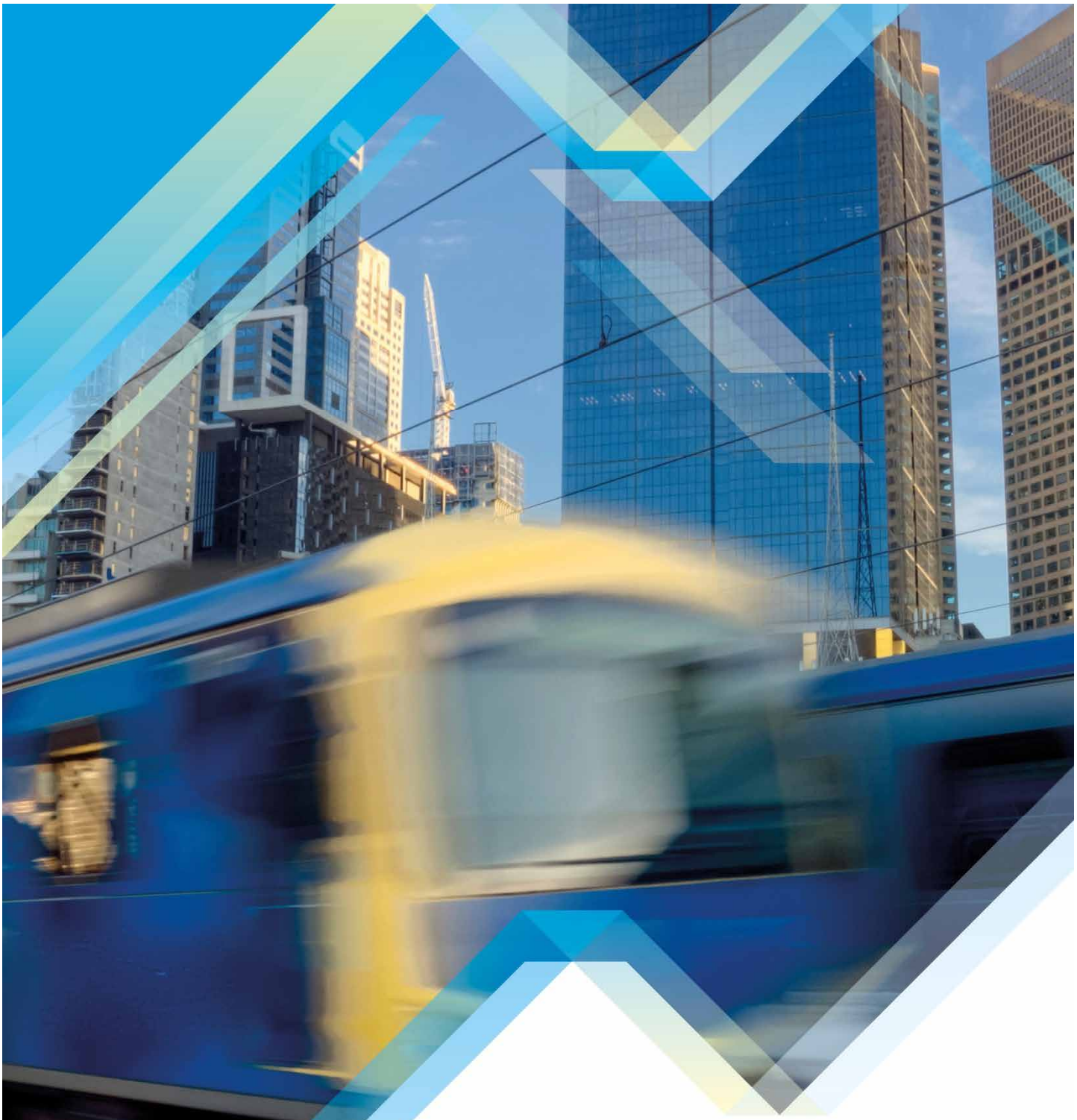

Melbourne Metro Rail Project

MMR-AJM-PWAA-RP-NN-000831

Terrestrial Ecology Impact Assessment

Melbourne Metro Rail Authority

20 April 2016

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Glossary and Abbreviations

Abbreviation	Term	Definition
-	Amenity tree	Tree established to improve the local environment, in terms of landscape, shade and other intrinsic values (may be indigenous or exotic).
DELWP	Department of Environment, Land, Water and Planning	State department responsible for administration of the *Flora and Fauna Guarantee Act 1988* and the bilateral agreement EPBC Act issues. DELWP is also the agency responsible for complex offsets.
DoE	Department of Environment (Commonwealth)	Commonwealth Department of the Environment responsible for administration of the EPBC Act.
DBH	Diameter at breast height	The width of a tree trunk measured at standard height (1.3 m).
EPBC	*Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth)	Commonwealth environmental legislation
EVC	Ecological vegetation class	Nomenclature used to describe/classify native vegetation communities throughout Victoria.
FFG	*Flora and Fauna Guarantee Act 1988*	State environmental legislation. See Table 4-1 and Appendix A.
-	Exotic tree	A tree species not from Australia.
-	Indigenous tree	A tree 'native' to the local area, forms part of local EVCs and natural part of the environment. Victorian planning schemes define native vegetation as plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses.
MNES	Matters of national environmental significance	Specific matters protected under the EPBC Act.
-	Native tree	A tree that is native to Australia but not necessarily native to the local area.
-	Remnant vegetation	Vegetation likely to have persisted since European settlement, reflecting the pre-European character of indigenous vegetation for an area.
TRZ	Tree retention zone	Required area to maintain the healthy functioning of the root zone for established trees, calculated at 10 x DBH. Works impact greater than 10 per cent of this area are considered to result in the 'loss' of the tree. Where this is an indigenous tree, this may require planning approval and an offset.

Executive Summary

