and then under significant impact guidelines in the following sub-sections.
Listed Threatened Species	64 species assessed for likelihood of occurrence and then under significant impact guidelines in the following sub-sections.
Listed Migratory Species	59 species assessed for likelihood of occurrence and then under significant impact guidelines in the following sub-sections.

7.1.1 Ramsar Wetlands of International Significance

An assessment against Ramsar Significant Impact Guidelines (DoE 2013) is provided in **Table 16**. Significant impacts to the Western Port Ramsar wetland are considered unlikely if all proposed construction methods such as HDD, CEMPs, and OEMPs are effectively developed and then implemented.

Table 16: Significant impact assessment for Ramsar wetlands.

Criteria	Comment
1. areas of the wetland being destroyed or substantially modified	The alignment is adjacent to the western boundary of the Western Port Ramsar site between KP0 and KP4, where it follows an existing oil and gas pipeline infrastructure corridor. The alignment traverses the Western Port Ramsar site between KP4.0 and KP4.3, again following the existing oil and gas infrastructure corridor, and KP19.0 to KP19.3 at Watson Creek. Horizontal directional drilling (HDD) will be employed from approximately KP3.9 to KP4.4 and KP18.6 to KP19.5 so that surface disturbance of the Western Port Ramsar site is entirely avoided.
2. a substantial and measurable change in the hydrological regime of the wetland, for example, a substantial change to the volume, timing, duration and frequency of ground and surface water flows to and within the wetland	No substantial or measurable changes to the water quality of the Western Port Wetland are considered likely to occur. Watson Creek is the closest the construction footprint will be to the wetland and HDD will be used to go under the creek at this location and avoid impacts.
3. the habitat or lifecycle of native species, including invertebrate fauna and fish species, dependent upon the wetland being seriously affected	Australian Grayling rely upon the Western Port Wetland for migration between fresh, estuarine and marine waters as part of their life cycles (DELWP 2017d). Impacts to this species will be avoided through using HDD under the Cardinia Creek KP40-40.3. Two species, seasonally reliant upon the Western Port Wetland and surrounding terrestrial habitats for occasional foraging, were recorded during surveys: • Cattle Egret was sighted at KP23 (Vowell Road Wetland, protected by HDD) and near KP 26 (near Fisheries Road crossing large eucalypts, protected by HDD) • The Eastern Great Egret was sighted at KP23 (Vowell Road Wetland, protected by HDD) and near KP30, (agricultural paddocks and planted trees). Significant impacts to these species will be avoided through the use of HDD techniques at areas of higher quality habitat.
4. a substantial and measurable change in the water quality of the wetland – for example, a substantial change in the level of salinity, pollutants, or nutrients in the wetland, or water temperature which may adversely impact on biodiversity, ecological integrity, social amenity or human health, or	No substantial or measurable changes to the water quality of the Western Port Wetland are considered likely to occur. The alignment is adjacent to the western boundary of the Western Port Ramsar site between KP0 and KP4, where it follows an existing oil and gas pipeline infrastructure corridor. The alignment traverses the Western Port Ramsar site between KP4.0 and KP4.3, again following the existing oil and gas infrastructure corridor, and KP19.0 to KP19.3 at Watson Creek. Horizontal directional drilling (HDD) will be employed from approximately KP3.9 to KP4.4 and KP18.6 to KP19.5 so that surface disturbance of the Western Port Ramsar site is entirely avoided. Along the construction footprint construction activities and control of runoff will be directed using a Construction EMP. The construction footprint will then be rehabilitated in line with an Operational EMP.
5. an invasive species that is harmful to the ecological character of the wetland being established (or an existing invasive species being spread) in the wetland.	Impacts from invasive species directly impacting on the ecological character of the wetland will be avoided along the construction footprint using standard pipeline construction biosecurity measures to be outlined in a Construction EMP. The construction footprint will then be rehabilitated in line with an Operational EMP.

7.1.2 Threatened species and ecological communities

As reported in Section 3, 10 EPBC Act listed species and/or communities were recorded within or adjacent to the construction footprint or are considered to have a high likelihood of occurrence within the construction footprint, as presented in **Table 17** below.

Table 17: EPBC Act listed species and communities recorded within or adjacent to the construction footprint, or with a high likelihood of occurrence within the construction footprint.

Species/Community	Location
Subtropical and Temperate Coastal Saltmarsh community	Recorded within the ROW but outside of the construction footprint at KP 19-19.5
Strzelecki Gum	Single individual recorded within the construction footprint at KP21 near Langwarrin Ck.
River Swamp Wallaby Grass	High likelihood of occurrence in suitable habitat near KP 13.5 – KP 15, approximately 200m outside of the construction footprint.
Dense Leek-orchid	High likelihood of occurrence within the construction footprint in Damp Heathy Woodland between KP 1 to 2 as known populations exist in similar habitat nearby at Crib Point and Stony Point.
Swamp Fireweed	High likelihood of occurrence within the construction footprint in suitable habitat at KP 33.5 as known populations exist nearby at Muddy Gates Lane and Manks Road, and the South Gippsland Railway line.
Swamp Everlasting	High likelihood of occurrence within the construction footprint in suitable habitat at KP 33.5 as known populations exist nearby at Muddy Gates Lane and Manks Road, and the South Gippsland Railway line.
Southern Brown Bandicoot	Recorded at 8 locations – Manks Rd (KP 34.4), Tooradin Station RD (KP 35.5), Tooradin Inlet Drain (KP 37.1), Cardinia Ck (two locations) - Bloomfield Lane (KP40.1), Toomuc Ck/Lower Gum Scrub Ck (KP 41.5), Soldiers Rd (KP 43.9), East of Koo Wee Rup Rd (KP 46.4). Likely to occur in 10 more locations from where to where?
Growling Grass Frog	Recorded at KP 40.1, Cardinia Creek (Bloomfield Lane). Likely to occur at KP 20.32, KP 23.05, KP 31.1, and KP 48.55.
Dwarf Galaxias	Likely to occur in 11 waterways where the species is a known resident or has recently been recorded: Warringine Ck, Watson Ck, Pearcedale South Ck, Langwarrin Ck, Lachies Marsh and nearby private farm dam, Craigs Lane Drain, Western Outfall Drain, Cardinia Ck, Toomuc Ck, Deep Ck, Pakenham Ck
Australian Grayling	Likely to occur in Cardinia Creek where the species has recently been recorded.

To determine if the project is likely to cause a significant impact on a matter of National Environmental Significance under the EPBC Act, an assessment against the significant impact criteria was undertaken. This assessment is provided below and follows the order present in the points directly above.

Communities

The *Subtropical and Temperate Coastal Saltmarsh* ecological community was recorded in the ROW but will be avoided in the construction footprint through the use of HDD. This community is listed as Vulnerable under the EPBC Act. Advice on determining significant impacts on vulnerable communities is provided in the Matters of National Environmental Significance - Significant Impact Guidelines 1.1 and states on page 8:

"Species in the extinct and conservation dependant categories of species listed under the EPBC Act, and listed ecological communities in the vulnerable category of ecological communities listed under the EPBC Act, are not matters of national environmental significance for the purposes of Part 3 of the EPBC Act (requirements for environmental approvals)." (DoE, 2013)

Therefore, formal assessment and Referral of impacts on this community are not required under the EPBC Act. It should be noted that no removal of *Subtropical and Temperate Coastal* Saltmarsh is associated with pipeline construction within the construction footprint.

Species - Endangered:

One Endangered species was recorded along the construction footprint, the Southern Brown Bandicoot. A twostep approach is required to determine if a Referral is required and the level of impact to this species. The first step is to assess the project against the Draft Referral Guidelines for the endangered Southern Brown Bandicoot (DSEWPaC 2011). These referral guidelines are a series of yes/no questions to guide the assessor through a decision tree. This yes/no assessment is presented in **Table 18**. These guidelines then refer the assessor to the Significant Impact Guidelines 1.1. (DoE 2013). This further assessment is presented in **Table 19**.

Table 18: Assessment against the Referral guidelines for Southern Brown Bandicoot.

Decision Criteria from the Draft Referral Guidelines for the endangered Southern Brown Bandicoot	
1. Could the impacts of your action occur within the modelled distribution of the Southern Brown Bandicoot	The impacts of the project will occur within the modelled distribution of the Southern Brown Bandicoot. Yes, progress to step 2.
2. Could the impacts of your action affect any southern brown bandicoot habitat	The impacts of the project will affect Southern Brown Bandicoot habitat. Yes, progress to step 3.
3. Have you surveyed for southern brown bandicoot using the recommended methods	Surveys for Southern Brown Bandicoots using the recommended methods confirmed presence of this species in the construction footprint. Yes, progress to step 4.
4. Could your action impact the southern brown bandicoot	Yes. Assess impacts against the Significant impact criteria. See Table 12.

5. Could your action require a referral to the Commonwealth environment minister for significant impacts on southern brown bandicoot	Arising from Table 12, The project is unlikely to cause a significant impact for the Southern Brown Bandicoot.

Table 19: Significant impact assessment for the Southern Brown Bandicoot.

Significant Impact Criteria – Critically Endangered or Endangered	Comment
Lead to a long-term decrease in the size of a population	The population of Southern Brown Bandicoots present or adjacent to the construction footprint will be subject to temporary and staged habitat removal. Habitat, excluding trees, will be reinstated along the construction footprint to as close to its former condition as practicable following construction. The Construction EMP will include mitigation measures to reduce direct impacts on this species prior to and during construction works. As such the project is not expected to lead to a long-term decrease in the size of a population of the southern brown bandicoot.
Reduce the area of occupancy of the species	The construction works will temporarily remove habitat along a 24Km section of the construction footprint. This will result in a short term impact during construction and until the footprint has been rehabilitated. Following rehabilitation, the project is not expected to reduce the area of occupancy of the southern brown bandicoot.
Fragment an existing population into two or more populations	The construction activity along the construction footprint will temporarily (October 2019 to March 2020) fragment the existing population. The species can disperse up to 2.5km and foraging habitat will remain untouched outside of the construction footprint. This will result in a short term impact during construction and until the footprint has been rehabilitated. Following rehabilitation, the project is not expected to fragment the existing population of the southern brown bandicoot.
Adversely affect habitat critical to the survival of a species	As per the National Recovery Plan "The critical habitat components required by the species are currently not fully understood and require further investigation. As a result, it is not possible at this stage to identify habitat critical to the survival of the species." (Brown and Main 2010).
Disrupt the breeding cycle of a population	The breeding season for Southern Brown Bandicoot is variable but the peak breeding season is thought to occur between spring and mid-summer (Brown and Main, 2010). The species is known to have a high reproductive output in response to favorable seasonal and food availability conditions. In the long term, the construction activities are unlikely to disrupt the breeding cycle of a population but an impact to breeding may occur during construction at those locations.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The population of Southern Brown Bandicoots present or adjacent to the construction footprint will be subject to temporary and staged habitat removal. Habitat, excluding trees, will be reinstated along the construction footprint to its former condition prior to construction. The Construction EMP will include mitigation measures to reduce direct impacts on this species prior to and during construction works. The construction activities are unlikely to have a long-term impact that would lead to the species decline. There will be a short-term impact resulting in

Significant Impact Criteria – Critically Endangered or Endangered	Comment
	modification, destruction and removal of habitat but not to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The Construction EMP will include measures to mitigate the risk of invasive species being introduced during construction works. An Operational EMP will be implemented to manage pest animals and weeds post construction works. These mitigation measures once implemented will reduce the potential for an invasive species resulting from the construction activities to become established in the southern brown bandicoot habitat within and adjacent to the ROW.
Introduce disease that may cause the species to decline, or	The Construction EMP will include measures to mitigate the risk of invasive species, including diseases, being introduced during construction works An Operational EMP will be implemented to manage pest animals and weeds post construction works. These mitigation measures once implemented should reduce the potential for an introduced disease associated with construction activities to cause species decline.
Interfere with the recovery of the species	The construction within the footprint will occur over a short period and be followed by rehabilitation. A detailed Construction EMP and Operational EMP will be used to control any direct impacts on bandicoots and any indirect impacts from invasive species or disease. As such, the project is not considered likely to interfere with the recovery of the species.

Arising from the assessment of the construction footprint against the significant impact criteria for Southern Brown Bandicoots the action should not lead to the long-term modification of suitable habitat or reduce its suitability for Southern Brown Bandicoots to survive in the ROW. Southern Brown Bandicoots in the Westernport Region are found within a variety of habitats including degraded pasture, blackberry patches, car bodies, degraded remnant vegetation and quality remnant vegetation (rare in the region). The project is considered unlikely to cause a significant impact for the Southern Brown Bandicoot.

Species - Vulnerable:

Species considered in this assessment of significant impacts to vulnerable species include:

- Strzelecki Gum – listed as Vulnerable, and recorded in the construction footprint
- River Swamp Wallaby Grass – listed as Vulnerable
- Dense Leek-orchid – listed as Vulnerable
- Swamp Fireweed – listed as Vulnerable
- Swamp Everlasting – listed as Vulnerable
- Growling Grass Frog – listed as Vulnerable
- Dwarf Galaxias – listed as Vulnerable

- Australian Grayling - listed as Vulnerable

Given the range of species this assessment is separated into an assessment for flora species and one for fauna species. The Flora species assessment of significant impact is provided in **Table 20**. An assessment of significant impacts to Dwarf Galaxias and Australian Grayling are provided in **Table 21** and the Growling Grass Frog in **Table 22**.

Table 20: Significant impact assessment for vulnerable flora species

Significant Impact Criteria - Vulnerable	Comment
lead to a long-term decrease in the size of an important population of a species	**Strzelecki Gum**: One tree was recorded on the edge of the construction footprint at KP21. This individual is not considered to be an important population as no other adult or juvenile Strzelecki Gums were present in the immediate area. The closest stand is near the mouth of the Bass River into Westernport (DSE 2008). **River Swamp Wallaby Grass**: There is a known population on the ESSO easement, adjacent (200m away) to the construction footprint between KP13.5 and KP15. This area will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is not likely to lead to a long-term decrease in the size of an important population of a species. **Dense Leek-orchid**: The construction footprint follows existing oil and gas pipeline infrastructure corridors in the Crib Point and Stony Point area but also goes through Damp Heathy Woodland, which provides suitable habitat for this species, at KP1.5. The species is known from 8 locations in Australia, including at Stony Point and Crib Point. The locations at Stony Point and Crib Point contribute to 27% of the total population. As such, if Dense Leek-orchid was found in the construction footprint it would be considered part of an important population. A targeted survey is planned at this location for Spring 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to lead to a long-term decrease in the size of an important population of a species. **Swamp Fireweed and Swamp Everlasting**: Swamp Fireweed is known from approximately 14 sites with the recorded population in the Westernport being one of the most easterly recorded (DEWHA 2008). Swamp Everlasting is known from about 35 populations with an estimated abundance of over 10,000 plants (Carter and Walsh 2011). Any plants found within the construction footprint would be considered an important population. Both species are known from a population near Muddy Gates Lane, Manks Road, and the South Gippsland Railway line, KP 33.5. A targeted survey is planned at this location for Spring and early Summer 2018 to determine if the species are present. If they are found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint.

Significant Impact Criteria - Vulnerable	Comment
	If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to lead to a long-term decrease in the size of an important population of a species.
reduce the area of occupancy of an important population	**Strzelecki Gum**: The single tree within the construction footprint is not considered an important population. As such, the project will not reduce the area of occupancy of an important population of this species. **River Swamp Wallaby Grass**: The recorded population will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is not expected to reduce the area of occupancy of an important population of this species. The construction footprint follows existing oil and gas pipeline infrastructure corridors in the Crib Point and Stony Point area but also goes through Damp Heathy Woodland, which provides suitable habitat for this species, at KP1.5. The species is known from 8 locations in Australia, including at Stony Point and Crib Point. The locations at Stony Point and Crib Point contribute to 27% of the total population. As such, if Dense Leek-orchid was found in the construction footprint it would be considered part of an important population. A targeted survey is planned at this location for Spring 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to lead to a long-term reduction in the area of occupancy of an important population of the species. **Swamp Fireweed and Swamp Everlasting**: Swamp Fireweed is known from approximately 14 sites with the recorded population in the Westernport being one of the most easterly recorded (DEWHA, 2008) and would be considered an important population. Swamp Everlasting is known from about 35 populations with an estimated abundance of over 10,000 plants (Carter and Walsh, 2011). Both species are known from a population near Muddy Gates Lane, Manks Road, and the South Gippsland Railway line, KP33.5. A targeted survey is planned at this location for Spring and early Summer 2018 to determine if the species are present. If they are found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to lead to a long-term reduction in the area of occupancy of an important population of the species.
fragment an existing important population into two or more populations	**Strzelecki Gum**: The single tree within the construction footprint is not considered an important population. As such, the project will not fragment an important population of this species. **River Swamp Wallaby Grass**: The recorded population will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is not expected to fragment an existing important population of this species.

Significant Impact Criteria - Vulnerable	Comment
	The construction footprint follows existing oil and gas pipeline infrastructure corridors in the Crib Point and Stony Point area but also goes through Damp Heathy Woodland, which provides suitable habitat for this species, at KP1.5. The species is known from 8 locations in Australia, including at Stony Point and Crib Point. The locations at Stony Point and Crib Point contribute to 27% of the total population. As such, if Dense Leek-orchid was found in the construction footprint it would be considered part of an important population. A targeted survey is planned at this location for Spring 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to lead to fragmentation of an important population. **Swamp Fireweed and Swamp Everlasting**: Swamp Fireweed is known from approximately 14 sites with the recorded population in the Westernport being one of the most easterly recorded (DEWHA 2008) and would be considered an important population. Swamp Everlasting is known from about 35 populations with an estimated abundance of over 10,000 plants (Carter and Walsh 2011). Both species are known from a population near Muddy Gates Lane, Manks Road, and the South Gippsland Railway line, KP33.5. A targeted survey is planned at this location for Spring and early Summer 2018 to determine if the species are present. If they are found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to fragment an important population of the species.
adversely affect habitat critical to the survival of a species	**Strzelecki Gum**: The single tree within the construction footprint is not considered critical habitat for the survival of this species. **River Swamp Wallaby Grass**: The recorded population will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is not expected to adversely affect habitat critical to the survival of a species. The construction footprint follows existing oil and gas pipeline infrastructure corridors in the Crib Point and Stony Point area but also goes through Damp Heathy Woodland, which provides suitable habitat for this species, at KP1.5. The species is known from 8 locations in Australia, including at Stony Point and Crib Point. The locations at Stony Point and Crib Point contribute to 27% of the total population. As such, if Dense Leek-orchid was found in the construction footprint it would be considered part of an important population. A targeted survey is planned at this location for Spring 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to adversely affect habitat critical to the survival of a species.

Significant Impact Criteria - Vulnerable	Comment
	Swamp Fireweed and Swamp Everlasting: Swamp Fireweed is known from approximately 14 sites with the recorded population in the Western Port being one of the most easterly recorded (DEWHA 2008) and would be considered an important population. Swamp Everlasting is known from about 35 populations with an estimated abundance of over 10,000 plants (Carter and Walsh 2011). Both species are known from a population near Muddy Gates Lane, Manks Road, and the South Gippsland Railway line, KP 33.5. A targeted survey is planned at this location for Spring and early Summer 2018 to determine if the species are present. If they are found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to adversely affect habitat critical to the survival of a species.
disrupt the breeding cycle of an important population	**Strzelecki Gum**: The single tree within the construction footprint is not considered too from part of an important population. **River Swamp Wallaby Grass**: The recorded population will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is not expected to disrupt the breeding cycle of an important population. The construction footprint follows existing oil and gas pipeline infrastructure corridors in the Crib Point and Stony Point area but also goes through Damp Heathy Woodland, which provides suitable habitat for this species, at KP1.5. The species is known from 8 locations in Australia, including at Stony Point and Crib Point. The locations at Stony Point and Crib Point contribute to 27% of the total population. As such, if Dense Leek-orchid was found in the construction footprint it would be considered part of an important population. A targeted survey is planned at this location for Spring 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to adversely disrupt the breeding cycle of an important population. **Swamp Fireweed and Swamp Everlasting**: Swamp Fireweed is known from approximately 14 sites with the recorded population in the Westernport being one of the most easterly recorded (DEWHA 2008) and would be considered an important population. Swamp Everlasting is known from about 35 populations with an estimated abundance of over 10,000 plants (Carter and Walsh 2011). Both species are known from a population near Muddy Gates Lane, Manks Road, and the South Gippsland Railway line, KP 33.5. A targeted survey is planned at this location for Spring and early Summer 2018 to determine if the species are present. If they are found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to adversely disrupt the breeding cycle of an important population.

Significant Impact Criteria - Vulnerable	Comment
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Strzelecki Gum**: This tree will be removed during construction works but this is not likely to isolate or decrease habitat to the extent that the species is likely to decline. **River Swamp Wallaby Grass**: The recorded population will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is not expected to decrease the availability or quality of habitat to the extent that the species is likely to decline. The construction footprint follows existing oil and gas pipeline infrastructure corridors in the Crib Point and Stony Point area but also goes through Damp Heathy Woodland, which provides suitable habitat for this species, at KP1.5. The species is known from 8 locations in Australia, including at Stony Point and Crib Point. The locations at Stony Point and Crib Point contribute to 27% of the total population. As such, if Dense Leek-orchid was found in the construction footprint it would be considered part of an important population. A targeted survey is planned at this location for Spring 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to adversely modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Swamp Fireweed and Swamp Everlasting**: Swamp Fireweed is known from approximately 14 sites with the recorded population in the Westernport being one of the most easterly recorded (DEWHA 2008) and would be considered an important population. Swamp Everlasting is known from about 35 populations with an estimated abundance of over 10,000 plants (Carter and Walsh 2011). Both species are known from a population near Muddy Gates Lane, Manks Road, and the South Gippsland Railway line, KP 33.5. A targeted survey is planned at this location for Spring and early Summer 2018 to determine if the species are present. If they are found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to adversely modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Strzelecki Gum**: The Construction EMP will include measures to mitigate the risk of invasive species being introduced during construction works. An Operational EMP will be implemented to manage pest animals and weeds post construction works. Given this approach, the project is not expected to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat **River Swamp Wallaby Grass**: The recorded population will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is

Significant Impact Criteria - Vulnerable	Comment
	not expected to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Dense Leek-orchid**: The Construction EMP will include measures to mitigate the risk of invasive species being introduced during construction works. An Operational EMP will be implemented to manage pest animals and weeds post construction works. Given this approach, the project is not expected to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat **Swamp Fireweed and Swamp Everlasting**: The Construction EMP will include measures to mitigate the risk of invasive species being introduced during construction works. An Operational EMP will be implemented to manage pest animals and weeds post construction works. Given this approach, the project is not expected to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat
introduce disease that may cause the species to decline, or	**Strzelecki Gum**: The Construction EMP will include measures to mitigate the risk of invasive species, including diseases, being introduced during construction works. An Operational EMP will be implemented to further manage disease post construction works. Given this approach, the project is not expected to result in introducing disease that may cause the species to decline. **River Swamp Wallaby Grass**: The Construction EMP will include measures to mitigate the risk of invasive species, including diseases, being introduced during construction works. An Operational EMP will be implemented to further manage disease post construction works. Given this approach, the project is not expected to result in introducing disease that may cause the species to decline. **Dense Leek-orchid**: The Construction EMP will include measures to mitigate the risk of invasive species, including diseases, being introduced during construction works. An Operational EMP will be implemented to further manage disease post construction works. Given this approach, the project is not expected to result in introducing disease that may cause the species to decline. **Swamp Fireweed and Swamp Everlasting**: The Construction EMP will include measures to mitigate the risk of invasive species, including diseases, being introduced during construction works. An Operational EMP will be implemented to further manage disease post construction works. Given this approach, the project is not expected to result in introducing disease that may cause the species to decline.
interfere substantially with the recovery of the species	**Strzelecki Gum**: Removal of a single tree is not considered likely to interfere substantially with the recovery of the species. **River Swamp Wallaby Grass**: The recorded population will not be impacted by the construction footprint. Other suitable habitat within the construction footprint near this point will be HDD to avoid impacts. As such, the project is not expected to interfere substantially with the recovery of the species. **Dense Leek-orchid**: A targeted survey is planned in potential habitat for this species for Spring 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or

Significant Impact Criteria - Vulnerable	Comment
	translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to interfere substantially with the recovery of the species. **Swamp Fireweed and Swamp Everlasting**: A targeted survey is planned in potential habitat for these species for Spring and Summer 2018 to determine if the species is present. If the species is found to be present during field surveys impacts will be avoided by using trenchless technology, or by minor realignment of the construction footprint. If the species is present and direct impacts cannot be entirely avoided, options for offsetting or translocation will be agreed with the federal regulator prior to impacts occurring. Given this approach, the project is not expected to interfere substantially with the recovery of the species.

