Western Outer Ring Main (WORM): Desktop biodiversity assessment

FINAL REPORT

Prepared for APA

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Biosis offices

NEW SOUTH WALES

Albury
Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle
Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong
Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat
Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne (Head Office)
Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta
Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

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Biosis offices

NEW SOUTH WALES

Albury
Phone: (02) 6069 9200
Email: albury@biosis.com.au

Newcastle
Phone: (02) 4911 4040
Email: newcastle@biosis.com.au

Sydney
Phone: (02) 9101 8700
Email: sydney@biosis.com.au

Wollongong
Phone: (02) 4201 1090
Email: wollongong@biosis.com.au

VICTORIA

Ballarat
Phone: (03) 5304 4250
Email: ballarat@biosis.com.au

Melbourne (Head Office)
Phone: (03) 8686 4800
Email: melbourne@biosis.com.au

Wangaratta
Phone: (03) 5718 6900
Email: wangaratta@biosis.com.au

Biosis staff involved in this project were:

- Mitchell Deaves and Gabby McMillan (project management)
- Clare McCutcheon (fauna inputs)
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Contents

Summary **1**

1. Introduction **7**

1.1 Project background 7
1.2 Scope of assessment 7
1.3 Study area 7
1.4 Preliminary pipeline alignment 8
1.5 Assessment objectives 8
1.6 Regional context 9
1.7 Existing assessments and approvals 9

2. Methods **11**

2.1 Database review 11
2.2 Definitions of significance 13
2.3 Determining likelihood of occurrence of significant species and ecological communities 13
2.4 Aerial Photo Interpretation 14
2.4.1 Approach to adopting API data 14
2.5 Rapid field assessment 15
2.6 Potential native vegetation and habitat mapping 15
2.7 Legislation and policy 16
2.8 Limitations 16

3. Desktop results **17**

3.1 Native Vegetation and habitat 17
3.1.1 Modelled Pre-1750 EVCs 17
3.1.2 Native Vegetation mapping 18
3.1.3 Native Vegetation condition 20
3.1.4 Wetlands 20
3.1.5 Groundwater Dependent Ecosystems 20
3.1.6 Waterways, drainage lines and dams 21
3.1.7 Native Trees 21
3.1.8 Habitat values 22
3.2 Significant flora 23
3.2.1 EPBC Act listed flora 23
3.2.2 FFG Act listed flora 24
3.2.3 FFG Act protected flora 24
3.2.4 DELWP Advisory listed flora 24
3.2.5 CaLP Act listed noxious weeds 25
3.3 Significant fauna 32
3.3.1 EPBC Act listed fauna 32
3.3.2 FFG Act listed fauna 32

3.3.3 DELWP Advisory listed fauna 33
3.3.4 Migratory species 33
3.3.5 CaLP Act listed pest animals 34
3.4 Significant ecological communities 46
3.4.1 Nationally significant ecological communities 46
3.4.2 State significant ecological communities 47
3.5 Conservation Areas 47
3.6 Landscape context 47
4. Biodiversity legislation and government policy 49
4.1 Commonwealth 49
4.1.1 Environment Protection and Biodiversity Conservation Act 1999 49
4.2 State 57
4.2.1 Environment Effects Act 1978 57
Not applicable to this report 58
4.2.2 Flora and Fauna Guarantee Act 1988 (FFG Act) 59
4.2.3 Planning and Environment Act 1987 (incl. Planning Schemes) 60
4.2.4 Victoria's Guidelines for the removal, destruction or lopping of native vegetation 60
4.2.5 Catchment and Land Protection Act 1994 (CaLP Act) 61
4.2.6 Wildlife Act 1975 and associated Regulations 62
4.2.7 Fisheries Act 1995 62
4.2.8 Water Act 1989 63
4.2.9 Environment Protection Act 1970: State Environmental Protection Policy (Waters) 2018 63
4.2.10 Regional Catchment Strategy and River Health Strategy 63
5. Constraints, recommendations and conclusions 65
5.1 Constraints and recommendations 65
5.2 Conclusions 71
5.3 Next steps 71
References 73
Acronyms 76
Appendices 78
Appendix 1 Flora 79
Appendix 2 Fauna 101
Appendix 3 Significant Ecological Communities 123
Appendix 4 Noxious weeds 128
Figures 131

Tables

Table 1 Criteria for determining significance of species & ecological communities 13
Table 2 Summary of EVCs most likely to occur in the study area (based on pre-1750 EVC mapping) 17
Table 3 Summary of extent of native vegetation EVCs within the PPA (based on the PNV mapping) 19
Table 4 Summary of EPBC Act, FFG Act and advisory listed flora species most likely to occur in the study area 26
Table 5 Summary of EPBC Act, FFG Act and advisory listed fauna species most likely to occur in the study area 35
Table 6 Areas or confirmed or potential nationally significant (EPBC Act listed) ecological communities within the PPA 46
Table 7 Assessment of project in relation to the EPBC Act 51
Table 8 Assessment of the PPA against the Individual Potential Environmental Effects referral criteria of the *Environment Effects Act 1978* 57
Table 9 Assessment of the PPA against the Combination of Potential Environmental Effects referral criteria of the *Environment Effects Act 1978* 58
Table 10 Determining the assessment pathway under the Guidelines 61
Table 11 Constraints and recommendations 66

Figures

Figure 1 Western Outer Ring Main 132
Figure 2 Location of the study area, Victoria 133
Figure 3 Melbourne Strategic Assessment and Precincts within the Urban Growth Boundary 134
Figure 4 Pre 1750s Ecological Vegetation Classes near the study area 135
Figure 5 Native Vegetation Extent 136
Figure 6 Modelled Native Vegetation Condition 137
Figure 7 Strategic Biodiversity Value 138
Figure 8 Current Wetlands 139
Figure 9 Native Vegetation Time Stamping Dataset - Melbourne Growth Areas (VC68) and previous Biosis mapping 140
Figure 10 Significant flora records 141
Figure 11 Significant fauna records 142
Figure 12 Modelled Threatened species habitat importance mapping 143
Figure 13 Modelled Threatened FFG Act listed communities 144
Figure 14 Melbourne Strategic Assessment Environmental Mitigation dataset 145
Figure 15 Location Risk 146
Figure 16 Catchment and Land Protection Act listed noxious weeds 147
Figure 17 Seasonal Herbaceous Wetland Likelihood surface model (mean data) 148
Figure 18 Seasonal Herbaceous Wetland uncertainty surface model (standard deviations) 149

Figure 19 Terrestrial and Aquatic Groundwater Dependent Ecosystem (GDE) model data 150
Figure 20 Potential Native Vegetation 151

Summary

Biosis Pty Ltd was commissioned by APA to undertake a desktop biodiversity assessment of the proposed Western Outer Ring Main Project (the Project). The Project is a proposed 500 millimetre diameter high pressure gas transmission pipeline between APA's existing Plumpton Regulating Station and Wollert, which will provide an additional connection between the eastern and western pipeline networks of the Victorian Transmission System (VTS). The pipeline will occupy an easement of nominally 20 metres width and be buried for its entire length to a minimum depth of 900 millimetres. An additional compressor and a regulating station are also proposed as part of the Project at APA's existing gas compressor station located at 365 Summerhill Road, Wollert.

For the purposes of this assessment, a study area has been defined to inform minimisation and avoidance of potential impacts to ecological values where construction requirements allow for it. A preliminary pipeline alignment (PPA) has been used as a 'reference project' for the purpose of conducting the desktop impact assessment of the Project within the study area.

This report identifies biodiversity values within or relevant to the Study area and specific impacts within the PPA, based on a review of relevant biodiversity databases, previous reports and planning documents relevant to the project, aerial photo interpretation of likely native vegetation and habitat and rapid on-ground assessment, where access was available. It also provides an assessment of implications under biodiversity protection regulations relevant to the Project.

A number of constraints have been identified across the study area. These constraints stem largely from the presence of modelled, previously mapped or likely (based on aerial imagery interpretation) native vegetation within the study area and the potential for threatened species and ecological communities to occur.

Part of the Study area is within land covered by the Melbourne Strategic Assessment (MSA) and subject to approvals for urban development. Time stamped native vegetation and habitat values apply within the approved MSA areas. For areas outside the MSA approvals area on ground assessments will be required to inform the final impact for the Project.

Recommendations and mitigation measures to be incorporated in project planning and future assessments to avoid and minimise impacts to biodiversity values are also provided. Key ecological values, proposed impacts, legislation and policy requirements and recommendations are summarised below.

Summary of key ecological values and proposed impacts to biodiversity

A summary of key ecological values and potential impacts based on the PPA and the potential native vegetation and habitat mapping compiled in this assessment is provided below.

- Total removal of up to 59.57 ha of potential native vegetation, indicative of endangered Ecological Vegetation Classes (EVCs) within the Victorian Volcanic Plain Bioregion, which includes:
  - Removal of up to 47.15 hectares of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) listed Natural Temperate Grassland of the Victorian Volcanic Plain ecological community which may also correlate with the *Flora and Fauna Guarantee Act 1988* (FFG Act)listed Western (Basalt) Plains Grasslands Community. This comprises 2.12 hectares of Plains Grassland (EVC 132) and 0.08 hectares Creekline Tussock Grassland (EVC 654) vegetation within the approved MSA areas and 44.79 hectares of potential Plains Grassland (EVC 132) and 0.16 hectares of potential Creekline Tussock Grassland (EVC 654) vegetation outside the MSA approvals area.

- Removal of up to 11.27 hectares of the EPBC Act listed Grassy Eucalypt Woodland of the Victorian Volcanic Plain or White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland ecological communities which may also correlate with the FFG Act listed Floristic Community 55-04 Western Basalt Plains (River Red Gum) Grassy Woodland. This comprises 5.69 hectares of Plains Grassy Woodland (EVC 55) and 1.43 hectares of Stony Knoll Shrubland (EVC 649) within the approved MSA area and 4.15 hectares of potential Plains Grassy Woodland (EVC 55) within the PPA in areas outside the approved MSA areas.
- Removal of up to 0.67 hectares of the EPBC Act listed Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains ecological community comprising a total of 0.17 hectares of Plains Grassy Wetland (EVC 125) inside the approved MSA area and 0.5 hectares of potential Plains Grassy Wetland (EVC 125) outside the approved MSA area.
- Removal of up to 0.26 hectares of Riparian Woodland (EVC 641) comprising 0.06 hectares inside the approved MSA area and 0.2 hectares outside the approved MSA area.
- Removal of up to 0.22 hectares of Creekline Grassy Woodland (EVC 68) outside the approved MSA area.

- Removal of a small number of scattered native canopy trees.
- Loss of potential habitat for species of national and state significance.
- Potential to impact aquatic ecosystems and waterways.

Government legislation and policy

An assessment of the project in relation to key biodiversity legislation and policy is provided and summarised below.

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	Sixteen listed threatened species with a medium or higher likelihood of occurrence within the study area (Section 3.2, Section 3.3) Known/potential occurrence of four listed ecological communities (Section 3.4). Areas of habitat values which have associated HCOs under the Melbourne Strategic Assessment.	For areas outside the MSA , on-ground assessment will be required to determine the presence and extent of listed ecological communities and targeted surveys will be required to resolve the presence and, if present, the extent of listed species and the potential for significant impact if development of areas of potential habitat is proposed. Where significant impacts to these Matters of National Environmental Significance (MNES) are proposed, a referral will be required. For areas within the MSA and approved under Part 10 of the EPBC Act, for all listed significant species and communities within the area covered by the MSA no further approvals are required under the EPBC Act as long as development follows the MSA Program Report and the conditions of the approvals which ensure that urban development proceeds in a way that protects matters of national environmental significance. The section of the study area covered by the MSA contains habitat values which have associated Habitat Compensation Obligations (HCOs). Biodiversity offsets to be provided through payment of HCOs will be required to develop these areas.	On-ground assessment required to determine presence and extent of listed ecological communities. Targeted survey required for areas of potential habitat which are proposed for development to confirm presence and if present extent of any listed threatened species.
Environmental Effects Act 1978 (EE Act)	Native vegetation, threatened species and habitat.	Referral recommended.	Based on the native vegetation mapping in this report, >10 ha of native vegetation is expected be impacted. On-ground assessments required to confirm presence and extent of native vegetation and habitat and presence of threatened species.

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
Flora and Fauna Guarantee Act 1988 (FFG Act)	Native vegetation in the PPA is likely to include a listed threatened community (Section 3.4.2; Appendix 3), contain protected flora species (Section 3.2.3), listed threatened species (Sections 3.2.3 and 3.3.2) or habitat for them (Appendix 1 and 2).	Protected Flora Permit required where removal of protected flora, listed communities or threatened species is proposed on public land.	On-ground assessments required to confirm presence and extent of native vegetation and habitat and presence of threatened species in areas of public land.
Planning & Environment Act 1987 (PE Act)	Any indigenous vegetation to be removed.	Exempt under the Pipelines Act 2005	Section 85 of the Pipelines Act provides exemption from the need for a pipeline licensee to secure permits pursuant to the Planning and Environment Act.
Guidelines for the removal, destruction or lopping of native vegetation	All native vegetation to be removed.	The Guidelines should be applied or considered, as appropriate, in decision making under approval processes for the removal of native vegetation that fall outside planning schemes.	Assessment under the Guidelines can be used as a mechanism for addressing the environmental mitigation requirements relating to the proposed removal of native vegetation. Based on the native vegetation mapping identified in this report, the application will be assessed on the detailed assessment pathway.
Catchment and Land Protection Act 1994 (CaLP Act)	Noxious weeds (Section 3.2.5). Pest animals (Section 3.3.5).	Permit required to transport soil/rock off site	Comply with requirements to control/eradicate.
Wildlife Act 1975	Wildlife as defined under the act.	Proposed works exempt under the P&E Act therefore DELWP have advised no permit is required.	

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
Water Act 1989	Jacksons Creek, Merri Creek, Kalkallo Creek and Deep Creek.	Referral to Melbourne Water/CMA.	Approval from Melbourne Water / the Port Philip and Westernport CMA required for works on waterways along the PPA.
Fisheries Act 1995	Protected aquatic biota: Murray Cod *Maccullochella peelii* and Australian Grayling *Prototroctes maraena.*	General permit may be required under Section 49 of the Act if obstruction of fish passage is proposed. Consultation with DELWP is recommended.	Providing mitigation measures outlined in this report are adhered to, the potential for protected aquatic biota as listed above, to be injured, damaged or destroyed is considered to be negligible and no Protected Aquatic Biota permit is required from DELWP.
Environment Protection Act 1970: State Environmental Protection Policy (Waters) 2018	Jacksons Creek, Merri Creek, Deep Creek	No permit required. But mitigation and minimisation measures to be implemented.	Impacts to surface water quality must not result in changes that exceed background levels and/or the water quality objectives specified for the Central Foothills and Coastal Plains segment to protect surface water uses and values.

Recommendations

The primary measure to reduce impacts to biodiversity values within the study area is to avoid and minimise removal of native vegetation and terrestrial and aquatic habitat. It is critical that this be considered during the design phase of the project, when key decisions are made about the alignment, location of ancillary infrastructure, site compounds, access roads, temporary material storage and stockpiles and construction methodology. The results of this assessment should therefore be incorporated into the project design and options to retain as much of the mapped vegetation/habitats as possible investigated where available. Priority should be given to highest value areas and retaining larger areas in preference to numerous smaller ones.

This assessment has taken a precautionary approach to mapping native vegetation and habitat. Given the history of disturbance within the study area from agricultural activities and urbanisation, the values presented are likely an overestimation of native vegetation and habitat extent. The results of this assessment have been used to determine the likely worst-case impact scenario based on the PPA. On-ground assessments should be undertaken outside the approved MSA areas to determine the impact on the final Project area.

1. Introduction

1.1 Project background

Biosis Pty Ltd was commissioned by APA to undertake a desktop biodiversity assessment of the proposed Western Outer Ring Main (WORM). The WORM project (the Project) is planned to provide a new high pressure link between existing sources of gas supply in the north and east of the State with those in western Victoria.

The Project is a proposed 500 millimetre diameter high pressure gas transmission pipeline between APA's existing Plumpton Regulating Station (approx. 38 kilometres west of Melbourne's CBD) and Wollert (approx. 26 kilometres north east of Melbourne's CBD), which will provide an additional connection between the eastern and western pipeline networks of the Victorian Transmission System (Figure 1).

The pipeline will occupy an easement of nominally 20 metres width and be buried for its entire length to a minimum depth of cover of 1200 millimetres. An additional compressor and a regulating station are also proposed as part of the Project at APA's existing gas compressor station located at 365 Summerhill Road, Wollert.

The pipeline and all the associated facilities will be designed, constructed, commissioned and operated in accordance with Australian Standard AS 2885 Pipelines – Gas and Liquid Petroleum (AS2885) and a Pipeline Licence, which would be required pursuant to the *Pipelines Act 2005* (Vic) (Pipelines Act).

A detailed description of the Project, including the Project rationale, route selection and Project components is provided in the *WORM Project Description* (Biosis 2019).

1.2 Scope of assessment

For the purposes of this assessment, a study area has been defined to inform minimisation and avoidance of potential impacts to ecological values, where construction requirements allow for it. A preliminary pipeline alignment (PPA) has been used as a 'reference project' for the purpose of conducting the desktop impact assessment of the Project within the study area. This report identifies biodiversity values within or relevant to the study area and specific impacts within the PPA, based on a review of relevant biodiversity databases, previous reports and planning documents relevant to the project, aerial photo interpretation of likely native vegetation and habitat and on-ground assessment, where access was available. It also provides an assessment of implications under biodiversity protection regulations relevant to the Project.

The study area, PPA and specific objectives of this assessment are detailed further below.

1.3 Study area

The study area (Figure 2) generally comprises a 100 metre wide corridor, which is indicative of where the Project could conceivably occur (either during construction or operational phases). The study area is wider than the final disturbance footprint that will be required to construct and operate the pipeline, however has been selected to provide flexibility in the determination of the final disturbance footprint.

The study area is generally described as follows:

- The study area commences at the current termination of the Truganina to Plumpton pipeline located just to the north of Taylors Rd, Plumpton, near the Plumpton Pressure Regulating Station.

- The study area then follows the existing Sunbury Pipeline easement north to the Calder Freeway.
- The study area then generally follows the proposed Outer Metropolitan Ring (OMR) road corridor through Diggers Rest, before deviating to the north and crossing Jacksons Creek, Sunbury Road and Deep Creek.
- The study area then re-joins the OMR in Oaklands Junction before following it North East through Mickleham, Merrifield and Kalkallo.
- The study area crosses the Hume Highway at the existing intersection with Gunns Gully Road before again following the OMR east to the Victorian Northern Interconnect (VNI).
- The study area then follows the existing VNI easement south to the Wollert compressor station.

1.4 Preliminary pipeline alignment

A preliminary pipeline alignment (PPA) has been used as a 'reference project' for the purpose of conducting the desktop impact assessment of the Project within the Study area. The PPA sits wholly within the study area and includes the Wollert compressor site (Figure 2).

The PPA has been defined to allow for all Project components described in the *WORM Project Description* (Biosis 2019). This includes the construction components of the Project, ancillary components of the pipeline, Wollert compressor station upgrade and operational and decommissioning components.

The PPA uses Kilometre Points (KPs) to reference distance from the start of the alignment at Plumpton to the end of the alignment at Wollert. These KPs are considered useful reference points for highlighting areas of potential biodiversity value and conveying recommendations to avoid and minimise impacts on these values.

1.5 Assessment objectives

The specific objectives of this assessment are to:

- Undertake a review of biodiversity information within 5 kilometres of the study area from relevant biodiversity databases including:
  - Department of Environment, Land, Water and Planning (DELWP) Victorian Biodiversity Atlas (VBA)
  - DELWP's NatureKit mapping tool
  - Department of the Environment and Energy (DoEE) *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Search Tool (PMST).
- Review previous reports and planning documents relevant to the project, including planning schemes.
- Undertake aerial photo interpretation of vegetation and habitat values within the study area.
- Undertake a rapid field assessment to determine the absence / presence of native vegetation and habitat, for properties where access was available.
- Provide indicative mapping of significant ecological features and constraints from desktop data and rapid assessment data.
- Provide a short report including recommendations to avoid and minimise native vegetation removal and implications under biodiversity protection regulations including the *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act), Victoria's *Flora and Fauna Guarantee Act 1988* (FFG Act),

Victoria's *Environment Effects Act 1978* (EE Act) and Victoria's *Guidelines for the removal, destruction or lopping of native vegetation* ('the Guidelines') (DELWP 2017a).

1.6 Regional context

The study area encompasses private and public land within the:

- Central Victorian Uplands (CVU) and Victorian Volcanic Plain (VVP) Bioregions.
- Port Phillip and Western Port Catchment Region managed by Melbourne Water for the Port Philip and Western Port Catchment Management Authority (PPWCMA).
- Cities of Melton, Hume and Whittlesea and Mitchell Shire.

The study area is within the Werribee River, Maribyrnong River and Yarra River Catchments and crosses the following creeks and waterways:

- Jacksons Creek, Deep Creek and the Tame Street Drain within the Maribyrnong River Catchment.
- Kalkallo Creek and Merri Creek within the Yarra River Catchment.

A number of minor streams, watercourses and farm dams are also traversed.

The study area traverses land both inside and outside the Melbourne Urban Growth Boundary (UGB) and land that was subject to the Melbourne Strategic Assessment (MSA). The study area traverses parts of the Plumpton, Lindum Vale, Merrifield West, Merrifield North Employment, Lockerbie, Donnybrook-Woodstock, Shenstone Park and Northern Quarries Precincts within the Northern and Western Growth Corridors.

1.7 Existing assessments and approvals

Land within the Study Area has been subject to a number of assessment and approval processes under the EPBC Act and *Planning and Environment Act 1987* (PE Act). Specifically, the following processes have been completed:

- An assessment was conducted under Part 10 of the EPBC Act for all land within the 'Melbourne Strategic Assessment area' (MSA area) in 2009. This assessment involved targeted surveys and detailed assessments of the potential impacts of urban development and associated infrastructure on matters of national environmental significance (MNES). While the MSA assessment was initiated under the EPBC Act an integrated assessment process was conducted, whereby matters of State ecological significance were assessed concurrently, including State significant species and native vegetation (as defined under State based assessment methodologies). Surveys were undertaken in accordance with the DELWP Biodiversity Precinct Structure Planning Kit (DSE 2010) and EPBC act guidelines and listing advice for MNES. Significant species recorded during the MSA surveys were input to State biodiversity databases.
- The MSA surveys and assessments resulted in development of the Native Vegetation Time Stamping Dataset (the timestamping dataset), a definitive view of native vegetation extent and condition across Melbourne's VC68 urban growth areas and incomplete Precinct planning areas within the Melbourne Urban Growth Boundary, time-stamped as at 13 December 2012. The timestamping dataset is based on an assessment of native vegetation using the Victorian habitat hectares method (Version 1.3), the current DELWP method for assessing native vegetation extent and condition for regulatory purposes. The dataset was based on a combination of extensive on-ground site surveys and estimated data using the best available information (desktop assessments, modelling, expert opinion, and over the fence assessment) for those properties where access was not obtained.