This report provides an assessment of the potential impacts on terrestrial flora and fauna and relevant environmental management requirements associated with the construction and operation of the Melbourne Metro Rail Project (Melbourne Metro). These include potential threatened species issues and other impacts to matters listed under relevant state and federal environmental legislation, including the loss of vegetation. Other aspects, including the removal of exotic trees and potential impacts on aquatic flora and fauna, are covered in other impact assessments including:

- Technical Appendix L *Landscape and Visual*
- Technical Appendix R and S *Arboriculture*
- Technical Appendix U *Aquatic Ecology and River Health.*

Terrestrial Flora and Fauna Context

The proposed Melbourne Metro alignment and associated infrastructure is to be constructed in the inner suburban and CBD areas of Melbourne, where the development and evolution of the city has had a major impact on local biodiversity.

Due to the location of proposed works and that the majority of construction would take place underground, there are relatively few terrestrial flora and fauna impacts associated with the project, with impacts to statutory flora and fauna limited to the unavoidable removal of a small number of indigenous trees. Additionally, the habitat of the limited number of threatened species previously identified within close proximity to the proposed project boundary would be avoided.

Method

The methods employed in the development of the terrestrial flora and fauna assessment included:

- A review of flora and fauna records, including relevant data held by state and federal environmental agencies, presenting previously recorded threatened species within a vicinity (5 km) of the proposed alignment
- A field assessment of all native vegetation and potential habitat for threatened species throughout the proposed alignment, with particular emphasis on areas of surface impact
- A review of relevant state and federal environmental legislation in relation to identified flora and fauna issues and the significance of associated potential impacts.

Risk Assessment

The risk assessment considered the following potential consequences across the study area, in the absence of specific mitigation measures:

- Impacts on healthy mature trees, both indigenous and exotic
- Impacts relating to the removal of native vegetation and threatened species habitat.

The risk assessment concluded that mitigation measures, generally associated with avoiding natural assets, could be implemented to reduce all risks to low.