An assessment of significant impacts to Dwarf Galaxias and Australian Grayling are provided in **Table 21**.

Table 21: Significant impact assessment for vulnerable fauna species

Significant Impact Criteria - Vulnerable	Comment
lead to a long-term decrease in the size of an important population of a species	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. An important population is unlikely to occur in this location. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be mitigated through a Construction EMP and Operational EMP. Given this approach, the project is not expected to lead to a long-term decrease in the size of an important population of a species. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. Given this approach, the project is not expected to lead to a long-term decrease in the size of an important population of a species.
reduce the area of occupancy of an important population	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. An important population is unlikely to occur in this location. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be mitigated through a Construction EMP and Operational EMP. Given this approach, the project is not expected to reduce the area of occupancy of an important population. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. The activity is considered unlikely to reduce the area of occupancy of an important population.
fragment an existing important population into two or more populations	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. An important

Significant Impact Criteria - Vulnerable	Comment
	population is unlikely to occur in this location. Three of the 10 waterbodies won't be impacted as HDD will be used. The construction footprint may have a temporary impact on the waterbody but this action would not fragment an existing important population into two or more populations. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. The activity would not fragment an existing important population into two or more populations.
adversely affect habitat critical to the survival of a species	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. Critical habitat to the survival of the species does not occur in this location. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be mitigated through a Construction EMP and Operational EMP. The construction footprint may have a temporary impact on habitat used for movement between other habitats for Dwarf Galaxias during construction. Given this approach, the project is not expected to adversely affect habitat critical to the survival of a species. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. The activity is considered unlikely to adversely affect habitat critical to the survival of a species.
disrupt the breeding cycle of an important population	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. An important population is unlikely to occur in this location. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be mitigated through a Construction EMP and Operational EMP. Given this approach, the project is not expected to disrupt the breeding cycle of an important population. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. The activity is considered unlikely to cause a significant impact on the species breeding cycle.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. However, a precautionary approach is being taken in assuming the species is present within waterways outlined in Section 3.4.5. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be mitigated through a Construction EMP and Operational EMP to rehabilitate habitat. Given this approach, the project is not expected to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts to habitat. Given this approach, the project is unlikely to modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.

Significant Impact Criteria - Vulnerable	Comment
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. However, a precautionary approach is being taken in assuming the species is present within waterways outlined in Section 3.4.5. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be mitigated through a Construction EMP and Operational EMP that will control invasive species introduction. Given this approach, the project is not expected to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. The activity is considered unlikely to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
introduce disease that may cause the species to decline, or	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. However, a precautionary approach is being taken in assuming the species is present within waterways outlined in Section 3.4.5. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be mitigated through a Construction EMP and Operational EMP that will control disease introduction. Given this approach, the project is not expected to introduce disease that may cause the species to decline. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. The activity is considered unlikely to introduce disease that may cause the species to decline.
interfere substantially with the recovery of the species	**Dwarf Galaxias**: No Dwarf Galaxias were recorded during targeted surveys and predatory fish were recorded in most surveyed locations. However, a precautionary approach is being taken in assuming the species is present within waterways outlined in Section 3.4.5. Three of the 10 waterbodies won't be impacted as HDD will be used. Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that includes rehabilitation. The activity is considered unlikely to interfere substantially with the recovery of the species. **Australian Grayling**: The critical waterway for Australian Grayling movement is the Cardinia Creek (KP40-40.3). At this location HDD will be used to bore under the creek and avoid impacts of connectivity and populations. The activity is considered unlikely to interfere substantially with the recovery of the species.

Assessing significant impacts from the construction footprint to the Growling Grass Frog requires determination against the ssignificant impact guidelines for the vulnerable growling grass frog (DEWHA, 2009). This assessment is provided in **Table 22** and relevant definitions provided below the table.

Table 22: Significant impact criteria for the Vulnerable Growling Grass Frog

Significant Impact Criteria	Comment
Habitat degradation in an area supporting an important population	Growling Grass Frog was present or is likely to be present, taking a precautionary approach, at seven surveyed locations along the construction footprint. Any viable population that can interact with nearby other populations is considered an important population (DEWHA 2009). Therefore, the populations at these seven locations are considered important populations. Impacts at four of these locations (Either side of Cardinia Creek – KP40-40.3, KP 23.05, and KP 41.5) will be avoided using HDD. Suitable habitat at KP 20.32, KP 31.1 and KP 48.55 will be directly impacted with mitigation developed through a Construction EMP and Operational EMP. Predatory fish were located at these four sites so the degree of habitat quality is reduced. The construction footprint will require removal of terrestrial habitat (restricted to the width of the construction footprint, less than 30m wide) within 200m of the water body at the four locations. Given the removal of degraded habitat were the species is only presumed to be present, a significant impact is considered unlikely if the Construction EMPs and Operational EMPs are implemented.
Isolation and fragmentation of populations	Connectivity of waterbodies will be temporarily affected by impacting on three sites of suitable habitat during construction that will not be HDD, but not significantly when compared to the existence of the waterway and creek network in the Region. Permanent physical barriers will not be installed. Aquatic fringing habitat of creeks being crossed will be reinstated under the Operational EMP. Note: no trees or tall shrubs can be installed in the construction footprint. Given the removal of degraded habitat were the species is only presumed to be present, a significant impact is considered unlikely if the Construction EMPs and Operational EMPs are implemented.

Growling Grass Frog Impact Definitions (DEWHA 2009)

Habitat degradation in an area supporting an important population:

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. Alteration of aquatic vegetation diversity or structure that leads to a decrease in habitat quality. 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. Introduction of predatory fish and/or disease agents.

Isolation and fragmentation of populations:

Net reduction in the number and/or diversity of water bodies available to an important population. Removal or alteration of available terrestrial or aquatic habitat corridors (including alteration of connectivity during flood events). Construction of physical barriers to movement between water bodies, such as roads or buildings.

An assessment of the potential for significant impact on the Growling Grass Frog is provided in **Table 23**.

Table 23: Significant impact assessment for vulnerable Growling Grass Frog

Significant Impact Criteria - Vulnerable	Comment
lead to a long-term decrease in the size of an important population of a species	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Any viable population that can interact with nearby other populations is considered an important population (DEWHA 2009). Therefore, the populations at these seven locations are considered important populations. Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation and wildlife handling protocols. Given this approach, the project is not expected to lead to a long-term decrease in the size of an important population of a species.
reduce the area of occupancy of an important population	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Any viable population that can interact with nearby other populations is considered an important population (DEWHA 2009). Therefore, the populations at these seven locations are considered important populations. Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation and wildlife handling protocols. Given this approach, the project is not expected to reduce the area of occupancy of an important population.
fragment an existing important population into two or more populations	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Any viable population that can interact with nearby other populations is considered an important population (DEWHA 2009). Therefore, the populations at these seven locations are considered important populations. Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation and wildlife handling protocols. Given this approach, the project is not expected to fragment an existing important population into two or more populations.
adversely affect habitat critical to the survival of a species	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation and wildlife handling protocols. The small area of waterway and habitat impacted by the construction footprint is not considered critical habitat. Given this approach, the project is not expected to adversely affect habitat critical to the survival of a species.
disrupt the breeding cycle of an important population	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Any viable population that can

Significant Impact Criteria - Vulnerable	Comment
	interact with nearby other populations is considered an important population (DEWHA 2009). Therefore, the populations at these seven locations are considered important populations. Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation and wildlife handling protocols. The small area of waterway and habitat impacted and the temporary nature of the works combined with rehabilitation is unlikely to disrupt the breeding cycle of an important population.
modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation and wildlife handling protocols. The small area of waterway and habitat impacted by the construction footprint is also not considered critical habitat. Given this approach, the project is not expected modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will control invasive species introduction. Given this approach, the project is not expected to result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
introduce disease that may cause the species to decline, or	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will control disease introduction. Given this approach, the project is not expected to result in diseases that are harmful to a vulnerable species becoming established in the vulnerable species' habitat.
interfere substantially with the recovery of the species	One Growling Grass Frog was recorded during the survey but the species is presumed present at 7 locations along the alignment. Four of these are outside of the construction footprint (**Table 17**). Impacts on the remaining waterways will be temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation and wildlife handling protocols. The small area of waterway and habitat impacted by the construction footprint is not considered critical habitat important in the recovery of the species.

Significant Impact Criteria - Vulnerable	Comment
	Given this approach, the project is not expected to interfere substantially with the recovery of the species.

7.1.3 Migratory species

As discussed in Section 3.3 the Latham's Snipe and the White-throated Needletail are the only migratory species identified as having "High" or "Moderate" likelihood of occurrence within the construction footprint. An assessment of impacts to these migratory species is provided **Table 24** with a brief habitat description below:

- The White-throated Needletail is widespread in eastern and south-eastern Australia, where the species is a non-breeding summer (October-April) visitor. The species is almost exclusively aerial in Australia, and has been recorded above most types of terrestrial habitat including woodlands, farmland, heathland and mudflats. (http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=682). The range of the White-throated Needletail in Australia extends from Cape York to Tasmania along the eastern seaboard, and inland to central NSW and western Victoria. The most recent records of the species near the project area were at Woolleys Beach and Warringine Park, Bittern in 2006 and 2007, respectively (Atlas of Living Australia). However, important habitat for the White-throated Needletail is not considered to occur within or proximal to the construction footprint of the project. Whilst the construction footprint will require removal of degraded pasture and some wooded vegetation, which provides moderate quality potential foraging/roosting habitat for the species, it is considered implausible that this will seriously disrupt the lifecycle of an ecologically significant proportion of the population.

- Latham's Snipe occur in single, widely dispersed non-breeding population in South-eastern Australia http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=863. The species differ to other shorebirds in preferring open freshwater or brackish wetlands with cover nearby, particularly areas of wet tussock grassland and other dense ground vegetation (SWIFFT 2018). Important habitat for Latham's snipe is defined under the EPBC Act Policy Statement 3.21 as areas that have previously been identified as internationally important for the species, or areas that support at least 18 individuals of the species. The site of international significance identified within Australia is Cedar Hill and Hexham Swamp in NSW (Bamford et al. 2008). This site is at least 800 km from the nearest point of the alignment. The species is considered to be an irregular visitor to the Western Port Ramsar site with a frequency of occurrence of 3% in annual surveys (Hale 2016). The most recent records of the species near the project area was ~420m from the alignment at the corner of Graydens Rd and Marine Parade, Hastings in 2013 (Atlas of Living Australia). Whilst the construction footprint will require removal of degraded pasture, which provides moderate quality habitat for the species, it is considered implausible that the construction footprint could support 18 individuals.

Table 24: Significant impact assessment for EPBC Act migratory species

Significant Impact Criteria – Migratory Species	Comment
substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Although foraging habitat for the White-throated Needletail and Latham's Snipe is present in the ROW in a degraded form, areas of important habitat are not found within the construction footprint. Impacts on the degraded habitat present will be largely temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation. Given this approach, the project is considered unlikely to impact an area of important habitat for a migratory species.
result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species, or	Impacts on the degraded habitat for White-throated Needletail and Latham's Snipe will be largely temporary and mitigated through a Construction EMP and Operational EMP that will include invasive species control. Given this approach, the project is considered unliklely to result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species.
seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.	Impacts on the degraded habitat for White-throated Needletail and Latham's Snipe will be largely temporary and mitigated through a Construction EMP and Operational EMP that will include land rehabilitation. Given this degraded habitat and approach, the project is considered unlikely to seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

7.2 Flora and Fauna Guarantee Act 1988

The assessment has noted the following species that have a moderate or high likelihood of occurrence within the construction footprint and therefore may require inclusion in an FFG Act permit:

- Lewin's Rail observation at KP3.9;
- Eastern Great Egret observation at KP23.0 and KP31.1;
- Baillon's Crake
- Blue-billed Duck observed at KP23.0;
- Swamp Skink
- Growling Grass Frog, as described in Section 3.4.2;
- Southern Brown Bandicoot, as described in Section 3.4.1.

The FFG Act applies to all Crown Land and permits are required under the FFG Act for the taking of listed species in these areas. A permit is also required where non-threatened flora that is protected on Crown Land requires clearance. Therefore, a permit will be required where clearance of native vegetation or habitat is required on areas such as roadsides and Crown Land reserves. Based on the flora survey the permit will need to include the above species and those genera listed in Table 10:

- Asteraceae - Daisies - all species.
- Epacridaceae - Heaths - all species
- Orchidaceae - Orchids - all species
- Acacia - Wattles - excluding *Acacia dealbata, Acacia decurrens, Acacia implexa, Acacia melanoxylon, Acacia paradoxa*
- Correa - Correas - all species

Nine threatening processes listed under the FFG Act could be applicable to the project if the Construction and Operational EMPs were not implemented to manage impacts:

- Degradation of native riparian vegetation along Victorian waterways and streams.
- Prevention of passage of aquatic biota as a result of the presence of instream structures.
- Increase in sediment input into Victorian waterways and streams due to human activities.
- Input of petroleum and related products into Victorian marine and estuarine environments.
- The discharge of human-generated marine debris into Victorian marine or estuarine waters.
- Infection of amphibians with Chytrid fungus resulting in chytridiomycosis.
- Habitat fragmentation as a threatening process for fauna in Victoria.
- Invasion of native vegetation by 'environmental weeds'.
- Loss of biodiversity as a result of the spread of Coast Wattle (*Acacia longifolia* subsp. *sophorae*) and Sallow Wattle (*Acacia longifolia* subsp. *longifolia*) into areas outside its natural range

A desktop review and field survey confirmed suitable habitat for Dwarf Galaxias, Australian Grayling and Flatback Mangrove Goby, all listed on the FFG Act. These species were located on Crown Land. Given the construction footprint intersects Crown Land on several publicly managed watercourses, an FFG Act permit will be required for construction activities.

7.3 Fisheries Act 1995

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

A person must not take, injure, damage, destroy, possess, keep or release into Victorian waters any protected aquatic biota without a permit or unless authorised to do so. Protected aquatic biota includes any taxon of fish or aquatic invertebrate listed under the FFG Act.

This act is relevant if there is a likelihood that land development will impact on fish habitat and aquatic ecological processes.

Similar to the FFG Act, action statements must outline the process that will be implemented to ensure the long-term protection of fish habitat and/or specific species

A permit will be required under the Fisheries Act for works in a waterway that may require the salvage and relocation (i.e. handing) of threatened and common fish species and threatened aquatic invertebrates.

7.4 Marine and Coastal Act 2018

Section 65(1) of the *Marine and Coastal Act 2018* requires the consent of the responsible Minister for the use and development of coastal Crown land, including Crown land in Victorian waters and 200 metres inland of the high-water mark.

Based on the desktop environmental assessment, three sections of construction footprint appear to fall under jurisdiction of the Act, the start of the route at Crib Point Jetty (KP0), the southern end of Warringine Park (approximately KP4.5) Watson Creek at KP 19.2 and a section just south of Langwarrin Creek (KP21.5) will require consent to undertake construction.

Consultation with DELWP to confirm areas of project corridor that fall under the Act and to determine consent requirements is needed.

7.5 Planning and Environment Act 1987

In Victoria, onshore natural gas pipelines with an operating pressure above 1,050kPa require licensing under the Pipelines Act 2005 (Pipeline Act), which is administered by DEWLP together with Energy Safe Victoria. Section 85 of the Pipeline Act provides that a pipeline issued with a licence under the Act is exempt from the requirements for a permit in a planning scheme under the Planning and Environment Act 1987 (P&E Act). As a matter of practice DEWLP administers the Pipeline Act as if the vegetation removal protection apply as outlined in the P&E Act.

7.6 Wildlife Act 1975 and Wildlife Regulations 2002

The main legislation for protecting and managing fauna in Victoria is the *Wildlife Act*. This covers indigenous vertebrate species (except declared pest species), invertebrate species listed under the FFG Act and some introduced game species but does not apply to fish, these are defined under the *Fisheries Act 1995*.

A Management Authorization permit will be required under the Act if salvage and relocation of fauna are to be undertaken as part of any mitigation measures for the project.

7.7 Catchment and Land Protection Act 1994

The *Catchment and Land Protection Act* (CaLP Act) contains provisions relating to catchment planning, land management, noxious weeds and pest animals. The Act also provides a legislative framework for the management of private and public land and sets out the responsibilities of land managers, stating that they must take all reasonable steps to:

- Avoid causing or contributing to land degradation which causes or may cause damage to land of another land owner.
- Protect water resources.
- Conserve soil.
- Eradicate regionally prohibited weeds.
- Prevent the growth and spread of regionally controlled weeds.
- Prevent the spread of, and as far as possible eradicate, established pest animals.

The construction footprint contains several noxious weeds listed as regionally controlled within the PPWCMA region. Appropriate weed control and hygiene measures should be outlined in the Construction and Operational EMPs.

8 REFERENCES

Agriculture Victoria 2018. *Declared Noxious Weeds of Victoria*, Viewed 3 July 2018, http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds/weeds/a-z-of-weeds.

Bamford M, Watkins D, Bancroft W, Tischler G & Wahl, J 2008, Migratory Shorebirds of the East Asian - Australasian Flyway; Population Estimates and Internationally Important Sites. Wetlands International – Oceania, Canberra, Australia.

Birdlife Australia 2018. Bittern Project, http://birdlife.org.au/projects/bittern-project, Accessed July 2018.

BOM 2018, Groundwater Dependent Ecosystems, Bureau of Meteorology, Australian Government Viewed 10 May 2018. http://www.bom.gov.au/water/groundwater/gde/index.shtml

Brown, GW & Main, ML 2010, National Recovery Plan for the Southern Brown Bandicoot Isoodon obesulus obesulus. Department of Sustainability and Environment, Victoria.

Carter, O & Walsh, N 2011, National Recovery Plan for the Swamp Everlasting Xerochrysum palustre. Department of Sustainability and Environment, Melbourne.

Clemann, N, Chapple, DG, & Wainer, J 2004, Sexual Dimorphism, Diet and Reproduction in the Swamp Skink Egernia coventryi, Journal of Herpetology, Vol. 38, No.3, 461-467.

Dann, P 2011, Birds and Marine Mammals, In Understanding the Western Port Environment: A summary of current knowledge and priorities for future research. Edited by Melbourne Water. Melbourne Water, Melbourne. pp. 156–169.DEPI., 2013. Western Port Ramsar Site Boundary Description Technical Report. Department of Environment and Primary Industries, East Melbourne, Victoria.

DEH 2006a, *White Box – Yellow Box – Blakely's Red Gum grassy woodlands and derived native grasslands, EPBC ACT Policy Statement,* Department of the Environment and Heritage, Canberra.

DELWP 2015a, Biodiversity Assessment Handbook: Permitted Clearing of Native Vegetation. Government of Victoria, Department of Environment, Land Water and Planning, Melbourne.

DELWP 2015b, *A Directory of Important Wetlands in Australia*, Government of Victoria, Department of Environment, Land Water and Planning, Victoria. https://www.data.vic.gov.au/data/dataset/victorian-wetlands-listed-in-a-directory-of-important-wetlands-in-australia.

DELWP 2015c, *Flora & Fauna Guarantee Act 1988*; Action Statement No. 258 Dwarf Galaxias *Galaxiella pusilla*, Department of Environment, Land, Water & Planning, Victoria.

DELWP 2017a. Guidelines for the removal, destruction or lopping of native vegetation, Government of Victoria, Department of Environment, Land Water and Planning, Melbourne.

DELWP 2017b. Applicants Guide – Applications to remove, destroy or lop native vegetation, Government of Victoria, Department of Environment, Land Water and Planning, Melbourne.

DEWLP 2017c, Protecting Victoria's Environment – Biodiversity 2037, Government of Victoria, Department of Environment, Land Water and Planning, Melbourne.

DELWP 2017d, Western Port Ramsar Site Management Plan. Department of Environment, Land, Water and Planning, East Melbourne.

DELWP 2018a, Victorian Biodiversity Atlas, Government of Victoria, Department of Environment, Land, Water and Planning, Victoria, Viewed March 2018, https://vba.dse.vic.gov.au/vba/#/.

DELWP 2018b, NatureKit, Government of Victoria, Department of Environment, Land, Water and Planning, Victoria, Viewed March 2018, http://maps.biodiversity.vic.gov.au/viewer/?viewer=NatureKit.

DELWP 2018c, Bioregions and EVC benchmarks, Government of Victoria, Department of Environment, Land, Water and Planning, Victoria, Viewed March 2018, https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks.

DELWP 2018d, *Planning Schemes Online.* Government of Victoria, Department of Environment, Land Water and Planning, Melbourne, Victoria, Viewed 10 May 2018, http://planningschemes.dpcd.vic.gov.au/.

DELWP 2018e, *Flora and Fauna Guarantee Act 1988 Threatened List April 2018*, Government of Victoria, Department of Environment, Land, Water and Planning, Victoria.

DEPI 2013, *Permitted clearing of native vegetation: biodiversity assessment guidelines*, Government of Victoria, Department of Environment and Primary Industries, East Melbourne.

DEPI 2014, *Advisory list of rare or threatened plants in Victoria – 2014,* Government of Victoria, Department of Environment and Primary Industries, East Melbourne.

DEWHA 2008, Approved Conservation Advice for *Senecio psilocarpus* (Swamp Fireweed). Canberra: Department of the Environment, Water, Heritage and the Arts. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/64976-conservation-advice.pdf.

DEWHA 2009, *EPBC Act Policy Statement 3.14: Significant impact guidelines for the vulnerable growling grass frog* (*Litoria raniformis*), Department of the Environment, Water, Heritage and the Arts, Canberra.

DNRE 2002, *Victoria's Native Vegetation Management: A Framework for Action*. Government of Victoria, Department of Natural Resources and Environment, East Melbourne.

DoE 2013, Matters of National Environmental Significance - Significant Impact Guidelines 1.1. Department of the Environment, Canberra.

DoE 2015, Approved Conservation Advice for the Natural Damp Grassland of the Victorian Coastal Plains. Department of the Environment, Canberra.

DoE 2018, Subtropical and Temperate Coastal Saltmarsh in Community and Species Profile and Threats Database, Department of the Environment, Canberra

DoEE 2018a, *EPBC Act Protected Matters Report*. Department of Environment and Energy, Canberra, ACT, Generated 18 April 2018, http://www.environment.gov.au/webgis-framework/apps/pmst/pmst.jsf.