- The area covered by the timestamping dataset aligns with the extent of the Biodiversity Conservation Strategy (BCS) for Melbourne's Growth Corridors (DSE 2013a). The BCS sets out the detailed conservation measures required for Victoria to satisfy the commitments made to the Commonwealth Government under the MSA and meet State requirements for biodiversity under the Victorian planning scheme.
- A Part 10 EPBC Act approval was granted on 5 September 2013 allowing actions resulting from urban development and infrastructure in parts of the MSA area. These are referred to as the 'approved MSA areas' and include the sections between approximately KP 0 to KP 3.2 and KP 28.2 to KP 50.
- The BCS and timestamped dataset have been used as the basis for assessing decisions under the PE Act within the approved MSA areas. Where Precinct Structure Plans (PSPs) have been approved in the MSA area there has been an amendment to clause 52.17 (Native vegetation) of relevant planning schemes so that proponents can rely on approval conditions under the Part 10 EPBC approval.
- The timestamping dataset has been combined with significant species habitat data collected as part of the MSA program to produce the Environment Mitigation Dataset, used to determine habitat compensation obligations for projects assessed under the MSA approvals. The Time Stamping Dataset and Environment Mitigation Dataset are currently used to determine impacts and mitigation requirements for projects within the approved MSA area under the EPBC Act and PE Act. The VNI pipeline project constructed in the eastern part of the Study Area is one such project that was within the definition of actions resulting from urban development and infrastructure under the Part 10 approval and which relied on that approval.
- APA have been advised by DoEE that it can rely on the approval decision made under Part 10 of the EPBC Act for those parts of the WORM project within the approved MSA areas between KP 0 to approximately KP 3.2 & KP 28.2 to KP 50.7
- In preparing this referral, APA has consulted with the DELWP MSA team and DELWP Port Phillip team and adopted a consistent approach. Consequently, APA has relied on the timestamped dataset and existing significant species records as the basis for quantifying the extent of the impact of the Project in the approved MSA area between KP 0 to KP 3.2 and KP 28.2 to 50.7.

To assist the Commonwealth in making a decision on the EPBC Act referral, those sections requiring referral (i.e. not covered by the Part 10 EPBC Act approval for the MSA) are hereafter referred to as 'areas outside the MSA approvals'. This includes the section from approximately KP 3.2 to KP 28.2.

Approved MSA areas and areas outside the MSA approvals are shown in Figure 3.

2. Methods

2.1 Database review

In order to provide context for the study area, information about flora and fauna from within 5 kilometres of the study area (the 'local area') was obtained from relevant biodiversity databases, many of which are maintained by the DELWP or DoEE.

Aquatic fauna records were searched for the Maribyrnong catchment (Deep Creek and Jacksons Creek) and Yarra Catchment (Merri Creek).

Records from the following databases were collated and reviewed:

- DELWP's Victorian Biodiversity Atlas (VBA), including the 'VBA_FLORA25, FLORA100 & FLORA Restricted' and 'VBA_FAUNA25, FAUNA100 & FAUNA Restricted' datasets
- DoEE's Protected Matters Search Tool (PMST) for matters protected by the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
- DELWP's Biodiversity Conservation Strategy Extent dataset
- DELWP's Native Vegetation Time Stamping Dataset - Melbourne Growth Areas (VC68)
- DELWP's Conservation Areas in the Biodiversity Conservation Strategy dataset
- DELWP's Environment Mitigation point dataset
- DELWP's Environment Mitigation polygon dataset
- DELWP's Areas of Strategic Importance for Growling Grass Frog habitat dataset
- DELWP's Strategic Biodiversity Value (NATUREPRINT_4_0_SBV) dataset
- DELWP's Native Vegetation Regulation Extent (2017) dataset
- DELWP's Native Vegetation Regulation Location (2017) (NVR2013_LOCRISK_V2) dataset
- DELWP's Native Vegetation Regulation Condition (2017) – 75 metre resolution dataset
- DELWP's Modelled FFG Act Community (NV2005_FFG_COMM) dataset
- DELWP's pre 1750 Ecological Vegetation Classes (EVCs, NV1750_EVC) dataset
- DELWP's Current Wetland layer
- DELWP's Victorian Bioregion (VBIOREG100) dataset
- DELWP's Bioregional Conservation Status datasets
- DELWP's Terrestrial Groundwater Dependent Ecosystem (GDE) Density dataset
- Australian Government Bureau of Meteorology Groundwater Dependent Ecosystem Atlas datasets
- DELWP's Seasonal Herbaceous Wetland likelihood model V1 output (mean and standard deviation) datasets
- DELWP's Habitat Importance maps
- Aerial photography including:
    - ESRI imagery dated 2015-2017

- Nearmap imagery dated April 19 and May 18 2019
- Real-time Nearmap imagery accessed on the 10-11 June 2019.

Other sources of biodiversity information were examined including:

- DELWP's NatureKit mapping tool
- DELWP's Native Vegetation Information Management (NVIM) system
- DoEE SPRAT documents
- Victorian Government Threatened Species and Community listing advice
- Previous reports relevant to the study area including:
  - Wollert to Wandong Transmission Pipeline Net Gain Assessment VNIE-RP-A-004 (Monarc Environmental 2014a)
  - Wollert to Wandong Pipeline Project - Flora and Fauna Assessment VNIE-RP-A-003 (Monarc Environmental 2013a)
  - Wollert to Wandong Transmission Pipeline – Merri Creek Crossing (Monarc Environmental 2013b)
  - Construction Environment Management Plan (VNIE-PL-A-004) Victorian Northern Interconnect expansion Wollert to Wandong gas pipeline (PL101) (Monarc Environmental 2014b)
  - Offset Management Plan – Wollert Compressor Station (Monarc Environmental 2011)
  - Lindum Vale PSP 1202: Biodiversity Assessment (Biosis 2015)
  - Scattered tree assessment, PSP 1067 Donnybrook (Biosis 2013a)
  - Scattered tree assessment, PSP 1069 Woodstock (Biosis 2013b)
  - Native vegetation assessment of land east of Melton, Victoria (Biosis 2009)
  - Growling Grass Frog masterplan for Melbourne's growth corridors: Melbourne Strategic Assessment (DELWP 2017b)
  - Sub-regional species strategy for the Golden Sun Moth (DEPI 2013c)
  - Sub-Regional Species Strategy for the Growling Grass Frog (DEPI 2013d)
  - Biodiversity Conservation Strategy for Melbourne's Growth Corridors (DEPI 2013a)
  - Lockerbie Native Vegetation Precinct Plan (May 2012)
  - Merrifield West Native Vegetation Precinct Plan (March 2012)
  - Donnybrook-Woodstock Precinct Structure Plan (VPA 2017a)
  - Lindum Vale Native Vegetation Precinct Plan (VPA 2018)
  - PSP 1078 Plumpton Precinct Structure Plan (VPA 2017b)
  - Western Outer Ring Main – Surface Water and Groundwater (Alluvium 2019)

2.2 Definitions of significance

The significance of a species or ecological community is determined by its listing status under Commonwealth or State legislation / policy (Table 1).

Table 1 Criteria for determining significance of species & ecological communities

Significance	
National	Threatened species listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent under the EPBC Act. Threatened ecological communities listed as critically endangered, endangered or vulnerable under the EPBC Act.
State	Threatened species listed as critically endangered, endangered or vulnerable in Victoria on a DELWP Advisory List (DSE 2009; DSE 2013; DEPI 2014a). Species or ecological communities listed as threatened under the FFG Act.

Lists of significant species generated from the databases are provided in Appendix 1 (flora) and Appendix 2 (fauna). Lists of significant ecological communities which are known to occur or predicted to occur within the local area based on database searches are provided in Appendix 3. The species and communities have been assessed to determine their likelihood of occurrence based on the process outlined below.

Migratory species are also considered as part of the significant impact assessment under the EPBC Act. Migratory species recorded from or predicted to occur within the 5km search area are listed in Appendix 2.

Flora protected under the FFG Act but not listed as threatened are also considered as part of the impact assessment under the FFG Act. FFG Act protected flora species previously recorded from the study area are listed in Section 3.2.

Noxious weeds and Pest animals listed under the CaLP Act are of significance for their potential to cause environmental or economic harm or have the potential to cause such harm. CaLP Act listed noxious weeds and pest animals previously recorded from the study area are listed in Section 3.2 and 3.3 respectively.

2.3 Determining likelihood of occurrence of significant species and ecological communities

Likelihood of occurrence indicates the potential for a species or ecological community to occur within the study area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitat within the study area. Likelihood of occurrence is ranked as negligible, low, medium, high, or recorded.

The rationale for the rank assigned is provided for each species in Appendix 1 (flora) and Appendix 2 (fauna). Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Only those species previously recorded from within 5 kilometres of the study area, or which have been predicted to occur within the area based on the DoEE PMST are considered here. Habitat value for species listed on the DELWP Advisory Lists is calculated by the Habitat Importance Modelling produced by DELWP (DELWP 2017a). DELWP Advisory listed species, for which habitat is modelled within the study area but which have not been recorded from within 5 kilometres, are not considered further within this report but will be considered as part of an assessment of native vegetation removal under the *Guidelines for the removal, destruction or lopping of native vegetation*.

The rationale for the rank assigned for significant ecological communities is provided in Appendix 3 and is based on a review of PMST ecological outputs produced by DoEE, FFG Act community models produced by DELWP and existing reports and expert knowledge.

2.4 Aerial Photo Interpretation

A review of aerial photos was conducted for all areas outside the MSA approvals within the study area (between approximately KP 3.2 to 28.2). The review identified additional areas of potential native vegetation beyond areas identified in existing datasets and reports due to:

- Gaps in existing datasets (e.g. areas that had not previously been assessed on-ground).
- The coarseness of existing modelled data (e.g. DELWPs Native Vegetation Extent dataset).
- Limitations in using remote imagery to accurately modelling grassland and grassy woodland vegetation types, which cover much of the study area, due to difficulty in distinguishing between introduced and native grassland species.
- The time since previous on-ground assessments were undertaken and the dynamic nature of vegetation within grassland and grassy woodland ecosystems.

Aerial photo interpretation (API) was therefore used to identify areas of potential native vegetation and habitat within the study area. API was completed by botanists (Sera Cutler and Steve Mueck) with extensive experience in API of vegetation patterns in grassland and grassy woodland ecosystems.

API involved a review of the following imagery:

- ESRI imagery dated 2015-2017
- Nearmap imagery dated April 19 and May 18, 2019
- Real-time Nearmap imagery accessed on the 10-11 June 2019.

The DELWP Native Vegetation Extent data and previous reports relevant to the study area (listed in Section 2.1 above) were also reviewed as part of the API. Reference was also made to the pre-1750 Ecological Vegetation Classes (EVC) mapping.

An EVC was assigned to all areas of potential native vegetation based on the aerial imagery interpretation and pre-1750 EVC or previously reported EVC. EVCs were assigned to broad habitat types (Grassland, Woodland, and Wetland). Dams and waterbodies were also mapped as potential habitat.

2.4.1 Approach to adopting API data

Where API identified areas that were significantly disturbed due to infrastructure, construction activities (excavation, stockpiling, and development) or recent or regular cultivation, these areas were excluded.

Where there was evidence of previous but not recent cultivation (as evidenced by furrow lines or cropping in older imagery) the areas were defined as native but annotated with 'Previously Cultivated'. All areas where furrow lines or past cultivation was not apparent have been assumed and annotated 'Uncultivated'. This classification was used to inform significant species habitat mapping for those species where previous cultivation or significant ground disturbance is likely to have led to the loss of such species from the area (e.g. Striped Legless Lizard, Matted Flax-lily, Spiny Rice-flower).

A precautionary approach was taken to mapping, and where there was uncertainty around the level of current or past disturbance, native vegetation has been assumed present. The API is therefore intended to represent the upper limit of likely native vegetation (and habitat) present.

2.5 Rapid field assessment

For land parcels where access was available, rapid field assessments were undertaken on the 8-9 May 2019, 28 June 2019, 22-25 July 2019 by senior ecologists (botanists and/or zoologists) from Biosis. These areas are identified in Figure 20. Biosis staff were escorted in the field by APA Land Access team members.

Areas inspected during the rapid field assessments were variously inspected on foot, from a vehicle or from adjacent road reserves. Where access on foot was available this was given priority, with most areas directly inspected.

The rapid field assessments involved mapping of areas of potential native vegetation and/or habitat for significant species. Any areas of potential native vegetation and habitat were mapped and a 'Cultivated', 'Previously Cultivated' or 'Uncultivated' status assigned.

The rapid assessment was not intended to provide fine scale mapping of native vegetation or habitat or of vegetation condition but to identify broad areas of potential native vegetation and habitat. Where native vegetation was identified and the cover was such that it could meet the thresholds required to classify as a patch of native vegetation, scattered tree or wetland under State guidelines (the Guidelines) or an ecological community based on FFG Act community listings or EPBC Act listing criteria, the area was mapped as potential native vegetation.

This rapid field assessment mapping includes small areas with a high cover of perennial non-native vegetation cover which are likely to be excluded from areas of potential native vegetation under more detailed assessments (e.g. a full assessment under the Guidelines and under FFG Act or EPBC Act listing criteria).

In addition, much of the vegetation present had suffered from prolonged grazing during an extended dry period. Therefore, while the presence of native vegetation was made with a relatively high degree of confidence, the degraded nature of most sites means that some areas identified as native vegetation could support a significant cover of introduced species under more benign conditions. Areas of potential native vegetation identified during the rapid field assessments are therefore considered to represent an upper limit of the extent of native vegetation for those properties accessed.

2.6 Potential native vegetation and habitat mapping

A potential native vegetation (PNV) map (Figure 20) for the study area was created using a combination of DELWP's Native Vegetation Time Stamping Dataset - Melbourne Growth Areas (VC68), rapid field assessment mapping and aerial photo interpretation.

For the MSA approved areas DELWP's Native Vegetation Time Stamping Dataset has been used to define native vegetation extent and DELWP's Environment Mitigation Dataset has been used to map habitat types for EPBC Act listed species. This approach was discussed and agreed with both the DELWP MSA team and DELWP Port Phillip region team. The Native Vegetation Time Stamping Dataset is discussed further in Section 3.1.2. The Environment Mitigation dataset is discussed further in Section 3.1.7.

For all other areas (i.e. areas outside the MSA approvals) the rapid field assessment data and the aerial photo interpretation data has been used to define potential native vegetation. This mapping has been developed using a conservative, precautionary approach which assumes native vegetation is present in areas of uncertainty and is considered to represent the upper limit of the extent of likely native vegetation.

For those species with a medium or higher likelihood of occurrence within the study area, potential habitat was defined on the basis of vegetation type using the potential native vegetation mapping to broadly categorise habitat types (grassland, woodland, wetland), and using the 'Previously Cultivated' and

'Uncultivated' categories where relevant. In addition dams, waterbodies and waterways were used to define potential habitat, with a 50 meter buffer applied where relevant (e.g. in the case of Growling Grass Frog).

Where API or rapid field assessments identified areas that were not patches of native vegetation but which contained potential habitat for significant species, these areas were assigned an "Uncultivated", "Previously Cultivated" or "Cultivated" status to aid future on-ground assessments. .

Estimates of potential native vegetation and habitat losses for the PPA have been based on the potential native vegetation map on consideration of habitat values identified from the API and rapid assessments (for all areas outside the MSA approvals) and the DELWP Environment Mitigation dataset (for all approved MSA areas). . This approach to assessment of impacts is taken to represent a worst case approach for the Project. The final actual impact will depend on the extent of native vegetation and habitat identified through further assessments on ground in all API and rapid field assessed areas, and on the mitigation measures implemented, and is expected to be less than the worst case scenario impact assessment presented here

2.7 Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- Matters listed under the EPBC Act, associated policy statements, significant impacts guidelines, listing advice and key threatening processes
- *Environment Effects Act 1978*
- Threatened taxa, communities and threatening processes listed under Section 10 of the FFG Act and associated action statements and listing advice
- FFG Act listed protected flora
- *Planning and Environment Act 1987* (P&E Act)
- *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a)
- Noxious weeds and pest animals lists under the *Catchment and Land Protection Act 1994* (CaLP Act)
- *Wildlife Act 1975*
- *Fisheries Act 1995*
- *Water Act 1989*
- *Environment Protection Act 1970*: State Environmental Protection Policy (Waters) 2018.

2.8 Limitations

The information contained in this report is primarily based on desktop sources and analysis only, with the exception of the rapid field assessment areas. Database searches and associated conclusions are reliant upon external data sources and information managed by third parties.

APA supplied digital mapping files for the PPA and KPs.

3. Desktop results

3.1 Native Vegetation and habitat

The study area supports native and non-native vegetation including remnant and adventive native vegetation, planted native vegetation and introduced non-native vegetation.

The majority of the study area has experienced some level of disturbance due to farming (predominantly cropping and grazing) and urban development. Despite this history of disturbance, surveys in recent decades (particularly the work carried out under the MSA) have shown that areas of native vegetation persist within the agricultural and peri-urban landscape. Indeed, many areas currently used for grazing, areas along roadsides, and long uncultivated grassland areas still meet the definition of a patch of native vegetation. Moreover, even agricultural areas not meeting the criteria to be defined as a patch of native vegetation can still have scattered native trees. Similarly, although the habitat is often degraded and fragmented, threatened plants and animals can and do persist in these areas. These features are described further below.

3.1.1 Modelled Pre-1750 EVCs

Pre-1750 Ecological Vegetation Classes (EVC) mapping indicates ten EVCs, comprising 14 bioregional EVCs (BioEVCs) occur within the study area (Figure 4). BioEVCs are a combination of EVCs across different bioregions and these mapping products have been developed by the Victorian Government (DELWP). These EVCs are listed in Table 2 with the relevant Bioregional Conservation Status (BCS).

Table 2 Summary of EVCs most likely to occur in the study area (based on pre-1750 EVC mapping)

Ecological Vegetation Class	EVC Number	Conservation status
Central Victorian Uplands (CVU)		
Plains Grassy Woodland	EVC 55	Endangered
Grassy Woodland	EVC 175	Endangered
Riparian Woodland	EVC 641	Endangered
Stream Bank Shrubland	EVC 851	Vulnerable
Escarpment Shrubland	EVC 895	Endangered
Victorian Volcanic Plains (VVP)		
Plains Grassy Woodland	EVC 55	Endangered
Grassy Woodland	EVC 175	Endangered
Stream Bank Shrubland	EVC 851	Endangered
Escarpment Shrubland	EVC 895	Endangered
Grey Clay Drainage-line Aggregate	EVC 124	N/A
Plains Grassy Wetland	EVC 125	Endangered
Plains Grassland	EVC 132	Endangered
Riparian Scrub	EVC 191	Endangered
Scoria Cone Woodland	EVC 894	Endangered

Conservation status indicates the level of depletion of a particular EVC across a bioregion. Endangered EVCs are vegetation types that have been widely cleared and are now restricted to less than 10% of the pre-European settlement extent. Vulnerable EVCs are vegetation types where 10% to 30% of the pre-European settlement extent remains across a bioregion.

3.1.2 Native Vegetation mapping

3.1.2.1 Native Vegetation Regulation Extent (2017) dataset (Native Vegetation Extent dataset)

DELWP's Native Vegetation Regulation Extent (2017) dataset (Native Vegetation Extent dataset) shows areas of native vegetation modelled within the study area, largely as fragmented patches or as scattered trees (Figure 5). The Native Vegetation Extent dataset provides the most current available estimation of native vegetation extent (i.e. cover) within the study area. It is intended as a landscape scale approximation of vegetation extent and should not be used for detailed design. A detailed review of aerial imagery for the study area indicates the potential for additional areas of grassland and ephemeral wetland vegetation outside the modelled NV Extent mapping.

3.1.2.2 Native Vegetation Time Stamping Dataset

DELWP's Native Vegetation Time Stamping Dataset is intended to be a definitive view (for the purposes of the MSA) of native vegetation extent and condition across Melbourne's Growth Areas, Time Stamped as at 13 December 2012 (Figure 9). The dataset was based on a combination of extensive on-ground site surveys and estimated data using the best available information (based on modelled data, expert opinion and over the fence assessment) for those properties where access was not obtained. This mapping has been incorporated into the Native Vegetation Extent dataset, however the Native Vegetation Extent dataset is modelled at a coarser scale. The Time Stamping data provides a highly accurate snap shot of native vegetation present within the MSA at the time it was collected, and in the context of current conditions, a reasonable estimate of contemporary native vegetation values present.

This dataset forms part of the approvals issued under Part 10 of the EPBC Act. Significant areas of native vegetation identified from the Time Stamping project were incorporated into Conservation Areas in the BCS where they met thresholds set out in the relevant MSA Program prescriptions.

3.1.2.3 Other assessments

Parts of the study area were previously mapped as part of publicly available projects including:

- *Lindum Vale PSP 1202: Biodiversity Assessment* (Biosis 2015) which maps native vegetation values present in the Lindum Vale Precinct and which has been used to inform the Lindum Vale Native vegetation Precinct Plan ((VPA 2018). The Study area and PPA have been sited within part of the Lindum Vale Precint which is shown to support areas of predominantly introduced vegetation which do not meet the definition of a patch of native vegetation or of a significant ecological community.
- *Offset Management Plan – Wollert Compressor Station* (Monarc Environmental 2011) maps native vegetation at the Wollert Compressor site at KP50. This assessment shows areas of native vegetation generally corresponding with the timestamped data for the site.

3.1.2.4 Potential native vegetation mapping

Due to the limitations in accuracy of the NV Extent Mapping and the limited coverage of the Native Vegetation Time Stamping Dataset mapping this report has used a combination the Native Vegetation Time Stamping dataset, for all MSA approved areas, and rapid field assessment mapping and API, in all areas outside the MSA approvals to identify areas of Potential Native Vegetation (PNV) and attribute a likely EVC. This has been used to create a PNV map for the study area. Using this approach approximately 59.57 hectares of PNV was identified within the PPA (Figure 20; Table 3). As outlined in Sections 2.4 and 2.5, the API and rapid field assessments have taken a precautionary approach to native vegetation mapping and mapped as PNV areas where there was uncertainty. The API and rapid field assessment data is therefore considered to represent an upper limit of PNV.