DoEE 2018b, Species Profile and Threats Database. Department of Environment and Energy, Canberra, ACT, Generated March 2018, http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

DoEE 2018c, Weeds of National Significance, Department of Environment and Energy, Canberra, ACT, Generated 3 July 2018, http://www.environment.gov.au/biodiversity/invasive/weeds/weeds/lists/wons.html.

DSE 2003, Coastal Moonah Woodland *Flora and Fauna Act* 1988 Guarantee Action Statement. Published by the Department of Sustainability and Environment for the State of Victoria.

DSE 2004, *Vegetation Quality Assessment Manual: guidelines for applying the habitat hectares scoring method,* Government of Victoria, Department of Sustainability & Environment, Melbourne.

DSE 2006, *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978,* Government of Victoria, Department of Sustainability & Environment, East Melbourne.

DSE 2008, Strzelecki Gum Action Statement. Prepared by the Victorian Department of Sustainability and Environment. Accessed from https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/32682/Strzelecki_Gum_Eucalyptus_strzeleckii.pdf on 2/9 August 2018.

DSE 2009, *Advisory list of threatened invertebrate fauna in Victoria – 2009,* Government of Victoria, Department of Sustainability and Environment, Melbourne.

DSE 2010, *Biodiversity Precinct Structure Planning Kit, Government of Victoria,* Department of Sustainability and Environment, Melbourne.

DSE 2013, *Advisory list of Threatened Vertebrate Fauna in Victoria 2013,* Government of Victoria, Department of Sustainability and Environment, Melbourne.

DSEWPaC 2013, Draft Survey Guidelines for Australia's Threatened Orchids guidelines for detecting Orchids listed as threatened under the EPBC Act 1999 Department of Sustainability, Environment, Water, Population and Communities, Canberra.

DSEWPaC 2011a, *Survey guidelines for Australia's threatened mammals: guidelines for detecting mammals listed as threatened under the EPBC Act 1999*, Department of Sustainability, Environment, Water, Population and Communities, Canberra, http://www.environment.gov.au/resource/survey-guidelines-australias-threatened-mammals-guidelines-detecting-mammals-listed.

DSEWPaC 2012, *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy,* Department of Sustainability, Environment, Water, Population and Communities, Canberra.

DSEWPaC 2013a, Decision Notice under the EPBC Act – Yaringa Boat Harbour, Western Port, Victoria (EPBC2011/6014). Department of Sustainability, Environment, Water, Population and Communities, Canberra.

DSEWPaC 2013b, *Conservation Advice for SUBTROPICAL AND TEMPERATE COASTAL SALTMARSH,* Department of Sustainability, Environment, Water, Population and Communities, Canberra,

http://www.environment.gov.au/biodiversity/threatened/communities/pubs/118-conservation-advice.pdf.

Ecology Australia 2009, Southern Brown Bandicoot Management Plan for the former Koo Wee Rup Swamp Area, Ecology Australia P/L, Fairfield, Victoria.

Ecology Australia 2012, Koo Wee Rup Bypass Fauna Infrastructure Requirements, Report prepared for VicRoads. Ecology Australia P/L, Fairfield, Victoria.

Federation University 2015, "Visualising Victoria's Groundwater" (internet data portal), Centre for eResearch and Digital Innovation, Federation University Australia, Mt Helen, Ballarat, Victoria. Retrieved 4/04/2018, from: http://www.vvg.org.au.

EPA 2018, Draft State Environment Protection Policy (Waters) 2018, Environment Protection Authority, Government of Victoria.

Hale, J 2016, Ecological Character Description Addendum - Western Port Ramsar Site. Department of Environment, Land, Water and Planning. East Melbourne.

Heard, GW, Scroggie, MP & Clemann, N 2010, *Guidelines for managing the endangered Growling Grass Frog in urbanising landscapes,* Arthur Rylah Institute for Environmental Research Technical Report Series No. 208, Government of Victoria, Department of Sustainability and Environment, Heidelberg, Victoria.

Jenkins, G 2011, Fish, In Understanding the Western Port Environment: A summary of current knowledge and priorities for future research. Edited by Melbourne Water. Melbourne Water, Melbourne. pp. 142–155.

Kellogg Brown & Root 2010, Western Port Ramsar Wetland Ecological Character Description. Report for Department of Sustainability, Environment, Water, Population and Communities, Canberra.

Lee, R 2011, Physical and chemical setting, In Understanding the Western Port Environment: A summary of current knowledge and priorities for future research. Edited by Melbourne Water. Melbourne Water, Melbourne. pp. 50–79.

Paul Kelly and Associates 2015, *Ecological (Flora & Fauna) Assessment Crib Point Jetty,* Port of Hastings Development Authority.

Paul Kelly and Associates 2016, *Southern Brown Bandicoot Isoodon obesulus obesulus survey at Crib Point Jetty,* Port of Hastings Development Authority.

Pizzey, G & Knight, F 2012, The Field Guide to Birds of Australia, 9th Ed, Harper Collins, Australia.

Port Phillip & Western Port CMA 2018, Viewed 3 July 2018, http://www.ppwcma.vic.gov.au/about/our-region/water/rivers/.

Wilson, S & Swan, G 2013, A Complete Guide to Reptiles of Australia, 4th Edition. New Holland Publishers, Sydney.

9 APPENDICES

Appendix A:	EPBC PMST 5km buffer
Appendix B:	List of Flora Recorded from the Alignment and Database Search Area
Appendix C:	Flora Likelihood of occurrence
Appendix D:	Vegetation Quality Assessment Results
Appendix E:	List of Fauna Recorded from the Alignment and Database Search Area
Appendix F:	Fauna Likelihood of occurrence
Appendix G:	EnSym Draft Assessment
Appendix H:	Detailed figures of ecological values found along the construction footprint.
	Growling Grass Frog Targeted Survey Location Map
	Southern Brown Bandicoot Mitigation Area
	Threatened Fauna Species Locations

Appendix A: EPBC PMST 5km buffer

EPBC Act Protected Matters Report

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

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

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

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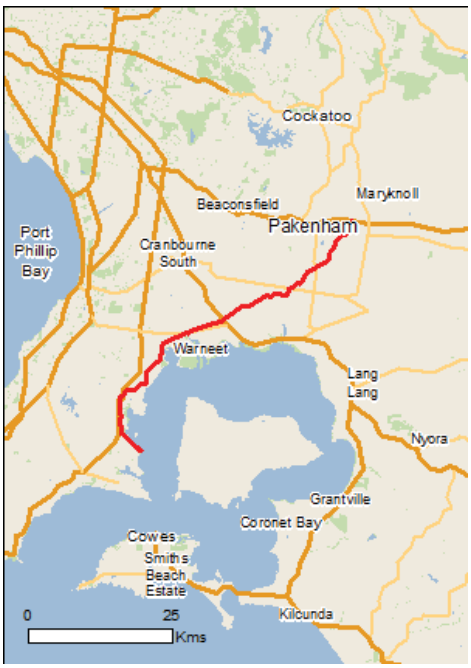

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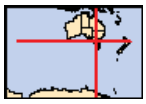

Summary

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:	3
Listed Threatened Species:	64
Listed Migratory Species:	59

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:	1
Commonwealth Heritage Places:	2
Listed Marine Species:	68
Whales and Other Cetaceans:	7
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:	13
Regional Forest Agreements:	1
Invasive Species:	49
Nationally Important Wetlands:	1
Key Ecological Features (Marine)	None

Details

Matters of National Environmental Significance

Wetlands of International Importance (Ramsar) [Resource Information]

Name	Proximity
Western port	Within Ramsar site

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
Natural Damp Grassland of the Victorian Coastal Plains	Critically Endangered	Community likely to occur within area
Subtropical and Temperate Coastal Saltmarsh	Vulnerable	Community likely to occur within area
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Community likely to occur within area

Listed Threatened Species [Resource Information]

Name	Status	Type of Presence
Birds		
Anthochaera phrygia Regent Honeyeater [82338]	Critically Endangered	Species or species habitat likely to occur within area
Botaurus poiciloptilus Australasian Bittern [1001]	Endangered	Species or species habitat known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis gibsoni Gibson's Albatross [82270]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely

Name	Status	Type of Presence
		to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Fregetta grallaria grallaria White-bellied Storm-Petrel (Tasman Sea), White-bellied Storm-Petrel (Australasian) [64438]	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
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur within area
Limosa lapponica baueri Bar-tailed Godwit (baueri), Western Alaskan Bar-tailed Godwit [86380]	Vulnerable	Species or species habitat known to occur within area
Limosa lapponica menzbieri Northern Siberian Bar-tailed Godwit, Bar-tailed Godwit (menzbieri) [86432]	Critically Endangered	Species or species habitat may occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Pachyptila turtur subantarctica Fairy Prion (southern) [64445]	Vulnerable	Species or species habitat known to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pterodroma leucoptera leucoptera Gould's Petrel, Australian Gould's Petrel [26033]	Endangered	Species or species habitat may occur within area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat likely to occur within area
Sternula nereis nereis Australian Fairy Tern [82950]	Vulnerable	Breeding likely to occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche bulleri platei Northern Buller's Albatross, Pacific Albatross [82273]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta cauta Shy Albatross, Tasmanian Shy Albatross [82345]	Vulnerable	Foraging, feeding or

Name	Status	Type of Presence
		related behaviour likely to occur within area
Thalassarche cauta steadi White-capped Albatross [82344]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Fish		
Galaxiella pusilla Eastern Dwarf Galaxias, Dwarf Galaxias [56790]	Vulnerable	Species or species habitat known to occur within area
Prototroctes maraena Australian Grayling [26179]	Vulnerable	Species or species habitat known to occur within area
Frogs		
Litoria raniformis Growling Grass Frog, Southern Bell Frog, Green and Golden Frog, Warty Swamp Frog [1828]	Vulnerable	Species or species habitat known to occur within area
Insects		
Synemon plana Golden Sun Moth [25234]	Critically Endangered	Species or species habitat may occur within area
Mammals		
Antechinus minimus maritimus Swamp Antechinus (mainland) [83086]	Vulnerable	Species or species habitat likely to occur within area
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
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Isoodon obesulus obesulus Southern Brown Bandicoot (eastern), Southern Brown Bandicoot (south-eastern) [68050]	Endangered	Species or species habitat known to occur within area
Mastacomys fuscus mordicus Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Petauroides volans Greater Glider [254]	Vulnerable	Species or species habitat likely to occur within area
Potorous tridactylus tridactylus Long-nosed Potoroo (SE mainland) [66645]	Vulnerable	Species or species habitat likely to occur

Name	Status	Type of Presence
		within area
Pseudomys fumeus Smoky Mouse, Konoom [88]	Endangered	Species or species habitat likely to occur within area
Pteropus poliocephalus Grey-headed Flying-fox [186]	Vulnerable	Roosting known to occur within area
Plants		
Amphibromus fluitans River Swamp Wallaby-grass, Floating Swamp Wallaby-grass [19215]	Vulnerable	Species or species habitat likely to occur within area
Caladenia orientalis Eastern Spider Orchid [83410]	Endangered	Species or species habitat may occur within area
Dianella amoena Matted Flax-lily [64886]	Endangered	Species or species habitat known to occur within area
Glycine latrobeana Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat likely to occur within area
Pomaderris vacciniifolia Round-leaf Pomaderris [4256]	Critically Endangered	Species or species habitat may 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
Prasophyllum spicatum Dense Leek-orchid [55146]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis chlorogramma Green-striped Greenhood [56510]	Vulnerable	Species or species habitat likely to occur within area
Pterostylis cucullata Leafy Greenhood [15459]	Vulnerable	Species or species habitat may occur within area
Senecio psilocarpus Swamp Fireweed, Smooth-fruited Groundsel [64976]	Vulnerable	Species or species habitat likely to occur within area
Thelymitra epipactoides Metallic Sun-orchid [11896]	Endangered	Species or species habitat may occur within area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat known to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Sharks		

Name	Status	Type of Presence
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to 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
Ardenna carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [82404]		Foraging, feeding or related behaviour likely to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Sternula albifrons Little Tern [82849]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area

Name	Threatened	Type of Presence
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Migratory Marine Species		
Balaena glacialis australis Southern Right Whale [75529]	Endangered*	Species or species habitat known to occur within area
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Carcharodon carcharias White Shark, Great White Shark [64470]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Lamna nasus Porbeagle, Mackerel Shark [83288]		Species or species habitat likely to occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Migratory Terrestrial Species		
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area
Migratory Wetlands Species		
Actitis hypoleucos Common Sandpiper [59309]		Species or species habitat known to occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area

Name	Threatened	Type of Presence
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Tringa brevipes Grey-tailed Tattler [851]		Roosting known to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa incana Wandering Tattler [831]		Roosting known to occur within area

Name	Threatened	Type of Presence
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area

Other Matters Protected by the EPBC Act

Commonwealth Land [Resource Information]

The Commonwealth area listed below may indicate the presence of Commonwealth land in this vicinity. Due to the unreliability of the data source, all proposals should be checked as to whether it impacts on a Commonwealth area, before making a definitive decision. Contact the State or Territory government land department for further information.

Name
Defence - HMAS CERBERUS

Commonwealth Heritage Places [Resource Information]

Name	State	Status
Natural		
HMAS Cerberus Marine and Coastal Area	VIC	Listed place
Historic		
HMAS Cerberus Central Area Group	VIC	Listed place

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 known to occur within area
Apus pacificus Fork-tailed Swift [678]		Species or species habitat likely to occur within area
Ardea alba Great Egret, White Egret [59541]		Species or species habitat known to occur within area
Ardea ibis Cattle Egret [59542]		Species or species habitat may occur within area
Arenaria interpres Ruddy Turnstone [872]		Roosting known to occur within area
Calidris acuminata Sharp-tailed Sandpiper [874]		Roosting known to occur within area
Calidris canutus Red Knot, Knot [855]	Endangered	Species or species habitat known to occur within area
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat known to occur within area
Calidris ruficollis Red-necked Stint [860]		Roosting known to occur within area
Calidris tenuirostris Great Knot [862]	Critically Endangered	Roosting known to occur within area
Charadrius bicinctus Double-banded Plover [895]		Roosting known to occur within area
Charadrius leschenaultii Greater Sand Plover, Large Sand Plover [877]	Vulnerable	Roosting known to occur within area
Charadrius mongolus Lesser Sand Plover, Mongolian Plover [879]	Endangered	Roosting known to occur within area
Charadrius ruficapillus Red-capped Plover [881]		Roosting known to occur within area
Diomedea antipodensis Antipodean Albatross [64458]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea epomophora Southern Royal Albatross [89221]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea exulans Wandering Albatross [89223]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Diomedea gibsoni Gibson's Albatross [64466]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Diomedea sanfordi Northern Royal Albatross [64456]	Endangered	Foraging, feeding or related behaviour likely to occur within area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Roosting may occur within area
Gallinago megala Swinhoe's Snipe [864]		Roosting likely to occur within area
Gallinago stenura Pin-tailed Snipe [841]		Roosting likely to occur within area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat known to occur within area
Heteroscelus brevipes Grey-tailed Tattler [59311]		Roosting known to occur within area
Heteroscelus incanus Wandering Tattler [59547]		Roosting known to occur within area
Himantopus himantopus Black-winged Stilt [870]		Roosting known to occur within area
Hirundapus caudacutus White-throated Needletail [682]		Species or species habitat known to occur within area
Lathamus discolor Swift Parrot [744]	Critically Endangered	Species or species habitat known to occur

Name	Threatened	Type of Presence
		within area
Limicola falcinellus Broad-billed Sandpiper [842]		Roosting known to occur within area
Limosa lapponica Bar-tailed Godwit [844]		Species or species habitat known to occur within area
Macronectes giganteus Southern Giant-Petrel, Southern Giant Petrel [1060]	Endangered	Species or species habitat may occur within area
Macronectes halli Northern Giant Petrel [1061]	Vulnerable	Species or species habitat may occur within area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area
Monarcha melanopsis Black-faced Monarch [609]		Species or species habitat known to occur within area
Motacilla flava Yellow Wagtail [644]		Species or species habitat likely to occur within area
Myiagra cyanoleuca Satin Flycatcher [612]		Breeding known to occur within area
Neophema chrysogaster Orange-bellied Parrot [747]	Critically Endangered	Migration route likely to occur within area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat known to occur within area
Numenius minutus Little Curlew, Little Whimbrel [848]		Roosting likely to occur within area
Numenius phaeopus Whimbrel [849]		Roosting known to occur within area
Pachyptila turtur Fairy Prion [1066]		Species or species habitat known to occur within area
Pandion haliaetus Osprey [952]		Species or species habitat likely to occur within area
Phoebetria fusca Sooty Albatross [1075]	Vulnerable	Species or species habitat likely to occur within area
Pluvialis fulva Pacific Golden Plover [25545]		Roosting known to occur within area
Pluvialis squatarola Grey Plover [865]		Roosting known to occur within area
Puffinus carneipes Flesh-footed Shearwater, Fleshy-footed Shearwater [1043]		Foraging, feeding or related behaviour likely to occur within area
Recurvirostra novaehollandiae Red-necked Avocet [871]		Roosting known to occur within area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area

Name	Threatened	Type of Presence
Rostratula benghalensis (sensu lato) Painted Snipe [889]	Endangered*	Species or species habitat likely to occur within area
Sterna albifrons Little Tern [813]		Species or species habitat may occur within area
Thalassarche bulleri Buller's Albatross, Pacific Albatross [64460]	Vulnerable	Species or species habitat may occur within area
Thalassarche cauta Tasmanian Shy Albatross [89224]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Thalassarche chrysostoma Grey-headed Albatross [66491]	Endangered	Species or species habitat may occur within area
Thalassarche impavida Campbell Albatross, Campbell Black-browed Albatross [64459]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche melanophris Black-browed Albatross [66472]	Vulnerable	Species or species habitat may occur within area
Thalassarche salvini Salvin's Albatross [64463]	Vulnerable	Foraging, feeding or related behaviour likely to occur within area
Thalassarche sp. nov. Pacific Albatross [66511]	Vulnerable*	Species or species habitat may occur within area
Thalassarche steadi White-capped Albatross [64462]	Vulnerable*	Foraging, feeding or related behaviour likely to occur within area
Tringa glareola Wood Sandpiper [829]		Roosting known to occur within area
Tringa nebularia Common Greenshank, Greenshank [832]		Species or species habitat known to occur within area
Tringa stagnatilis Marsh Sandpiper, Little Greenshank [833]		Roosting known to occur within area
Xenus cinereus Terek Sandpiper [59300]		Roosting known to occur within area
Mammals		
Arctocephalus forsteri Long-nosed Fur-seal, New Zealand Fur-seal [20]		Species or species habitat may occur within area
Arctocephalus pusillus Australian Fur-seal, Australo-African Fur-seal [21]		Species or species habitat likely to occur within area
Reptiles		
Caretta caretta Loggerhead Turtle [1763]	Endangered	Species or species habitat known to occur within area
Chelonia mydas Green Turtle [1765]	Vulnerable	Foraging, feeding or related behaviour known to occur within area
Dermochelys coriacea Leatherback Turtle, Leathery Turtle, Luth [1768]	Endangered	Species or species

Name	Threatened	Type of Presence
		habitat known to occur within area

Whales and other Cetaceans [Resource Information]

Name	Status	Type of Presence
Mammals		
Caperea marginata Pygmy Right Whale [39]		Foraging, feeding or related behaviour may occur within area
Delphinus delphis Common Dophin, Short-beaked Common Dolphin [60]		Species or species habitat may occur within area
Eubalaena australis Southern Right Whale [40]	Endangered	Species or species habitat known to occur within area
Lagenorhynchus obscurus Dusky Dolphin [43]		Species or species habitat may occur within area
Megaptera novaeangliae Humpback Whale [38]	Vulnerable	Species or species habitat may occur within area
Tursiops aduncus Indian Ocean Bottlenose Dolphin, Spotted Bottlenose Dolphin [68418]		Species or species habitat likely to occur within area
Tursiops truncatus s. str. Bottlenose Dolphin [68417]		Species or species habitat may occur within area

Extra Information

State and Territory Reserves [Resource Information]

Name	State
Bittern B.R.	VIC
Crib Point G228 B.R.	VIC
Crib Point G229 B.R.	VIC
Nar-Nar-Goon G74 B.R	VIC
Nar-Nar-Goon G75 B.R	VIC
Nar-Nar-Goon G76 B.R	VIC
North Western Port N.C.R.	VIC
Olivers Creek B.R.	VIC
Tyabb B.R.	VIC
Warneet Balaka St B.R.	VIC
Warneet Iluka St B.R.	VIC
Warneet N.F.R.	VIC
Warrengine Creek SS.R.	VIC

Regional Forest Agreements [Resource Information]

Note that all areas with completed RFAs have been included.

Name	State
Central Highlands 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
Feral deer Feral deer species in Australia [85733]		Species or species habitat likely to occur within area
Lepus capensis Brown Hare [127]		Species or species habitat likely to occur within area
Mus musculus House Mouse [120]		Species or species habitat likely to occur within area
Oryctolagus cuniculus Rabbit, European Rabbit [128]		Species or species habitat likely to occur within area
Rattus norvegicus Brown Rat, Norway Rat [83]		Species or species habitat likely to occur within area
Rattus rattus Black Rat, Ship Rat [84]		Species or species habitat likely to occur within area
Sus scrofa Pig [6]		Species or species habitat likely to occur within area
Vulpes vulpes Red Fox, Fox [18]		Species or species habitat likely to occur within area
Plants		
Alternanthera philoxeroides Alligator Weed [11620]		Species or species habitat likely to occur within area
Anredera cordifolia Madeira Vine, Jalap, Lamb's-tail, Mignonette Vine, Anredera, Gulf Madeiravine, Heartleaf Madeiravine, Potato Vine [2643]		Species or species habitat likely to occur within area
Asparagus aethiopicus Asparagus Fern, Ground Asparagus, Basket Fern, Sprengi's Fern, Bushy Asparagus, Emerald Asparagus [62425]		Species or species habitat likely to occur within area
Asparagus asparagoides Bridal Creeper, Bridal Veil Creeper, Smilax, Florist's Smilax, Smilax Asparagus [22473]		Species or species habitat likely to occur within area
Asparagus scandens Asparagus Fern, Climbing Asparagus Fern [23255]		Species or species habitat likely to occur within area
Austrocylindropuntia spp. Prickly Pears [85132]		Species or species habitat likely to occur within area
Carrichtera annua Ward's Weed [9511]		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

Name	Status	Type of Presence
Chrysanthemoides monilifera subsp. rotundata Bitou Bush [16332]		Species or species habitat likely to occur within area
Cytisus scoparius Broom, English Broom, Scotch Broom, Common Broom, Scottish Broom, Spanish Broom [5934]		Species or species habitat likely to occur within area
Eichhornia crassipes Water Hyacinth, Water Orchid, Nile Lily [13466]		Species or species 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
Genista sp. X Genista monspessulana Broom [67538]		Species or species habitat may occur within area
Lycium ferocissimum African Boxthorn, Boxthorn [19235]		Species or species habitat likely to occur within area
Nassella neesiana Chilean Needle grass [67699]		Species or species habitat likely to occur within area
Nassella trichotoma Serrated Tussock, Yass River Tussock, Yass Tussock, Nassella Tussock (NZ) [18884]		Species or species habitat likely to occur within area
Olea europaea Olive, Common Olive [9160]		Species or species habitat may 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
Senecio madagascariensis Fireweed, Madagascar Ragwort, Madagascar Groundsel [2624]		Species or species habitat likely to occur within area
Ulex europaeus Gorse, Furze [7693]		Species or species habitat likely to occur within area

Nationally Important Wetlands	[Resource Information]
Name	State
Western Port	VIC

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

-38.34832 145.21734,-38.34768 145.21532,-38.3448 145.21362,-38.34426 145.21264,-38.34416 145.20859,-38.32863 145.19192,-38.32638 145.18615,-38.31632 145.18602,-38.31613 145.18394,-38.30813 145.18376,-38.30777 145.18537,-38.30308 145.18535,-38.30308 145.18379,-38.28055 145.18365,-38.28053 145.1882,-38.27642 145.18991,-38.27265 145.19486,-38.27262 145.20857,-38.26566 145.21605,-38.26567 145.22468,-38.25318 145.22467,-38.24359 145.23332,-38.24218 145.2375,-38.23864 145.24231,-38.23732 145.24739,-38.22266 145.24826,-38.22187 145.24974,-38.21586 145.25093,-38.21561 145.25162,-38.20364 145.28665,-38.20402 145.29122,-38.20367 145.29308,-38.20061 145.29414,-38.19254 145.33119,-38.19022 145.34086,-38.16982 145.37493,-38.17085 145.38358,-38.15793 145.41437,-38.15875 145.4206,-38.1551 145.42459,-38.15786 145.44538,-38.14909 145.44721,-38.14722 145.45146,-38.14285 145.46139,-38.14315 145.46392,-38.12867 145.47707,-38.11659 145.50435,-38.11288 145.50931,-38.10621 145.51124,-38.10049 145.51872,-38.09322 145.52025,-38.08549 145.52824,-38.08336 145.5287,-38.08112 145.54321,-38.06553 145.54671,-38.06515 145.54377,-38.06515 145.54377

Acknowledgements

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

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

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

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Appendix B: List of Flora Recorded from the Alignment and Database Search Area

Legend:
X = recorded during survey, * = Weed, # = non-indigenous native, C = regionally controlled weed, R = regionally restricted weed
EPBC Act: CE = critically endangered, EN = endangered, VU = vulnerable
FFG Act: L = Listed, X = rejected, N = nominated
Victorian Rare or Threatened list (VROT): en = endangered, r = rare, vu = vulnerable, ex = presumed extinct

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Acacia aculeatissima	Thin-leaf Wattle	X				
Acacia howittii	Sticky Wattle		#			r
Acacia longifolia subsp. sophorae	Coast Wattle	X	#			
Acacia mearnsii	Black Wattle	X				
Acacia melanoxylon	Blackwood	X				
Acacia paradoxa	Hedge Wattle	X				
Acacia verticillata	Prickly Moses	X				
Acaena novae-zelandiae	Bidgee-widgee	X				
Acaena ovina	Australian Sheep's Burr	X				
Acetosella vulgaris	Sheep Sorrel	X	*			
Acianthus pusillus	Small Mosquito-orchid	X				
Acrotriche serrulata	Honey-pots	X				
Adiantum diaphanum	Filmy Maidenhair				L	en
Agapanthus praecox subsp. orientalis	Agapanthus	X	*			
Agrostis capillaris	Brown-top Bent	X	*			
Allium triquetrum	Angled Onion	X	*R			
Allocasuarina littoralis	Black Sheoak	X				
Allocasuarina verticillata	Drooping Sheoak	X				
Amaranthus spp.	Amaranth	X	*			
Amphibromus fluitans	River Swamp Wallaby-grass			VU	X	
Amyema pendula	Drooping Mistletoe	X				
Anthoxanthum odoratum	Sweet Vernal-grass	X	*			
Arctotheca calendula	Cape weed	X	*			
Asparagus asparagoides	Bridal Creeper	X	*R			

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Astroloma humifusum	Cranberry Heath	X				
Atriplex paludosa subsp. *paludosa*	Marsh Saltbush	X				r
Austrostipa densiflora	Dense Spear-grass	X				
Austrostipa rudis	Veined Spear-grass	X				r
Austrostipa spp.	Spear Grass	X				
Austrostipa stipoides	Prickly Spear-grass	X				
Avicennia marina subsp. *australasica*	Grey Mangrove	X				r
Azolla filiculoides	Pacific Azolla	X				
Banksia integrifolia subsp. *integrifolia*	Coast Banksia	X				
Banksia marginata	Silver Banksia	X				
Banksia serrata	Saw Banksia	X				
Banksia spinulosa var. *cunninghamii*	Hairpin Banksia				N	
Betula spp.	Birch	X	*			
Billardiera heterophylla	Bluebell Creeper	X	*			
Billardiera scandens	Common Apple-berry	X				
Bossiaea prostrata	Creeping Bossiaea	X				
Briza maxima	Large Quaking-grass	X	*			
Bromus diandrus	Great Brome	X	*			
Bursaria spinosa subsp. spinosa	Sweet Bursaria	X				
Caladenia orientalis	Eastern Spider Orchid			EN	L	en
Carex appressa	Tall Sedge	X				
Carex breviculmis	Common Grass-sedge	X				
Carpobrotus rossii	Karkalla	X				
Cassinia aculeata subsp. aculeata	Common Cassinia	X				
Cassytha spp.	Dodder Laurel	X				
Cenchrus clandestinus	Kikuyu	X	*			
Centaurium erythraea	Common Centaury	X	*			
Cerastium glomeratum	Common Mouse-ear Chickweed	X	*			
Chenopodium album	Fat Hen	X	*			
Chloris spp.	Windmill Grass	X	*			
Chrysanthemoides monilifera	Boneseed	X	*c			
Cirsium vulgare	Spear Thistle	X	*c			
Coprosma quadrifida	Prickly Currant-bush	X				

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Coprosma repens	Mirror Bush	X	*			
Coronidium gunnianum	Pale Swamp Everlasting					vu
Correa reflexa	Common Correa	X				
Corymbia citriodora	Lemon-scented Gum	X	##			
Corymbia maculata	Spotted Gum	X	#			vu
Cotoneaster pannosus	Velvet Cotoneaster	X	*			
Cotula coronopifolia	Water Buttons	X	*			
Craspedia canens	Grey Billy-buttons				L	en
Crassula helmsii	Swamp Crassula	X				
Crataegus monogyna	Hawthorn	X	*C			
Cynodon dactylon	Couch	X				
Cytisus scoparius	English Broom	X	*C			
Dactylis glomerata	Cocksfoot	X	*			
Daucus carota	Carrot	X	*			
Daucus glochidiatus	Australian Carrot	X				
Dianella admixta	Black-anther Flax-lily	X				
Dianella amoena	Matted Flax-lily			EN	L	en
Dianella revoluta	Black-anther Flax-lily	X				
Dianella sp. aff. *longifolia (Benambra)*	Arching Flax-lily					vu
Dichondra repens	Kidney-weed	X				
Dillwynia spp.	Parrot Pea	X				
Disphyma crassifolium subsp. *clavellatum*	Rounded Noon-flower	X				
Distichlis distichophylla	Australian Salt-grass	X				
Diuris punctata	Purple Diuris				L	vu
Drosera aberrans	Scented Sundew	X				
Ehrharta erecta var. *erecta*	Panic Veldt-grass	X	*			
Ehrharta longiflora	Annual Veldt-grass	X	*			
Epacris impressa	Common Heath	X				
Epilobium billardierianum	Variable Willow-herb	X				
Erica lusitanica	Spanish Heath	X	*			
Erigeron bonariense	Flaxleaf Fleabane	X	*			
Eucalyptus botryoides	Southern Mahogany	X	#			
Eucalyptus camaldulensis	River Red-gum	X				
Eucalyptus cladocalyx	Sugar Gum	X	#			

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Eucalyptus crenulata	Buxton Gum		#		L	en
Eucalyptus fulgens	Green Scentbark					r
Eucalyptus globulus	Blue-gum	X	#			r
Eucalyptus globulus subsp. globulus	Southern Blue-gum		#			r
Eucalyptus leucoxylon	Yellow Gum	X	#			
Eucalyptus leucoxylon subsp. *megalocarpa*	Large-fruit Yellow-gum		#		L	en
Eucalyptus ovata	Swamp Gum	X				
Eucalyptus pauciflora subsp. *pauciflora*	White Sallee	X	#			
Eucalyptus radiata	Narrow-leaf Peppermint	X				
Eucalyptus sideroxylon subsp. *sideroxylon*	Mugga					r
Eucalyptus spp.	Eucalypt	X	#			
Eucalyptus viminalis	Manna Gum	X				
Eucalyptus viminalis subsp. *pryoriana*	Coast Manna-gum	X				
Eucalyptus willisii s.s.	Promontory Peppermint					r
Eucalyptus X studleyensis	Studley Park Gum					en
Eucalyptus strzeleckii	Strzelecki Gum			VU	L	vu
Euchiton japonicus	Creeping Cudweed	X				
Euryomyrtus ramosissima subsp. *prostrata*	Nodding Baeckea					r
Exocarpos cupressiformis	Cherry Ballart	X				
Exocarpos spp.	Ballart	X				
Exocarpos syrticola	Coast Ballart					r
Ficinia nodosa	Knobby Club-sedge	X				
Freesia leichtlinii	Freesia	X	*			
Gahnia radula	Thatch Saw-sedge	X				
Gahnia sieberiana	Red-fruit Saw-sedge	X				
Gahnia spp.	Saw Sedge	X				
Genista linifolia	Flax-leaf Broom	X	*C			
Genista monspessulana	Montpellier Broom	X	*C			
Geranium solanderi var. *solanderi* s.s.	Austral Crane's-bill					vu
Gladiolus spp.	Gladiolus	X	*			
Gladiolus undulatus	Wild Gladiolus	X	*			
Glycine latrobeana	Clover Glycine, Purple Clover			VU	L	vu

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Gonocarpus tetragynus	Common Raspwort	X				
Goodenia humilis	Swamp Goodenia	X				
Goodenia ovata	Hop Goodenia	X				
Hakea drupacea	Sweet Hakea	X	#			
Hedera helix	English Ivy	X	*			
Helichrysum luteoalbum	Jersey Cudweed	X				
Helminthotheca echioides	Ox-tongue	X	*			
Holcus lanatus	Yorkshire Fog	X	*			
Hordeum leporinum	Barley-grass	X	*			
Hydrocotyle spp.	Pennywort	X				
Hypericum gramineum	Small St John's Wort	X				
Hypochaeris radicata	Flatweed	X	*			
Hypochaeris spp.	Cat's Ear	X	*			
Imperata cylindrica	Blady Grass	X	#			
Isolepis inundata	Swamp Club-sedge	X				
Isolepis spp.	Club Sedge	X				
Isopogon ceratophyllus	Horny Cone-bush	X				
Juncus kraussii subsp. *australiensis*	Sea Rush	X				
Juncus procerus	Tall Rush	X				
Juncus revolutus	Creeping Rush					r
Juncus spp.	Rush	X				
Juncus subsecundus	Finger Rush	X				
Kennedia prostrata	Running Postman	X				
Kunzea ericoides	Burgan	X				
Lachnagrostis punicea subsp. *filifolia*	Purple Blown-grass				L	r
Lachnagrostis punicea subsp. *punicea*	Purple Blown-grass					r
Lachnagrostis robusta	Salt Blown-grass					r
Lawrencia spicata	Salt Lawrencia					r
Lepidosperma elatius	Tall Sword-sedge	X				
Lepidosperma laterale	Variable Sword-sedge	X				
Leptospermum continentale	Prickly Tea-tree	X				
Leptospermum laevigatum	Coast Tea-tree	X	#			
Leucopogon spp.	Beard Heath	X				
Limonium australe var. *australe*	Yellow Sea-lavender					r

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Limonium australe var. *baudinii*	Tasmanian Sea-lavender			VU		ex
Lobelia anceps	Angled Lobelia	X				
Lolium spp.	Rye Grass	X	*			
Lomandra filiformis	Wattle Mat-rush	X				
Lomandra longifolia	Spiny-headed Mat-rush	X				
Lycium ferocissimum	African Box-thorn	X	*C			
Lythrum hyssopifolia	Small Loosestrife	X				
Malus spp.	Apple	X	*			
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle		#			r
Melaleuca ericifolia	Swamp Paperbark	X				
Microlaena stipoides var. *stipoides*	Weeping Grass	X				
Microseris scapigera s.s.	Plains Yam-daisy					vu
Microtis spp.	Onion Orchid	X				
Myoporum insulare	Common Boobialla	X				
Olearia lirata	Snowy Daisy-bush	X				
Olearia tenuifolia	Scented Daisy-bush					r
Oxalis corniculata	Yellow Wood-sorrel	X				
Oxalis pes-caprae	Soursob	X	*R			
Oxalis purpurea	Large-flower Wood-sorrel	X	*			
Paspalum dilatatum	Paspalum	X	*			
Patersonia occidentalis var. *occidentalis*	Long Purple-flag	X				
Persicaria decipiens	Slender Knotweed	X				
Phalaris aquatica	Toowoomba Canary-grass	X	*			
Phragmites australis	Common Reed	X				
Phytolacca octandra	Red-ink Weed	X	*			
Pimelea humilis	Common Rice-flower	X				
Pinus radiata	Radiata Pine	X	*			
Pittosporum undulatum	Sweet Pittosporum	X	#			
Plantago coronopus	Buck's-horn Plantain	X	*			
Plantago lanceolata	Ribwort	X	*			
Plantago spp.	Plantain	X	*			
Platylobium obtusangulum	Common Flat-pea	X				
Poa labillardierei	Common Tussock-grass	X				
Poa sieberiana	Grey Tussock-grass	X				

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Poa spp.	Tussock Grass	X				
Polygonum arenastrum	Wireweed	X				
Pomaderris vacciniifolia	Round-leaf Pomaderris			CE	L	en
Populus spp.	Poplar	X	*			
Poranthera microphylla	Small Poranthera	X				
Prasophyllum frenchii	Maroon Leek-orchid			EN	L	en
Prasophyllum lindleyanum	Green Leek-orchid				X	vu
Prasophyllum spicatum	Dense Leek-orchid			VU		en
Pteridium esculentum	Austral Bracken	X				
Pterostylis chlorogramma	Green-striped Greenhood			VU	L	vu
Pterostylis cucullata	Leafy Greenhood			VU	L	en
Pterostylis grandiflora	Cobra Greenhood					r
Pterostylis spp.	Greenhood	X				
Pterostylis X toveyana	Mentone Greenhood					vu
Rhagodia candolleana subsp. *candolleana*	Seaberry Saltbush	X				
Romulea rosea	Onion Grass	X	*			
Rosa rubiginosa	Sweet Briar	X	*C			
Rubus fruticosus spp. agg.	Blackberry	X	*C			
Rumex spp.	Dock (naturalised)	X	*			
Rytidosperma spp.	Wallaby Grass	X				
Salix spp.	Willow	X	*R			
Sarcocornia quinqueflora	Beaded Glasswort	X				
Schoenus apogon	Common Bog-sedge	X				
Selliera radicans	Shiny Swamp-mat	X				
Senecio glomeratus subsp. *longifructus*	Annual Fireweed					r
Senecio psilocarpus	Swamp Fireweed			VU		vu
Senecio spp.	Groundsel	X	*			
Solanum aviculare	Kangaroo Apple	X				
Solanum nigrum	Black Nightshade	X	*			
Sonchus oleraceus	Common Sow-thistle	X	*			
Sporobolus africanus	Rat-tail Grass	X	*			
Tecticornia arbuscula	Shrubby Glasswort	X				
Thelymitra epipactoides	Metallic Sun-orchid			EN	L	en
Thelymitra longiloba	Marsh Sun-orchid				L	en

Scientific Name	Common Name	Recorded in the construction footprint	Origin	Conservation Status		
				EPBC	FFG	VROT
Thelymitra orientalis	Hoary Sun-orchid					vu
Thelymitra pallidiflora	Pallid Sun-orchid					en
Thelymitra reflexa	Gaping Sun-orchid					en
Thelymitra spp.	Sun Orchid	X				
Thelymitra X irregularis	Crested Sun-orchid					r
Thelymitra X macmillanii	Crimson Sun-orchid					vu
Thelymitra X merraniae	Merran's Sun-orchid				L	en
Themeda triandra	Kangaroo Grass	X				
Thysanotus patersonii	Twining Fringe-lily	X				
Thysanotus tuberosus	Common Fringe-lily	X				
Tricoryne elatior	Yellow Rush-lily	X				
Triglochin minutissima	Tiny Arrowgrass					r
Triglochin spp.	Arrowgrass	X				
Typha domingensis	Narrow-leaf Cumbungi	X				
Typha spp.	Bulrush	X				
Ulex europaeus	Gorse	X	*C			
Urtica dioica	Giant Nettle	X	*			
Vicia sativa	Common Vetch	X	*			
Viminaria juncea	Golden Spray	X				
Viola hederacea sensu	Ivy-leaf Violet	X				
Vulpia spp.	Fescue	X	*			
Wahlenbergia gracilis	Sprawling Bluebell	X				
Watsonia meriana var. *bulbillifera*	Bulbil Watsonia	X	*C			
Xanthium spinosum	Bathurst Burr	X	*C			
Xanthorrhoea minor	Small Grass-tree	X				
Xanthosia tasmanica	Southern Xanthosia					r
Xerochrysum palustre	Swamp Everlasting			VU	L	vu
Zantedeschia aethiopica	White Arum-lily	X	*			

Appendix C: Flora Likelihood of occurrence

Note: Legend provided in Appendix C is relevant to this table.

Scientific Name	Common Name	Status	Source	Potential Habitat	#Likelihood of occurrence (Assessment based)	Notes
		EPBC/FFG/ VROT				
Acacia howittii	Sticky Wattle	r	VBA	Likely to be cultivated or introduced into the area	Low	
Adiantum diaphanum	Filmy Maidenhair	L / e	VBA	Swamp Scrub	Low	
Amphibromus fluitans	River Swamp Wallaby-grass	VU	VBA, PMST	Swamp Scrub, Plains Grassy Woodland	**High**	Known Population on ESSO easement, adjacent (200m away) to the construction footprint between KP13.5 and KP15.
Atriplex paludosa subsp. *paludosa*	Marsh Saltbush	r	VBA	Mangrove Shrubland, Coastal Saltmarsh, Swamp Scrub, Heathy Woodland	**High**	In areas where alignment crosses Coastal Saltmarsh or other areas that have tidal influence.
Austrostipa rudis subsp. *australis*	Veined Spear-grass	r	VBA	Swampy Riparian Woodland, Grassy Woodland, Heathy Woodland	Low	
Avicennia marina subsp. *australasica*	Grey Mangrove	r	VBA	Coastal Saltmarsh, Mangrove Shrubland, Swamp Scrub	**High**	In areas where alignment crosses Coastal Saltmarsh or other areas that have tidal influence
Banksia spinulosa var. cunninghamii	Hairpin Banksia		VBA	Heathy Woodland	Negligible	Outlier - unlikely
Caladenia orientalis	Eastern Spider Orchid	EN / L / e	PMST	Sand Heathland/Wet Heathland Mosaic	Low	Wilsons Prom main population with outliers Wonthaggi, Traralgon, Walkerville
Coronidium gunnianum	Pale Swamp Everlasting	v	VBA	Plains Grassy Wetland, Swamp Scrub	Negligible	Closest record north of Eastlink or east of South Gippsland Highway

Scientific Name	Common Name	Status	Source	Potential Habitat	#Likelihood of occurrence (Assessment based)	Notes
		EPBC/FFG/ VROT				
Corymbia maculata	Spotted Gum	v	VBA	Lowland Forest, Grassy Woodland, Damp Sands Herb-rich Woodland	Low	Distribution appears to be along the western side of the coastal line, common. It's used as a street tree
Craspedia canens	Grey Billy-buttons	L/ e	VBA	Grassy Woodland, Plains Grassy Woodland	Low	
Dianella amoena	Matted Flax-lily	EN / L / e	VBA, PMST	Grassy Woodland, Plains Grassy Woodland, Swamp Scrub	Low	Recorded from approximately 5km East of Fiveways in 1994. Co-ordinates place the record in Swamp Scrub associated with the rail reserve at Pakenham where the rail reserve crosses the Princes Freeway, East of Ryan Road. Approximately 500m West of KP53.
Dianella sp. aff. *longifolia (Benambra)*	Arching Flax-lily	v	VBA	Plains Grassy Woodland, Swampy Woodland	Negligible	Closest record other side of PPB (St Leonards) or east of Pakenham
Diuris punctata	Purple Diuris	L / v	VBA	Grassy Woodland, Heathy Woodland, Swampy Woodland	Low	
Eucalyptus crenulata	Buxton Gum	EN / L / e	VBA	Swampy Woodland	Negligible	Closest record in Pakenham
Eucalyptus fulgens	Green Scentbark	r	VBA	Valley Heathy Forest, Valley Grassy Forest	Negligible	Closet record is Box Hill
Eucalyptus globulus subsp. *globulus*	Southern Blue-gum	r	VBA	Swampy Riparian Woodland, Grassy Woodland, Plains Grassy Woodland	Low	
Eucalyptus leucoxylon subsp. *megalocarpa*	Large-fruit Yellow-gum	L / e	VBA	Near Nelson is the eastern most past of the mainly South Australian coastal distribution.	Negligible	Closest record in Melbourne. Widely planted for its pink to red flowers
Eucalyptus sideroxylon subsp. *sideroxylon*	Mugga	r	VBA	Heathy Dry Forest, Valley Grassy Forest	Negligible	In Victoria confined to the Chiltern area, northern warby range and south of Winton

Scientific Name	Common Name	Status	Source	Potential Habitat	#Likelihood of occurrence (Assessment based)	Notes
		EPBC/FFG/ VROT				
Eucalyptus strzeleckii	Strzelecki Gum	VU / L / v	recorded		**Present**	Not specifically known from this location however an isolated tree was recorded within the construction footprint.
Eucalyptus willisii s.s.	Promontory Peppermint	r	VBA	Granitic Hills Woodland, wet Rocky Outcrop Scrub	Negligible	Closest population Wilsons Prom
Eucalyptus X studleyensis	Studley Park Gum	e	VBA	Plains Grassland/Plains Grassy Woodland	Low	Closest record Carrum Downs
Euryomyrtus ramosissima subsp. *prostrata*	Nodding Baeckea	r	VBA	Heathy Woodland	Low	One record at Stony Point near railway line. Main cluster at Anglesea
Exocarpos syrticola	Coast Ballart	r	VBA	Swamp Scrub	Low	One record at Hasting, remaining Phillip Island, Wonthaggi etc
Geranium solanderi var. *solanderi* s.s.	Austral Crane's-bill	v	VBA	Swamp Scrub, Damp Heathy Woodland	Low	Closest record Pakenham
Glycine latrobeana	Clover Glycine	VU / L / v	PMST	Herb-rich Foothill Forest, Lowland Forest, Grassy Woodland	Low	Records south around Rosebud and north at Pakenham
Juncus revolutus	Creeping Rush	r	VBA	Coastal Saltmarsh, Swamp Scrub, Heathy Woodland	Moderate	Records appear to hug the coast from Hastings to Tooradin and French Island
Lachnagrostis punicea subsp. *filifolia*	Purple Blown-grass	L / r	VBA	Plains Grassy Wetland, Swamp Scrub, Swampy Riparian Woodland.	Low	Scattered records north of Frankston and Tooradin northward
Lachnagrostis punicea subsp. *punicea*	Purple Blown-grass	r	VBA	Plains Grassy Woodland, Plains Grassland, Coastal Banksia Woodland	Low	Scattered records on peninsula, mostly along the western coast. Main pop west of Melbourne
Lachnagrostis robusta	Salt Blown-grass	r	VBA	Coastal Saltmarsh	Low	Closest record east of Tooradin. Distribution mostly west of PPB.
Lawrencia spicata	Salt Lawrencia	r	VBA	Coastal Saltmarsh, Swamp Scrub	Moderate	Scattered records Hastings, Warneet and Tooradin