Much of the PPA has been subject to extensive past soil disturbance in the form of cultivation. Where cultivation was recent and/or regular these areas were not mapped as native vegetation in the API assessment. However, where cultivation was not recent (based on the 2019 NearMap imagery) and where there was uncertainty around the level of current or past disturbance, a precautionary approach was taken and native vegetation has been assumed present.

Given the past history of disturbance within the study area, the known prevalence of introduced weed species within the landscape, and the precautionary approach taken, the PNV map presents a likely overestimation of the actual extent of native vegetation and present.

It should be noted that the study area lies predominantly within the DELWP modelled Victorian Volcanic Plain (VVP) bioregion and intrudes slightly into the Central Victorian Uplands (CVU) bioregion at KP 17 and between KP 29-32. The bioregional boundaries shown in DELWP's Victorian Bioregion (VBIOREG100) dataset were defined at a broad scale and are intended to be indicative only. Based on previous on-ground assessments undertaken as part of the Timestamping project and the rapid field assessment undertaken as part of this assessment, the areas shown on the bioregion maps within the CVU have been assigned to the VVP based on the vegetation, soil and geology observed. All vegetation shown in the PNV map is therefore classified according to the relevant VVP EVC.

Table 3 Summary of extent of native vegetation EVCs within the PPA (based on the PNV mapping)

Ecological Vegetation Class	Timestamped Data (ha)	Biosis Desktop Assessment Data (ha)	Biosis Rapid Field Assessment Data (ha)	Total (ha)
Approved MSA areas (approved under Part 10 of the EPBC Act)				
(VVP_0055) Plains Grassy Woodland	5.69	-	-	5.69
(VVP_0068) Creekline Grassy Woodland	-	-	-	-
(VVP_0125) Plains Grassy Wetland	0.17	-	-	0.17
(VVP_0132) Plains Grassland	2.12	-	-	2.12
(VVP_0641) Riparian Woodland	0.06	-	-	0.06
(VVP_0649) Stony Knoll Shrubland	1.43	-	-	1.43
(VVP_0654) Creekline Tussock Grassland	0.08	-	-	0.08
Sub-total	**9.55**	-	-	**9.55**
Areas outside the MSA approvals				
(VVP_0055) Plains Grassy Woodland	-	0.3	3.85	4.15
(VVP_0068) Creekline Grassy Woodland	-	0.14	0.08	0.22
(VVP_0125) Plains Grassy Wetland	-	0.46	0.04	0.5
(VVP_0132) Plains Grassland	-	15.21	29.57	44.79
(VVP_0641) Riparian Woodland	-	0.12	0.08	0.2
(VVP_0649) Stony Knoll Shrubland	-	-	-	-
(VVP_0654) Creekline Tussock Grassland	-	0.15	0.01	0.16
Sub-total	-	**16.38**	**33.63**	**50.02**
TOTAL				**59.57**

3.1.3 Native Vegetation condition

The DELWP Native Vegetation Regulation Condition dataset shows native vegetation condition scores within the study area range from 0 to 0.84 (Figure 6) representing areas with low condition value, or no value, to very high condition value. The modelled condition scores can be used where an application to remove native vegetation under the Guidelines (DELWP 2017a) falls on the basic or intermediate assessment pathway (Section 4.2.4). Where an application to remove native vegetation falls under the detailed assessment pathway, an on-ground assessment of vegetation condition will be required. A detailed review of condition scores is not provided as it is anticipated on ground assessments will be required due to the scale of the project.

For areas inside the MSA approvals, DELWP's Native Vegetation Time Stamped Dataset contains condition scores for native vegetation. These scores will be used to inform the impact assessment for the Project.

3.1.4 Wetlands

The EPBC Protected Matters Search Tool identified one Ramsar site, the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site, as being within proximity (10-20km upstream) of the study area. The study area does not traverse any wetlands of international importance, and there are no records of any nationally significant wetlands within the study area, however DELWP's Current Wetland layer (Figure 8) shows four mapped wetlands occur within the study area:

- KP 41 – part of a single mapped wetland partially impacted by the PPA, within the approved MSA area.
- KP 44-45 – three small wetlands two of which are partially impacted by the PPA, within the approved MSA area

Under the native vegetation regulations, mapped current wetlands are considered native vegetation.

These wetlands are currently incorporated in the PNV map as Plains Grassy Wetland and Plains Grassland EVCs (outside the VNI pipeline easement). Much of the proposed area of impact to these wetlands from the PPA is within the existing VNI pipeline easement which has been subject to past disturbance under the existing approvals. The PPA follows the VNI pipeline easement at this location (a 20 meter wide corridor previously cleared for construction of the VNI) and an additional 5 meters adjacent to the existing easement required to maintain a safe working distance to the existing pipeline while allowing construction of the WORM.

3.1.5 Groundwater Dependent Ecosystems

DELWP's *Terrestrial Groundwater Dependent Ecosystem (GDE) Density* dataset models GDEs in the study area (Figure 19). This dataset is based on the Potential Terrestrial Groundwater Dependent Ecosystem (GDE) mapping undertaken by Dresel et al. (2010). Dresel et al. (2010) recognised that the dataset overestimated the occurrence of mapped terrestrial GDEs. For this reason, the GDE dataset was refined to provide information regarding the relative density of GDEs across the State. Areas of very low GDE density were assigned less weighting than areas with very high GDE density. This provided a suitable solution to the problem of mapped GDE overestimation. Key areas of potential constraint occur at:

- KP 0 and within KP 3-4, 5-7, 8-9 (scattered modelled GDEs. From KP 0-9 the alignment follows the existing Sunbury pipeline easement and it is likely that any GDEs within the easement have been subject to past disturbance).
- KP 10-11 (appears to be associated with a tributary of Jacksons Creek and adjacent areas of uncultivated grassland).

The Australian Government Bureau of Meteorology *Groundwater Dependent Ecosystem Atlas* datasets also show a number of potential Aquatic and Terrestrial GDEs within the study area (Figure 19). Key areas of potential constraint occur between:

- KP 13-14 (Jacksons Creek aquatic GDE) – outside the MSA approvals area
- KP 17 (Deep Creek aquatic GDE) – outside the MSA approvals area
- KP 15-24, 26-27 (terrestrial GDEs, will be difficult to avoid if present) – outside the MSA approvals area
- KP 30-31 (small terrestrial GDE, may be able to adjust alignment within study area to avoid) – within the approved MSA area
- KP 34-35 (Kalkallo Creek aquatic GDE) – within the approved MSA area
- KP 38-39 (terrestrial GDE, will be difficult to avoid if present) – within the MSA area
- KP 42-43 (Merri Creek aquatic GDE) – within the MSA approved area

The Alluvium (2019) desktop assessment of Surface Water and Groundwater within the WORM study area identifies the potential for impact on groundwater to be very low for the following reasons:

- *The activity of installing the pipeline will only intersect the shallowest aquifer, or potentially may not intersect any aquifer at all (depending on seasonal conditions).*
- *The groundwater resource in the areas is generally brackish, and the activity will not result in the addition of salts to the aquifer. Consequently, the beneficial use, which is defined by the groundwater salinity, is unlikely to be at risk.*
- *The activity does not involve depositing or releasing any potential contaminant to shallow aquifers.*

The Alluvium (2019) report indicates the predominant risk to groundwater from the Project is the potential to create preferential flow paths that may inadvertently change groundwater flow directions. The potential for this risk is likely to be higher where the water table is shallow, such as the wetlands around KP 40 to KP 45.

Given the depth to the water table is generally well below the impact depth proposed, except in the Merri Creek catchment in the north near KP40-45 where much of the impact area has been subject to disturbance in the past, any impact to GDEs is likely to be highly localised provided the mitigation measures recommended in the Alluvium (2019) report are implemented.

3.1.6 Waterways, drainage lines and dams

Watercourses, waterbodies and their margins often provide important habitat for native fauna and flora.

The study area crosses the following creeks and waterways:

- Jacksons Creek, Deep Creek and the Tame Street Drain within the Maribyrnong River Catchment.
- Kalkallo Creek and Merri Creek within the Yarra River Catchment.

A number of minor streams, watercourses and farm dams are also traversed.

The Alluvium (2019) desktop assessment of Surface Water and Groundwater within the study area provides further details on these features.

3.1.7 Native Trees

Native canopy trees have been previously recorded within the study area as both scattered trees and as trees within patches (Figure 9). Additional native canopy trees are likely to occur in areas that have not yet been assessed along creeklines, in patches and scattered in the landscape. Under the native vegetation regulations native canopy trees are classified as small or large depending on whether they meet the relevant EVC

Benchmark diameter at breast height (DBH). EVC Benchmarks are available from https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks.

Native canopy trees are likely to range in size from large old hollow-bearing specimens, which provide important local habitat, to small trees in areas of dense regrowth. Planted native and indigenous trees and shrubs are also likely to occur along roadsides and stream banks in the study area.

Within the approved MSA area all native canopy trees have been mapped and are included in the DELWP Environment Mitigation Dataset.

An on-ground assessment will be required to confirm the presence and size of native canopy trees for all areas outside the approved MSA areas.

3.1.8 Habitat values

Habitat values within the study area comprise of extensive areas of native and exotic grassland, small areas of woodland and scattered trees (both native and exotic), some of which are hollow bearing and which provide a foraging resource and nesting and roosting habitat for fauna, dams and waterways, areas of embedded rock and rocky outcrops and cracking clay soils.

3.1.8.1 MSA surveys and mapping

Habitat mapping, general fauna surveys and targeted surveys for significant fauna species including Growling Grass Frog and Golden Sun Moth have been undertaken across parts of the study area as part of the MSA. (DEPI 2013c, DEPI 2013d). Habitat mapping for Golden Sun Moth and Growling Grass Frog was incorporated into DELWP's Environment Mitigation Dataset (Figure 14). The Environment Mitigation Dataset is used to determine habitat compensation obligations within the approved MSA areas based on habitat mapping for key significant species.

Targeted flora surveys for both National and State significant species were also undertaken as part of the MSA Program in the preliminary investigation areas and as part of the precinct surveys commissioned by the Growth Areas Authority (DSE 2009). Habitat mapping was incorporated into the Environment Mitigation Dataset for both Spiny Rice Flower and Matted Flax-lily. These areas of habitat correspond with patches of native vegetation and are likely to represent the best quality habitat for significant flora species commonly found in grassland and grassy woodland habitats.

Within the MSA Program area, significant populations of threatened flora and / or fauna or areas of significant habitat have been incorporated into Conservation Areas identified in the BCS where they met thresholds set out in the relevant MSA Program prescriptions.

3.1.8.2 Other previous surveys and mapping

Within the approved MSA areas

Targeted surveys were conducted for significant flora and fauna at the Wollert Compressor Station (KP 50) prior to 2011 (Monarc Environmental 2011). These assessments recorded a number of significant flora and fauna on site, outside the current Study Area (Clover Glycine, Striped Legless Lizard, Red-Chested Buttonquail) and one species from within the study area (Golden Sun Moth).

Targeted surveys for significant flora and fauna were undertaken between KP 42 and KP 50 for the *Wollert to Wandong Pipeline Project - Flora and Fauna Assessment VNIE-RP-A-003* (Monarc Environmental 2013a) in areas not accessed as part of the MSA timestamping surveys. These studies identified the presence of Golden Sun Moth between approximately KP 43.5-44.5 and an unconfirmed Growling Grass Frog call at the Merri Creek crossing. The Environment Mitigation Dataset shows corresponding areas of suitable habitat for these species at these locations.

Areas outside the MSA approvals

Outside the MSA area, targeted surveys for Golden Sun Moth and Striped Legless Lizard were undertaken within the Lindum Vale Precinct to inform preparation of the Lindum Vale Precinct Structure Plan (Biosis 2015). Golden Sun Moth were found to be present on the site and are likely to occur within the study area.

3.1.8.3 Potential habitat for significant species

For all areas outside the MSA approvals, the PNV mapping and additional information collected from the API and rapid assessments on cultivation history and presence of waterbodies was used to identify areas of potential habitat based on the habitat descriptions for threatened species recorded from or likely to occur within the study area as described in Section 3.2 (Significant flora, Table 4) and Section 3.3 (Significant fauna, Table 5) and the methods outlined in Section 2.6. This information will be used to inform targeted surveys for significant species for all areas not covered by the MSA approvals.

For areas inside the MSA approvals the Environment Mitigation Dataset and DELWP's Habitat Importance maps will be used to determine the impact of the project to significant species.

3.2 Significant flora

A 5 kilometre buffered search of the EPBC Protected Matters Search Tool and VBA indicates 45 significant threatened flora species occur, or are predicted to occur, in the study area (Appendix 1, Figure 10) comprising 19 nationally significant and 44 state significant species. A summary of those species recorded from databases, or with a medium or higher likelihood of occurring in the study area, is provided in Sections 3.2.1 and 3.2.2 below, with details provided in Table 4. This includes a total of 29 threatened flora species comprising 9 Nationally significant and 28 State significant species which will require consideration during detailed ecological surveys for all areas outside the approved MSA areas.

Areas of potential habitat for significant flora include areas of Plains Grassland, Plains Grassy Woodland, Grassy Woodland, uncultivated areas along roadsides and within paddocks, along drainage lines and wetlands and areas of Riparian Woodland, Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.

As part of the MSA, targeted surveys were undertaken for significant flora (EPBC Act listed, FFG Act listed and DELWP Advisory listed species) on properties accessed for site surveys, in accordance with the *Biodiversity Precinct Structure Planning Kit* guidelines (DSE 2010).

For areas of habitat where no Part 10 approval under the EPBC Act applies, areas of potential habitat will require targeted survey during the detailed on-ground assessment.

3.2.1 EPBC Act listed flora

A total of 19 EPBC Act listed flora species occur or are predicted to occur within the study area (Appendix 1, Figure 10). This includes 9 species with a medium or higher likelihood of occurring in the study area (and within areas outside the MSA approvals), detailed in Table 4.

None of these species have been previously recorded within the PPA however, one of these species, Matted Flax-lily, has been previously recorded within the study area just south of Merri Creek within the approved MSA area (near KP 42.7).

Targeted surveys will be required to confirm the presence (or absence), and if present, the extent, of these species in areas of suitable habitat, outside the approved MSA areas. Habitat requirements and survey timing are provided in Table 4.

3.2.2 FFG Act listed flora

A total of 32 FFG Act listed flora species occur or are predicted to occur within the study area (Appendix 1, Figure 10). This includes 19 with a medium or higher likelihood of occurring in the study area, as detailed in Table 4.

None of these species have been previously recorded within the PPA, and one of these species has been previously recorded within the study area, Matted Flax-lily (near KP 42.7) inside the approved MSA Area. Targeted surveys will be required to confirm the presence (or absence), and if present, the extent, of these species in areas of suitable habitat, outside the approved MSA areas. Habitat requirements and survey timing are provided in Table 4.

3.2.3 FFG Act protected flora

A total of 12 FFG Act protected flora species, including species declared to be protected under section 46 of the FFG Act, have been recorded from the study area and one from the PPA (Common Maidenhair). These species are listed below:

- Black Wattle *Acacia mearnsii*
- Clustered/Creeping Cudweed *Euchiton japonicus s.l.*
- Common Maidenhair *Adiantum aethiopicum*
- Common Woodruff *Asperula conferta*
- Cotton Fireweed *Senecio quadridentatus*
- Golden Wattle *Acacia pycnantha*
- Green Rock-fern *Cheilanthes austrotenuifolia*
- Matted Flax-lily *Dianella amoena*
- Milky Beauty-heads *Calocephalus lacteus*
- Rock Correa *Correa glabra* var. *glabra*
- Scaly Buttons *Leptorhynchos squamatus*
- Smooth Solenogyne *Solenogyne dominii*

It is likely that some of these species will occur within the PPA. On-ground assessment will be required to determine the number of protected flora impacted by the PPA, for areas of public land.

3.2.4 DELWP Advisory listed flora

A total of 42 DELWP Advisory listed flora species occur or are predicted to occur within the study area (Appendix 1, Figure 10). This includes 27 with a medium or higher likelihood of occurring in the study area as detailed in Table 4.

None of these species have been previously recorded within the PPA, and one of these species has been previously recorded within the study area, Matted Flax-lily (near KP 42.7) within the approved MSA area. Targeted surveys will be required to confirm the presence (or absence), and if present, the extent, of these species in areas of suitable habitat, outside the approved MSA areas. Habitat requirements and survey timing are provided in Table 4.

The density of modelled rare or threatened species habitat importance mapping is shown in Figure 12. If an application to remove native vegetation under a detailed assessment pathway is required under the Guidelines (Section 4.2.4) habitat importance models for listed rare or threatened species will need to be individually assessed to determine the type and extent of offset requirements.

3.2.5 CaLP Act listed noxious weeds

A total of 63 species declared as noxious weeds under the CaLP Act have been identified within 5 kilometres of the study area as listed in Appendix 4 (Table A4.1) and shown in Figure 16. Of these, a total of 12 species have previously been recorded from within the study area. This includes:

- Nine Regionally Controlled species (Saffron Thistle, Spear Thistle, Spiny Rush, Serrated Tussock, Sweet Briar, Ragwort, Variegated Thistle, Gorse).
- Two Restricted species (Bridal Creeper and Prickly Pear).
- One State Prohibited species (Lobed Needle-grass).

Table 4 Summary of EPBC Act, FFG Act and advisory listed flora species most likely to occur in the study area

Common name	Scientific name	Conservation status	Potential habitat	Likelihood to occur in the study area	Likelihood to occur in areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Matted Flax-lily	*Dianella amoena*	Endangered under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Previously recorded from within the study area close to Merri Creek at Beveridge. Potential habitat in areas of uncultivated Plains Grassland, Grassy Woodland and Plains Grassy Woodland and in uncultivated grassy paddocks and roadsides in the study area.	Recorded (near KP 42.7, just south of Merri Creek, within the approved MSA area).	Medium	Late Spring/Summer
Spiny Rice-flower	*Pimelea spinescens* subsp. *spinescens*	Critically Endangered under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in areas of uncultivated Plains Grassland and uncultivated grassy paddocks and roadsides in the west of the study area east of Deep Creek.	High	High	Winter
Small Golden Moths	*Diuris basaltica*	Endangered under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in higher quality areas of uncultivated Plains Grassland, particularly where Kangaroo Grass and embedded rock is present.	Medium	Medium	Spring

Common name	Scientific name	Conservation status	Potential habitat	Likelihood to occur in the study area	Likelihood to occur in areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Adamson's Blown-grass	*Lachnagrostis adamsonii*	Endangered under the EPBC Act Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	Medium	Medium	Late Spring/Summer
Basalt Peppercress	*Lepidium hyssopifolium* s.s.	Endangered under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in areas of uncultivated Plains Grassland and Plains Grassy woodland and uncultivated grassy paddocks and roadsides in the study area.	Medium	Medium	Late Spring/Summer
Button Wrinklewort	*Rutidosis leptorhynchoides*	Endangered under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in higher quality areas of Plains Grassland, Grassy Woodland and Plains Grassy Woodland.	Medium	Medium	Late Spring/Summer
River Swamp Wallaby-grass	*Amphibromus fluitans*	Vulnerable under the EPBC Act	Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	Medium	Medium	Late Spring/Summer

Common name	Scientific name	Conservation status	Potential habitat	Likelihood to occur in the study area	Likelihood to occur in areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Clover Glycine	*Glycine latrobeana*	Vulnerable under the EPBC Act Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Potential habitat in higher quality areas of Plains Grassland, Grassy Woodland and Plains Grassy Woodland, particularly where Kangaroo Grass is present.	Medium	Medium	Late Spring/Summer
Large-headed Fireweed	*Senecio macrocarpus*	Vulnerable under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in areas of Plains Grassland and Plains Grassy woodland and uncultivated grassy paddocks and roadsides in the study area.	Medium	Medium	Spring
Buloke	*Allocasuarina luehmannii*	Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential to persist as scattered trees.	Medium	N/A	Year round
Plump Swamp Wallaby-grass	*Amphibromus pithogastrus*	Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	Medium	N/A	Late Spring/Summer
Curly Sedge	*Carex tasmanica*	Listed under the FFG Act	Potential habitat along drainage lines and wetlands and areas of Plains	Medium	N/A	Late Spring/Summer

Common name	Scientific name	Conservation status	Potential habitat	Likelihood to occur in the study area	Likelihood to occur in areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
		Vulnerable on a DELWP Advisory List.	Grassy Wetland and Grey Clay Drainage-line Aggregate.			
Small Milkwort	*Comesperma polygaloides*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Potential habitat in higher quality areas of Plains Grassland.	Medium	N/A	Late Spring/Summer
Small Scurf-pea	*Cullen parvum*	Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.	High	N/A	Late Spring/Summer
Tough Scurf-pea	*Cullen tenax*	Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.	High	N/A	Late Spring/Summer
Swamp Diuris	*Diuris palustris*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Potential habitat in higher quality areas of Plains Grassland, Plains Grassy Woodland and Plains Grassy Wetland.	Medium	N/A	Spring
Purple Diuris	*Diuris punctata*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Potential habitat in higher quality areas of Plains Grassland, Plains Grassy Woodland and Plains Grassy Wetland.	Medium	N/A	Spring

Common name	Scientific name	Conservation status	Potential habitat	Likelihood to occur in the study area	Likelihood to occur in areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Large-flower Crane's-bill	*Geranium* sp. 1	Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential habitat in areas of Plains Grassland within the VVP and uncultivated grassy paddocks and roadsides in the study area.	Medium	N/A	Late Spring/Summer
Narrow Goodenia	*Goodenia macbarronii*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	Medium	N/A	Late Spring/Summer
Cut-leaf Burr-daisy	*Calotis anthemoides*	Listed under the FFG Act	Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	Medium	N/A	Late Spring/Summer
Plump Windmill Grass	*Chloris ventricose*	Vulnerable on a DELWP Advisory List.	Known only with confidence from northern Victoria where it is possibly an accidental introduction to Victoria.	Medium	N/A	Late Spring/Summer
Flax-lily	*Dianella longifolia* var. *grandis*	Vulnerable on a DELWP Advisory List.	Relatively intact grassland and grassy woodlands	High	N/A	Late Spring/Summer
Flat Spike-sedge	*Eleocharis plana*	Vulnerable on a DELWP Advisory List.	Wetlands and areas of Plains Grassy Wetland	Medium	N/A	Late Spring/Summer
Melbourne Yellow-gum	*Eucalyptus leucoxylon* subsp. *connata*	Vulnerable on a DELWP Advisory List.	Woodlands of the volcanic plains north and west of Melbourne	Medium	N/A	Year round

Common name	Scientific name	Conservation status	Potential habitat	Likelihood to occur in the study area	Likelihood to occur in areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Studley Park Gum	*Eucalyptus* X *studleyensis*	Endangered on a DELWP Advisory List.	Stream-sides and wetlands	Medium	N/A	Year round
Austral Crane's bill	*Geranium solanderi* var. *solanderi* s.s.	Vulnerable on a DELWP Advisory List.	Relatively intact grassland and grassy woodlands	Medium	N/A	Late Spring/Summer
Plains Yam-daisy	*Microseris scapigera* s.s.	Vulnerable on a DELWP Advisory List.	Wetlands and Plains Grassy Wetland	Medium	N/A	Late Spring/Summer
Basalt Podolepis	*Podolepis linearifolia*	Endangered on a DELWP Advisory List.	Relatively intact grassland and grassy woodlands	Medium	N/A	Late Spring/Summer
Pale Swamp Everlasting	*Coronidium gunnianum*	Vulnerable on a DELWP Advisory List.	Wetlands and Plains Grassy Wetland	Medium	N/A	Late Spring/Summer

3.3 Significant fauna

A 5 kilometre buffered search of the EPBC Protected Matters Search and VBA Tool indicates 58 significant threatened fauna species occur, or are predicted to occur, in the study area (Appendix 2, Figure 11) comprising 26 nationally significant and 58 state significant species. Migratory species (with no threatened status) are considered separately in Section 3.3.4 below.