Scientific Name	Common Name	Status	Source	Potential Habitat	#Likelihood of occurrence (Assessment based)	Notes
		EPBC/FFG/ VROT				
Limonium australe var. *australe*	Yellow Sea-lavender	r	VBA	Coastal Saltmarsh, Swamp Scrub, Mangrove Shrubland	Low	Records (several in area from south of Hastings north) hug the east coastline
Limonium australe var. *baudinii*	Tasmanian Sea-lavender	VU / x	VBA	Coastal Saltmarsh, Swamp Scrub, Mangrove Shrubland	Negligible	No records showing on NatureKit
Melaleuca armillaris subsp. *armillaris*	Giant Honey-myrtle	r	VBA	Grassy Woodland, Plains Swampy Woodland, Heathy Woodland	Low	Several records in the vicinity (most likely planted), Naturally occurring populations LOW likelihood.
Microseris scapigera s.s.	Plains Yam-daisy	v	VBA	Plains Grassy Wetland, Swamp Scrub	Low	Closet record is Lyndhurst and east of Fiveways
Olearia tenuifolia	Scented Daisy-bush	r	VBA	Shrubby Damp Forest, Shrubby Dry Forest	Negligible	Records in the Avon Wilderness Park
Pomaderris vacciniifolia	Round-leaf Pomaderris	CR / L / e	PMST	Grassy Dry Forest, Shrubby Foothill Forest	Negligible	Records in the Warrandyte/Kinglake area
Prasophyllum frenchii	Maroon Leek-orchid	EN / L / e	VBA, PMST	Swamp Scrub	Low	Closest records east of Five-ways & Clyde North
Prasophyllum lindleyanum	Green Leek-orchid	X / v	VBA	Mangrove Shrubland, Lowland Forest	Low	Cluster of records Crib Point edge of water, low acc/old records Safety Beach, Mt Eliza and Frankston.
Prasophyllum spicatum	Dense Leek-orchid	VU / e	VBA, PMST	Mangrove Shrubland, Sand Heathland, Grassy Woodland	**High**	Cluster of recent records from Stony Point Rail Reserve, Unreserved Crown Land at Crip Point and the Bittern Bushland Group reserve at Crib Point.
Pterostylis chlorogramma	Green-striped Greenhood	VU / L / v	PMST	Heathy Woodland	Low	Recent record near Baxter, other closest at Tonimbuk & French Is.
Pterostylis cucullata	Leafy Greenhood	L / e	PMST	Coastal Alkaline Scrub	Low	Recent closest records around Rosebud/Cape Schanck and westward

Scientific Name	Common Name	Status	Source	Potential Habitat	#Likelihood of occurrence (Assessment based)	Notes
		EPBC/FFG/ VROT				
Pterostylis grandiflora	Cobra Greenhood	r	VBA	Herb-rich Foothill Forest, Grassy Forest, Lowland Forest	Low	Scattered records to the south (Main Ridge), most records further north (Beaconsfield)
Pterostylis X toveyana	Mentone Greenhood	v	VBA	Heathy Dry Forest	Negligible	Only scattered records, closest is 1926 at Frankston, then 1916 Moorabbin
Senecio glomeratus subsp. longifructus	Annual Fireweed	r	VBA	Plains Grassy Forest, Swamp Scrub	Negligible	Closest record in Heidelberg. Only scattered records
Senecio psilocarpus	Swamp Fireweed	VU / v	VBA, PMST	Swamp Scrub	**High**	Muddy Gates Lane/ South Gippsland Railway line
Thelymitra epipactoides	Metallic Sun-orchid	EN /L / e	PMST	Heathy Woodland	Low	Limited records, old (1980), closest Moorabbin & Doveton
Thelymitra longiloba	Marsh Sun-orchid	e	VBA	Grassy Woodland, Heathy Woodland, Sand Heathland	Moderate	1988 record Crib Point, others French Is & Blind Bight
Thelymitra orientalis	Hoary Sun-orchid	v	VBA	Swamp Scrub, Sand Heathland	Moderate	Recent record at Crib Point, other points on French Is.
Thelymitra pallidiflora	Pallid Sun-orchid	e	VBA	Heathy Woodland	Moderate	Three records Crib Point, remaining at Anglesea
Thelymitra reflexa	Gaping Sun-orchid	e	VBA		Low	No records showing on NatureKit
Thelymitra X irregularis	Crested Sun-orchid	r	VBA	Grassy Woodland, Damp Sands Herb-rich Woodland	Moderate	Scattered records, a couple from Crib Point, one from Rosebud and also French Island
Thelymitra X macmillanii	Crimson Sun-orchid	v	VBA	Sand Heathland, Grassy Woodland	Moderate	Good records at Crib Point, nearest then is near Baluk Willum
Thelymitra X merraniae	Merran's Sun-orchid	L / e	VBA	Heathy Woodland, Swamp Scrub	Moderate	Two old and low account records Crib Point, closest then is near Rhyll
Triglochin minutissima	Tiny Arrowgrass	r	VBA	Coastal Saltmarsh	Low	One record 1991 Western Port Coastal Reserve, more records other side of bay, east of Geelong

Scientific Name	Common Name	Status	Source	Potential Habitat	#Likelihood of occurrence (Assessment based)	Notes
		EPBC/FFG/ VROT				
Xanthosia tasmanica	Southern Xanthosia	r	VBA	Heathy Woodland, Lowland Forest, Sand Heathland, Damp Heathy Woodland	Low	Bulk of pop in Anglesea, scattered old points Rosebud, French Is, Sandringham
Xerochrysum palustre	Swamp Everlasting	VU / L/ v	VBA, PMST	Sand Heathland, Swamp Scrub, Plains Grassy Wetland	**High**	2005 record Muddy Gates Lane-Manks Road

Appendix D: Vegetation Quality Assessment Results

	Habitat Zone		KOJH1	KOJH2	KOJH3	K0JH5	KOJH6	KOJH10	KOJH13	KOJH14	KOJH15	KOJH16
	Bioregion		GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
	EVC number		793	793	793	48	83	53	53	53	53	83
	EVC Conservation Status		V	V	V	LC	E	E	E	E	E	E
		Max Score										
Site Condition	Large Old Trees	10	0	0	7	0	5	N/A	N/A	N/A	N/A	2
	Canopy Cover	5	0	0	4	0	4	N/A	N/A	4	N/A	2
	Lack of Weeds	15	6	6	9	7	4	6	9	9	9	7
	Understorey	25	5	5	15	5	5	10	15	20	15	10
	Recruitment	10	5	5	10	1	0	6	6	3	6	10
	Organic Litter	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	0	5	0	5	N/A	N/A	N/A	N/A	2
	Standardiser	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.25	1.25	1.25	1.25	N/A
	Subtotal	75	26	21	55	18	28	34	44	51	44	38
Landscape Context	Patch Size	10	1	1	8	8	2	8	8	8	8	8
	Neighbourhood	10	1	1	1	1	0	2	2	3	3	3
	Distance to Core Area	5	4	3	4	4	3	4	4	4	4	4
	Subtotal	25	6	5	14	13	5	14	14	15	15	15
	Habitat Points	100	32	26	68	31	33	48	58	65	59	53
	Habitat Score	1	0.32	0.32	0.68	0.31	0.33	0.48	0.58	0.65	0.59	0.53
	Habitat Zone Area (ha)		0.01	0.05	0.14	0.06	0.14	0.88	0.73	2.56	2.19	0.69
	Habitat Hectares		0.00	0.01	0.10	0.02	0.05	0.42	0.43	1.66	1.29	0.37

		Habitat Zone	KOJH19	KOJH21	KOJH23	KOJH24	KOJH27	KOJH28	KOJH30	KOJH31A	KOJH33A	KOJH33B
		Bioregion	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		EVC number	83	175	175	83	83	53	53	53	53	53
		EVC Conservation Status	E	E	E	E	E	E	E	E	E	E
		Max Score										
Site Condition	Large Old Trees	10	7	2	9	9	0	N/A	N/A	N/A	N/A	N/A
	Canopy Cover	5	2	4	4	4	5	2	0	0	0	0
	Lack of Weeds	15	7	6	7	4	4	4	0	0	0	0
	Understorey	25	5	15	15	10	5	15	5	5	5	5
	Recruitment	10	5	10	6	3	3	6	5	3	5	5
	Organic Litter	5	3	3	4	5	5	5	3	3	5	5
	Logs	5	5	4	2	5	4	N/A	N/A	N/A	N/A	N/A
	Standardiser	N/A	N/A	N/A	N/A	N/A	N/A	1.25	1.25	1.25	1.25	1.25
	Subtotal	75	34	44	47	40	26	40	16	14	19	19
Landscape Context	Patch Size	10	1	8	8	8	1	1	1	1	8	8
	Neighbourhood	10	0	2	1	3	1	1	0	0	0	0
	Distance to Core Area	5	1	4	4	4	4	3	1	0	4	4
	Subtotal	25	2	14	13	15	6	5	2	1	12	12
		Habitat Points	100	36	58	60	55	32	45	18	15	31	31
		Habitat Score	1	0.36	0.58	0.6	0.55	0.32	0.45	0.18	0.15	0.31	0.31
		Habitat Zone Area (ha)		0.09	0.51	0.06	0.21	0.09	0.21	0.06	0.05	0.10	0.03
		Habitat Hectares		0.03	0.30	0.04	0.11	0.03	0.10	0.01	0.01	0.03	0.01

		Habitat Zone	KOJH33C	KOJH34	KOJH35	KOJH36	KOJH37	KOJH38	KOJH39	KOJH40	KOJH41	KOJH42
		Bioregion	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		EVC number	53	175	175	175	175	175	175	175	175	53
EVC Conservation Status			E	E	E	E	E	E	E	E	E	E
		Max Score										
Site Condition	Large Old Trees	10	N/A	9	9	9	0	0	0	9	3	N/A
	Canopy Cover	5	0	2	2	4	2	4	4	2	3	0
	Lack of Weeds	15	0	9	9	9	7	7	11	4	4	0
	Understorey	25	5	5	15	5	5	15	5	5	5	5
	Recruitment	10	5	1	3	0	0	3	0	3	0	6
	Organic Litter	5	5	5	5	5	5	5	5	5	5	3
	Logs	5	N/A	2	2	0	0	2	0	0	0	N/A
	Standardiser	N/A	1.25	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.25
	Subtotal	75	19	33	45	32	19	36	25	28	20	18
Landscape Context	Patch Size	10	8	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	1	1	1	0	0	0	0	0	0
	Distance to Core Area	5	4	3	3	3	3	3	3	3	3	1
	Subtotal	25	12	5	5	5	23	4	4	4	4	2
Habitat Points		100	31	38	50	37	23	40	29	32	24	20
Habitat Score		1	0.31	0.38	0.5	0.37	0.23	0.4	0.29	0.32	0.24	0.2
Habitat Zone Area (ha)			0.03	0.11	0.33	0.23	0.01	0.28	0.01	0.04	0.06	0.07
Habitat Hectares			0.01	0.04	0.16	0.00	0.00	0.11	0.00	0.01	0.02	0.01

		Habitat Zone	KOJH43	KOJH44	KOJH45	KOJH46	KOJH47	KODC1	KODC3	KODC3A	KODC3B	KODC3C
		Bioregion	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		EVC number	53	175	175	175	175	83	53	53	53	53
EVC Conservation Status			E	E	E	E	E	E	E	E	E	E
		Max Score										
Site Condition	Large Old Trees	10	N/A	9	9	0	0	8	N/A	N/A	N/A	N/A
	Canopy Cover	5	0	4	4	4	2	4	0	0	0	0
	Lack of Weeds	15	0	0	0	4	4	6	4	4	4	4
	Understorey	25	5	5	5	5	5	5	0	0	0	0
	Recruitment	10	6	0	3	1	0	0	5	5	5	5
	Organic Litter	5	5	5	5	5	5	5	3	3	3	3
	Logs	5	N/A	2	0	5	0	0	N/A	N/A	N/A	N/A
	Standardiser	N/A	1.25	N/A	N/A	N/A	N/A	N/A	1.25	1.25	1.25	1.25
	Subtotal	75	20	25	26	24	16	28	15	15	15	15
Landscape Context	Patch Size	10	1	1	1	1	1	1	1	1	1	1
	Neighbourhood	10	0	0	0	0	0	0	0	0	0	0
	Distance to Core Area	5	3	3	3	3	3	1	0	0	0	0
	Subtotal	25	4	4	4	4	4	2	1	1	1	1
Habitat Points		100	24	29	30	28	20	30	16	16	16	16
Habitat Score		1	0.24	0.29	0.3	0.28	0.2	0.3	0.16	0.16	0.16	0.16
Habitat Zone Area (ha)			0.27	0.02	0.14	0.06	0.02	0.06	0.00	0.01	0.01	0.00
Habitat Hectares			0.06	0.01	0.04	0.02	0.00	0.02	0.00	0.00	0.00	0.00

		Habitat Zone	CCCT4	CCCT10	CCCT52	CCCT53	JHCC1	JHCC2	JHCC49	JHCC50	JHCC55	JHCC56
		Bioregion	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		EVC number	83	53	83	83	53	53	53	53	48	83
EVC Conservation Status			E	E	E	E	E	E	E	E	LC	E
		Max Score										
Site Condition	Large Old Trees	10	0	N/A	0	0	N/A	N/A	N/A	N/A	5	9
	Canopy Cover	5	2	0	0	0	3	0	0	0	2	4
	Lack of Weeds	15	4	6	6	9	2	4	2	4	4	7
	Understorey	25	5	5	10	5	5	5	5	5	15	15
	Recruitment	10	1	3	3	1	3	1	1	1	6	3
	Organic Litter	5	2	2	2	2	2	2	2	2	2	3
	Logs	5	0	2	5	4	N/A	N/A	N/A	N/A	3	5
	Standardiser	N/A	0	1.25	N/A	N/A	1.25	1.25	1.25	1.25	N/A	N/A
	Subtotal	75	14	23	26	21	19	15	13	15	37	46
Landscape Context	Patch Size	10	2	1	1	1	2	1	1	1	8	8
	Neighbourhood	10	0	0	0	0	0	0	1	1	2	2
	Distance to Core Area	5	0	0	0	0	1	1	4	4	4	4
	Subtotal	25	1	1	1	1	3	2	6	6	14	14
Habitat Points		100	16	24	27	22	22	17	19	21	51	60
Habitat Score		1	0.16	0.24	0.27	0.22	0.22	0.17	0.19	0.21	0.51	0.6
Habitat Zone Area (ha)			0.16	0.05	0.04	0.02	0.32	0.32	0.03	0.10	0.49	0.11
Habitat Hectares			0.03	0.01	0.01	0.00	0.07	0.05	0.00	0.02	0.25	0.07

		Habitat Zone	JHCC57	JHCC58	JHCC61	JHCC62	JHCC64	JHCC67	JHCC68	JHCC69	JHCC70	JHMV1
		Bioregion	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		EVC number	48	48	793	793	48	175	175	48	53	48
EVC Conservation Status			LC	LC	V	V	LC	E	E	LC	E	LC
		Max Score										
Site Condition	Large Old Trees	10	9	3	3	7	0	0	7	9	N/A	0
	Canopy Cover	5	4	2	2	2	4	4	4	4	0	0
	Lack of Weeds	15	6	7	9	6	9	9	9	7	6	4
	Understorey	25	20	20	20	5	5	5	5	5	5	15
	Recruitment	10	6	3	6	1	0	0	0	0	1	6
	Organic Litter	5	5	2	5	2	4	3	3	2	2	4
	Logs	5	5	5	0	0	0	2	3	5	N/A	2
	Standardiser	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1.25	N/A
	Subtotal	75	55	43	45	23	22	23	31	32	18	31
Landscape Context	Patch Size	10	8	8	8	8	8	1	1	1	1	1
	Neighbourhood	10	2	2	2	2	2	1	1	2	0	2
	Distance to Core Area	5	4	4	4	4	4	3	3	4	0	4
	Subtotal	25	14	14	14	14	14	5	5	7	1	7
Habitat Points		100	69	57	59	37	36	28	36	39	19	38
Habitat Score		1	0.69	0.57	0.59	0.37	0.36	0.28	0.36	0.39	0.19	0.38
Habitat Zone Area (ha)			0.70	1.73	2.40	0.09	0.06	0.04	0.08	0.05	0.02	0.71
Habitat Hectares			0.49	0.98	1.41	0.33	0.02	0.01	0.03	0.02	0.00	0.27

		Habitat Zone	JHMV3	JHCC77	JHCC76	JHCC75	JHCC74A	JHCC74B	JHCC74C	JHCC78	JHCC79
		Bioregion	GP	GP	GP	GP	GP	GP	GP	GP	GP
		EVC number	48	48	48	53	9	9	9	48	48
		EVC Conservation Status	LC	LC	LC	E	LC	LC	LC	LC	LC
		Max Score									
Site Condition	Large Old Trees	10	2	10	10	N/A	NA	NA	N/A	10	9
	Canopy Cover	5	2	5	5	3	0	0	0	5	2
	Lack of Weeds	15	4	6	4	9	15	15	15	6	6
	Understorey	25	15	5	5	5	10	10	10	5	5
	Recruitment	10	5	6	3	10	6	6	6	1	1
	Organic Litter	5	5	3	3	3	5	5	5	2	3
	Logs	5	4	5	5	N/A	N/A	N/A	N/A	5	2
	Standardiser	N/A	N/A	N/A	N/A	N/A	1.25	1.25	1.25	1.25	N/A	N/A
	Subtotal	75	37	45	35	38	45	45	45	34	28
Landscape Context	Patch Size	10	10	10	10	10	10	10	10	1	1
	Neighbourhood	10	2	5	5	5	5	5	5	1	1
	Distance to Core Area	5	4	5	5	5	5	5	5	1	1
	Subtotal	25	16	15	20	20	20	20	20	3	3
		Habitat Points	100	53	60	55	58	65	65	65	37	31
		Habitat Score	1	0.53	0.6	0.55	0.58	0.65	0.65	0.65	0.37	0.31
		Habitat Zone Area (ha)		0.91	0.55	0.34	0.13	0.21	0.09	0.26	0.13	0.14
		Habitat Hectares		0.47	0.33	0.19	0.08	0.14	0.06	0.17	0.05	0.04

		Habitat Zone	JHCC80	JHCC81	JHCC82
		Bioregion	GP	GP	GP
		EVC number	53	53	48
EVC Conservation Status			E	E	LC
		Max Score			
Site Condition	Large Old Trees	10	N/A	N/A	9
	Canopy Cover	5	0	0	2
	Lack of Weeds	15	6	4	6
	Understorey	25	5	5	5
	Recruitment	10	6	1	1
	Organic Litter	5	0	1	3
	Logs	5	N/A	N/A	2
	Standardiser	N/A	1.25	1.25	N/A
	Subtotal	75	21	13	28
Landscape Context	Patch Size	10	1	1	1
	Neighbourhood	10	1	1	1
	Distance to Core Area	5	1	1	1
	Subtotal	25	3	3	3
Habitat Points		100	24	16	31
Habitat Score		1	0.24	0.16	0.31
Habitat Zone Area (ha)			0.03	0.03	0.12
Habitat Hectares			0.01	0.01	0.04

Appendix E: List of Fauna Recorded from the Alignment and Database Search Area

Legend:
Y = recorded during survey, * = exotic,
EPBC Act: CE = critically endangered, EN = endangered, VU = vulnerable, M = migratory, Mr = marine
FFG Act: L = Listed, X = rejected, N = nominated
Victorian Advisory List of Threatened Vertebrate Fauna (VTVF): en = endangered, r = rare, vu = vulnerable, ex = presumed extinct, nt = near threatened

Scientific Name	Common Name	Recorded in construction footprint	Origin	Conservation Status		
				EPBC	FFG	VTVF
Aquatic invertebrate						
Lepidurus apus viridis	Shield Shrimp	Y				
Paratya australiensis	Australian Paratya	Y				
Amphibians						
Chelodina longicollis	Eastern Snake-necked Turtle					dd
Crinia signifera	Common Froglet	Y				
Limnodynastes dumerilii	Pobblebonk Frog	Y				
Limnodynastes peronii	Striped Marsh Frog	Y				
Limnodynastes tasmaniensis	Spotted Marsh Frog	Y				
Litoria ewingii	Southern Brown Tree Frog	Y				
Litoria raniformis	Growling Grass Frog	y		VU	L	en
Litoria verreauxii verreauxii	Verreaux's Tree Frog	Y				
Pseudophryne semimarmorata	Southern Toadlet	y				vu
Birds						
Acanthiza chrysorrhoa	Yellow-rumped Thornbill	Y				
Acanthiza pusilla	Brown Thornbill	Y				
Acanthorhynchus tenuirostris	Eastern Spinebill	Y				
Accipiter fasciatus	Brown Goshawk	Y				
Acridotheres tristis	Common Myna	y	*			
Acrocephalus australis	Australian Reed-warbler	Y				
Actitis hypoleucos	Common Sandpiper			M, Mr		vu
Alauda arvensis	European Skylark	y	*			
Alisterus scapularis	Australian King-Parrot	Y				
Anas castanea	Chestnut Teal	Y				
Anas gracilis	Grey Teal	Y				
Anas rhynchotis	Australasian Shoveler	y				vu
Anas superciliosa	Pacific Black Duck	Y				
Anhinga novaehollandiae	Darter	Y				
Anseranas semipalmata	Magpie Goose				L	nt
Anthochaera carunculata	Red Wattlebird	Y				
Anthochaera chrysoptera	Little Wattlebird	Y				

Scientific Name	Common Name	Recorded in construction footprint	Origin	Conservation Status		
				EPBC	FFG	VTVF
Anthus novaeseelandiae	Australasian Pipit	Y				
Aquila audax	Wedge-tailed Eagle	Y				
Ardea ibis	Cattle Egret	Y		Mr		
Ardea modesta	Eastern Great Egret	y		Mr	L	vu
Artamus cyanopterus	Dusky Woodswallow	Y				
Aythya australis	Hardhead	y				vu
Biziura lobata	Musk Duck					vu
Botaurus poiciloptilus	Australasian Bittern			EN	L	en
Cacatua galerita	Sulphur-crested Cockatoo	Y				
Cacatua tenuirostris	Long-billed Corella	Y				
Calidris ferruginea	Curlew Sandpiper			CR		en
Calidris melanotos	Pectoral Sandpiper			M,Mr		nt
Callocephalon fimbriatum	Gang-gang Cockatoo	Y				
Calyptorhynchus funereus	Yellow-tailed Black-Cockatoo	Y				
Carduelis carduelis	European Goldfinch	y	*			
Cereopsis novaehollandiae	Cape Barren Goose	Y				
Chenonetta jubata	Australian Wood Duck	Y				
Chlidonias hybridus javanicus	Whiskered Tern					nt
Chroicocephalus novaehollandiae	Silver Gull	Y				
Chrysococcyx basalis	Horsfield's Bronze-Cuckoo	Y				
Cisticola exilis	Golden-headed Cisticola	Y				
Colluricincla harmonica	Grey Shrike-thrush	Y				
Columba livia	Rock Dove	y	*			
Coracina novaehollandiae	Black-faced Cuckoo-shrike	Y				
Corvus coronoides	Australian Raven	Y				
Corvus mellori	Little Raven	Y				
Cracticus torquatus	Grey Butcherbird	Y				
Cygnus atratus	Black Swan	Y				
Dacelo novaeguineae	Laughing Kookaburra	Y				
Egretta novaehollandiae	White-faced Heron	Y				
Elanus axillaris	Black-shouldered Kite	Y				
Elseyornis melanops	Black-fronted Dotterel	Y				
Eolophus roseicapillus	Galah	Y				
Eopsaltria australis	Eastern Yellow Robin	Y				
Epthianura albifrons	White-fronted Chat	Y				
Erythrogonys cinctus	Red-kneed Dotterel	Y				
Falco berigora	Brown Falcon	Y				
Falco cenchroides	Nankeen Kestrel	Y				
Falco subniger	Black Falcon				N	vu
Fulica atra	Eurasian Coot	Y				

Scientific Name	Common Name	Recorded in construction footprint	Origin	Conservation Status		
				EPBC	FFG	VTVF
Gallinago hardwickii	Latham's Snipe			M, Mr		nt
Gallinula tenebrosa	Dusky Moorhen	Y				
Gallirallus philippensis	Buff-banded Rail	Y				
Glossopsitta concinna	Musk Lorikeet	Y				
Grallina cyanoleuca	Magpie-lark	Y				
Gymnorhina tibicen	Australian Magpie	Y				
Haliaeetus leucogaster	White-bellied Sea-Eagle			Mr	L	vu
Haliastur sphenurus	Whistling Kite	Y				
Hirundapus caudacutus	White-throated Needletail			M, Mr		vu
Hydroprogne caspia	Caspian Tern				L	nt
Hypseleotris galii	Firetail Gudgeon	Y				
Larus pacificus pacificus	Pacific Gull	y				nt
Lewinia pectoralis pectoralis	Lewin's Rail	y			L	vu
Lichenostomus chrysops	Yellow-faced Honeyeater	Y				
Lichenostomus leucotis	White-eared Honeyeater	Y				
Lichenostomus penicillatus	White-plumed Honeyeater	Y				
Limosa lapponica	Bar-tailed Godwit			VU		
Macronectes giganteus	Southern Giant-Petrel			EN	L	vu
Malurus cyaneus	Superb Fairy-wren	Y				
Manorina melanocephala	Noisy Miner	Y				
Megalurus gramineus	Little Grassbird	Y				
Melithreptus brevirostris	Brown-headed Honeyeater	Y				
Melithreptus lunatus	White-naped Honeyeater	Y				
Microcarbo melanoleucos	Little Pied Cormorant	Y				
Neophema pulchella	Turquoise Parrot				L	nt
Numenius madagascariensis	Eastern Curlew			CR		vu
Nycticorax caledonicus hillii	Nankeen Night Heron					nt
Ocyphaps lophotes	Crested Pigeon	Y				
Oxyura australis	Blue-billed Duck	y			L	en
Paratya australiensis	Australian Paratya	Y				
Pardalotus punctatus punctatus	Spotted Pardalote	Y				
Pardalotus striatus	Striated Pardalote	Y				
Passer domesticus	House Sparrow	y	*			
Pelecanus conspicillatus	Australian Pelican	Y				
Petrochelidon neoxena	Welcome Swallow	Y				
Petrochelidon nigricans	Tree Martin	Y				
Petroica phoenicea	Flame Robin	Y				
Phalacrocorax carbo	Great Cormorant	Y				
Phalacrocorax fuscescens	Black-faced Cormorant					nt
Phalacrocorax sulcirostris	Little Black Cormorant	Y				

Scientific Name	Common Name	Recorded in construction footprint	Origin	Conservation Status		
				EPBC	FFG	VTVF
Phalacrocorax varius	Pied Cormorant					nt
Phaps chalcoptera	Common Bronzewing	Y				
Phaps elegans	Brush Bronzewing	Y				
Phylidonyris novaehollandiae	New Holland Honeyeater	Y				
Platalea regia	Royal Spoonbill	y				nt
Platycercus elegans	Crimson Rosella	Y				
Platycercus eximius	Eastern Rosella	Y				
Pluvialis fulva	Pacific Golden Plover			M, Mr		vu
Poliocephalus poliocephalus	Hoary-headed Grebe	Y				
Porphyrio porphyrio	Purple Swamphen	Y				
Pseudaphritis urvillii	Congolli	Y				
Rhipidura albiscarpa	Grey Fantail	Y				
Rhipidura leucophrys	Willie Wagtail	Y				
Sericornis frontalis	White-browed Scrubwren	Y				
Sternula nereis nereis	Fairy Tern			VU	L	en
Strepera graculina	Pied Currawong	Y				
Streptopelia chinensis	Spotted Turtle-Dove	y	*			
Sturnus vulgaris	Common Starling	y	*			
Tachybaptus novaehollandiae	Australasian Grebe	Y				
Thalassarche cauta	Shy Albatross			VU	L	vu
Thalassarche melanophris melanophris	Black-browed Albatross			VU		vu
Threskiornis molucca	Australian White Ibis	Y				
Threskiornis spinicollis	Straw-necked Ibis	Y				
Trichoglossus haematodus	Rainbow Lorikeet	Y				
Tringa nebularia	Common Greenshank					vu
Turdus merula	Common Blackbird	y	*			
Vanellus miles	Masked Lapwing	Y				
Zosterops lateralis	Silvereye	Y				
Fish						
Anguilla australis	Southern Shortfin Eel	Y				
Carassius auratus	Goldfish	y	*			
Cyprinus carpio	European Carp	y	*			
Eubalaena australis	Southern Right Whale			EN	L	cr
Galaxias maculatus	Common Galaxias	Y				
Galaxiella pusilla	Dwarf Galaxis			VU	L	en
Gambusia holbrooki	Eastern Gambusia	y	*			
Maccullochella peelii	Murray Cod			VU	L	vu
Macquaria australasica	Macquarie Perch			EN	L	en
Nannoperca australis	Southern Pygmy Perch	Y				
Perca fluviatilis	Redfin	y	*			

Scientific Name	Common Name	Recorded in construction footprint	Origin	Conservation Status		
				EPBC	FFG	VTVF
Philynodon grandiceps	Flathead Gudgeon	Y				
Prototroctes maraena	Australian Grayling			VU	L	vu
Salmo trutta	Brown Trout		*			
Tetractenos spp.	Toadfish	Y				
Mammals						
Arctocephalus pusillus doriferus	Australian Fur Seal			X		
Antechinus agilis	Agile Antechinus	Y				
Bos taurus	Cattle (feral)	Y	*			
Canis lupus	Dingo & Dog (feral)		*			
Canis lupus familiaris	Dog	Y	*			
Capra hircus	Goat (feral)	Y	*			
Cervus unicolor	Sambar	Y				
Felis catus	Cat	y	*			
Isoodon obesulus obesulus	Southern Brown Bandicoot	y		EN	L	nt
Lepus europeaus	European Hare	Y	*			
Mus musculus	House Mouse	y	*			
Oryctolagus cuniculus	European Rabbit	y	*			
Petaurus breviceps	Sugar Glider	Y				
Pseudocheirus peregrinus	Common Ringtail Possum	Y				
Pseudomys novaehollandiae	New Holland Mouse			VU	L	vu
Rattus lutreolus	Swamp Rat	Y				
Rattus rattus	Black Rat	y	*			
Tachyglossus aculeatus	Short-beaked Echidna	Y				
Trichosurus vulpecula	Brushtailed possum	Y				
Trichosurus vulpecula	Common Brushtail Possum	Y				
Tadarida australis	White-striped Freetail Bat	Y				
Vulpes vulpes	Red Fox	y	*			
Wallabia bicolor	Black Wallaby	Y				
Reptiles						
Austrelaps superbus	Lowland Copperhead	Y				
Lampropholis guichenoti	Garden Skink	Y				
Liopholis whitii	White's Skink	Y				
Lissolepis coventryi	Swamp Skink				L	vu
Pseudemoia rawlinsoni	Glossy Grass Skink	y				vu
Tiliqua nigrolutea	Blotched Blue-tongued Lizard	Y				

Appendix F: Fauna Likelihood of Occurrence

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Foothill Burrowing Crayfish	*Engaeus victoriensis*			Endangered	VBA	Pakenham	1911		Negligible	N2
Michelea Species 5256	*Michelea microphylla*		Listed	Vulnerable	VBA		1965		Negligible	N2, N5
Ghost Shrimp	*Pseudocalliax tooradin*		Listed	Vulnerable	VBA		1965		Negligible	N2, N5
Great White Shark	*Carcharodon carcharias*	Vulnerable / BonnA1, A2S	Listed	Vulnerable	DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Mackerel Shark	*Lamna nasus*	BonnA2S			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N5
Macquarie Perch	*Macquaria australasica*	Endangered	Listed	Endangered	VBA		1976		Negligible	N2
Murray Cod	*Maccullochella peelii*	Vulnerable	Listed	Vulnerable	VBA		1970		Negligible	N2
Dwarf Galaxis	*Galaxiella pusilla*	**Vulnerable**	**Listed**	**Endangered**	**DoEE/VBA**	**Hastings Road Pearcedale**	**1964**	**Species or species habitat known to occur within area**	**Moderate to High**	**M2, M3**
Australian Grayling	*Prototroctes maraena*	**Vulnerable**	**Listed**	**Vulnerable**	**DoEE/VBA**	**Cardinia Creek, Ballarto Road, Cardinia**	**2001**	**Species or species habitat known to occur within area**	**Moderate to High**	**M2, M3**
Flatback Mangrove Goby	*Mugilogobius platynotus*		Listed	Vulnerable	VBA	embayment, 150 m ESE of Long Island Drive, Hastings	2009		Low	M2, M3

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Green and Golden Bell Frog	*Litoria aurea*	Vulnerable		Vulnerable	DoEE/VBA	Western Port	1962		Negligible	N2
Growling Grass Frog	*Litoria raniformis*	**Vulnerable**	**Listed**	**Endangered**	**DoEE/VBA**	Dam adjacent to Toomuc Creek. Also presumed present at Cardinia Creek KP40, KP 20.32, KP 23.05 – avoided by HDD, KP 31.1, KP 41.5 – avoided by HDD, KP 48.55	**2016**	**Species or species habitat known to occur within area**	**High**	**H1, H2**
Southern Toadlet	*Pseudophryne semimarmorata*			Vulnerable	VBA	Quail Island, 1 km SW of Warneet, Western Port Bay	2016		**Moderate to High**	M2, M3
Loggerhead Turtle	*Caretta caretta*	Endangered / BonnA1, A2S / Marine			DoEE			Species or species habitat known to occur within area	Negligible	N1, N5
Green Turtle	*Chelonia mydas*	Vulnerable / BonnA1, A2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Leatherback Turtle	*Dermochelys coriacea*	Endangered / Marine	Listed	Critically Endangered	DoEE/VBA	Western Port Bay	2017	Species or species habitat known to occur within area	Negligible	H2, N5
Swamp Skink	*Lissolepis coventryi*		**Listed**	**Vulnerable**	**VBA**	**Warringine Park, Hastings**	**2018**		**High**	**H1, H2**
Glossy Grass Skink	*Pseudemoia rawlinsoni*			**Vulnerable**	**VBA**	**Warringine Park, Hastings**	**2018**		**High**	**H1, H2**
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*		Listed	Vulnerable	VBA	Nar Nar Goon	1978		Low	M3, N2

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Common Sandpiper	*Actitis hypoleucos*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Vulnerable	DoEE / PersObs	Hastings Foreshore	2018	Roosting known to occur within area	Low	H2, N5
Australian Shoveller	*Anas rhynchotis*			**Vulnerable**	**VBA**	**Rutherford Inlet**	**2011**		**High**	**H1, H2**
Magpie Goose	*Anseranas semipalmata*		Listed	Near threatened	VBA	Blind Bight	1994		Low	L2, L3
Regent Honeyeater	*Anthocaera phrygia*	Critically Endangered	Listed	Critically Endangered	DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Fork-tailed Swift	*Apus pacificus*	CAMBA / JAMBA / ROKAMBA / Marine			DoEE / eBird	Nar Nar Goon	2018	Species or species habitat likely to occur within area	Low	H2, L1
Cattle Egret	*Ardea ibis*	**Marine**			**DoEE / PersObs**	**Baxter-Tooradin Road**	**2018**	**Species or species habitat may occur within area**	**High**	**M1, H2**
Intermediate Egret	*Ardea intermedia*	Marine	Listed	Endangered	VBA	Long Island Point	1981		Negligible	N2, M3
Eastern Great Egret	*Ardea modesta*	**Marine**	**Listed**	**Vulnerable**	**DoEE/VBA**		**2015**	**Species or species habitat known to occur within area**	**High**	**H2, H3**
Flesh-footed Shearwater	*Ardenna carneipes*	JAMBA / ROKAMBA			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Ruddy Turnstone	*Arenaria interpres*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Vulnerable	DoEE / VBA	Chilcot Rocks	1992	Roosting known to occur within area	Negligible	N2, N5
Hardhead	*Aythya australis*			**Vulnerable**	**VBA**		**2007**		**High**	**H1, H2**
Musk Duck	*Biziura lobata*			Vulnerable	eBird	Pakenham Sewage Lagoons	2017		Low	H2, L3
Australasian Bittern	*Botaurus poiciloptilus*	Endangered	Listed	Endangered	VBA	Site 5 Quail Island.	2011	Species or species habitat known to occur within area	Low	M2, L1
Sharp-tailed Sandpiper	*Calidris acuminata*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			eBird	Pakenham Sewage Lagoons	2009	Roosting known to occur within area	Negligible	N1, N5
Red Knot	*Calidris canutus*	Endangered CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Endangered	DoEE		1992	Species or species habitat known to occur within area	Negligible	N1, N5
Curlew Sandpiper	*Calidris ferruginea*	Critically Endangered CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine	Listed	Endangered	DoEE / VBA	Hanns Inlet, Crib Point	2014	Species or species habitat known to occur within area	Negligible	H2, N5
Pectoral Sandpiper	*Calidris melanotos*	ROKAMA/ JAMBA / BonnA2H / Marine		Near threatened	VBA	Pakenham Sewage Lagoons	1998	Species or species habitat known to occur within area	Negligible	L2, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Red-necked Stint	*Calidris ruficollis*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE / eBird	Hastings Jetty	2016	Roosting known to occur within area	Negligible	H2, N5
Great Knot	*Calidris tenuirostris*	Critically Endangered CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine	Listed	Endangered	DoEE			Roosting known to occur within area	Negligible	N1, N5
Double-banded Plover	*Charadrius bicinctus*	BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N5
Greater Sand Plover	*Charadrius leschenaultii*	Vulnerable CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N5
Lesser Sand Plover	*Charadrius mongolus*	Endangered CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE	Watson Inlet	1977	Roosting known to occur within area	Negligible	N1, N5
Red-capped Plover	*Charadrius ruficapillus*	Marine			DoEE / eBird	South of Hastings	2015	Roosting known to occur within area	Low	H2, N5
King Quail	*Coturnix chinensis victoriae*		Listed	Endangered	VBA	Watson Inlet	1977		Negligible	N1, M3
Antipodean Albatross	*Diomedea antipodensis*	Vulnerable / BonnA2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Gibson's Albatross	*Diomedea antipodensis gibsoni*	Vulnerable / BonnA2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Southern Royal Albatross	*Diomedea epomophora*	Vulnerable / BonnA2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Wandering Albatross	*Diomedea exulans*	Vulnerable / BonnA2S / Marine	Listed	Endangered	DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Northern Royal Albatross	*Diomedea sanfordi*	Endangered / BonnA2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Little Egret	*Egretta garzetta nigripes*	Marine	Listed	Endangered	eBird	Stony Point jetty carpark	2016		Low	H2, L3
Black Falcon	*Falco subniger*		Nominated	Vulnerable	VBA	Rutherford Inlet	2011		Low	H2, L1
White-bellied Storm-Petrel	*Fregetta grallaria grallaria*	Vulnerable / Marine			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N4
Latham's Snipe	*Gallinago hardwickii*	JAMBA / ROKAMBA / BonnA2H / Marine		Near threatened	VBA	Latham's Snipe is a mobile species that often inhabit open wetlands with low dense vegetation. Warringine Park, Hastings	2007	Roosting known to occur within area	Moderate	M2, M3

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Swinhoe's Snipe	*Gallinago megala*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N4
Pin-tailed Snipe	*Gallinago stenura*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N4
Gull-billed Tern	*Gelochelidon nilotica macrotarsa*	CAMBA / Marine	Listed	Endangered	VBA	Pioneer Bay, Western Port	2007		Negligible	M2, N3
Painted Honeyeater	*Grantiella picta*	Vulnerable	Listed	Vulnerable	DoEE			Species or species habitat likely to occur within area	Negligible	N1, N4
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	CAMBA / Marine	Listed	Vulnerable	DoEE / eBird	Hastings	2016	Species or species habitat known to occur within area	Low	H2, N5
Black-winged Stilt	*Himantopus himantopus*	Marine			eBird	Pakenham Sewage Lagoons	2018	Roosting known to occur within area	Low	H2, L3
White-throated Needletail	*Hirundapus caudacutus*	CAMBA / JAMBA / ROKAMBA / Marine		Vulnerable	VBA	The White-throated Needletail is considered aerial in Australia but may forage above woodlands, farmland, heathland and mudflats	2015	Species or species habitat known to occur within area	Moderate	H2, M1
Caspian Tern	*Hydroprogne caspia*	JAMBA / Marine	Listed	Near threatened	ebird	Woolley's Beach Reserve	2017		Low	H2, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Swift Parrot	*Lathamus discolor*	Critically Endangered / Marine	Listed	Endangered	DoEE / eBird	Crofters Hill, Somerville	2015	Species or species habitat known to occur within area	Low	H2, L1
Lewin's Rail	*Lewinia pectoralis pectoralis*		**Listed**	**Vulnerable**	**VBA**		**2015**		**High**	**H1, H2**
Broad-billed Sandpiper	*Limicola falcinellus*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N5
Bar-tailed Godwit (baueri)	*Limosa lapponica baueri*	Vulnerable CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE / VBA		2007	Species or species habitat known to occur within area	Negligible	M2, N5
Bar-tailed Godwit (menzbieri)	*Limosa lapponica menzbieri*	Critically Endangered CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE			Species or species habitat may occur within area	Negligible	N1, N5
Southern Giant-Petrel	*Macronectes giganteus*	Endangered / BonnA2S	Listed	Vulnerable	DoEE / VBA	between Stony Point & French Island	1988	Species or species habitat may occur within area	Negligible	N2, N5
Northern Giant Petrel	*Macronectes halli*	Vulnerable / A2S			DoEE			Species or species habitat may occur within area	Negligible	N1, N5
Hooded Robin	Melanodryas cucullata cucullata		Listed	Near threatened	VBA	Nar Nar Goon	1980		Negligible	N1, N6
Rainbow Bee-eater	*Merops ornatus*	Marine			DoEE			Species or species habitat may occur within area	Negligible	N1, L3

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Black-faced Monarch	*Monarcha melanopsis*	BonnA2H / Marine			DoEE			Species or species habitat known to occur within area	Negligible	N1, N5
Yellow Wagtail	*Motacilla flava*	CAMBA / JAMBA / ROKAMBA / Marine			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N5
Satin Flycatcher	*Myiagra cyanoleuca*	BonnA2H / Marine			DoEE			Breeding known to occur within area	Negligible	N1, L3
Orange-bellied Parrot	*Neophema chrysogaster*	Critically Endangered / Marine			DoEE / VBA	Tyabb	1987	Migration route likely to occur within area	Low	N2, M3
Turquoise Parrot	*Neophema pulchella*		Listed	Near threatened	VBA	5' Block containing Cannon Creek	1982		Negligible	N1, N4
Barking Owl	*Ninox connivens connivens*		Listed	Endangered	VBA	Watson Inlet	1978		Negligible	N1, N6
Powerful Owl	*Ninox strenua*		Listed	Vulnerable	VBA	Mornington Peninsula	2013		Low	H2, L3
Eastern Curlew	*Numenius madagascariensis*	Critically Endangered CAMBA / JAMBA / ROKAMBA / BonnA1 / Marine		Vulnerable	VBA	West coast near Chilcott Rocks	2016	Species or species habitat known to occur within area	Negligible	H2, N5
Little Curlew	*Numenius minutus*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N5
Whimbrel	*Numenius phaeopus*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Vulnerable	DoEE / eBird	Hanns Inlet, Crib Point	2010	Roosting known to occur within area	Negligible	M2, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Blue-billed Duck	*Oxyura australis*		**Listed**	**Endangered**	**eBird**	**Pakenham Sewage Lagoons**	**2018**		**High**	**H1**
Fairy Prion	*Pachyptila turtur subantarctica*	Vulnerable / Marine		Vulnerable	DoEE / VBA	Hanns Inlet, Crib Point	1975	Species or species habitat known to occur within area	Negligible	N1, N5
Osprey	*Pandion haliaetus*	BonnA2S / Marine			DoEE / eBird	Somerville	2012	Species or species habitat likely to occur within area	Negligible	H2, N3
Sooty Albatross	*Phoebetria fusca*	Vulnerable / BonnA2S / Marine			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N5
Pacific Golden Plover	*Pluvialis fulva*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Vulnerable	DoEE / VBA	Warnete	1990	Roosting known to occur within area	Low	L1, L2
Grey Plover	*Pluvialis squatarola*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Endangered	DoEE / VBA	Watson I nlet	1977	Roosting known to occur within area	Negligible	N1, N5
Grey-crowned Babbler	*Pomatostomus temporalis temporalis*		Listed	Endangered	VBA	Stumpy Gully Rd Balnarring	2000		Negligible	M2, N6
Baillon's Crake	*Porzana pusilla palustris*	Marine	Listed	Vulnerable	VBA	Farm dam N of Greenhill Rd and W of McGregor Rd	2003		Moderate	M2, M3
Gould's Petrel	*Pterodroma leucoptera leucoptera*	Endangered / Marine			DoEE			Species or species habitat may occur within area	Negligible	N1, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Red-necked Avocet	*Recurvirostra novaehollandiae*	Marine			DoEE / eBird	Hanns Inlet, Crib Point	2018	Roosting known to occur within area	Low	H2, N5
Rufous Fantail	*Rhipidura rufifrons*	BonnA2H / Marine			DoEE / ebird	Moonlit Sanctuary, Pearcedale	2016	Species or species habitat known to occur within area	Low	H2, L1
Australian Painted Snipe	*Rostratula australis*	Endangered / Marine			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N5
Diamond Firetail	*Stagonopleura guttata*		Listed	Near threatened	VBA	Site 6 Blind Bight Foreshore Reserve.	2011		Low	H2, L1
Little Tern	*Sternula albifrons*	JAMBA / ROKAMBA / BonnA2S / Marine			DoEE			Species or species habitat may occur within area	Negligible	N1, N5
Australian Fairy Tern	*Sternula nereis nereis*	Vulnerable / Marine	Listed	Endangered	DoEE / VBA	Chilcot Rocks	1992	Breeding likely to occur within area	Negligible	N1, N5
Freckled Duck	*Stictonetta naevosa*		Listed	Endangered	VBA	Nar Nar Goon	1980		Low	N2, M3
Buller's Albatross	*Thalassarche bulleri*	Vulnerable / BonnA2S / Marine			DoEE			Species or species habitat may occur within area	Negligible	N1, N5
Northern Buller's Albatross	*Thalassarche bulleri platei*	Vulnerable / BonnA2S / Marine			DoEE			Species or species habitat may occur within area	Negligible	N1, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Shy Albatross	*Thalassarche cauta cauta*	Vulnerable / BonnA2S / Marine			DoEE / VBA	5' Block Containing Sandy Point	1981	Foraging, feeding or related behaviour likely to occur within area	Negligible	N2, N5
White-capped Albatross	*Thalassarche cauta steadi*	Vulnerable / BonnA2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Grey-headed Albatross	*Thalassarche chrysostoma*	Endangered / BonnA2S / Marine			DoEE			Species or species habitat may occur within area	Negligible	N1, N5
Campbell Albatross	*Thalassarche impavida*	Vulnerable / BonnA2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Black-browed Albatross	*Thalassarche melanophris melanophris*	Vulnerable / BonnBonnA2S / Marine		Vulnerable	DoEE / VBA	5' Block Containing Sandy Point	1981	Species or species habitat may occur within area	Negligible	N2, N5
Salvin's Albatross	*Thalassarche salvini*	Vulnerable / BonnA2S / Marine			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Hooded Plover	*Thinornis rubricollis rubricollis*		Listed	Vulnerable	VBA	Hanns Inlet, Crib Point	1974		Negligible	N1, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Grey-tailed Tattler	*Tringa brevipes*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine	Listed	Critically Endangered	DoEE / VBA	Warneet, Western Port	1992	Roosting known to occur within area	Negligible	N2, N5
Wood Sandpiper	*Tringa glareola*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N5
Wandering Tattler	*Tringa incana*	JAMBA / BonnA2H / Marine			DoEE			Roosting known to occur within area	Negligible	N1, N5
Common Greenshank	*Tringa nebularia*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Vulnerable	VBA		2010	Species or species habitat known to occur within area	Low	H2, N5
Marsh Sandpiper	*Tringa stagnatilis*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine		Vulnerable	DoEE / VBA	Hanns Inlet, Crib Point	1992	Roosting known to occur within area	Negligible	N2, N5
Terek Sandpiper	*Xenus cinereus*	CAMBA / JAMBA / ROKAMBA / BonnA2H / Marine	Listed	Endangered	DoEE / VBA	Hastings	1979	Roosting known to occur within area	Negligible	N2, N5
New Holland Mouse	*Pseudomys novaehollandiae*	Vulnerable	Listed	Vulnerable	VBA	Roughly 6km NW of Esso-BHP Fractionation Plant	1972		Negligible	N2, N6
Southern Right Whale	*Eubalaena australis*	Endangered/ BonnA1	Listed	Critically Endangered	DoEE / VBA	Western Port Bay	2009	Species or species habitat known to occur within area	Negligible	M2, N5