A summary of those species recorded from databases or with a medium or higher likelihood of occurring in the study area is provided in Table 5. This includes a total of 22 threatened fauna species comprising 7 nationally significant fauna species and 22 state significant fauna species. Areas of potential habitat for significant fauna include forest, grassland and grassy woodland habitat, pasture supporting spear grasses and wallaby grasses, grassland dominated by introduced tussock grasses, scattered indigenous and planted eucalypts within or adjacent to the proposed alignment, wetlands and farm dams within or adjacent to the alignment, and aquatic habitat along Merri Creek, Jacksons Creek and Deep Creek.

General fauna surveys and targeted surveys for significant fauna species including Growling Grass Frog and Golden Sun Moth have been undertaken across parts of the study area as part of the MSA. (DEPI 2013c, DEPI 2013d).

Targeted surveys for Golden Sun Moth and Striped Legless Lizard were undertaken within the Lindum Vale Precinct, outside the MSA approvals area, to inform preparation of the Lindum Vale Precinct Structure Plan (Biosis 2015).

For areas where no Part 10 approval under the EPBC Act applies, targeted surveys will be required for significant species in areas of potential habitat to confirm the presence (or absence), and if present, the extent, of these species. These are detailed further below.

3.3.1 EPBC Act listed fauna

A total of 26 EPBC Act listed fauna species occur or are predicted to occur within the study area (Appendix 2, Figure 11). This includes 7 species with a medium or higher likelihood of occurring in the study area, detailed in Table 5. Targeted surveys will be required to confirm the presence (or absence), and if present, the extent, of these species in areas of suitable habitat, outside the MSA areas approved under Part 10 of the EPBC Act. Habitat requirements and survey timing are provided in Table 5.

Four of these species have been previously recorded within the study area and 4 within the PPA:

- Growling Grass Frog (2 records, both in PPA near KP 40.5 within the approved MSA area)
- Golden Sun Moth (8 records, in study area between KP 30.3 – KP 44.5 within the approved MSA area, 4 records in PPA at KP 30.9, 44.3, 44.5, 44.9 within the approved MSA area)
- White-throated Needletail (2 records in PPA both near KP 40.45 within the approved MSA area).

There is a historical record of Grassland Earless Dragon in the PPA (last record 1990) inside the approved MSA area near KP 42.6 within the VNI easement. However, extensive surveys for the species have been done at this location and others to the north and west of Melbourne (Robertson and Evans 2009/2012) and the species has not been detected. The species is considered likely to be extinct within northern Melbourne and potentially within Victoria (Melville et al 2019). The likelihood of occurrence or potential for significant impact to this species resulting from the Project is therefore considered low.

3.3.2 FFG Act listed fauna

A total of 45 FFG Act listed fauna species occur or are predicted to occur within the study area (Appendix 2, Figure 11). This includes 17 species with a medium or higher likelihood of occurring in the study area, detailed

in Table 5. Targeted surveys will be required to confirm the presence (or absence), and if present, the extent, of these species in areas of suitable habitat, outside the approved MSA areas. Habitat requirements and survey timing are provided in Table 5.

Five of these species have been previously recorded within the Study area and three from the PPA:

- Growling Grass Frog (2 records, both in PPA near KP 40.5 within the approved MSA area)
- Golden Sun Moth (8 records, in study area between KP 30.3 – KP 44.5 within the approved MSA area, 4 records in PPA at KP 30.9, 44.3, 44.5, 44.9 within the approved MSA area)
- Red-chested Button Quail (1 record from study area near KP 42.5 within the approved MSA area)
- Black Falcon (1 record from study area near KP 42.5 within the approved MSA area)

There are historical records of Grassland Earless Dragon in the PPA (last record 1990) inside the approved MSA area however as discussed in section 3.3.1 this species is considered extinct within northern Melbourne and potentially within Victoria.

3.3.3 DELWP Advisory listed fauna

A total of 54 DELWP Advisory listed threatened fauna species occur or are predicted to occur within the study area (Appendix 2, Figure 11). This includes 22 with a medium or higher likelihood of occurring in the study area as detailed in Table 5. Targeted surveys will be required to confirm the presence (or absence), and if present, the extent, of these species in areas of suitable habitat, outside the approved MSA areas. Habitat requirements and survey timing are provided in Table 5.

Six of these species have been previously recorded within the study area and four from the PPA:

- Growling Grass Frog (2 records, both in PPA near KP 40.5 within the approved MSA area)
- Golden Sun Moth (8 records, in study area between KP 30.3 – KP 44.5 within the approved MSA area, 4 records in PPA at KP 30.9, 44.3, 44.5, 44.9 within the approved MSA area)
- Red-chested Button Quail (1 record from study area near KP 42.5 within the approved MSA area)
- Black Falcon (1 record from study area near KP 42.5 within the approved MSA area)
- White-throated Needletail (2 records in PPA both near KP 40.45 within the approved MSA area).

The density of modelled rare or threatened species habitat importance mapping is shown in Figure 12. If an application to remove native vegetation under a detailed assessment pathway is required under the Guidelines (Section 4.2.4) habitat importance models for listed rare or threatened species will need to be individually assessed to determine the type and extent of offset requirements.

3.3.4 Migratory species

A total of twenty migratory species have been recorded from or are predicted to occur within the study area (Appendix 2, Figure 11). The majority of these species are unlikely to make significant use of or have significant habitat within the Study area, with the exception of Latham's Snipe, listed as a Migratory species under the EPBC Act, which may occur in seasonal wetlands supporting tussock-grasses and rushes as well as vegetated farm dams. Habitat requirements are detailed in Table 5. Important habitat for Latham's Snipe is described as areas that have previously been identified as internationally important for the species, or areas that support at least 18 individuals of the species. No internationally important areas of habitat occur within the study area and the likelihood of 18 individuals being recorded from seasonal wetlands or farm dams within the study area is considered low due to the limited size of these habitat types within the study area.

3.3.5 CaLP Act listed pest animals

No CaLP act listed pest animals have been previously recorded from the study area however European Rabbit *Oryctolagus cuniculus* and Fox *Vulpes vulpes* are known to be established across the study area.

Table 5 Summary of EPBC Act, FFG Act and advisory listed fauna species most likely to occur in the study area

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Golden Sun Moth	*Synemon plana*	Critically Endangered under the EPBC Act Listed under the FFG Act Endangered on DELWP's Advisory List	Species recorded within the study area at Mickleham and Donnybrook. High likelihood of occurring elsewhere in the study area in areas of suitable grassland habitat including natural temperate grassland, grassy woodland and pasture supporting spear grasses and wallaby grasses and exotic grassland dominated by Chilean needle grass. Previously recorded from previously cultivated recolonised grasslands.	Recorded (in study area between KP 30.3 – KP 44.5 within the approved MSA area, 4 records in PPA at KP 30.9, 44.3, 44.5, 44.9 within the approved MSA area)	High	Early November through to the end of December. Survey may be able to be continued in early January if the species is still flying in the local area.
Swift Parrot	*Lathamus discolour*	Critically Endangered under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List	Likely to make occasional use of scattered indigenous and planted eucalypts within or adjacent to the Study area on rare occasions. Project unlikely to pose a significant risk to	Medium	Medium	Between March and July, when the species is present on mainland Australia. Species unlikely to be detected. Survey for the species not considered necessary as an

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
			the species and the Study area does not constitute important habitat.			assessment of vegetation can be used to predict and rank the importance of feeding habitat.
Grey-headed Flying-fox	*Pteropus poliocephalus*	Vulnerable under the EPBC Act Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Species likely to utilise flowering indigenous and planted trees within and adjacent to the study area for foraging.	High	High	Roosts (camps) in the Melbourne area are well-documented and it is unlikely that any occur within or near the Study area. Survey for the species not considered necessary as an assessment of vegetation can be used to predict and rank the importance of feeding habitat.
Striped Legless Lizard	*Delma impar*	Vulnerable under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Known to occur in the local area; potentially present in habitat dominated by native or introduced tussock grasses throughout the Study area. Unlikely to occur in previously cultivated areas.	High	High	Tiles deployed during June and July; must be in place by August. Survey undertaken from September to December.

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Growling Grass Frog	*Litoria raniformis*	Vulnerable under the EPBC Act Listed under the FFG Act Endangered on a DELWP Advisory List.	Species has been recorded in all creeks bisected by the alignment, and has potential to occur in all wetlands and farm dams within or adjacent to the alignment.	Recorded (2 records, both in PPA near KP 40.5 along Merri Creek within the approved MSA area)	High	October-March. The appropriate period to detect Growling Grass Frogs is concentrated in November to January when males call, however the frogs are still active until March.
Australian Grayling	*Prototroctes maraena*	Vulnerable under the EPBC Act Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Species is present throughout the Maribyrnong and Yarra River, however Deep Creek is the only waterway within the study area that contains suitable habitat.	Medium	Medium	Targeted survey not required. The project is considered unlikely to pose a significant risk to the species provided appropriate sediment management and site remediation measures are implemented. The species is most susceptible to construction related impacts immediately upstream of estuaries during spawning in April-May. The alignment crosses Deep Creek >10km upstream of the estuary.

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
White-throated Needletail	*Hirundapus caudacutus*	Vulnerable under the EPBC Act Vulnerable on a DELWP Advisory List.	As an almost exclusively aerial species within Australia, it occurs over most types of habitat, particularly wooded areas. Potential to use the aerial space over much of the study area.	Recorded (2 records in PPA both near KP 40.45 within the approved MSA area)	High	Species can only be detected within the study area in summer (December to March) when the species migrates from Asia, however the project is unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Eastern Great Egret	*Ardea alba modesta*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Known to occur within the local area and likely to utilise a range of wetlands within or immediately adjacent to the Study area.	High	High	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Little Egret	*Egretta garzetta*	Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential wetland habitat located within and immediately adjacent to the Study area.	Medium	Medium	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Freckled Duck	*Stictonetta naevosa*	Listed under the FFG Act Endangered on a DELWP Advisory List.	Potential wetland habitat located within and immediately adjacent to the Study area.	Medium	Medium	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Blue-billed Duck	*Oxyura australis*	Listed under the FFG Act	Suitable wetland habitat located within and	Medium	Medium	Species can be detected at any time of the year, however the project is

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
		Endangered on a DELWP Advisory List.	immediately adjacent to the Study area.			unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Latham's Snipe	*Gallinago hardwickii*	Listed as Migratory under the EPBC Act.	Likely to occur in seasonal wetlands supporting tussock-grasses and rushes as well as vegetated farm dams. Important habitat for Latham's snipe is described as areas that have previously been identified as internationally important for the species, or areas that support at least 18 individuals of the species.	Medium	Medium	Species can be between November and January, however the project is unlikely to pose a significant risk to the species, therefore targeted survey is not considered warranted.
Brown Toadlet	*Pseudophryne bibronii*	Listed under the FFG Act Endangered on a DELWP Advisory List.	Woodland, forest and grassland habitats within the Study area. It is likely that Brown Toadlet is now extinct in the Greater	Medium	Medium	Survey in autumn and early winter. Targeted surveys are unlikely to detect the species, because it is likely to be locally extinct

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
			Melbourne area as the species has not been recorded for many years, despite targeted surveys at sites where it formerly occurred.			
Plumed Egret	*Ardea intermedia plumifera*	Listed under the FFG Act Endangered on a DELWP Advisory List.	More commonly recorded in northern Victoria, however may utilise wetland habitat in the Study area.	Medium	Medium	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Red-chested Buttonquail	*Turnix pyrrhothorax*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Previously recorded within the Study area near Donnybrook. Potentially utilises grassland, crop and pasture habitat throughout the Study area. However, the species is very	Recorded (1 record from study area near KP 42.5 within the approved MSA area)	Medium	Survey can be undertaken at any time of the year. The probability of detection is low as the species is exceedingly rare in southern Victoria. The project is unlikely to pose a significant risk to the

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
			infrequently recorded in southern Victoria.			species. If present within the Study area, this species may be detected while undertaking surveys for other species such as Golden Sun-moth, Striped Legless Lizard and Growling Grass Frog.
Lewin's Rail	*Lewinia pectoralis*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Potentially occurs in any wetland in the Study area supporting dense, fringing, emergent long or tussock-grass, reeds and rushes including well-vegetated farm dams.	Medium	Medium	Can be detected at any time of the year, however more likely to be recorded during spring as the species is breeding at that time. If present within the Study area, this species may be detected while undertaking surveys for other species such as Golden Sun-moth, Striped Legless Lizard and Growling Grass Frog.
Baillon's Crake	*Porzana pusilla*	Listed under the FFG Act	Potentially occurs in any wetland in the study area supporting dense, fringing, emergent long or tussock-	Medium	Medium	Spring and summer. This species is thought to be migratory and is mainly recorded in spring and

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
		Vulnerable on a DELWP Advisory List.	grass, reeds and rushes including well-vegetated farm dams.			summer in southern Victoria. If present within the Study area, this species may be detected while undertaking surveys for other species such as Golden Sun-moth, Striped Legless Lizard and Growling Grass Frog.
Black Falcon	*Falco subniger*	Listed under the FFG Act Vulnerable on a DELWP Advisory List.	Suitable habitat present, but unlikely to make regular use of the study area	Recorded (1 record from study area near KP 42.5 within the approved MSA area).	High	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species as it is unlikely to make regular use of the area and the Study area does not constitute important habitat. Therefore targeted survey is not considered warranted.
Common Bent-wing	*Miniopterus schreibersii oceanensis*	Listed under the FFG Act	Likely to utilise habitat within the PPA for foraging on rare occasions. Unlikely	Medium	Medium	Species can be detected at any time of the year, however the project is

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
Bat (eastern ssp.)		Vulnerable on a DELWP Advisory List.	that any maternity caves occur within or immediately adjacent to the study area.			unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Australasian Shoveler	*Spatula rhynchotis*	Vulnerable on a DELWP Advisory List.	Prefers large, permanent lakes and swamps with deep water, stable conditions and abundant aquatic vegetation. Potential wetland habitat located within and immediately adjacent to the study area.	Medium	Medium	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Hardhead	*Aythya australis*	Vulnerable on a DELWP Advisory List.	Prefers large, deep freshwater environments with abundant aquatic vegetation, including slow moving areas of rivers. Potential wetland habitat	Medium	Medium	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species and the Study area

Common name	Scientific name	Conservation status	Potential habitat	Likely to occur in the study area	Likelihood to occur in the areas outside the MSA approvals (KP 3.2 – 28.2)	Survey timing
			located within and immediately adjacent to the study area.			does not constitute important habitat, and therefore targeted survey is not considered warranted.
Musk Duck	*Biziura lobata*	Vulnerable on a DELWP Advisory List.	Prefers deep water on large, permanent swamps, lakes and estuaries with abundant aquatic vegetation. Potential wetland habitat located within and immediately adjacent to the study area.	Medium	Medium	Species can be detected at any time of the year, however the project is unlikely to pose a significant risk to the species and the Study area does not constitute important habitat, and therefore targeted survey is not considered warranted.
Tussock Skink	*Pseudemoia pagenstecheri*	Vulnerable on a DELWP Advisory List.	Known to occur in the local area; potentially present in habitat dominated by native or introduced tussock grasses throughout the study area.	High	High	Targeted survey for Striped Legless Lizard is likely to detect Tussock Skink, if the species is present within the Study area.

3.4 Significant ecological communities

3.4.1 Nationally significant ecological communities

The EPBC Protected Matters Search Tool indicates five threatened ecological communities occur or have the potential to occur in the local area (Appendix 3). Of these, four are considered to have at least a medium likelihood of occurrence in areas outside the approved MSA areas or are known from the approved MSA areas. A brief description is provided below:

- Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP) - listed as Critically Endangered. This community has the potential to occur in areas of woodland including Plains Grassy Woodland (EVC 55) and Stony Knoll Shrubland (EVC 649) or where scattered River Red-gum trees are present or likely to have been formerly present.
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (WBYB) - listed as Critically Endangered. This community has the potential to occur in areas of woodland including Plains Grassy Woodland (EVC 55) or where scattered Yellow Box is a dominant overstorey species. White Box and Blakely's Red Gum do not occur around Melbourne, or records of these species are doubtful.
- Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) - listed as Critically Endangered. This community has the potential to occur in areas of grassland and may correlate with areas of Plains Grassland (EVC 132) and Creekline Tussock Grassland (EVC 654).
- Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP) - listed as Critically Endangered. DELWP has developed a model to predict the likelihood of occurrence of this community. Model outputs include both an uncertainty surface (Figure 17) and a likelihood surface (Figure 18). The likelihood surface depicts the mean likelihood (of 30 independent models) of seasonal herbaceous wetland occurrence at each 25 x 25 metre pixel and the uncertainty surface is the standard deviation derived from the set of 30 likelihood of occurrence predictions at each pixel. These two surfaces can be combined and/or thresholded for decision making contexts that may be more or less risk averse. Using these models, existing native vegetation data and aerial photo interpretation this study identifies those areas most likely to correlate with the SHWTLP community. These have been mapped as areas of potential Plains Grassy Wetland EVC in the PNV map.

Table 6 below provides a breakdown of nationally significant ecological communities across the study area.

Table 6 Areas or confirmed or potential nationally significant (EPBC Act listed) ecological communities within the PPA

Nationally significant ecological community	Inside approved MSA areas (KP 0 – 3.2 and KP 28.2 – 50.7) (ha)	Outside approved MSA areas (KP 3.2 – 28.2) (ha)	Total (ha)
Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP) or White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (WBYB)	7.12 (GEWVVP)	4.15 (potentially GEWVVP or WBYB)	11.27
Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP)	2.2	44.95	47.15
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWTLP)	0.17	0.5	0.67
Total	**9.49**	**49.6**	**59.09**

Within the MSA areas approved under Part 10 of the EPBC Act mapping of EPBC listed ecological communities is provided in the Environment Mitigation Dataset. This includes areas of the NTGVVP and GEWVVP ecological communities.

Detailed survey and mapping will be required to confirm the presence / absence and define the extent and quality of these threatened ecological communities outside the approved MSA areas.

3.4.2 State significant ecological communities

There are two FFG Act listed communities modelled within the study area by DELWP's Modelled FFG Act Community dataset (Figure 13):

- Western (Basalt) Plains Grasslands Community
- Floristic Community 55-04 Western Basalt Plains (River Red Gum) Grassy Woodland.

Both of these communities are likely to occur within the study area and will align closely with Plains Grassland and Plains Grassy Woodland EVCs and the EPBC grassland and grassy woodland communities described above. The location and extent of these communities will need to be defined through detailed survey and mapping for all areas outside the MSA areas approved under Part 10 of the EPBC Act.

3.5 Conservation Areas

The study area traverses two BCS conservation areas (Figure 14):

- Conservation Area 34a - Northern Growth Corridor: Growling Grass Frog Corridor (between KP42 and KP43). This area has been classified as a Growling Grass Frog conservation, floodplain and open space area in the BCS. The key rationale for protection of area is that it protects important populations of Growling Grass Frog and ensures connectivity between populations within the northern growth corridor. The PPA follows the existing VNI pipeline easement within the conservation area. Impacts to Growling Grass Frog habitat and or any other MNES outside the VNI pipeline easement should be avoided, where possible.
- Conservation Area 28b - Summerhill Road (East), Wollert (between KP48 and KP49). This area was originally classified as an open space area within the BCS to preserve areas of GEWVVP, NTGVVP and Striped Legless Lizard Habitat. This conservation area has since been assigned to a nature conservation following a boundary revision in 2017 (DELWP 2017c). A small area of modelled NTGVVP and GEWVVP is impacted by the PPA. This is largely within the existing VNI pipeline easement. Impacts to NTGVVP and GEWVVP outside the existing VNI pipeline should be avoided, where possible.

A Works in Conservation Area (WICA) approval will be required for any works proposed in a Conservation Area. These requirements are considered further in Section 4.1.

3.6 Landscape context

The study area spans the north-eastern boundary of the Victorian Volcanic Plain bioregion adjacent to the Central Victorian Uplands. It traverses a landscape that has been highly fragmented by past land use including agricultural, infrastructure and urban development. Native vegetation within the landscape persists largely as isolated patches and scattered trees with the exception of riparian corridors along creeks including Jacksons Creek, Deep Creek and Merri Creek which provide important habitat networks for fauna movement. Patches of trees within the northern extent of the study area also contribute to a broader area of open

woodland that is unique within the local landscape. These trees can serve as stepping stones for more mobile species such as birds and bats and provide some level of habitat continuity with reserves in the local area, such as the reserve system proposed under the BCS (DEPI 2013a).

Strategic Biodiversity Values (SBV) for the study area are shown in Figure 7. The SBV combines information on important areas for threatened flora and fauna, levels of depletion, connectivity, vegetation types and condition to provide a view of relative biodiversity importance of all parts of the Victorian landscape. This integrated information provides decision-makers with a comprehensive and spatially explicit view of the importance of biodiversity assets to enable comparison of locations across Victoria. The SBV of the study area varies from 11 to 100 (Figure 7) indicating the highly variable condition of habitats and native vegetation based on landscape modelling techniques used by DELWP.

4. Biodiversity legislation and government policy

This section provides an assessment of the project in relation to key biodiversity legislation and government policy. This section does not describe the legislation and policy in detail. Where available, links to further information are provided.

4.1 Commonwealth

4.1.1 Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act.

Significant impact guidelines under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) define what constitutes a significant impact on a Matter of National Environmental Significance (MNES). A 'significant impact' is an impact which is important, notable, or of consequence, having regard to its context or intensity (Commonwealth of Australia 2013).

Implications for the Project under the EPBC Act:

MNES relevant to the project are summarised in Table 7. It includes an assessment against the MSA and EPBC Act policy statements published by the Australian Government which provide guidance on the practical application of EPBC Act.

Part of the study area is located within the areas approved under Part 10 of the EPBC Act (Approved MSA areas, Figure 3). Urban development within these areas is subject to conditions of approval which include the following.

- The requirement to comply with the Biodiversity Conservation Strategy for Melbourne's Growth Corridors (DEPI 2013a) (the BCS) which identifies nominated Conservation Areas which require protection for conservation within the MSA area; and
- The requirement to meet habitat compensation obligations (HCOs) to offset the loss or deemed loss of particular listed threatened species habitat and/or native vegetation which is not required to be retained for conservation as set out in the Habitat Compensation Obligation Guidelines under the BCS (DEPI 2013b) (HCO Guidelines).

Land covered by the BCS has been subject to vegetation and habitat mapping (Timestamping) conducted under the supervision of the DELWP and the Victorian Planning Authority (VPA). The BCS has been approved under Section 146B of the EPBC Act (Part 10 approval).

HCOs or biodiversity offsets are determined with reference to habitat data contained in the habitat compensation layer dataset (environment mitigation dataset) maintained by DELWP, and the applicable fee schedule.

The study area contains habitat values which have associated HCOs (Figure 14). In accordance with the BCS habitat data, biodiversity offsets to be provided through payment of HCOs will be required for the project if the MSA applies. Fees are payable to DELWP. The current fee schedule for each unit of obligation is set out in the HCO Guidelines (DEPI 2013b).

For all MNES within the areas approved under Part 10 of the EPBC Act (approved MSA areas), no further approvals are required under the EPBC Act for the project provided the conditions of the approvals are adhered to.

Where scattered trees or patches of native vegetation are proposed to be retained within the project, there may be scope to reduce the HCOs. Any reduction in HCOs would need approval from DELWP and would need to be in accordance with the requirements outlined in the Guidance Note (DELWP 2015).

There are two BCS Conservation Areas intersected by the study area (Figure 14):

- Conservation Area 34a - Northern Growth Corridor: Growling Grass Frog Corridor (between KP42 and KP43).
- Conservation Area 28b - Summerhill Road (East), Wollert (between KP48 and KP49).

Any new development or change in land use within a Conservation Area identified in the Biodiversity Conservation Strategy will require approval. In these areas it will be necessary to submit a Works in a Conservation Area (WICA) application to DELWP as outlined in the *Guidance note: Implementing the Biodiversity Conservation Strategy for Melbourne's Growth Corridors* (the Guidance Note) (DELWP 2015).

On the basis of the potential for significant impacts on MNES, the EPBC Act is likely to be triggered where impacts to threatened species or ecological communities are proposed in areas outside the MSA approvals , or where the Project is not in accordance with the conditions of the existing Part 10 approval. In areas outside the MSA approvals, if the Project will significantly impact MNES, referral of the proposed action to the Australian Government Minister for the Environment is recommended. On-ground assessments are recommended to determine the presence or absence of listed communities and species in areas outside the MSA approvals andwhere there is some uncertainty about the presence of listed species or communities, targeted surveys are recommended to confirm the potential for significant impacts.

Table 7 Assessment of project in relation to the EPBC Act

MNES	Project specifics	Significant impact Guidelines	Assessment against significant impact guidelines
Threatened species	45 listed threatened species have been recorded or predicted to occur in the project search area. The likelihood of these species occurring in the study area is assessed in Appendix 1 (flora) and Appendix 2 (fauna) and summarised in sections 3.2 and 3.3. In summary, 16 of these species have a medium or higher likelihood of occurrence within the study area: • Matted Flax-lily - Endangered under the EPBC Act • Spiny Rice-flower - Critically Endangered under the EPBC Act • Small Golden Moths - Endangered under the EPBC Act • Adamson's Blown-grass - Endangered under the EPBC Act • Basalt Peppercress - Endangered under the EPBC Act • Button Wrinklewort - Endangered under the	As defined in the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Commonwealth of Australia 2013), an action will require approval if the action has, will have, or is likely to have a significant impact on a species listed in any of the following categories: • extinct in the wild • critically endangered • endangered, or • vulnerable Significant Impact Criteria of relevance to this project are detailed below: **Critically endangered and endangered species: Significant impact criteria** An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will: • lead to a long-term decrease in the size of a population • reduce the area of occupancy of the species • fragment an existing population into two or more populations • adversely affect habitat critical to the survival of a species • disrupt the breeding cycle of a population • modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	For all listed significant species within areas covered by the existing MSA approvals under Part 10 of the EPBC Act, no further approvals may be required under the EPBC Act, as long as the Project follows the Program Report and the conditions of approval. For areas outside the MSA areas approved under Part 10 of the EPBC Act, or where the Project is not in accordance with the conditions of approval, for species predicted to occur within the study area considered to have a low to negligible likelihood of occurrence within the site, the proposed action is unlikely to constitute a significant impact. For those species with a medium or higher likelihood of occurrence an assessment of potential for significant impact is outlined below: • Grey-headed Flying-fox and Swift Parrot: Planted eucalypt species within the site may be used as a foraging resource for Grey-headed Flying-fox, and on occasion, Swift Parrot. However the site is not considered to constitute important or limiting habitat for either species or the proposed works are considered highly unlikely to have a significant impact on either of these highly mobile species. • White-throated Needletail: The study area is not considered to constitute important of limiting habitat for the species and the project is highly

MNES	Project specifics	Significant impact Guidelines	Assessment against significant impact guidelines
	EPBC Act • River Swamp Wallaby-grass - Vulnerable under the EPBC Act • Clover Glycine - Vulnerable under the EPBC Act • Large-headed Fireweed - Vulnerable under the EPBC Act • Golden Sun Moth - Critically Endangered under the EPBC Act • Swift Parrot - Critically Endangered under the EPBC Act • White-throated Needletail – Vulnerable under the EPBC Act • Grey-headed Flying-fox - Vulnerable under the EPBC Act • Striped Legless Lizard - Vulnerable under the EPBC Act • Growling Grass Frog - Vulnerable under the EPBC Act • Australian Grayling - Vulnerable under the EPBC Act	• result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat • introduce disease that may cause the species to decline, or • interfere with the recovery of the species. **Vulnerable species: Significant impact criteria** An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will: • 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 • fragment an existing important population into two or more populations • adversely affect habitat critical to the survival of a species • 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 • 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 interfere substantially with the recovery of the species.	unlikely to have a significant impact on this highly mobile species. • Matted Flax-lily, Basalt Peppercress and Large-headed fireweed: There is potential habitat for these species in areas of uncultivated grassland and woodland within paddocks and along roadsides). Targeted surveys will be required to resolve the absence / presence and if present, the extent of these species and the potential for significant impacts on areas of potential habitat is proposed. • Spiny Rice-flower: There is potential habitat for this species in areas of uncultivated grassland in paddocks and along roadsides within the west of the study area. Targeted surveys will be required to resolve the absence / presence and if present, the extent of this species and the potential for significant impacts on areas of potential habitat is proposed. • Small Golden Moths have potential to occur within higher quality Plains Grassland. Targeted surveys will be required to resolve the absence / presence and if present, the extent of this species and the potential for significant impacts on areas of potential habitat is proposed. • Clover Glycine and Button Wrinklewort have potential to occur in areas of higher quality Plains Grassland and Plains Grassy Woodland. Targeted surveys will be required to resolve the absence / presence and if present, the extent of these species and the potential for significant

MNES	Project specifics	Significant impact Guidelines	Assessment against significant impact guidelines
		Significant impact guidelines have also been developed for the following species: • Significant impact guidelines for the critically endangered spiny rice-flower (Commonwealth of Australia 2009a.) • Significant impact guidelines for the critically endangered golden sun moth (Commonwealth of Australia 2009b). • Significant impact guidelines for the vulnerable Growling Grass Frog (Commonwealth of Australia 2009c)	impacts on areas of potential habitat is proposed. • Adamson's Blown-grass and River-swamp Wallaby-grass: Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate. Targeted surveys will be required to resolve the absence / presence and if present, the extent of these species and the potential for significant impacts on areas of potential habitat is proposed. • Golden Sun Moth: The species has been recorded from numerous locations along the proposed route. Targeted surveys will be required to resolve the extent of this species and the potential for significant impacts on areas of potential habitat is proposed. • Growling Grass Frog is known from waterways and waterbodies within the study area and may occasionally forage in areas of grassland and woodland adjacent to creeklines and rivers within the study area (i.e. Merri Creek and Deep Creek). • Striped-legless Lizard: There is potential habitat for this species in areas of uncultivated grassland and woodland in paddocks and along roadsides within the study area. Targeted surveys will be required to resolve the absence / presence and if present, the extent of this species and the potential for significant impacts on areas of potential habitat is proposed.

MNES	Project specifics	Significant impact Guidelines	Assessment against significant impact guidelines
			Referral guidelines for the species have been developed (Commonwealth of Australia 2011). • Australian Grayling: There is habitat in the Maribyrnong River and Yarra River with potential for the species to occur in in Deep Creek, a tributary of the Maribyrnong River. The project is considered unlikely to pose a significant risk to an important population of the species provided appropriate sediment management and site remediation measures are implemented. The species is most susceptible to construction related impacts immediately upstream of estuaries during spawning in April-May (Backhouse et al 2008), however the Deep Creek crossing is located well upstream of the estuary.
Threatened ecological communities	Five listed threatened communities are predicted to occur within the broader area (Appendix 3; Section 3.5). Four of these are likely to occur within the study area: • Grassy Eucalypt Woodland of the Victorian Volcanic Plain (GEWVVP) - listed as Critically Endangered • Natural Temperate Grassland of the Victorian Volcanic Plain (NTGVVP) - listed as Critically Endangered	As defined in the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Commonwealth of Australia 2013), an action will require approval if the action has, will have, or is likely to have a significant impact on an ecological community listed in any of the following categories: • critically endangered, or • endangered **Significant impact criteria** An action is likely to have a significant impact on a critically endangered or endangered ecological community if there is a real chance or possibility that it will:	For all areas of the listed GEWVVP and NTGVVP communities within the MSA areas covered by the existing Part 10 approvals, no further approvals may be required under the EPBC Act, as long as the Project follows the conditions of approval. For areas of the listed communities outside the areas approved under Part 10 of the EPBC Act, significant impact guidelines for ecological communities are outlined in Commonwealth of Australia (2013). If the Project is likely to have a significant impact on the listed ecological communities where it will reduce the extent of the ecological community or fragment or increase fragmentation of the ecological community. On-ground

MNES	Project specifics	Significant impact Guidelines	Assessment against significant impact guidelines
	• Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains (SHWotTLP)- listed as Critically Endangered • White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland (WBGW) - listed as Critically Endangered	• reduce the extent of an ecological community • fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines • adversely affect habitat critical to the survival of an ecological community • modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns • cause a substantial change in the species composition of an occurrence of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting • cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including, but not limited to: – assisting invasive species, that are harmful to the listed ecological community, to become established, or – causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community, or interfere with the recovery of an ecological community.	assessments are recommended to determine the absence / presence and extent of these communities.

MNES	Project specifics	Significant impact Guidelines	Assessment against significant impact guidelines
Migratory species	20 listed migratory species have been recorded or are predicted to occur in the project search area (Appendix 2).	As defined in the EPBC Act Policy Statement 1.1 Significant Impact Guidelines (Commonwealth of Australia 2013), an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will: • 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 • 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.	There are significant impact guidelines for this group of species in Commonwealth of Australia (2015). These include actions that will substantially modify, destroy or isolate an area of important habitat or disrupt the lifecycle of an ecologically significant proportion of the population. While some of these species would be expected to use the study area on occasions, and some of them may do so regularly or may be resident, it does not provide important habitat for an ecologically significant proportion of any of these species.
Wetlands of international importance (Ramsar sites).	The study area is identified as being within proximity (10-20km upstream) of one Ramsar site: the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site.	Approval is required for an action occurring within or outside a declared Ramsar wetland if the action has, will have, or is likely to have a significant impact on the ecological character of the Ramsar wetland (commonwealth of Australia 2013).	There are significant impact guidelines specifically for Ramsar sites in Commonwealth of Australia (2013). These are defined as actions that will have a significant impact on the ecological character of a declared Ramsar wetland. The study area drains into the Port Phillip Bay (Western Shoreline) and Bellarine Peninsula Ramsar site, but this site is located over 15 kilometres downstream of the study area and the potential for the Project to have a significant impact on it is considered to be negligible.

4.2 State

4.2.1 Environment Effects Act 1978

The *Environment Effects Act* 1978 establishes a process to assess the environmental impacts of a project. If applicable, the Act requires that an Environment Effects Statement (EES) be prepared by the proponent. The EES is submitted to the Minister for Planning and enables them to assess the potential environmental effects of the proposed development.

The general objective of the assessment process is *to provide for the transparent, integrated and timely assessment of the environmental effects of projects capable of having a significant effect on the environment* (DSE 2006).

The 'Ministerial Guidelines for Assessment of Environmental Effects under the Environment Effects Act 1978' (DSE 2006) provide a range of criteria that can be used to determine whether an EES may be required for a project. These criteria relate to individual potential environmental effects and a combination of (two or more) potential environmental effects.

An assessment of the project against the individual potential effects criteria is provided in Table 8, and against the combination of potential effects criteria in Table 9.

However, the guidelines are not binding, and the decision as to whether an EES is required is ultimately at the discretion of the Minister for Planning.

Table 8 Assessment of the PPA against the Individual Potential Environmental Effects referral criteria of the *Environment Effects Act 1978*

Referral criteria	Referral criteria met?	Comments
Potential clearing of 10 ha or more of native vegetation from an area that:	Yes	Based on the current PPA.
is of an EVC classified as Endangered within the Bioregion		Endangered EVCs within the VVP Bioregion likely to be impacted
is, or is likely to be, of Very High conservation significance; and,		Some mapped EVCs are of high strategic biodiversity value and likely to be of very high conservation significance.
is not authorised under an approved Forest Management Plan or Fire Protection Plan.		
Potential long-term loss of a significant proportion of known remaining habitat or population of a threatened species within Victoria	No	Disturbance has the potential to impact on habitat for threatened species, however it is not considered likely to be significant.
Potential long-term change to the ecological character of a wetland listed under the Ramsar Convention or in 'A Directory of Important Wetlands in Australia (DIWA)' (Environment Australia 2001).	No	The Study area does not contain, or drain directly into, any wetland listed under the Ramsar Convention or a DIWA wetland (Environment Australia 2001).
Potential extensive or major effects on the health or biodiversity of aquatic, estuarine or marine ecosystems, over the long term.	No	Any potential impacts are likely to be minor and short term in nature.

Referral criteria	Referral criteria met?	Comments
Potential extensive or major effects on the health, safety or well-being of a human community, due to emissions to air or water or chemical hazards or displacement of residences.	Not applicable to this report	This criterion is assessed within the Desktop Land Use and Planning Assessment, August 2019, prepared by Biosis and the Noise and Air Quality Assessment Desktop Study, August 2019, prepared by Golder.
Potential greenhouse gas emissions exceeding 200,000 tonnes of carbon dioxide equivalent per annum, directly attributable to the operation of the facility.	Not applicable to this report	This criterion is assessed within the Noise and Air Quality Assessment Desktop Study, August 2019, prepared by Golder.

Table 9 Assessment of the PPA against the Combination of Potential Environmental Effects referral criteria of the *Environment Effects Act 1978*

Referral criteria	Referral criteria met?	Comments
A combination of two or more of the following types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:		
Potential clearing of 10 ha or more of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan	Yes	Based on the current PPA > 10 ha of native vegetation likely to be impacted.
Matters listed under the FFG Act: - potential loss of a significant area of a listed ecological community; or - potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats; or - potential loss of critical habitat; or - potential significant effects on habitat values of a wetland supporting migratory bird species	No	The project should seek to avoid and minimise impacts to listed threatened species and communities.
Potential extensive or major effects on landscape values of regional importance, especially where recognised by a planning scheme overlay or within or adjoining land reserved under the National Parks Act 1975	Not applicable to this report	This criterion is assessed within the Desktop Land Use and Planning Assessment, August 2019, prepared by Biosis
Potential extensive or major effects on land stability, acid sulphate soils or highly erodible soils over the short or long term	Not applicable to this report	This criterion is assessed within the Geological and Soils Desktop Study, August 2019, prepared by Golder
Potential extensive or major effects on beneficial uses of waterbodies over the long term due to changes in water quality, streamflows or regional groundwater levels	Not applicable to this report	This criterion is assessed within the Surface Water and Groundwater Desktop Assessment, August 2019, prepared by Alluvium.
Potential extensive or major effects on social or economic well-being due to direct or indirect displacement of non-residential land use activities	Not applicable to this report	This criterion is assessed within the Desktop Land Use and Planning Assessment, August 2019, prepared by Biosis

Referral criteria	Referral criteria met?	Comments
Potential for extensive displacement of residences or severance of residential access to community resources due to infrastructure development	Not applicable to this report	This criterion is assessed within the Desktop Land Use and Planning Assessment, August 2019, prepared by Biosis
Potential significant effects on the amenity of a substantial number of residents, due to extensive or major, long-term changes in visual, noise and traffic conditions	Not applicable to this report	This criterion is assessed within the Desktop Land Use and Planning Assessment, August 2019, prepared by Biosis
Potential exposure of a human community to severe or chronic health or safety hazards over the short or long term, due to emissions to air or water or noise or chemical hazards or associated transport	Not applicable to this report	This criterion is assessed within the Desktop Land Use and Planning Assessment, August 2019, prepared by Biosis and the Noise and Air Quality Assessment Desktop Study, August 2019, prepared by Golder
Potential extensive or major effects on Aboriginal cultural heritage	Not applicable to this report	This criterion is assessed within the Preliminary Desktop Cultural Heritage Assessment, August 2019, prepared by Biosis
Potential extensive or major effects on cultural heritage places listed on the Heritage Register or the Archaeological Inventory under the Heritage Act 1995.	Not applicable to this report	This criterion is assessed within the Preliminary Desktop Cultural Heritage Assessment, August 2019, prepared by Biosis

4.2.2 Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Under the FFG Act a permit is required from DELWP to 'take' protected flora species from public land. Protected flora are:

- Plants that have been declared to be protected under section 46 of the FFG Act.
- Plants that are listed as threatened under section 10 of the FFG Act
- Plants that belong to communities that are listed as threatened under section 10 of the FFG Act.

A permit is generally not required for removal of protected flora from private land. Authorisation under the FFG Act is required to collect, kill, injure or disturb listed fish.

Link for further information: https://www.environment.vic.gov.au/conserving-threatened-species/flora-and-fauna-guarantee-act-1988.

Native vegetation in the PPA is likely to include a listed threatened community (Section 3.4.2; Appendix 3), contain protected flora species (Section 3.2.3), listed threatened species (Sections 3.2.3 and 3.3.2) or habitat for them (Appendix 1 and 2).

For land that is privately owned, is not declared 'critical habitat' for the purposes of the FFG Act and the flora species are not being taken for the purpose of commercial sale, a protected flora permit is not required. There is currently no areas of declared 'critical habitat' under the FFG Act. Therefore for areas of private land a protected flora permit will not be required.

Part of the study area is on public land (e.g. roadsides and Crown land). Protected flora species, threatened species and threatened communities are likely to be present (Sections 3.2, 3.3 and 3.5), and a protected flora permit from DELWP would be required for public land if any of these species or communities will be affected by the Project.

4.2.3 Planning and Environment Act 1987 (incl. Planning Schemes)

The *Planning and Environment Act 1987* (P&E Act) controls the planning and development of land in Victoria, and provides for the development of planning schemes for all municipalities. The P&E Act includes a statutory device, the Victorian Planning Provisions (a series of reference documents used to ensure a consistent strategic approach to planning issues throughout Victoria). As a result, responsibilities for the clearance of native vegetation are referenced under the P&E Act as well as under the Victorian Government's Guidelines. These responsibilities are generally enacted under the municipal planning scheme.

However, Section 85 of the Pipelines Act provides exemption from the need for a pipeline licensee to secure permits pursuant to the P&E Act.

Of relevance to the Project, agreements between the pipeline regulator and other government departments, ensure that relevant government policies such as State Environment Protection Policies or those related to vegetation management still apply.

A permit under the P&E Act will not be required for the Project under the Pipelines Act exemptions. However the Project will need to address state government policy regarding assessing and compensating for the removal of native vegetation as set out in the *Guidelines for the removal, destruction or lopping of native vegetation* (Guidelines) (DELWP 2017a). This is addressed further in Section 4.2.4.

4.2.4 Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The *Guidelines for the removal, destruction or lopping of native vegetation* (Guidelines) are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria. The purpose of the Guidelines is to set out, and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation. The objective for the guidelines in Victoria is 'No net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

The Guidelines should be applied or considered, as appropriate, in decision making under approval processes for the removal of native vegetation that fall outside planning schemes. For example, approval processes that allow exemptions from requiring a planning permit to remove native vegetation to be relied on, or approvals under the Pipelines Act 2005 or the Mineral Resources (Sustainable Development) Act 1990. In such instances, assessment under the Guidelines (and provision of offsets required under the guidelines) can be used as a mechanism for addressing the environmental mitigation requirements of a project relating to the proposed removal of native vegetation.

When making decisions about proposals that involve, or will lead to, the removal, destruction or lopping of native vegetation, the three step approach in accordance with the Guidelines will be applied:

1. Avoid the removal, destruction or lopping of native vegetation.
2. Minimise impacts from the removal, destruction or lopping of native vegetation that cannot be avoided.
3. Provide an offset to compensate for the biodiversity impact from the removal, destruction or lopping of native vegetation.

Decision guidelines depend on the assessment pathway relevant to the proposal. The assessment pathway can be basic, intermediate or detailed, and is determined by reviewing the following information:

- The DELWP native vegetation location risk categories mapped in areas where native vegetation is proposed to be removed, which will be examined using the NVIM online tool.
- The location and amount of vegetation proposed for removal.
- The location and number of large trees proposed for removal.