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Pygmy Right Whale	*Caperea marginata*	BonnA2S			DoEE			Foraging, feeding or related behaviour likely to occur within area	Negligible	N1, N5
Dusky Dolphin	*Lagenorhynchus obscurus*	BonnA2S			DoEE			Species or species habitat may occur within area	Negligible	N1, N5
Swamp Antechinus	*Antechinus minimus maritimus*	Vulnerable			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N5
Spot-tailed Quoll	*Dasyurus maculatus maculatus*	Endangered			DoEE			Species or species habitat may occur within area	Negligible	N2, N6
Broad-toothed Rat	*Mastacomys fuscus mordicus*	Vulnerable			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N5
Humpback Whale	*Megaptera novaeangliae*	Vulnerable / BonnA1	Listed	Vulnerable	DoEE / VBA	Westenport Bay	2013	Species or species habitat may occur within area	Negligible	H2, N5
Greater Glider	*Petauroides volans*	Vulnerable			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N4

Common Name	Scientific Name	Conservation Status DELWP			Record Source	Location	Latest Date	Likelihood of occurrence (PMST)	#Likelihood of occurrence	Assessment Criteria
		EPBC	FFG	Advisory List						
Long-nosed Potoroo	*Potorous tridactylus tridactylus*	Vulnerable			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N4
White-footed Dunnart	*Sminthopsis leucopus*		Listed	Near threatened	VBA	Bittern	1970		Negligible	N2, N5
Smoky Mouse	*Pseudomys fumeus*	Endangered			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N4
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable	Listed	Vulnerable	DoEE / VBA	5' Block containing Nar Nar Goon	1982	Roosting known to occur within area	Negligible	N1, L1
Long-nosed Fur-seal	*Arctocephalus forsteri*	Marine		Vulnerable	DoEE / VBA	Sawtells Inlet	1977	Species or species habitat may occur within area	Negligible	N2, N5
Australian Fur-seal	*Arctocephalus pusillus*	Marine			DoEE			Species or species habitat likely to occur within area	Negligible	N1, N5
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	**Endangered**	**Listed**	**Near threatened**	**DoEE / VBA**	**Warneet, Western Port**	**2017**	**Species or species habitat known to occur within area**	**High**	**H1, H2**

Appendix G: EnSym Draft Assessment

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: **17/08/2018**
Time of issue: **5:48 pm**

Report ID: Scenario Testing

Project ID	ENSYM_Data_180817

Assessment pathway

Assessment pathway	**Detailed Assessment Pathway**
Extent including past and proposed	8.259 ha
Extent of past removal	0.000 ha
Extent of proposed removal	8.259 ha
No. Large trees proposed to be removed	43
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); and a wetland designated under the Convention on Wetlands of International Importance (the Ramsar Convention); and an internationally important site for Migratory Shorebirds of the East Asian-Australasian Flyway.

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]	0.577 general habitat units
Vicinity	Port Phillip and Westernport Catchment Management Authority (CMA) or Cardinia Shire, Casey City, Mornington Peninsula Shire Council
Minimum strategic biodiversity value score[2]	0.340
Large trees*	22 large trees
Species offset amount[3]	3.423 species units of habitat for Coast Fescue, *Poa billardierei* 4.853 species units of habitat for Coast Twin-leaf, *Zygophyllum billardierei* 4.669 species units of habitat for Coast Wirilda, *Acacia uncifolia* 4.515 species units of habitat for Coast Bitter-bush, *Adriana quadripartita*
Large trees*	21 trees
*** The total number of large trees that the offset must protect**	43 large trees to be protected in either the general, species or combination across all habitat units protected

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

3 The species offset amount(s) required is the sum of all species habitat units in Appendix 1.

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**
3-CPP ST	Scattered Tree	gipp0048	Least Concern	1	no	0.200	0.070	0.070	0.779	0.640	0.023	501361 Coast Fescue *Poa billardierei*
										0.626	0.023	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.626	0.023	504210 Coast Wirilda *Acacia uncifolia*
										0.626	0.023	504755 Coast Bitter-bush *Adriana quadripartita*
4-CPP ST	Scattered Tree	gipp0048	Least Concern	1	no	0.200	0.070	0.070	0.740	0.640	0.023	501361 Coast Fescue *Poa billardierei*
										0.637	0.023	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.637	0.023	504210 Coast Wirilda *Acacia uncifolia*
										0.637	0.023	504755 Coast Bitter-bush *Adriana quadripartita*

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
5-CPPST	Scattered Tree	gipp0048	Least Concern	0	no	0.200	0.031	0.000			0.000	
6-CPPST	Scattered Tree	gipp0048	Least Concern	0	no	0.200	0.031	0.000	0.730	0.640	0.000	501361 Coast Fescue *Poa billardierei*
										0.640	0.000	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.640	0.000	504210 Coast Wirilda *Acacia uncifolia*
										0.640	0.000	504755 Coast Bitter-bush *Adriana quadripartita*
8-CPPST	Scattered Tree	gipp0048	Least Concern	0	no	0.200	0.031	0.031	0.425	0.660	0.010	501361 Coast Fescue *Poa billardierei*
										0.591	0.010	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.591	0.010	504210 Coast Wirilda *Acacia uncifolia*
										0.591	0.010	504755 Coast Bitter-bush *Adriana quadripartita*
9-CPPST	Scattered Tree	gipp0048	Least Concern	1	no	0.200	0.070	0.070	0.420	0.470	0.021	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.470	0.021	504210 Coast Wirilda *Acacia uncifolia*
										0.470	0.021	504755 Coast Bitter-bush *Adriana quadripartita*
11-KOJHST	Scattered Tree	gipp0175	Endangered	1	no	0.200	0.070	0.070	0.100		0.012	General
18-KOJHST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.031	0.140		0.005	General
28-CPPST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.031	0.130		0.005	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
29-CPPST	Scattered Tree	gipp0175	Endangered	1	no	0.200	0.070	0.056	0.150		0.010	General
30-KOJHST	Scattered Tree	gipp0175	Endangered	1	no	0.200	0.070	0.056	0.150		0.010	General
30-KOJHST	Scattered Tree	gipp0175	Endangered	1	no	0.200	0.070	0.070	0.150		0.012	General
31-KOJHST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.031	0.135		0.005	General
32-KOJHST	Scattered Tree	gipp0175	Endangered	1	no	0.200	0.070	0.070	0.130		0.012	General
44-KOJHST	Scattered Tree	gipp0083	Endangered	0	no	0.200	0.031	0.026	0.190		0.005	General
45-KOJHST	Scattered Tree	gipp0083	Endangered	0	no	0.200	0.031	0.026	0.190		0.005	General
56-KOJHST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.029	0.562		0.007	General
57-KOJHST	Scattered Tree	gipp0175	Endangered	1	no	0.200	0.070	0.055	0.630		0.014	General
58-KOJHST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.010	0.630		0.002	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
59-KOJ HST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.031	0.220		0.006	General
60-KOJ HST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.031	0.950	0.510	0.009	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.510	0.009	504210 Coast Wirilda *Acacia uncifolia*
65-CPP ST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.031	0.470	0.420	0.009	503615 Coast Twin-leaf *Zygophyllum billardierei*
67-CPP ST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.027	0.470	0.420	0.008	503615 Coast Twin-leaf *Zygophyllum billardierei*
68-CPP ST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.027	0.690	0.420	0.008	503615 Coast Twin-leaf *Zygophyllum billardierei*
69-CPP ST	Scattered Tree	gipp0003	Vulnerable	1	no	0.200	0.070	0.070	0.538		0.016	General
75-CPP ST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.029	0.360		0.006	General
79-CPP ST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.029	0.360		0.006	General
80-CPP ST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.028	0.400		0.006	General
81-CPP ST	Scattered Tree	gipp0175	Endangered	0	no	0.200	0.031	0.028	0.400		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
82-CPPST	Scattered Tree	gipp0003	Vulnerable	1	no	0.200	0.070	0.070	0.240		0.013	General
96-CPPST	Scattered Tree	gipp0048	Least Concern	0	no	0.200	0.031	0.031	0.650		0.008	General
100-CPPST	Scattered Tree	gipp0048	Least Concern	0	no	0.200	0.031	0.031	0.440		0.007	General
141-CPPST	Scattered Tree	hsf_0937	Endangered	0	no	0.200	0.031	0.031	0.440		0.007	General
142-CPPST	Scattered Tree	hsf_0937	Endangered	0	no	0.200	0.031	0.030	0.440		0.006	General
143-CPPST	Scattered Tree	hsf_0937	Endangered	0	no	0.200	0.031	0.030	0.440		0.006	General
144-CPPST	Scattered Tree	hsf_0937	Endangered	0	no	0.200	0.031	0.031	0.440		0.007	General
146-CPPST	Scattered Tree	gipp0048	Least Concern	0	no	0.200	0.031	0.031	0.140		0.005	General
1-KOJH	Patch	gipp0793	Vulnerable	0	no	0.320	0.001	0.001	0.660	0.630	0.001	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.630	0.001	504210 Coast Wirilda *Acacia uncifolia*
										0.630	0.001	504755 Coast Bitter-bush *Adriana quadripartita*
2-KOJH	Patch	gipp0793	Vulnerable	0	no	0.260	0.055	0.055	0.760	0.650	0.023	501361 Coast Fescue *Poa billardierei*

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
										0.602	0.023	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.602	0.023	504210 Coast Wirilda *Acacia uncifolia*
										0.602	0.023	504755 Coast Bitter-bush *Adriana quadripartita*
3-KOJH	Patch	gipp0793	Vulnerable	4	no	0.700	0.042	0.042	0.766	0.680	0.049	501361 Coast Fescue *Poa billardierei*
										0.682	0.050	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.682	0.050	504210 Coast Wirilda *Acacia uncifolia*
										0.682	0.050	504755 Coast Bitter-bush *Adriana quadripartita*
5-KOJH	Patch	gipp0048	Least Concern	0	no	0.310	0.012	0.012	0.990	0.720	0.006	501361 Coast Fescue *Poa billardierei*
										0.720	0.006	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.720	0.006	504210 Coast Wirilda *Acacia uncifolia*
										0.720	0.006	504755 Coast Bitter-bush *Adriana quadripartita*
4-CCCT	Patch	gipp0083	Endangered	0	no	0.160	0.075	0.075	0.460		0.013	General
10-KOJH	Patch	gipp0053	Endangered	0	no	0.480	0.438	0.438	0.548	0.562	0.328	501361 Coast Fescue *Poa billardierei*
										0.578	0.331	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.578	0.331	504210 Coast Wirilda *Acacia uncifolia*
										0.578	0.331	504755 Coast Bitter-bush *Adriana quadripartita*
13-KOJH	Patch	gipp0053	Endangered	0	no	0.580	0.450	0.450	0.760	0.649	0.430	503615 Coast Twin-leaf *Zygophyllum billardierei*

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
										0.649	0.430	504210 Coast Wirilda *Acacia uncifolia*
										0.611	0.430	504755 Coast Bitter-bush *Adriana quadripartita*
14-KOJH	Patch	gipp0053	Endangered	0	no	0.650	0.223	0.223	0.796	0.687	0.244	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.687	0.244	504210 Coast Wirilda *Acacia uncifolia*
										0.687	0.244	504755 Coast Bitter-bush *Adriana quadripartita*
15-KOJH	Patch	gipp0053	Endangered	0	no	0.590	0.385	0.385	0.768	0.740	0.395	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.740	0.395	504210 Coast Wirilda *Acacia uncifolia*
										0.107	0.404	504755 Coast Bitter-bush *Adriana quadripartita*
10-CCCT	Patch	gipp0053	Endangered	0	no	0.240	0.034	0.034	0.448		0.009	General
21-KOJH	Patch	gipp0175	Endangered	1	no	0.580	0.238	0.238	0.250	0.570	0.216	503615 Coast Twin-leaf *Zygophyllum billardierei*
23-KOJH	Patch	gipp0175	Endangered	1	no	0.600	0.004	0.004	0.557	0.640	0.004	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.312	0.004	504210 Coast Wirilda *Acacia uncifolia*
										0.312	0.004	504755 Coast Bitter-bush *Adriana quadripartita*
28-KOJH	Patch	gipp0053	Endangered	0	no	0.450	0.089	0.089	0.230	0.422	0.057	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.323	0.057	504210 Coast Wirilda *Acacia uncifolia*
										0.241	0.056	504755 Coast Bitter-bush *Adriana quadripartita*

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
30-KOJH	Patch	gipp0053	Endangered	0	no	0.180	0.004	0.004	0.390		0.001	General
11-KOJH	Patch	gipp0053	Endangered	0	no	0.150	0.008	0.008	0.470		0.001	General
31-KOJH	Patch	gipp0053	Endangered	0	no	0.150	0.003	0.003	0.469		0.001	General
32-KOJH	Patch	gipp0053	Endangered	0	no	0.170	0.014	0.014	0.450		0.003	General
12-KOJH	Patch	gipp0053	Endangered	0	no	0.170	0.006	0.006	0.450		0.001	General
38-KOJH	Patch	gipp0175	Endangered	0	no	0.400	0.020	0.020	0.190		0.007	General
39-KOJH	Patch	gipp0175	Endangered	0	no	0.290	0.003	0.003	0.130		0.001	General
40-KOJH	Patch	gipp0175	Endangered	1	no	0.320	0.045	0.045	0.370		0.015	General
43-KOJH	Patch	gipp0053	Endangered	0	no	0.240	0.228	0.228	0.566		0.064	General
41-KOJH	Patch	gipp0175	Endangered	1	no	0.240	0.063	0.063	0.221		0.014	General

Information provided by or on behalf of the applicant in a GIS file							Information calculated by EnSym					
Zone	Type	BioEVC	BioEVC conservation status	Large tree(s)	Partial removal	Condition score	Polygon Extent	Extent without overlap	SBV score	HI score	Habitat units	Offset type
47-KOJH	Patch	gipp0175	Endangered	0	no	0.200	0.016	0.016	0.190		0.003	General
24-KOJH	Patch	gipp0083	Endangered	5	no	0.550	0.002	0.002	0.250	0.570	0.002	503615 Coast Twin-leaf *Zygophyllum billardierei*
16-KOJH	Patch	gipp0083	Endangered	1	no	0.530	0.113	0.113	0.870	0.664	0.099	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.664	0.099	504210 Coast Wirilda *Acacia uncifolia*
6-KOJH	Patch	gipp0083	Endangered	1	no	0.330	0.045	0.045	0.630		0.018	General
1-JHCC	Patch	gipp0053	Endangered	0	no	0.210	0.247	0.247	0.757		0.068	General
2-JHCC	Patch	gipp0053	Endangered	0	no	0.200	0.360	0.360	0.415		0.076	General
52-CCCT	Patch	gipp0083	Endangered	0	no	0.270	0.019	0.019	0.450		0.006	General
53-CCCT	Patch	gipp0083	Endangered	0	no	0.220	0.010	0.010	0.450		0.002	General
49-JHCC	Patch	gipp0053	Endangered	0	no	0.190	0.024	0.024	0.470	0.170	0.005	504210 Coast Wirilda *Acacia uncifolia*
50-JHCC	Patch	gipp0053	Endangered	0	no	0.210	0.060	0.060	0.740		0.017	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
64-JHCC	Patch	gipp0048	Least Concern	0	no	0.360	0.055	0.055	0.980	0.710	0.034	501361 Coast Fescue *Poa billardierei*
										0.710	0.034	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.710	0.034	504210 Coast Wirilda *Acacia uncifolia*
										0.710	0.034	504755 Coast Bitter-bush *Adriana quadripartita*
55-JHCC	Patch	gipp0048	Least Concern	5	no	0.510	0.050	0.050	0.728		0.033	General
56-JHCC	Patch	gipp0083	Endangered	2	no	0.610	0.000	0.000	0.700		0.000	General
61-JHCC	Patch	gipp0793	Vulnerable	3	no	0.590	2.259	2.259	0.724	0.734	2.312	501361 Coast Fescue *Poa billardierei*
										0.678	2.237	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.678	2.237	504210 Coast Wirilda *Acacia uncifolia*
										0.678	2.237	504755 Coast Bitter-bush *Adriana quadripartita*
62-JHCC	Patch	gipp0793	Vulnerable	1	no	0.370	0.087	0.087	0.740	0.346	0.043	501361 Coast Fescue *Poa billardierei*
										0.346	0.043	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.346	0.043	504210 Coast Wirilda *Acacia uncifolia*
										0.346	0.043	504755 Coast Bitter-bush *Adriana quadripartita*
68-JHCC	Patch	gipp0175	Endangered	1	no	0.360	0.023	0.023	0.371		0.008	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
69-JHCC	Patch	gipp0048	Least Concern	3	no	0.390	0.017	0.017	0.400		0.007	General
70-JHCC	Patch	gipp0053	Endangered	0	no	0.190	0.004	0.004	0.460		0.001	General
1-JHMV	Patch	gipp0048	Least Concern	0	no	0.380	0.702	0.702	0.980	0.579	0.421	501361 Coast Fescue *Poa billardierei*
										0.433	0.421	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.433	0.421	504210 Coast Wirilda *Acacia uncifolia*
										0.433	0.421	504755 Coast Bitter-bush *Adriana quadripartita*
3-JHMV	Patch	gipp0048	Least Concern	0	no	0.530	0.167	0.167	0.980	0.681	0.149	501361 Coast Fescue *Poa billardierei*
										0.289	0.149	503615 Coast Twin-leaf *Zygophyllum billardierei*
										0.289	0.149	504210 Coast Wirilda *Acacia uncifolia*
										0.289	0.149	504755 Coast Bitter-bush *Adriana quadripartita*
79-JHCC	Patch	gipp0048	Least Concern	2	no	0.310	0.095	0.095	0.540	0.450	0.043	504210 Coast Wirilda *Acacia uncifolia*
80-JHCC	Patch	gipp0053	Endangered	0	no	0.240	0.014	0.014	0.540	0.450	0.005	504210 Coast Wirilda *Acacia uncifolia*
81-JHCC	Patch	gipp0053	Endangered	0	no	0.160	0.024	0.024	0.370	0.230	0.005	504210 Coast Wirilda *Acacia uncifolia*
										0.230	0.005	504755 Coast Bitter-bush *Adriana quadripartita*

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
Coast Twin-leaf	*Zygophyllum billardierei*	503615	Rare	Dispersed	Habitat importance map	0.0082
Coast Wirilda	*Acacia uncifolia*	504210	Rare	Dispersed	Habitat importance map	0.0066
Coast Bitter-bush	*Adriana quadripartita*	504755	Vulnerable	Dispersed	Habitat importance map	0.0056
Coast Fescue	*Poa billardierei*	501361	Rare	Dispersed	Habitat importance map	0.0052
Coast Helmet-orchid	*Corybas despectans*	500836	Vulnerable	Dispersed	Habitat importance map	0.0049
Creeping Rush	*Juncus revolutus*	501839	Rare	Dispersed	Habitat importance map	0.0038
Coast Fescue	*Poa billardierei*	501361	Rare	Dispersed	Top ranking map	0.0031
Marsh Saltbush	*Atriplex paludosa subsp. paludosa*	500326	Rare	Dispersed	Habitat importance map	0.0027
Dune Wood-sorrel	*Oxalis rubens*	502390	Rare	Dispersed	Habitat importance map	0.0022
King Quail	*Coturnix chinensis victoriae*	10012	Endangered	Dispersed	Habitat importance map	0.0019
Tiny Arrowgrass	*Triglochin minutissima*	503446	Rare	Dispersed	Top ranking map	0.0019
Grey Mangrove	*Avicennia marina subsp. australasica*	500345	Rare	Dispersed	Habitat importance map	0.0013
Salt Lawrencia	*Lawrencia spicata*	501888	Rare	Dispersed	Habitat importance map	0.0011
Dense Leek-orchid	*Prasophyllum spicatum*	504506	Endangered	Dispersed	Habitat importance map	0.0011
Dune Poa	*Poa poiformis var. ramifer*	504826	Rare	Dispersed	Habitat importance map	0.0011
Glossy Grass Skink	*Pseudemoia rawlinsoni*	12683	Vulnerable	Dispersed	Habitat importance map	0.0009
Veined Spear-grass	*Austrostipa rudis subsp. australis*	504940	Rare	Dispersed	Habitat importance map	0.0009
Pacific Golden Plover	*Pluvialis fulva*	10137	Vulnerable	Dispersed	Habitat importance map	0.0006
Tiny Arrowgrass	*Triglochin minutissima*	503446	Rare	Dispersed	Habitat importance map	0.0006
Green Leek-orchid	*Prasophyllum lindleyanum*	502702	Vulnerable	Dispersed	Habitat importance map	0.0006