- The extent of past native vegetation removal on the same property, and under the same ownership, within the preceding five year period.

The assessment pathway is determined as outlined below and summarised in Table 10:

- Applications involving removal of less than 0.5 hectares of native vegetation from location category 1 will be assessed under the **basic** assessment pathway if no large trees are proposed for removal. If any large trees are proposed for removal, the application will be assessed under the **intermediate** pathway.
- Applications involving removal of less than 0.5 hectares of native vegetation from location category 2 will be assessed under the **intermediate** pathway.
- Applications for removal of 0.5 hectares or more will be assessed under the **detailed** pathway, as will all applications involving any extent of native vegetation removal from location category 3.

Table 10 Determining the assessment pathway under the Guidelines

Extent	Location		
	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

Depending on the assessment pathway, an application to remove native vegetation must address specific Application requirements and Decision guidelines listed under the tables to Sections 6.4.1, 6.4.2 and Section 7 of the *Guidelines*.

A review of the study area indicates that the site contains areas of location categories 1-3 (Figure 15). Based on the current PPA, and PNV mapping compiled in this assessment, the application is likely to be assessed in the detailed assessment pathway. On-ground assessments will be required to determine the final native vegetation removal proposed. However the PNV mapping has been used to determine a worst case native vegetation removal scenario and will be used to develop an offset strategy for the Project.

4.2.5 Catchment and Land Protection Act 1994 (CaLP Act)

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species.

A total of 63 declared noxious weeds have been identified within 5 kilometres of the study area as listed in Appendix 4 (Table A4.1) and shown in Figure 16. Of these, a total of 12 species have previously been recorded from within the Study area as outlined in Section 3.2.5.

Key potential constraints include the previous record of the State Prohibited Weed Lobed Needle-grass *Nassella charruana* between KP 43-44.

No established pest animals have been recorded within 5 kilometres of the study area however European rabbit *Oryctolagus cuniculus* and Fox *vulpes vulpes* are known to be established across the study area.

The Act prohibits the movement and sale of noxious weeds of all categories anywhere in the State, and covers weed seeds occurring as contaminants in seed lots, plant products or on vehicles, machinery or animals. Specifically, it is an offence to:

- remove or sell soil, sand, stone, gravel, fodder or grain likely to contain any part of a noxious weed without a permit. A person who contravenes any of these prohibitions may be directed to remove the noxious weed from any infested goods (animal, plants, vehicle, soil, sand, gravel and stone) or destroy them or restrict the movement if it is likely to spread weeds;
- buy, sell, possess for sale, bring into the State or transport within the State without a permit noxious weeds, seeds of noxious weeds or any part of a noxious weed capable of growing;

A permit will be required under the CaLP Act if removal of soil, sand, stone, gravel, fodder or grain likely to contain any part of a noxious weed or transport of noxious weeds, seeds of noxious weeds or any part of a noxious weed capable of growing is proposed.

Link for further information: http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds.

4.2.6 Wildlife Act 1975 and associated Regulations

The Wildlife Act 1975 and the Wildlife Regulations 2002, administered by DELWP, were established in order to protect wildlife throughout Victoria from extinction, while making provisions for regulated possession, trade and utilisation of wildlife for private and commercial purposes through licensing.

'Wildlife', as defined under the Wildlife Act 1975, includes:

- any animal of a vertebrate taxon that is indigenous to Australia
- all kinds of deer, nonindigenous quail, pheasants, and partridges
- any taxon of animal which the Governor in Council declares to be wildlife for the purposes of the Wildlife Act 1975
- any taxon of terrestrial invertebrate animal that is listed under the Flora and Fauna Guarantee Act 1988
- any hybrids of a taxon of animal specified above
- includes any such animal or any member of a taxon which is bred or kept in captivity or confinement.

The term 'wildlife' refers to wildlife in any form whether dead or alive, and includes any individual part of an animal, however the Wildlife Act does not apply to fish, as defined under the Fisheries Act 1995.

It is an offence to kill, take, control or harm wildlife under the Wildlife Act 1975. Anyone wishing to manage wildlife must have an authorisation from DELWP. The Wildlife Regulations 2002 prescribe penalties for persons who wilfully damage, disturb or destroy any wildlife habitat without appropriate authorisation.

DELWP advise that exemption from the need to obtain a planning permit (under the planning scheme) constitutes appropriate authorisation and therefore the habitat protection provisions under the Wildlife Regulations 2002 are not applicable to this project.

4.2.7 Fisheries Act 1995

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

A person must not take, injure, damage, destroy or release any protected aquatic biota. Protected aquatic biota includes all species of the family Syngnathidae (seahorses, sea dragons and pipefish), and any fish or aquatic invertebrate or community that is listed under the FFG Act.

Protected aquatic biota that may be impacted upon by the Project include:

- Australian Grayling *Prototroctes maraena*
- Murray Cod *Maccullochella peelii*

Providing mitigation measures outlined in this report are adhered to, the potential for protected aquatic biota as listed above, to be injured, damaged or destroyed is considered to be negligible and no Protected Aquatic Biota permit is required from DELWP. However, consultation with DELWP is recommended as it is an offence under Section 119 of the Fisheries Act to obstruct the free passage of fish, and a General permit may be required under Section 49 of the Act.

4.2.8 Water Act 1989

The primary purpose of the *Water Act 1989* is to provide a framework for the allocation and management of surface water and groundwater throughout Victoria. It provides a principal mechanism for maintenance of ecosystem functions including those of aquatic ecosystems. Under By-Laws created by the relevant Authority under the Act, the authorities regulate the works within and in the vicinity of waterways.

The proposed development will involve construction or maintenance activities that affect beds and banks of waterways, riparian vegetation or quality or quantity of water in Jacksons Creek, Deep Creek, Merri Creek, Tame Street Drain and Kalkallo Creek.

Development within the study area will require approval from Melbourne Water / the Port Philip and Westernport CMA for the crossing of all designated waterways along the PPA. Guidelines and application forms are available from CMAs online, or can be obtained from Melbourne Water's Asset Service team – 9235 1414.

4.2.9 Environment Protection Act 1970: State Environmental Protection Policy (Waters) 2018

The Environment Protection Act underpins the State Environmental Protection Policy (SEPP) - Waters which provides a legal framework for the protection and rehabilitation of Victoria's surface water environments.

The project may directly and/or indirectly impact upon Merri Creek, Jacksons Creek and Deep Creek and their associated aquatic ecosystems. The SEPP requires that aquatic ecosystem values be protected. Environmental quality objectives and indicators are defined to protect beneficial uses (i.e. the uses and values of the water environment) and an attainment program provides guidance on protection of the beneficial uses.

Impacts to surface water quality must not result in changes that exceed background levels and/or the water quality objectives specified for the Central Foothills and Coastal Plains segment to protect surface water uses and values. APA needs to ensure that direct and indirect (e.g. runoff) impacts to surface water quality do not exceed the background levels and/or water quality objectives.

Link to further information: https://www.epa.vic.gov.au/about-us/legislation/water-legislation/water-related-policies.

4.2.10 Regional Catchment Strategy and River Health Strategy

State Planning Policy Framework Clause 14.02-1 (Catchment planning and management) states that planning must consider as relevant, Regional Catchment Strategies (RCS) and any associated implementation plan or strategy including any regional river health and wetland strategies.

Strategies of relevance to the study area are the:

- Port Phillip & Western Port Region Regional Catchment Strategy https://www.ppwrcs.vic.gov.au/
- Melbourne Water Healthy Waterways Strategy 2018-2028 https://yoursay.melbournewater.com.au/healthy-waterways/document-library
- Melbourne Water Maribyrnong Catchment Region Program (Jacksons Creek and Deep Creek)
- Melbourne Water Yarra Catchment Region Program (Merri Creek)

These documents provide recommendations on the protection of existing high-value rivers and creeks that are in good condition and strategic improvement of other rivers and creeks. All three creeks, Jacksons Creek, Deep Creek and Merri Creek are listed as important waterways in their respective catchments. In addition, all three waterways provide important aquatic habitat for local flora and fauna as well as hold important cultural values for current and past residents. Mitigation measures (Section 5) have been recommended to minimise disturbance to the bed and banks of waterways and reduce the temporal scale of impacts as far as practicable. The proposed works will result in short term localised impacts, which are considered unlikely to affect the ecological character of the waterways crossed by the alignment.

5. Constraints, recommendations and conclusions

5.1 Constraints and recommendations

A number of constraints are present across the study area. These constraints stem largely from the presence of modelled, previously mapped and likely (from aerial imagery) native vegetation within the study area and the potential for threatened species and ecological communities to occur. The identified constraints and how they may influence design, construction and approvals are summarised in Table 11. Recommendations and mitigation measures to be incorporated in project planning and future assessments that will avoid and minimise impacts to biodiversity values are also provided.

The primary measure to reduce impacts to biodiversity values within the study area is to avoid and minimise removal of native vegetation and terrestrial and aquatic habitat. It is critical that this be considered during the design phase of the project, when key decisions are made about the alignment, location of ancillary infrastructure, site compounds, access roads, temporary material storage and stockpiles. The results of this assessment should therefore be incorporated into the project design and options to retain as much of the mapped vegetation/habitats as possible be investigated through construction methodologies, and micro siting where possible. Priority should be given to highest value areas and retaining larger areas in preference to numerous smaller ones. On ground assessments will be required to determine the impact of the final pipeline alignment.

Table 11 Constraints and recommendations

Constraint	Presence in the study area	Implications	Recommendations
Native vegetation (Section 3.1, Figure 20)	Native vegetation within the study area has been modelled and in some areas mapped on-ground.	Approvals in accordance with the Guidelines will be required. Implications for cost and availability of offsets and the removal of habitat for threatened species or communities.	Impacts to native vegetation should be avoided and minimised wherever possible. The mapped and modelled information provides a useful basis for refining a footprint which will avoid and minimise impacts to native vegetation however on ground assessments will be required to verify the extent of native vegetation with the final pipeline alignment outside the MSA approved areas. Vegetation adjacent to the final pipeline alignment will require protection for the duration of construction and temporary disturbance areas should be rehabilitated to reinstate the landform and soil surface and revegetated with locally indigenous species where disturbance is within or immediately adjacent to an area of native vegetation to minimise potential for consequential impacts.
Modelled condition scores (Section 3.1.3, Figure 6)	The study area has a modelled condition score between 0 and 84.	High condition score implies high quality native vegetation is present. Also influences the quantity and quality of native vegetation offsets required.	High quality native vegetation should be avoided where possible during the detailed assessment and micro-siting process. Consideration should be given to construction techniques which minimise impacts in areas with high condition scores.
Wetlands and Groundwater Dependent Ecosystems (Sections 3.1.4 and 3.1.5, Figures 8 and 19)	Wetlands and GDEs have been recorded from or are predicted to occur within the study area.	Wetlands shown in the Current Wetland layer will be assessed as native vegetation in accordance with the Guidelines.	Impacts to wetlands and GDEs should be avoided and minimised. On ground assessment of any modelled GDEs within the final pipeline alignment will be required.

Constraint	Presence in the study area	Implications	Recommendations
Native trees and tree protection zones (Section 3.1.6, Figures 9 and 20)	Likely to be impacted throughout the study area.	Potential loss of canopy trees. Removal of native canopy trees will require an offset. If greater than 10% of a tree protection zone (TPZ) is impacted by construction activities, then that tree is considered lost and included in the vegetation removal footprint unless an arborist assessment determines otherwise. This has the potential to increase the quantity of offsets required and increases the likelihood of triggering species offsets.	Native canopy trees (both scattered and in patches) should be avoided where possible. Particularly large trees which provide important habitat value. Construction methods should be developed to avoid work in the TPZ where possible. Where impacts to greater than 10% of a TPZ are proposed an arborist assessment is recommended. Key areas of constraint for native trees are listed in Section 3.1.6.
Threatened species records (Sections 3.2 and 3.3, Figures 10 and 11)	Threatened species have been recorded from and are predicted to occur within the Study area.	Provisions of the federal EPBC Act and state FFG Act may apply. If impacts to threatened species are unavoidable then a referral to the minister may be required under the EPBC Act. DELWP will need to be consulted regarding any impacts on FFG Act threatened species on public land.	The final pipeline alignment should seek to avoid potential habitat for significant species where possible. Surveys will be required in areas outside the MSA approvals to determine the potential for significant impacts on threatened species. This will need to be considered further during the detailed ecological assessments and project micro-siting process.

Constraint	Presence in the study area	Implications	Recommendations
Habitat importance mapping (heat map) (Section 3.2 and 3.3, Figure 12)	The study area contains modelled habitat for threatened species. The distribution of modelled habitat is variable across the site and ranges from ≤ 5 to ≤ 25 species with modelled habitat.	The area of native vegetation removal combined with the quantity of each species mapped habitat in Victoria determines the requirements for species offsets. If species offsets are required there could be potential difficulties finding and securing such offsets for species that are largely restricted to public land or densely forested landscapes.	Avoidance and minimisation methods required during design and construction to reduce habitat removal. The model can be used to identify areas of highest constraint. An assessment of impacts against the final pipeline alignment will be required to determine if species offsets are required. If species offsets are generated options include disputing the habitat importance models or avoiding modelled habitat. Again, due to the coarse nature of the desktop mapping and the linear nature of the project, avoidance may be difficult.
Threatened ecological communities (Section 3.4)	Threatened ecological communities have been recorded from or are predicted to occur within the study area.	Provisions of federal EPBC Act and state FFG Act may apply. If impacts to threatened ecological communities are unavoidable then a referral to the minister may be required under the EPBC Act. DELWP will need to be consulted regarding any impacts on FFG Act threatened communities on public land.	If threatened ecological communities are present within the study area then these areas should be avoided through detailed assessment, mapping and a micro-siting process wherever possible.
Strategic biodiversity value (SBV) (Section 3.5, Figure 7)	The SBV of the study area ranges from 11-100.	High minimum SBV for native vegetation offsets may limit the availability of units and increase the cost of offsets.	Difficult to avoid areas with high SBV given the scale of the mapping units and the linear nature of the Project. Consideration could be given to construction techniques which minimise impacts in areas with high SBV scores.

Constraint	Presence in the study area	Implications	Recommendations
Conservation Areas (Section 4.1.1, Figure 14)	There are two BCS Conservation Areas intersected by the study area.	Where the Project intersects a Conservation Area identified in the BCS approval from DELWP may be required. A Works in a Conservation Area (WICA) application may be required as outlined in the *Guidance note: Implementing the Biodiversity Conservation Strategy for Melbourne's Growth Corridors* (the Guidance Note) (DELWP 2015).	Works will need to address the no net loss of habitat requirement for CAs. This could be through site rehabilitation post construction, or enhancement works elsewhere within the CA.
DELWP modelled location risk (Section 4.2.4, Figure 15)	The study area is mapped as location risk 1, 2 and 3.	The quantity of vegetation removal required to construct the project is likely to push the project into the intermediate or detailed assessment pathway regardless of location risk.	Areas of location risk 3 should be avoided where possible to minimise the potential for impacts to habitat for significant species, however vegetation removal is likely to trigger the requirement for a detailed assessment pathway under the Guidelines. If vegetation removal is at, or near thresholds, areas with a lower location risk could be targeted.
Noxious weeds and pest animals (Section 4.2.5, Figure 16)	Records of noxious weeds within and adjacent to the study area, including 3 State Prohibited weeds.	Control required under the CaLP Act.	The project will need to comply with requirements to control/eradicate noxious weeds and pest species. Appropriate construction methodologies and contractor vehicle hygiene protocols will need to be developed and included in the project Construction Environmental Management Plan. Restrictions may apply to the transport of material from land where State Prohibited noxious weeds are known to occur. Controls will also apply to the introduction of weed and pathogens as a result of works.

Constraint	Presence in the study area	Implications	Recommendations
Waterways	Drainage lines and creeks are present throughout the study area.	Disturbance of the structural integrity of the bed and banks of waterways and associated vegetation. Creation of potential short term barriers to fish passage. Mobilisation of sediments into waterways, which may negatively influence water quality.	Appropriate safeguards and construction methodology will need to be developed and implemented to avoid impacts to waterways. Any waterway crossings will need to be considered at a design stage and appropriate construction techniques and materials will be required to reduce impacts to creeks and drainage lines. To ensure activities associated with the proposed works result in minimal impacts to the aquatic ecological values of Merri Creek, Jackson Creek and Deep Creek, the following recommendation are proposed: • Conducting construction during periods of low water levels and local rainfall to reduce the movement of sediments with the aim of minimising sediment loads exiting the site. Despite this, sediment control measures are to be implemented or considered during earthworks could include sediment fencing around stockpiles and silt curtains installed downstream of the bridge during instream works. • Ensure connectivity within the creek environments remains throughout the construction period to maintain fish passage. • A Site Environmental Management Plan (SEMP) should be developed by a suitably qualified consultant. The SEMP should include measures to monitor water quality within all three creeks pre, during and post construction. Furthermore, additional monitoring should be conducted during periods of high rainfall. • Minimise the removal of vegetation within the riparian zone to reduce sedimentation of all three creeks.

5.2 Conclusions

This desktop assessment has identified the following biodiversity matters as critical to gaining approvals for the project:

- Native vegetation removal requirements under Victoria's Guidelines for the removal, destruction or lopping of native vegetation.
- Possible impacts on threatened species and ecological communities listed under the EPBC Act.
- Protected flora permits under the FFG Act required for any removal of protected flora on public land.
- Crossing designs that minimise any impacts on local waterways.
- Approval for works on waterways required from Melbourne Water under the Victorian *Water Act 1989* for stream and river crossings and disturbance to aquatic habitats.
- Works in Conservation Area approvals required for works within BCS Conservation Areas.
- Requirements to prevent the spread of noxious weeds and pest animals under the CaLP Act, including restrictions on transport of noxious weeds.
- Potential referral triggers under the EE Act.

Due to the presence of significant native vegetation and habitat for significant species within the study area, the highest constraint to the project is demonstrating avoidance and minimisation of biodiversity impacts, then finding and securing native vegetation offsets that satisfy the requirements of the project for any impacts which cannot be avoided. Developing an ecologically sensitive design and construction method will be critical in reducing the construction footprint and the native vegetation offset requirements of this project.

Impacts to threatened species or communities protected under the EPBC Act or FFG Act may be avoided through a micro-siting process and developing a final pipeline alignment that avoids high quality habitat or the removal or disturbance of key habitat features (i.e. hollow bearing trees, roosting sites).

5.3 Next steps

The primary measure to reduce impacts on biodiversity is to avoid and minimise the removal of native vegetation in accordance with the Guidelines. With this is mind the following steps should be considered:

1. A preliminary construction method should be developed that takes into consideration the ecological values present within the study area. This method can be used in discussions with DoEE and DELWP regarding impacts to native vegetation and TPZs. It will also be important to consult with relevant stakeholders and land managers including DELWP, Melbourne Water and Country Fire Authority regarding land use, approvals, biodiversity impacts and waterways as early as possible.
2. An on-ground constraints assessment process should be undertaken with project ecologists, archaeologists, infrastructure designers and project managers to confirm alignment refinement to take into account the biodiversity constraints outlined above.
3. A detailed ecological field survey will be required outside the approved MSA areas. The detailed ecological field survey would involve high resolution vegetation mapping and vegetation quality (habitat hectare) assessments to confirm native vegetation offset requirements for the project, in accordance with the Guidelines.
4. Depending on the findings of the on-ground constraints assessment, any associated micro-siting recommendations and the detailed ecological assessments, targeted surveys for threatened flora

and fauna species will be required outside the approved MSA areas. These surveys should consider the target species' flowering/active periods.

Following detailed ecological field surveys and preparation of a detailed flora and fauna assessment report, APA will be better placed to:

- Confirm alignment options (micro-siting) to further avoid and minimise impacts on native vegetation, threatened species and ecological communities.
- Request a Native Vegetation Removal Report (NVRR) from DELWP which incorporates on ground assessed native vegetation outside the approved MSA areas and timestamped native vegetation data within the approved MSA areas.
- Accurately assess risks to threatened species and ecological communities utilising on ground targeted survey results outside the approved MSA areas. Assess risks to threatened species and ecological communities for the approved MSA areas.
- Finalise an Offset Strategy and, if applicable, Offset Management Plan for the provision of prescribed biodiversity offsets.
- Request a habitat compensation obligations statement for proposed removal of native vegetation or habitat within the approved MSA areas as determined from the DELWP Environment Mitigation Dataset.

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Acronyms

Acronyms	
API	Aerial Photo Interpretation
BCS	Biodiversity Conservation Strategy
CaLP	Catchment and Land Protection Act 1994
CAs	Conservation Areas
CVU	Central Victoria Uplands
DBH	Diameter at Breast Height
DELWP	Department of Environment, Land, Water, and Planning
DEPI	Department of Environment and Primary Industries
DIWA	Directory of Important Wetlands in Australia
DoEE	Department of Energy and Environment
EE Act	Environment Effects Act 1978
EES	Environment Effects Statement
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
EVC	Ecological Vegetation Class
FFG Act	Flora and Fauna Guarantee Act 1988
GDE	Groundwater Dependent Ecosystems
GEWVVP	Grassy Eucalypt Woodland of the Victorian Volcanic Plain
HCO	Habitat Compensation Obligations
KPs	Kilometre Points
MNES	Matters of National Environmental Significance
MSA	Melbourne Strategic Area
NTGVVP	Natural Temperate Grassland of the Victorian Volcanic Plain
NV Mapping	Natural Vegetation Mapping
NVRR	Native Vegetation Removal Report
OMR	Outer Metropolitan Ring
P&E Act	Planning and Environment Act 1987
PMST	Protected Matters Search Tool
PNV	Potential Native Vegetation
PPA	Preliminary Pipeline Alignment
PPWCMA	Port Philip and Western Port Catchment Management Authority
PSP	Precinct Structure Plan
RCS	Regional Catchment Strategies
SBV	Strategic Biodiversity Values
SEMP	Site Environmental Management Plan
SEPP	State Environmental Protection Policy

Acronyms	
SHWTLP	Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains
TPZ	Tree Protection Zone
VBA	Victorian Biodiversity Atlas
VNI	Victorian Northern Interconnect
VNIE	Victorian Northern Interconnect Expansion
VTS	Victorian Transmission System
VVP	Victorian Volcanic Plains
WBGW	White Box Grassy Woodland
WBYB	White Box-Yellow Box-Blakely's Red Gum Grassy Woodland
WICA	Works in a Conservation Area
WORM	Western Outer Ring Main

Appendices

Appendix 1 Flora

Notes to tables:

EPBC Act: CR - Critically Endangered EN - Endangered VU - Vulnerable PMST – Protected Matters Search Tool	**DEPI 2014a:** e - endangered v - vulnerable r - rare k - poorly known
FFG Act: L - listed as threatened under FFG Act P - protected under the FFG Act (public land only) I - determined ineligible for listing	**Noxious weed status:** SP - State prohibited species RP - Regionally prohibited species RC - Regionally controlled species R - Regionally restricted species # - Native species outside natural range

A1.1 Listed flora species

The following table includes the listed flora species that have potential to occur within the study area. The list of species is sourced from the Victorian Biodiversity Atlas and the Protected Matters Search Tool (DoE; accessed on 01.04.2019).

Table A1.1 Listed flora species recorded / predicted to occur within 5 km of the study area

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
National significance											
Amphibromus fluitans	River Swamp Wallaby-grass	VU		I	2008	PMST	Swampy areas, mainly along the Murray River between Wodonga and Echuca with scattered records from southern Victoria.	**Medium**	Previously recorded from the local area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	**Medium**	Previously recorded from the local area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.
Dianella amoena	Matted Flax-lily	EN	e	L	2015	PMST	Lowland grassland and grassy woodland, on well-drained to seasonally waterlogged fertile sandy loam	**Recorded**	Previously been recorded from within the study area close to Merri Creek at Beveridge.	**Medium**	Potential habitat in areas of Plains Grassland, Grassy Woodland and Plains

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							soils to heavy cracking clays.		Potential habitat in areas of Plains Grassland, Grassy Woodland and Plains Grassy Woodland and in uncultivated grassy paddocks and roadsides in the study area.		Grassy Woodland and in uncultivated grassy paddocks and roadsides in the study area.
Diuris basaltica	Small Golden Moths	EN	e	L	2009	PMST	Plains Grassland dominated by tussock-forming perennial grasses (including Kangaroo Grass); often with embedded surface basalt.	**Medium**	Previously recorded from the local area. Potential habitat in higher quality areas of Plains Grassland, particularly where Kangaroo Grass and	**Medium**	Previously recorded from the local area. Potential habitat in higher quality areas of Plains Grassland, particularly where Kangaroo Grass and

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
									embedded rock is present.		embedded rock is present.
Diuris fragrantissima	Sunshine Diuris	EN	e	L	1912		Grassland dominated by *Themeda trianda,* on plains with heavy basalt soils and embedded boulders.	**Low**	Only known naturally occurring population is in Sunshine.	**Low**	Only known naturally occurring population is in Sunshine.
Dodonaea procumbens	Trailing Hop-bush	VU	v			PMST	Sandy or clay soils in low-lying, winter-wet areas in grasslands, woodlands, and low-open forest.	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.
Glycine latrobeana	Clover Glycine	VU	v	L	1995	PMST	Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	**Medium**	Previously recorded from the broader area. Potential habitat in	**Medium**	Previously recorded from the broader area. Potential habitat in

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
									higher quality areas of Plains Grassland, Grassy Woodland and Plains Grassy Woodland, particularly where Kangaroo Grass is present.		higher quality areas of Plains Grassland, Grassy Woodland and Plains Grassy Woodland, particularly where Kangaroo Grass is present.
Lachnagrostis adamsonii	Adamson's Blown-grass	EN	v	L	1990	PMST	Low-lying, seasonally wet or swampy areas of plains communities, often in slightly saline conditions.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Lepidium hyssopifolium s.s.	Basalt Peppercress	EN	e	L	1984		Basalt plains grassland and woodland communities.	**Medium**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and Plains Grassy woodland and uncultivated grassy paddocks and roadsides in the study area.	**Medium**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and Plains Grassy woodland and uncultivated grassy paddocks and roadsides in the study area.
Leucochrysum albicans subsp. *tricolor*	White Sunray	EN	e	L		PMST	Grasslands of the Victorian Volcanic Plains, primarily on acidic clay soils derived from basalt, with occasional occurrences on adjacent sedimentary, sandy-clay soils.	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Pimelea spinescens subsp. *spinescens*	Spiny Rice-flower	CR	e	L	2014	PMST	Primarily grasslands featuring a moderate diversity of other native species and inter-tussock spaces, although also recorded in grassland dominated by introduced perennial grasses.	**High**	Previously recorded close to the study area south of Diggers Rest. Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.	**High**	Previously recorded close to the study area south of Diggers Rest. Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.
Pomaderris vacciniifolia	Round-leaf Pomaderris	CR	e	L		PMST	Endemic in Victoria. Largely confined to moist forest and scrubs in the upper catchment of the Yarra, Plenty and Yea Rivers in an area bounded by Healesville, Marysville and Whittlesea, but	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							also in the Tyers-Walhalla areas.				
Prasophyllum frenchii	Maroon Leek-orchid	EN	e	L		PMST	Grassland and grassy woodland environments on sandy or black clay loam soils that are generally damp but well drained.	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.
Pterostylis chlorogramma	Green-striped Greenhood	VU	v	L		PMST	Heathy woodland; more specific habitat requirements are poorly known.	**Low**	No previous records within 5km of the study area. No suitable habitat likely to occur.	**Low**	No previous records within 5km of the study area. No suitable habitat likely to occur.
Pterostylis cucullata	Leafy Greenhood	VU		L		PMST	Sand dune scrubs in coastal areas, and inland on slopes and river flats in moist foothill and montane forests.	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Rutidosis leptorhynchoides	Button Wrinklewort	EN	e	L	1982	PMST	Higher quality Plains Grassland and Grassy Woodland in Western Victoria, particularly those with fertile soil and light timber cover.	**Medium**	Previously recorded from the local area. Potential habitat in higher quality areas of Plains Grassland, Grassy Woodland and Plains Grassy Woodland.	**Medium**	Previously recorded from the local area. Potential habitat in higher quality areas of Plains Grassland, Grassy Woodland and Plains Grassy Woodland.
Senecio macrocarpus	Large-headed Fireweed	VU	e	L	2013	PMST	Grassland, shrubland and woodland habitats on heavy soils subject to waterlogging and/or drought conditions in summer.	**Medium**	Previously been recorded close to the study area south of Diggers Rest. Potential habitat in areas of Plains Grassland and Plains Grassy woodland and	**Medium**	Previously been recorded close to the study area south of Diggers Rest. Potential habitat in areas of Plains Grassland and Plains Grassy woodland and

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
									uncultivated grassy paddocks and roadsides in the study area.		uncultivated grassy paddocks and roadsides in the study area.
Senecio psilocarpus	Swamp Fireweed	VU	v			PMST	Seasonally inundated herb-rich swamps, growing on peaty soils or volcanic clays.	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.
Thelymitra matthewsii	Spiral Sun-orchid	VU	v	L		PMST	Typically on well-drained soils on slightly elevated sites, but also on coastal sandy flats. Often in open situations following disturbance.	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.
Xerochrysum palustre	Swamp Everlasting	VU	v	L		PMST	Sedge-swamps and shallow freshwater marshes and swamps in lowlands, on black cracking clay soils.	**Low**	No previous records within 5km of the study area.	**Low**	No previous records within 5km of the study area.
State significance											

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Allocasuarina luehmannii	Buloke		e	L	2010		Non-calcareous soils in drier areas on slopes and plains; often in woodlands associated with Grey Box.	**Medium**	Recorded close to the study area. Potential to persist as scattered trees.	**Medium**	Recorded close to the study area. Potential to persist as scattered trees.
Amphibromus pithogastrus	Plump Swamp Wallaby-grass		e	L	1992		Seasonally damp depressions in grassland or grassy wetland.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.
Atriplex billardierei	Glistening Saltbush		x	L	1980		Scattered along sandy seashores from the western to eastern extremities of Victoria.	**Low**	Associated with coastal habitats.	**Low**	Associated with coastal habitats.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Calotis anthemoides	Cut-leaf Burr-daisy			L	2005		Scattered north and west of Melbourne (e.g. Sunshine, Camperdown, Moyston, Dunkeld, Numurkah regions) on heavy soils prone to waterlogging, but now rather rare due to habitat depletion.	**Medium**	Potential habitat in areas of Plains Grassland and Plains Grassy Wetland.	**Medium**	Potential habitat in areas of Plains Grassland and Plains Grassy Wetland.
Carex tasmanica	Curly Sedge		v	L	2009		Seasonally wet areas, such as around drainage lines and freshwater swamps, on fertile, clay soils derived from basalt.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
									Drainage-line Aggregate.		Drainage-line Aggregate.
Comesperma polygaloides	Small Milkwort		v	L	1995		Grasslands on the western basalt plains; less commonly in grassy woodlands between Bendigo and the Wimmera.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland.
Cullen parvum	Small Scurf-pea		e	L	2011		Lowland grasslands, including pastures and occasionally in otherwise disturbed grassy areas.	**High**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.	**High**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Cullen tenax	Tough Scurf-pea		e	L	2015		Lowland grasslands, including pastures and occasionally in otherwise disturbed grassy areas.	**High**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.	**High**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and uncultivated grassy paddocks and roadsides in the study area.
Diuris palustris	Swamp Diuris		v	L	1979		Grasslands and open woodlands, often in swampy depressions; confined to the west of the State.	**Medium**	Previously recorded close to Jacksons Creek. Potential habitat in higher quality areas of Plains Grassland, Plains Grassy Woodland and Plains	**Medium**	Previously recorded close to Jacksons Creek. Potential habitat in higher quality areas of Plains Grassland, Plains Grassy Woodland and Plains

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
									Grassy Wetland.		Grassy Wetland.
Diuris punctata	Purple Diuris		v	L	1982		Fertile, loamy soils and periodically wet areas in lowland grasslands, grassy woodlands, heathy woodlands and open heathlands.	**Medium**	Previously recorded close to Jacksons Creek. Potential habitat in higher quality areas of Plains Grassland, Plains Grassy Woodland and Plains Grassy Wetland.	**Medium**	
Geranium sp. *1*	Large-flower Crane's-bill		e	L	2012		Apparently endemic in Victoria. Known only from basaltic grassland (now generally weedy) in the Glenroy-Broadmeadows area, Riddells Creek and Malmsbury. It was presumed to be extinct, until	**Medium**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland within the VVP and uncultivated grassy	**Medium**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland within the VVP and uncultivated grassy

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							rediscovered in 2000. Formally known from the far north-east near Wodonga.		paddocks and roadsides in the study area.		paddocks and roadsides in the study area.
Goodenia macbarronii	Narrow Goodenia		v	L	2009		Sandy to clay/silt soils in areas that are moist or wet year round, such as spring-soaks and alluvial fans of drainage lines, and including disturbed areas.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate.
Leiocarpa leptolepis	Pale Plover-daisy		e	L	1912		Grasslands and grassy woodlands, often in disturbed areas. In Victoria, confined to one	**Low**	No recent records close to study area.	**Low**	No recent records close to study area.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							known population approximately 4km east of Mildura.				
Lindsaea trichomanoides	Oval Wedge-fern		e	L	2000		Reported from a couple of isolated sites at Wilsons Promontory, but only one of them, near the headwaters of Chinaman Creek, has been confirmed recently.	**Low**	Species highly restricted in distribution to areas near Wilson's Promontory. A single record from Epping is likely erroneous.	**Low**	Species highly restricted in distribution to areas near Wilson's Promontory. A single record from Epping is likely erroneous.
Eucalyptus leucoxylon subsp. *connata*	Melbourne Yellow-gum		v	I	2016		Well-drained slopes in a restricted area around Melbourne and Geelong.	**Medium**	Potential to occur in wooded areas or on well-drained slopes.	**Medium**	Potential to occur in wooded areas or on well-drained slopes.
Chloris ventricosa	Plump Windmill Grass		v		2011		Woodlands. Mainly found on clay soils, sometimes in winter-wet depressions. Few records from Victoria.	**Medium**	Potential to occur in wooded areas.	**Medium**	Potential to occur in wooded areas.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							Previously recorded close to Jacksons Creek in Keilor.				
Coronidium gunnianum	Pale Swamp Everlasting		v		2010		Widespread throughout the state except for the north-west and the alpine and adjacent mountainous areas, and usually at low elevations (under c. 100 m) where mostly in grasslands and riverine woodland on soils that are prone to inundation.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland, Plains Grassy Woodland and Plains Grassy Wetland.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland, Plains Grassy Woodland and Plains Grassy Wetland.
Corymbia maculata	Spotted Gum		v		2014		In Victoria, naturally confined to a small population near Mt Tara in the east of the state.	**Negligible**	Planted within the local area	**Negligible**	Planted within the local area

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Dianella longifolia var. *grandis*	Flax-lily		v		2014		Occurs in lowland plains grassland and grassy woodlands (e.g. Volcanic Plain and Riverina) as well as around rocky outcrops at higher altitudes than the var. longifolia (e.g. between Swifts Creek and Omeo, Benambra-Corryong district, Don River near Launching Place). Overall, rather rare in the State.	**High**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and Plains Grassy Woodland and uncultivated grassy paddocks and roadsides in the study area.	**High**	Previously recorded close to the study area. Potential habitat in areas of Plains Grassland and Plains Grassy Woodland and uncultivated grassy paddocks and roadsides in the study area.
Eleocharis plana	Flat Spike-sedge		v		2011		Shallow freshwater pools and the margins of lakes and rivers.	**Medium**	Previously recorded from the broader area. Potential habitat along creeks, drainage lines and wetlands.	**Medium**	Previously recorded from the broader area. Potential habitat along creeks, drainage lines and wetlands.
Eucalyptus X *studleyensis*	Studley Park Gum		e		2006		A morphologically variable hybrid	**Medium**	Potential to occur along	**Medium**	Potential to occur along

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							between Eucalyptus Camaldulensis subsp. camaldulensis and E. ovata subsp. ovata from the lower Yarra River north-east of Melbourne (Kew, Viewbank, Watsonia).		creeks and low lying areas.		creeks and low lying areas.
Geranium solanderi var. *solanderi* s.s.	Austral Crane's-bill		v		2013		Grasslands or grassy woodlands where hydrology is not a limiting factor.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland and Plains Grassy Woodland.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland and Plains Grassy Woodland.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Microseris scapigera s.s.	Plains Yam-daisy		v		2010		Damp depressions in grasslands, woodlands, stream banks, alpine herbfields and around the margins of saline lakes and flats.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate and in low lying areas within Plains Grassland.	**Medium**	Previously recorded from the broader area. Potential habitat along drainage lines and wetlands and areas of Plains Grassy Wetland and Grey Clay Drainage-line Aggregate and in low lying areas within Plains Grassland.
Podolepis linearifolia	Basalt Podolepis		e		2015		Grasslands and grassy woodlands.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland and Plains Grassy Woodland.	**Medium**	Previously recorded from the broader area. Potential habitat in higher quality areas of Plains Grassland and Plains Grassy Woodland.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence in areas outside the MSA approvals	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Prasophyllum pyriforme s.s.	Silurian Leek-orchid		e		1983		Dry foothill forest with shrubby understorey.	**Low**	Study area unlikely to contain habitat.	**Low**	Study area unlikely to contain habitat.
Pterostylis pedoglossa	Prawn Greenhood		v		1883		Heath and heathy woodland near the coast.	**Low**	Study area unlikely to contain habitat.	**Low**	Study area unlikely to contain habitat.

Appendix 2 Fauna

Notes to tables:

EPBC Act:	**DSE 2009, DSE 2013:**
EX - Extinct CR - Critically Endangered EN - Endangered VU - Vulnerable CD - Conservation dependent	ex - extinct cr - critically endangered en - endangered vu - vulnerable nt - near threatened dd - data deficient rx - regionally extinct
FFG Act:	**Introduced species**
L - listed as threatened under FFG Act N - nominated for listing as threatened I - determined ineligible for listing	PS - pest species listed under the CaLP Act * - introduced species
Most recent database records are from the Victorian Biodiversity Atlas unless otherwise specified as follows PMST – Protected Matters Search Tool BA – Birds Australia	

A2.1 Listed fauna species

The following table includes a list of the listed fauna species that have potential to occur within the study area. The list of species is sourced from the Victorian Biodiversity Atlas and the Protected Matters Search Tool (DoE; accessed on 01.04.2019).

Table A2.1 Listed fauna species recorded, or predicted to occur, within 5 km of the study area

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
National significance											
Pedionomus torquatus	Plains-wanderer	CR	e	L	1991	PMST	Native grassland with a sparse, open structure.	**Low**	Rarely recorded in southern Victoria, considered unlikely to make regular use of the study area	**Low**	Rarely recorded in southern Victoria, considered unlikely to make regular use of the study area
Rostratula australis	Australian Painted-snipe	EN	e	L	1977	PMST	Shallows of well-vegetated freshwater wetlands.	**Low**	Lack of suitable wetland habitat and no recent local records.	**Low**	Lack of suitable wetland habitat and no recent local records.
Botaurus poiciloptilus	Australasian Bittern	EN	e	L	1989	PMST	Shallow freshwater and brackish wetlands with abundant emergent aquatic vegetation.	**Low**	Lack of suitable wetland habitat and no recent local records.	**Low**	Lack of suitable wetland habitat and no recent local records.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Polytelis swainsonii	Superb Parrot	VU	e	L	1950		Red-gum and box-dominated forests and woodlands.	**Negligible**	Species does not occur in southern Victoria	**Negligible**	Species does not occur in southern Victoria
Neophema chrysogaster	Orange-bellied Parrot	CR	e	L	1977		Coastal vegetation including saltmarshes, dunes, pastures, shrublands, sewage plants, saltworks, islands, and beaches.	**Negligible**	No suitable habitat	**Negligible**	No suitable habitat
Lathamus discolor	Swift Parrot	CR	e	L	2009	PMST	A range of forests and woodlands, especially those supporting nectar-producing tree species. Also well-treed urban areas.	**Medium**	Likely to make occasional use of scattered indigenous and planted eucalypts within or adjacent to the proposed study area	**Medium**	Likely to make occasional use of scattered indigenous and planted eucalypts within or adjacent to the proposed study area
Numenius madagascariensis	Eastern Curlew	CR	v			PMST	Large intertidal sandflats,	**Negligible**	No suitable habitat	**Negligible**	No suitable habitat

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.				
Calidris ferruginea	Curlew Sandpiper	CR	e		1990		Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	**Negligible**	No suitable habitat	**Negligible**	No suitable habitat
Grantiella picta	Painted Honeyeater	VU	v	L		PMST	Dry open woodlands and forests. Typically forages for fruit and nectar in mistletoes	**Negligible**	Species only present within North East Victoria.	**Negligible**	Species only present within North East Victoria.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							and in tree canopies.				
Hirundapus caudacutus	White-throated Needletail	VU, Mi	v		2014		An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas.	**High**	Previously recorded from study area. Likely to use the aerial space over the study area.	**High**	Likely to use the aerial space over the study area.
Anthochaera phrygia	Regent Honeyeater	CR	e	L	1991	PMST	A range of dry woodlands and forests dominated by nectar-producing tree species.	**Negligible**	Species only present within North East Victoria.	**Negligible**	Species only present within North East Victoria.
Thinornir rubricollis ribricollis	Hooded Plover	VU	v	L		PMST	A migratory species that breeds in southern Australia, it occupies dry open woodlands and forests located on the inland foothills	**Negligible**	No suitable habitat present.	**Negligible**	No suitable habitat present.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							of the Great Dividing Range. Typically forages for fruit and nectar in mistletoes and in tree canopies				
Dasyurus maculatus maculatus	Spot-tailed Quoll	EN	e	L	1910	PMST	Rainforest and wet and dry sclerophyll forests and woodlands.	**Negligible**	No suitable habitat and not present within outer metropolitan Melbourne	**Negligible**	No suitable habitat and not present within outer metropolitan Melbourne
Dasyurus viverrinus	Eastern Quoll	EN	rx	L	1930		The species is now restricted to Tasmania and is considered to be extinct from mainland Australia.	**Negligible**	Considered extinct from mainland Australia	**Negligible**	Considered extinct from mainland Australia
Perameles gunnii	Eastern Barred Bandicoot	VU	ew	L	2002	PMST	Natural temperate grasslands and grassy woodlands.	**Negligible**	No naturally occurring populations in the Melbourne region.	**Negligible**	No naturally occurring populations in the Melbourne region.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Petauroides volans	Southern Greater Glider	VU	v	L		PMST	Wet and damp sclerophyll forest with large hollow-bearing trees.	**Negligible**	No suitable habitat	**Negligible**	No suitable habitat
Pseudomys fumeus	Smoky Mouse	EN	e	L		PMST	Coastal heath and heathy woodland, wet forest, sub-alpine heath and dry sclerophyll forest.	**Negligible**	No suitable habitat	**Negligible**	No suitable habitat
Pteropus poliocephalus	Grey-headed Flying-fox	VU	v	L		PMST	Rainforest, wet and dry sclerophyll forest, woodland and urban areas.	**High**	Species likely to utilise flowering indigenous and planted trees within and adjacent to the study area for foraging.	**High**	Species likely to utilise flowering indigenous and planted trees within and adjacent to the study area for foraging.
Aprasia parapulchella	Pink-tailed Worm-Lizard	VU	e	L		PMST	Woodland and grassland with partially buried rocks.	**Low**	No known populations around Melbourne	**Low**	No known populations around Melbourne
Delma impar	Striped Legless Lizard	VU	e	L	2012	PMST	Natural temperate grassland, grassy	**High**	Known to occur in the local area; potentially present in	**High**	Known to occur in the local area; potentially

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							woodland and exotic grassland.		habitat dominated by native or introduced tussock grasses throughout the study area		present in habitat dominated by native or introduced tussock grasses throughout the study area
Tympanocryptis pinguicolla	Grassland Earless Dragon	EN	e	L	1990	PMST	Natural temperate grassland.	**Negligible**	There are historical records for this species in the study area however the species is now considered extinct from northern Melbourne and likely from Victoria (Melville *et al* 2019).	**Negligible**	Species considered extinct from northern Melbourne and likely from Victoria
Litoria raniformis	Growling Grass Frog	VU	e	L	2017	PMST	Still or slow-flowing waterbodies and surrounding terrestrial vegetation.	**High**	Species has been recorded in all creeks bisected by the study area, and has potential to occur in all wetlands and farm dams	**High**	Species has been recorded in all creeks bisected by the study area, and has potential to occur in all