Annual Fireweed	*Senecio glomeratus subsp. longifructus*	507144	Rare	Dispersed	Habitat importance map	0.0006
Growling Grass Frog	*Litoria raniformis*	13207	Endangered	Dispersed	Habitat importance map	0.0005
Leafy Twig-sedge	*Cladium procerum*	500786	Rare	Dispersed	Habitat importance map	0.0005
Swamp Skink	*Lissolepis coventryi*	12407	Vulnerable	Dispersed	Habitat importance map	0.0005
Golden Cowslips	*Diuris behrii*	501061	Vulnerable	Dispersed	Habitat importance map	0.0005
Parsley Xanthosia	*Xanthosia leiophylla*	504562	Rare	Dispersed	Habitat importance map	0.0005
Purple Blown-grass	*Lachnagrostis punicea subsp. punicea*	504206	Rare	Dispersed	Habitat importance map	0.0005
Lewin's Rail	*Lewinia pectoralis pectoralis*	10045	Vulnerable	Dispersed	Habitat importance map	0.0004
Rough Blown-grass	*Lachnagrostis rudis subsp. rudis*	500159	Endangered	Dispersed	Habitat importance map	0.0003
Australian Mudfish	*Neochanna cleaveri*	4703	Critically endangered	Dispersed	Habitat importance map	0.0002
Coast Bush-pea	*Pultenaea canaliculata*	502839	Rare	Dispersed	Habitat importance map	0.0002
Clover Glycine	*Glycine latrobeana*	501456	Vulnerable	Dispersed	Habitat importance map	0.0002
Common Bent-wing Bat (eastern ssp.)	*Miniopterus schreibersii oceanensis*	61342	Vulnerable	Dispersed	Habitat importance map	0.0002
Grey Goshawk	*Accipiter novaehollandiae novaehollandiae*	10220	Vulnerable	Dispersed	Habitat importance map	0.0001
Elegant Parrot	*Neophema elegans*	10307	Vulnerable	Dispersed	Habitat importance map	0.0001
Chestnut-rumped Heathwren	*Calamanthus pyrrhopygius*	10498	Vulnerable	Dispersed	Habitat importance map	0.0001
Hooded Plover	*Thinornis rubricollis rubricollis*	10138	Vulnerable	Dispersed	Habitat importance map	0.0001
Mauve-tuft Sun-orchid	*Thelymitra malvina*	503374	Vulnerable	Dispersed	Habitat importance map	0.0001
Southern Toadlet	*Pseudophryne semimarmorata*	13125	Vulnerable	Dispersed	Habitat importance map	0.0001
Black Falcon	*Falco subniger*	10238	Vulnerable	Dispersed	Habitat importance map	0.0000
Ruddy Turnstone	*Arenaria interpres*	10129	Vulnerable	Dispersed	Habitat importance map	0.0000
Grey Plover	*Pluvialis squatarola*	10136	Endangered	Dispersed	Habitat importance map	0.0000

White-throated Needletail	*Hirundapus caudacutus*	10334	Vulnerable	Dispersed	Habitat importance map	0.0000
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	10226	Vulnerable	Dispersed	Habitat importance map	0.0000
Strzelecki Gum	*Eucalyptus strzeleckii*	504558	Vulnerable	Dispersed	Habitat importance map	0.0000
Leafy Greenhood	*Pterostylis cucullata subsp. cucullata*	505911	Endangered	Dispersed	Habitat importance map	0.0000
Australasian Bittern	*Botaurus poiciloptilus*	10197	Endangered	Dispersed	Habitat importance map	0.0000
Little Egret	*Egretta garzetta nigripes*	10185	Endangered	Dispersed	Habitat importance map	0.0000
Purple Diuris	*Diuris punctata*	501084	Vulnerable	Dispersed	Habitat importance map	0.0000
Lesser Sand Plover	*Charadrius mongolus*	10139	Critically endangered	Dispersed	Habitat importance map	0.0000
Green Scentbark	*Eucalyptus fulgens*	505175	Rare	Dispersed	Habitat importance map	0.0000
Intermediate Egret	*Ardea intermedia*	10186	Endangered	Dispersed	Habitat importance map	0.0000
Eastern Great Egret	*Ardea modesta*	10187	Vulnerable	Dispersed	Habitat importance map	0.0000
Grey Billy-buttons	*Craspedia canens*	504643	Endangered	Dispersed	Habitat importance map	0.0000
Australasian Shoveler	*Anas rhynchotis*	10212	Vulnerable	Dispersed	Habitat importance map	0.0000
Freckled Duck	*Stictonetta naevosa*	10214	Endangered	Dispersed	Habitat importance map	0.0000
Baillon's Crake	*Porzana pusilla palustris*	10050	Vulnerable	Dispersed	Habitat importance map	0.0000
Blue-billed Duck	*Oxyura australis*	10216	Endangered	Dispersed	Habitat importance map	0.0000
Musk Duck	*Biziura lobata*	10217	Vulnerable	Dispersed	Habitat importance map	0.0000
Sticky Wattle	*Acacia howittii*	500044	Rare	Dispersed	Habitat importance map	0.0000
Hardhead	*Aythya australis*	10215	Vulnerable	Dispersed	Habitat importance map	0.0000
Green-striped Greenhood	*Pterostylis chlorogramma*	504728	Vulnerable	Dispersed	Habitat importance map	0.0000
Curlew Sandpiper	*Calidris ferruginea*	10161	Endangered	Dispersed	Top ranking map ; special site	0.0000
Yarra Gum	*Eucalyptus yarraensis*	501326	Rare	Dispersed	Habitat importance map	0.0000
Naked Sun-orchid	*Thelymitra circumsepta*	503383	Vulnerable	Dispersed	Habitat importance map	0.0000

Swamp Everlasting	*Xerochrysum palustre*	503763	Vulnerable	Dispersed	Habitat importance map	0.0000
Maroon Leek-orchid	*Prasophyllum frenchii*	502709	Endangered	Dispersed	Habitat importance map	0.0000
Swamp Fireweed	*Senecio psilocarpus*	504659	Vulnerable	Dispersed	Habitat importance map	0.0000
Sand Brome	*Bromus arenarius*	500497	Rare	Dispersed	Habitat importance map	0.0000
Winter Sun-orchid	*Thelymitra hiemalis*	505006	Endangered	Dispersed	Habitat importance map	0.0000
Plains Yam-daisy	*Microseris scapigera s.s.*	504657	Vulnerable	Dispersed	Habitat importance map	0.0000
Matted Flax-lily	*Dianella amoena*	505084	Endangered	Dispersed	Habitat importance map	0.0000
Cobra Greenhood	*Pterostylis grandiflora*	502798	Rare	Dispersed	Habitat importance map	0.0000
Floodplain Fireweed	*Senecio campylocarpus*	507136	Rare	Dispersed	Habitat importance map	0.0000
Salt Blown-grass	*Lachnagrostis robusta*	504223	Rare	Dispersed	Habitat importance map	0.0000
Pale Swamp Everlasting	*Coronidium gunnianum*	504655	Vulnerable	Dispersed	Habitat importance map	0.0000
Purple Blown-grass	*Lachnagrostis punicea subsp. filifolia*	504222	Rare	Dispersed	Habitat importance map	0.0000
Spurred Helmet-orchid	*Corybas aconitiflorus*	500835	Rare	Dispersed	Habitat importance map	0.0000
Hoary Rapier-sedge	*Lepidosperma canescens*	501915	Rare	Dispersed	Habitat importance map	0.0000
Tufted Club-sedge	*Isolepis wakefieldiana*	501789	Rare	Dispersed	Habitat importance map	0.0000
Lace Monitor	*Varanus varius*	12283	Endangered	Dispersed	Habitat importance map	0.0000
Slender Stylewort	*Levenhookia sonderi*	501998	Rare	Dispersed	Habitat importance map	0.0000
Curlew Sandpiper	*Calidris ferruginea*	10161	Endangered	Dispersed	Habitat importance map ; special site	0.0000
Whimbrel	*Numenius phaeopus*	10150	Vulnerable	Dispersed	Habitat importance map	0.0000
Great Knot	*Calidris tenuirostris*	10165	Endangered	Dispersed	Habitat importance map	0.0000
Red Knot	*Calidris canutus*	10164	Endangered	Dispersed	Habitat importance map	0.0000
Common Sandpiper	*Actitis hypoleucos*	10157	Vulnerable	Dispersed	Habitat importance map	0.0000
Masked Owl	*Tyto novaehollandiae novaehollandiae*	10250	Endangered	Dispersed	Habitat importance map	0.0000

Greater Sand Plover	*Charadrius leschenaultii*	10141	Critically endangered	Dispersed	Habitat importance map	0.0000
Eastern Curlew	*Numenius madagascariensis*	10149	Vulnerable	Dispersed	Habitat importance map	0.0000
Gull-billed Tern	*Gelochelidon nilotica macrotarsa*	10111	Endangered	Dispersed	Habitat importance map	0.0000
Common Greenshank	*Tringa nebularia*	10158	Vulnerable	Dispersed	Habitat importance map	0.0000
Black-tailed Godwit	*Limosa limosa*	528553	Vulnerable	Dispersed	Habitat importance map	0.0000

Habitat group

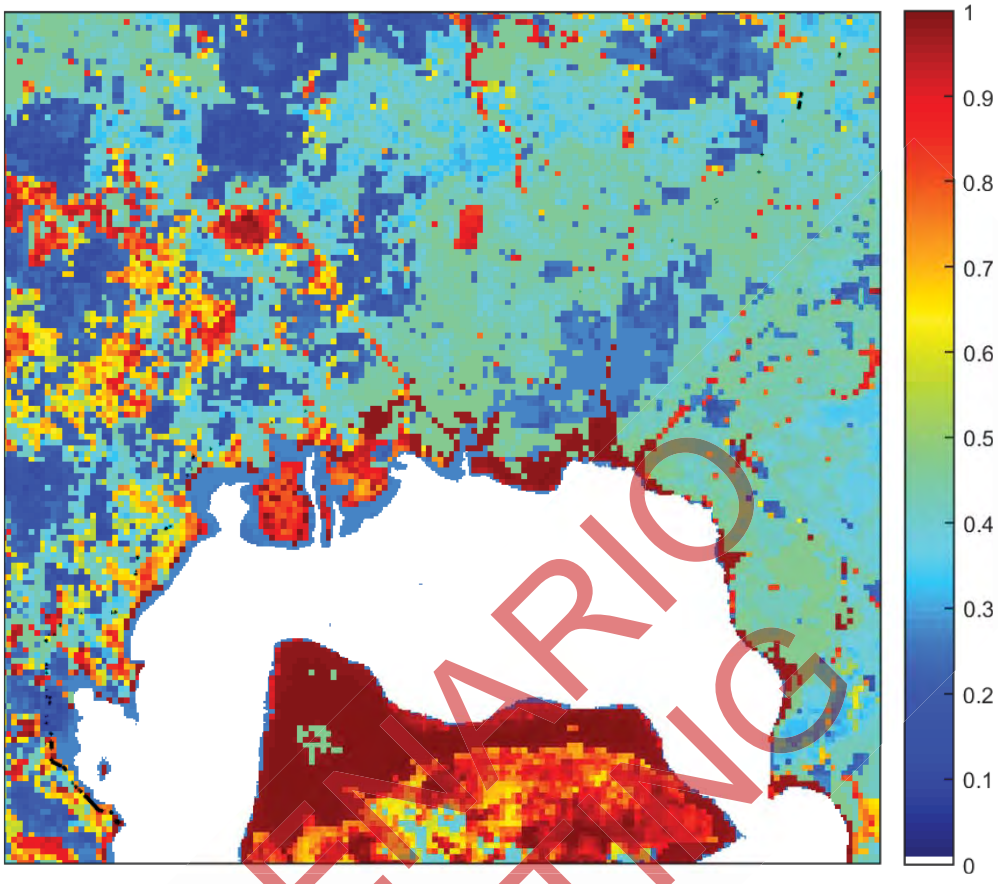
- Highly localised habitat means there is 2000 hectares or less mapped habitat for the species
- Dispersed habitat means there is more than 2000 hectares of mapped habitat for the species

Habitat impacted

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

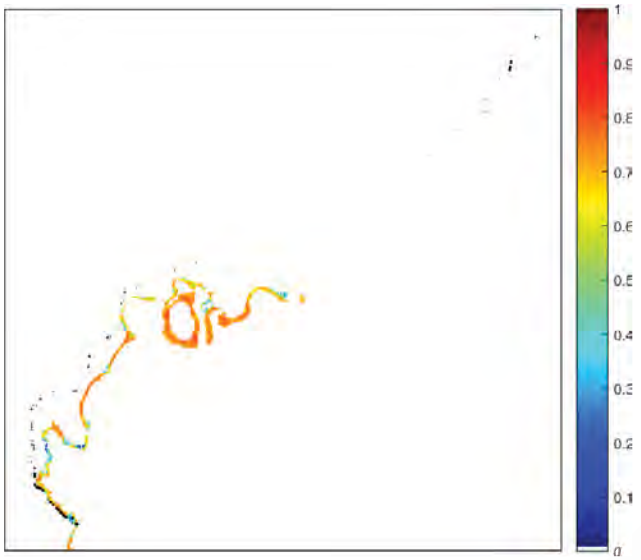
Appendix 3 – Images of mapped native vegetation

2. Strategic biodiversity values map

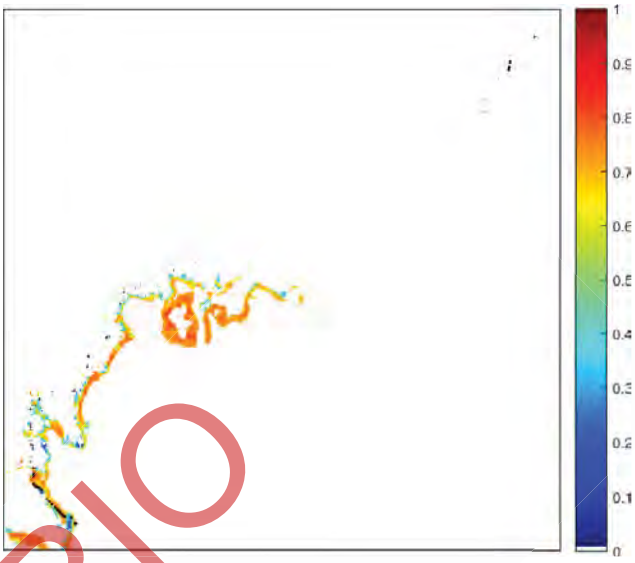


3. Habitat importance maps

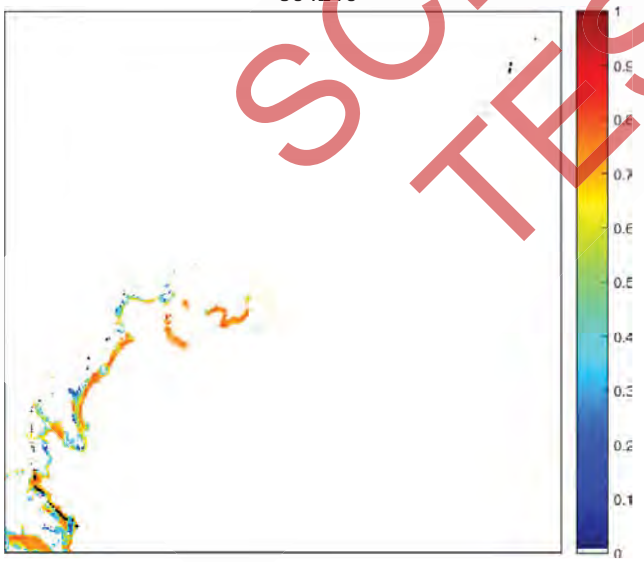
Coast Fescue
Poa billardierei
501361



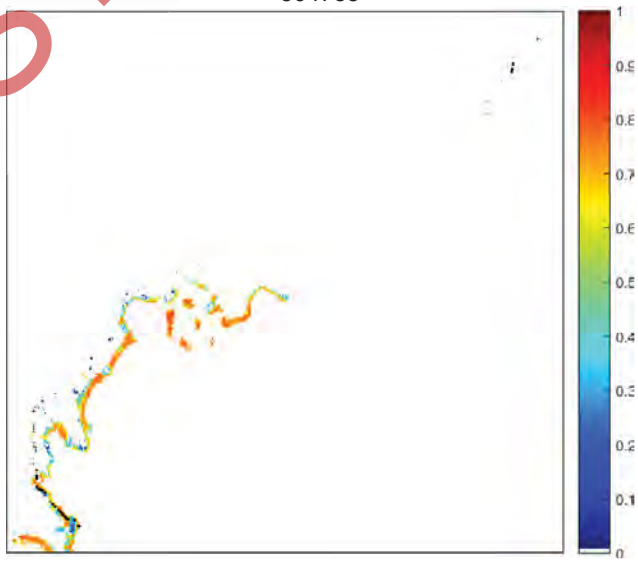
Coast Twin-leaf
Zygophyllum billardierei
503615



Coast Wirilda
Acacia uncifolia
504210



Coast Bitter-bush
Adriana quadripartita
504755

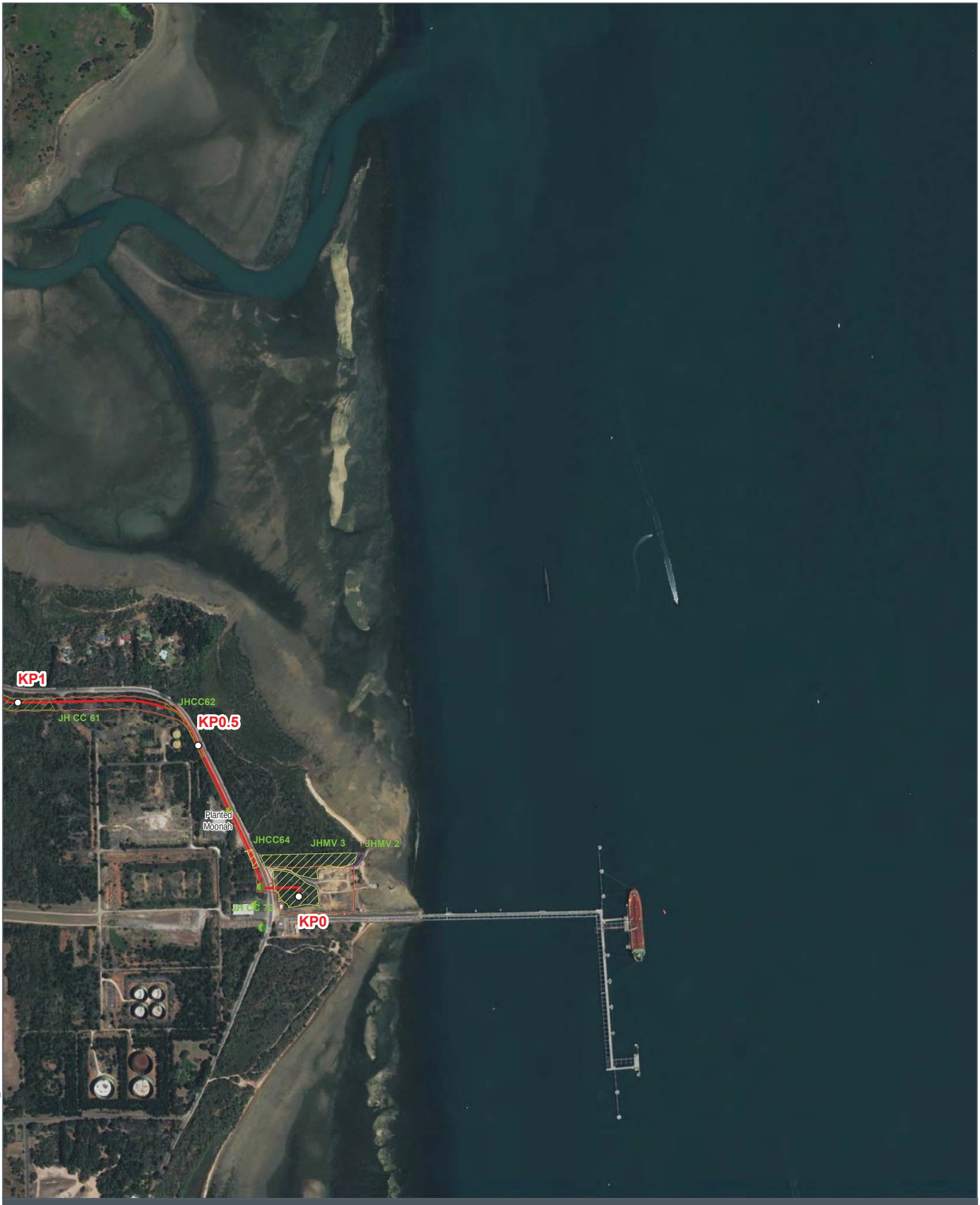


Appendix H: Detailed figures of ecological values found along the construction footprint.

Growling Grass Frog Targeted Survey Location Map

Southern Brown Bandicoot Mitigation Area

Threatened Fauna Species Locations



APA Transmission Pty Limited - 31-02984.00

Crib Point Pakenham Pipeline Project
Listed Flora and Fauna
Page 1 of 24

WORK REQUEST NUMBER: 31-02984.00

DATA SOURCES:
Service Layer Credits: Copyright:© 2018 Garmin
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

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LEGEND

- Kilometre Points
- Large Scattered Trees
- Small Scattered Trees
- Other Scattered Trees
- Flora Survey Site
- Fauna Survey Site

Listed Fauna
- Listed Avian Fauna
- FFG Listed Aquatic Fauna
- Glossy Grass Skink
- Growling Grass Frog
- Southern Brown Bandicoot
- Southern Toadlet

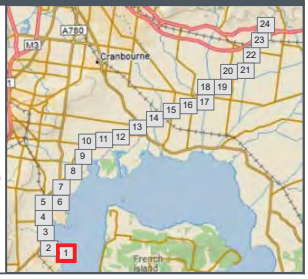
- Water Course
- Crib Point Pakenham Alignment
- Construction Footprint
- Water Body

Vegetation Patch
- Endangered
- Vulnerable
- Least Concern
- Planted
- EPBC Listed Subtropical and Temperate Coastal Saltmarsh

ISSUE DATE	AUTHOR	QA CHECK	APPROVED	MAP REV.	REVISION NOTE
04/09/2018	AB	JH	MV	B	Issued for Review
14/08/2018	AB	JH	CC	A	Issued for Review

0 100 200
Metres
1:8,500
(A3) GDA 1994 MGA Zone 55

LOCATION DIAGRAM



APA Transmission Pty Limited - 31-02984.00

Crib Point Pakenham Pipeline Project
Listed Flora and Fauna
Page 2 of 24

WORK REQUEST NUMBER: 31-02984.00

DATA SOURCES:
Service Layer Credits: Copyright:© 2018 Garmin
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

- Kilometre Points
- Large Scattered Trees
- Small Scattered Trees
- Other Scattered Trees
- Flora Survey Site
- Fauna Survey Site

Listed Fauna
- Listed Avian Fauna
- FFG Listed Aquatic Fauna
- Glossy Grass Skink
- Growling Grass Frog
- Southern Brown Bandicoot
- Southern Toadlet

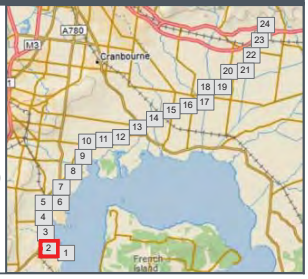
- Water Course
- Crib Point Pakenham Alignment
- Construction Footprint
- Water Body

Vegetation Patch
- Endangered
- Vulnerable
- Least Concern
- Planted
- EPBC Listed Subtropical and Temperate Coastal Saltmarsh

ISSUE DATE	AUTHOR	QA CHECK	APPROVED	MAP REV.	REVISION NOTE
04/09/2018	AB	JH	MV	B	Issued for Review
14/08/2018	AB	JH	CC	A	Issued for Review

0 100 200
Metres
1:8,500
(A3) GDA 1994 MGA Zone 55

LOCATION DIAGRAM



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