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
									within or adjacent to the study area		wetlands and farm dams within or adjacent to the study area
Prototroctes maraena	Australian Grayling	VU	v	L		PMST	Adults inhabit cool, clear, freshwater streams.	**Medium**	Species is present throughout the Maribyrnong and Yarra River, however Deep Creek is the only waterway within the study area that contains suitable habitat.	**Medium**	Species is present throughout the Maribyrnong and Yarra River, however Deep Creek is the only waterway within the study area that contains suitable habitat.
Galaxiella pusilla	Dwarf Galaxis	VU	e	L		PMST	Slow-flowing or still freshwater wetlands such as swamps, drains and backwaters of streams.	**Low**	Species range does not extend throughout the study area.	**Low**	Species range does not extend throughout the study area.
Maccullochella peelii	Murray Cod	VU	v	L		PMST; Aquatic database search	A diverse range of stream habitats in the	**Low**	Although there is a population in the Yarra River it is	**Negligible**	Historic records in the Maribynong catchment

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							Murray-Darling basin; principally the main channels of rivers and their major tributaries.		unlikely that this species occurs in the upper reaches of the Merri Creek due to a lack of suitable habitat.		represent faild translocations and this species is now considered unlikely to persist within Deep Creek and Jacksons Creek.
Synemon plana	Golden Sun Moth	CR	e	L	2017	PMST	Natural temperate grassland, grassy woodland and pasture supporting spear grasses and wallaby grasses and exotic grassland dominated by Chilean needle grass.	**High**	Species recorded within the proposed study area at Mickleham and Donnybrook. High likelihood of occurring elsewhere in the study area in areas of suitable grassland habitat	**High**	Suitable habitat occurs within the referral study area. Populations recorded in adjacent areas, particular around KP XXX
State significance											
Burhinus grallarius	Bush Stone-curlew		e	L	1950		Open woodland, treed farmland.	**Negligible**	Not known to occur around Melbourne, generally confined to	**Negligible**	Not known to occur around Melbourne, generally confined to

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
									northern and western Victoria		northern and western Victoria
Egretta garzetta	Little Egret		e	L	1980		Swamps, billabongs, floodplain pools, mudflats, mangroves and channels; breeds in trees standing in water.	**Medium**	Potential wetland habitat located within and immediately adjacent to the study area	**Medium**	Potential wetland habitat located within and immediately adjacent to the study area
Stictonetta naevosa	Freckled Duck		e	L	2009		Large freshwater wetlands, generally with dense vegetation.	**Medium**	Potential wetland habitat located within and immediately adjacent to the study area	**Medium**	Potential wetland habitat located within and immediately adjacent to the study area
Oxyura australis	Blue-billed Duck		e	L	2015		Open or densely vegetated wetlands.	**Medium**	Suitable wetland habitat located within and immediately adjacent to the study area	**Medium**	Suitable wetland habitat located within and immediately adjacent to the study area

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Ninox connivens	Barking Owl		e	L	1991		Open woodland forest habitats often where forests adjoin open land. Barking Owl is now considered rare in many areas of Victoria. North East Victoria is the remaining stronghold area for this species.	**Low**	Not commonly recorded around Melbourne, unlikely to make regular use of habitat in the study area	**Low**	Not commonly recorded around Melbourne, unlikely to make regular use of habitat in the study area
Pomatostomus temporalis	Grey-crowned Babbler		e	L	1950		Open forests and woodlands.	**Negligible**	No suitable habitat, considered locally extinct	**Negligible**	No suitable habitat, considered locally extinct
Pseudophryne bibronii	Brown Toadlet		e	L	2010		A wide variety of woodland, forest and grassland habitats.	**Medium**	Previously recorded within close proximity of the study area	**Medium**	Previously recorded within close proximity of the study area
Ardea intermedia plumifera	Plumed Egret		e	L	1980		Densely-vegetated freshwater wetlands including lakes, swamps	**Medium**	More commonly recorded in northern Victoria, however may utilise wetland	**Medium**	More commonly recorded in northern Victoria, however may

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							and billabongs. Breeds in trees standing in water.		habitat in the study area		utilise wetland habitat in the study area
Geopelia cuneata	Diamond Dove		nt	L	1999		Drier woodlands and scrub, spinifex and mulga.	**Low**	Not commonly recorded around Melbourne, unlikely to make regular use of habitat in the study area	**Low**	Not commonly recorded around Melbourne, unlikely to make regular use of habitat in the study area
Hydroprogne caspia	Caspian Tern		nt	L	1981		Estuaries, inlets, bays, lagoons, inland lakes, flooded pasture, sewage ponds.	**Negligible**	No suitable habitat	**Negligible**	No suitable habitat
Melanodryas cucullata	Hooded Robin		nt	L	2002		Woodlands of eucalypt, mallee, semi-cleared farmland.	**Low**	Limited suitable habitat; not commonly recorded in local area		
Stagonopleura guttata	Diamond Firetail		nt	L	1991		Open forests and woodlands	**Low**	Limited suitable habitat; not commonly		

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							with a grassy ground layer.		recorded in local area		
Turnix pyrrhothorax	Red-chested Button-quail		v	L	2010		Grassland, grassy woodland and crops.	**Medium**	Previously recorded within study area near Donnybrook. Potentially utilises grassland habitat throughout the study area.	**Medium**	Previously recorded near Donnybrook. Potentially utilises grassland habitat throughout the study area.
Lewinia pectoralis	Lewin's Rail		v	L	1991		Swamps, dense riparian vegetation and saltmarsh.	**Medium**	Potentially suitable wetland habitat within creek corridors bisected by the study area	**Medium**	Potentially suitable wetland habitat within creek corridors bisected by the study area
Porzana pusilla	Baillon's Crake		v	L	2006		Well-vegetated permanent and temporary fresh and brackish wetlands.	**Medium**	Potentially suitable wetland habitat within creek corridors bisected by the study area	**Medium**	Potentially suitable wetland habitat within creek corridors bisected by the study area
Grus rubicunda	Brolga		v	L	2002		Shallow freshwater and brackish	**Low**	Unlikely to be present in wetlands within		

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							wetlands, crops, grassland and pasture.		or adjacent to the study area		
Accipiter novaehollandiae	Grey Goshawk		v	L	1991		Rainforest, gallery forest, tall wet forest and woodland. Also partially cleared agricultural land.	**Low**	Limited suitable habitat; not commonly recorded in local area		
Falco subniger	Black Falcon		v	L	2007		Woodlands, open country and around terrestrial wetlands areas, including rivers and creeks. Mostly hunts over open plains and undulating land with large tracts of low vegetation.	**High**	Suitable habitat present, likely to use the study area as part of broader area of foraging habitat.	**High**	Suitable habitat present, likely to use the study area as part of broader area of foraging habitat.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Chthonicola sagittatus	Speckled Warbler		v	L	1990		Eucalypt woodland with rocky gullies, ridges, tussock grasses and a sparse shrub understorey.	**Low**	Limited suitable habitat; not commonly recorded in local area		
Phascogale tapoatafa	Brush-tailed Phascogale		v	L	2017		Drier sclerophyll forests and woodlands.	**Low**	No suitable habitat		
Miniopterus schreibersii oceanensis	Common Bent-wing Bat (eastern ssp.)		v	L	2013		A variety of treed and treeless habitats. Roosts in caves and man-made structures.	**Medium**	Likely to utilise habitat within the study area for foraging. Unlikely that any breeding sites occur within or immediately adjacent to the study area.	**Medium**	Likely to utilise habitat within the study area for foraging. Unlikely that any breeding sites occur within or immediately adjacent to the study area.
Ardea alba modesta	Great Egret		v	L	2014		Prefer shallow water, particularly when flowing, but may be seen on any watered area,	**High**	Known to occur within the local area and likely to utilise a range of wetlands within or immediately	**High**	Known to occur within the local area and likely to utilise a range of wetlands within or

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							including damp grasslands.		adjacent to the study area		immediately adjacent to the study area
Spatula rhynchotis	Australasian Shoveler		v		2005		Prefers large, permanent lakes and swamps with deep water, stable conditions and abundant aquatic vegetation..	**Medium**	Suitable wetland habitat located within or adjacent to the proposed alignment which species may use on occasion.	**Medium**	Suitable wetland habitat located within or adjacent to the proposed alignment which species may use on occasion.
Aythya australis	Hardhead		v		2015		A mainly aquatic species preferring large, deep freshwater environments with abundant aquatic vegetation, including slow moving areas	**Medium**	Suitable wetland habitat located within or adjacent to the proposed alignment which species may use on occasion.	**Medium**	Suitable wetland habitat located within or adjacent to the proposed alignment which species may use on occasion.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							of rivers. Also occurs in brackish wetlands and may be found in deep dams and water storage ponds.				
Biziura lobata	Musk Duck		v		1996		A largely aquatic species preferring deep water on large, permanent swamps, lakes and estuaries with abundant aquatic vegetation. Often occurs in areas of dense vegetated cover within a wetland.	**Medium**	Suitable wetland habitat located within or adjacent to the proposed alignment which species may use on occasion.	**Medium**	Suitable wetland habitat located within or adjacent to the proposed alignment which species may use on occasion.

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Actitis hypoleucos	Common Sandpiper		v		1981	PMST	Migrates to Australia from Eurasia in August where it inhabits a wide variety of coastal and inland wetlands with muddy margins before departing north in March.	**Low**	Limited suitable wetland habitat present within or immediately adjacent to alignment and over 20 years since last recorded locally.		
Tringa nebularia	Common Greenshank		v		1994	PMST	A variety of ephemeral and permanent inland wetlands and sheltered coastal wetlands.	**Low**	Limited suitable wetland habitat present within or immediately adjacent to alignment and over 20 years since last recorded locally.		
Tringa stagnatilis	Marsh Sandpiper		v		1994		Permanent or ephemeral wetlands, mudflats and saltmarshes in coastal and	**Low**	Limited suitable wetland habitat present within or immediately adjacent to alignment and		

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
							inland environments.		over 20 years since last recorded locally.		
Sminthopsis murina murina	Common Dunnart		v		1988		Found in heathland areas, open forests and woodlands that have structurally complex microhabitats. Common Dunnart prefer dry sclerophyll forest and mallee heath with high rock and crevice density.	**Low**	Limited suitable grassland habitat present.	Low	Limited suitable grassland habitat present.
Pogona barbata	Bearded Dragon		v		1988		Woodlands, forests and heathlands with abundant cover of course woody debris.	**Low**	Limited suitable habitat and over 30 years since last recorded locally.		

Scientific name	Common name	Conservation status			Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking	Likely occurrence outside approved MSA areas	Rationale for likelihood ranking
		EPBC	VIC	FFG							
Pseudemoia pagenstecheri	Tussock Skink		v		2016		On the ground in a range of grasslands or sparse grassy woodlands from alps to coast.	**High**	Known to occur in the local area; potentially present in habitat dominated by native or introduced tussock grasses throughout the study area.	**High**	Known to occur in the local area; potentially present in habitat dominated by native or introduced tussock grasses throughout the study area.
Pseudophryne semimarmorata	Southern Toadlet		v		1962		A variety of habitats such as open forests, lowland woodlands and heathlands where adults shelter beneath leaf litter and other debris in moist soaks and depressions.	**Low**	Potentially suitable habitat present, however it has been over 50 years since last recorded locally.		

A2.2 Migratory species (EPBC Act listed)

Table A2.2 Migratory fauna species recorded or predicted to occur within 5 km of the study area

Scientific name	Common name	Most recent record
Migratory species		
Gallinago hardwickii	Latham's Snipe	2006
Pandion cristatus	Osprey	PMST
Hirundapus caudacutus	White-throated Needletail	2014
Apus pacificus	Fork-tailed Swift	2007
Motacilla flava	Western Yellow Wagtail	PMST
Chlidonias leucopterus	White-winged Black Tern	2014
Hydroprogne caspia	Caspian Tern	1981
Thalasseus bergii	Crested Tern	1978
Charadrius bicinctus	Double-banded Plover	1990
Numenius madagascariensis	Eastern Curlew	PMST
Actitis hypoleucos	Common Sandpiper	1981
Tringa nebularia	Common Greenshank	1994
Tringa stagnatilis	Marsh Sandpiper	1994
Calidris ferruginea	Curlew Sandpiper	1990
Calidris ruficollis	Red-necked Stint	1990
Calidris acuminata	Sharp-tailed Sandpiper	1997
Calidris melanotos	Pectoral Sandpiper	1990
Rhipidura rufifrons	Rufous Fantail	2014
Myiagra cyanoleuca	Satin Flycatcher	1989
Monarcha melanopsis	Black-faced Monarch	PMST

Appendix 3 Significant Ecological Communities

Notes to tables:

EPBC Act:
CR - Critically Endangered
EN - Endangered
VU - Vulnerable

PMST – Protected Matters Search Tool

FFG Act:
L - listed as threatened under FFG Act

A1.1 Significant Ecological Communities

The following table includes the significant ecological communities that have been recorded from or have potential to occur within the study area. The list of communities is sourced from the DELWP Modelled FFG Act Community (NV2005_FFG_COMM) dataset, the Protected Matters Search Tool (DoE; accessed on 01.04.2019), a review of other relevant DELWP databases and a review of previous reports.

Table A1.1 Listed of significant ecological communities recorded / predicted to occur within 5 km of the study area

Scientific name	EPBC	FFG	Type of Presence	Vegetation associations	Likelihood of occurrence	Rationale for likelihood ranking
National significance						
Grassy Eucalypt Woodland of the Victorian Volcanic Plain	CR		PMST - Known to occur within area Prior reports – known to occur within the search area	The Grassy Eucalypt Woodland of the Victorian Volcanic Plain correlates with the following EVCs or Floristic Communities identified from the Victorian Volcanic Plain bioregion (although the description and condition thresholds of the listed community must be met) (Threatened Species Scientific Committee 2009): • EVC 55_61 Plains Grassy Woodland • EVC 55-04 Western Basalt Plains Grassy Woodland • EVC 55_63 Higher Rainfall Plains Grassy Woodland • EVC 651 Plains Swampy Woodland • EVC 649 Stony Knoll Shrubland. • EVC 897 Plains Grassland/Plains Grassy Woodland Mosaic. • FFG Act listed *Floristic Community 55-04 Western Basalt Plains (River Red Gum) Grassy Woodland*	**High**	Previously recorded from the broader area. Potential to correlate with higher quality Plains Grassy Woodland and Floristic Community 55-04 Western Basalt Plains (River Red Gum) Grassy Woodland.

Scientific name	EPBC	FFG	Type of Presence	Vegetation associations	Likelihood of occurrence	Rationale for likelihood ranking
Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia	EN		PMST - May occur within area	Grey Box (*Eucalyptus microcarpa*) Grassy Woodlands and Derived Native Grasslands of South-eastern Australia most likely correlates with the following EVCs or Floristic Communities identified from the Victorian Volcanic Plain bioregion and/or Central Victorian Uplands Bioregion (although the description and condition thresholds of the listed community must be met) (Threatened Species Scientific Committee 2010): • EVC 235 Plains Woodland/Herb-rich Gilgai Wetland Mosaic (CVU bioregion) • EVC 803 Plains Woodland (CVU or VVP bioregion).	**Low**	No correlating EVCs or Floristic communities have been recorded or modelled within 5 km of the study area.
Natural Temperate Grassland of the Victorian Volcanic Plain	CR		PMST - Likely to occur within area Prior reports – known to occur within the search area	The Natural Temperate Grassland of the Victorian Volcanic Plain community correlates with the following EVCs or Floristic Communities identified from the Victorian Volcanic Plain and adjacent bioregions (although the description and condition thresholds of the listed community must be met) (Threatened Species Scientific Committee 2008): • EVC 132 Plains Grassland; • EVC 654 Creekline Tussock Grassland • FFG Act listed *Western (Basalt) Plains Grasslands Community*.	**High**	Previously recorded from the broader area. Potential to correlate with Plains Grassland and the Western (Basalt) Plains Grasslands Community.

Scientific name	EPBC	FFG	Type of Presence	Vegetation associations	Likelihood of occurrence	Rationale for likelihood ranking
Seasonal Herbaceous Wetlands (Freshwater) of the Temperate Lowland Plains	CR		PMST - Likely to occur within area Prior reports – known to occur within the search area	Wetland Ecological Vegetation Classes (EVCs) most likely to correspond to the Seasonal Herbaceous Wetland ecological community are listed below (this is an indicative list and the description and condition thresholds of the listed community must still be met) (Threatened Species Scientific Committee 2012): • EVC 125 Plains Grassy Wetland + complexes (Complexes may include EVCs 755, 767, 959, 960). • EVC 306 Aquatic Grassy Wetland • EVC 647 Plains Sedgy Wetland • EVC 678 Ephemeral Drainage-line Grassy Wetland • EVC 778 Gilgai Wetland • EVC 920 Sweet Grass Wetland • EVC 956 Herb-rich Gilgai Wetland	**High**	Previously recorded from the broader area. Potential to occur in areas of Plains Grassy Wetland, Grey Clay Drainage-line Aggregate and in gilgai systems along poorly defined drainage lines within natural temperate grassland.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	CR		PMST - Likely to occur within area	The ecological community broadly equates to the following Ecological Vegetation Classes (EVC) in the Central Victorian Uplands Bioregion (although the description and condition thresholds of the listed community must be met) (Department of Environment, Climate Change and Water NSW 2010): • EVC 47 Valley Grassy Forest • EVC 175_62 Granitic Grassy Woodland • EVC 175_61 Grassy Woodland. It may also equate to Plains Grassy Woodland (EVC 55) (Threatened Species Scientific Committee 2006).	**Medium**	Potential to correlate with areas of Grassy Woodland / Plains Grassy Woodland.

Scientific name	EPBC	FFG	Type of Presence	Vegetation associations	Likelihood of occurrence	Rationale for likelihood ranking
State significance						
Western (Basalt) Plains Grasslands Community		L		The Western (Basalt) Plains Grasslands Community is an open grassland community found mainly on undisturbed, poorly-drained heavy clay soils on the basalt plains of western Victoria. The vegetation is characteristically dominated by perennial native grasses, with very few eucalypts and shrubs (DSE 2003).	**High**	Previously recorded from the broader area. Correlates with Plains Grassland within the VVP and has potential to correlate with uncultivated grassy areas within paddocks and roadsides in the study area.
Floristic Community 55-04 Western Basalt Plains (River Red Gum) Grassy Woodland		L		Floristic Community 55-04 Western Basalt Plains (River Red Gum) Grassy Woodland is an endemic Victorian community restricted to an area approximately bounded by Whittlesea, Craigieburn and Epping. It forms part of the Plains Grassy Woodland Ecological Vegetation Class (EVC 55), but is distinguished ecologically by its occurrence on fertile clay soils derived from Quaternary basalts. It is floristically characterised by an overstorey of River Red-gum *Eucalyptus camaldulensis* with various wattles (eg. *Acacia implexa, A. pycnantha*). The ground layer is dominated by grasses (SAC 2004)	**High**	Previously recorded from the broader area. Correlates with Plains Grassy Woodland within the VVP and has potential to correlate with areas on the basalt plain where River Red-gum is present within the study area.

Appendix 4 Noxious weeds

Notes to tables:

Noxious weed status:

SP	- State prohibited species
RP	- Regionally prohibited species
RC	- Regionally controlled species
R	- Regionally restricted species
#	- Native species outside natural range

A4.1 CaLP Act listed noxious weeds

The following table includes the CaLP Act listed flora species that have been recorded from within 5 km of the study area and have potential to occur within the study area. The list of species is sourced from the Victorian Biodiversity Atlas.

Table A1.1 CaLP listed noxious weeds recorded within 5 km of the study area

Scientific name	Common name	Recorded in study area?
Regionally controlled		
Ailanthus altissima	Tree of Heaven	
Carduus tenuiflorus	Winged Slender-thistle	
Carthamus lanatus	Saffron Thistle	Recorded
Chrysanthemoides monilifera	Boneseed	
Cirsium arvense	Perennial Thistle	
Cirsium vulgare	Spear Thistle	Recorded
Conium maculatum	Hemlock	
Convolvulus arvensis	Common Bindweed	
Crataegus monogyna	Hawthorn	Recorded
Cynara cardunculus subsp. *flavescens*	Artichoke Thistle	
Cytisus scoparius	English Broom	
Datura stramonium	Common Thorn-apple	
Diplotaxis tenuifolia	Sand Rocket	
Dipsacus fullonum	Wild Teasel	
Dittrichia graveolens	Stinkwort	
Echium plantagineum	Paterson's Curse	
Echium vulgare	Viper's Bugloss	
Eragrostis curvula	African Love-grass	
Genista linifolia	Flax-leaf Broom	
Genista monspessulana	Montpellier Broom	
Hypericum perforatum subsp. *veronense*	St John's Wort	
Juncus acutus subsp. *acutus*	Spiny Rush	Recorded
Lepidium draba	Hoary Cress	
Lycium ferocissimum	African Box-thorn	
Marrubium vulgare	Horehound	
Moraea miniata	Two-leaf Cape-tulip	
Nassella trichotoma	Serrated Tussock	Recorded
Opuntia monacantha	Drooping Prickly-pear	
Opuntia stricta	Common Prickly-pear	
Physalis hederifolia	Sticky Ground-cherry	
Rosa rubiginosa	Sweet Briar	Recorded
Rubus fruticosus spp. agg.	Blackberry	
Scolymus hispanicus	Golden Thistle	
Senecio jacobaea	Ragwort	Recorded
Silybum marianum	Variegated Thistle	Recorded
Solanum linnaeanum	Apple of Sodom	

Ulex europaeus	Gorse	Recorded
Watsonia meriana var. *bulbillifera*	Bulbil Watsonia	
Xanthium spinosum	Bathurst Burr	
Restricted		
Allium triquetrum	Angled Onion	
Allium vineale	Crow Garlic	
Asparagus asparagoides	Bridal Creeper	Recorded
Foeniculum vulgare	Fennel	
Nassella neesiana	Chilean Needle-grass	
Opuntia puberula	Blind Prickly-pear	
Opuntia spp.	Prickly pear	Recorded
Oxalis pes-caprae	Soursob	
Reseda luteola	Weld	
Salix alba	White Willow	
Salix cinerea	Grey Sallow	
Salix fragilis	Crack Willow	
Salix spp.	Willow	
Salix X *rubens*	Basket Willow	
Salix X *sepulcralis* var. *sepulcralis*	Weeping Willow	
Verbascum thapsus subsp. *thapsus*	Great Mullein	
Regionally Prohibited		
Chondrilla juncea	Skeleton Weed	
Emex australis	Spiny Emex	
Onopordum acanthium subsp. *acanthium*	Scotch Thistle	
Opuntia robusta	Wheel Cactus	
Solanum elaeagnifolium	Silver-leaf Nightshade	
State prohibited		
Alternanthera philoxeroides	Alligator Weed	
Eichhornia crassipes	Water Hyacinth	
Nassella charruana	Lobed Needle-grass	Recorded