The impact assessment determined the issues, risks and management measures by precinct to be:

- Precinct 1 - Tunnels: Underground construction avoids majority of terrestrial issues, although early consideration to potential grey-headed flying-fox (*Pteropus poliocephalus*) feed on trees in Fawkner Park, in the vicinity of the proposed emergency access shaft locations and laydown areas. There is no impact to any native vegetation as defined under relevant policy in this precinct

- Precinct 2 - Western portal (Kensington): Loss of established native landscaping associated with the rail embankment and within the Childers Street road reserve and at the south eastern end of Ormond Street. These would be replaced following construction. This includes 12 trees and one non-indigenous tree, but *Flora and Fauna Guarantee Act 1988* listed spotted gums (*Corymbia maculata*) trees have been recorded in Technical Appendix R *Arboriculture*
- Precinct 3 - Arden station: Removal of 10 indigenous trees located within the proposed project boundary requiring offset under the *Permitted clearing of native vegetation – Biodiversity assessment guidelines*. Additionally six non-indigenous, but *Flora and Fauna Guarantee Act 1988* listed spotted gum (*Corymbia maculata*) trees and two snow in summer (*Melaleuca armillaris*) bushes have been recorded in Technical Appendix R *Arboriculture*
- Precinct 4 - Parkville station: The proposed works would not have an impact on terrestrial flora and fauna given the lack of relevant vegetation/habitat in the area
- Precinct 5 - CBD North station: No indigenous vegetation was identified however eight non-indigenous, but *Flora and Fauna Guarantee Act 1988* listed spotted gums (*Corymbia maculata*) trees are established within the CBD North investigation area and have been recorded in Technical Appendix R *Arboriculture*
- Precinct 6 – CBD South Station: No indigenous vegetation was identified however eight non-indigenous, but *Flora and Fauna Guarantee Act 1988* listed Spotted Gums (*Corymbia maculata*) trees are established within the CBD South investigation area and have been recorded in Technical Appendix R *Arboriculture*
- Precinct 7 - Domain station: There are eight non-indigenous, but *Flora and Fauna Guarantee Act 1988* listed spotted gum (*Corymbia maculata*) trees established around the Domain tram interchange and South African Soldiers Memorial that are considered unavoidable. These have been recorded in Technical Appendix R *Arboriculture*. Given local records, the area may be used for seasonal or foraging habitat for some threatened bird species, including the Grey Goshawk, Powerful Owl and Swift Parrot, but is not considered critical habitat given the availability of similar trees in the wider area
- Precinct 8 - Eastern portal: There are 19 planted indigenous trees identified in the South Yarra Sidings area. Additionally, one non-indigenous, but *Flora and Fauna Guarantee Act 1988* listed spotted gum (*Corymbia maculata*) tree has been recorded in the Technical Appendix R *Arboriculture*. Given local records, the area may be used for seasonal or foraging habitat for some threatened bird species, including the Grey Goshawk, Powerful Owl and Swift Parrot, but is not considered critical habitat given the availability of similar trees in the wider area
- Precinct 9 - Western turnback. The proposed western turnback would be located within the rail reserve at West Footscray station. The proposed works would not have an impact on terrestrial flora and fauna given the disturbance history and lack of vegetation/habitat in the area.

If the proposed mitigation measures, largely related to replacing/offsetting potentially impacted vegetation, are put in place the project would comply with the terrestrial ecology (flora and fauna) elements of the Environment Effects Statement (EES) draft evaluation objectives.

The project is consistent with draft EES evaluation objectives for terrestrial flora and fauna as the assessment area's limited biodiversity values, in terms of intact native vegetation and related threatened species, would not be adversely impacted.

The removal of indigenous plant species, present as planted amenity features, would be offset in accordance with relevant policy. This would mean no long term decline in species distribution or survival for any listed threatened species, no impact to intact native vegetation, listed community or otherwise or long term impacts to the natural character of the surrounding environs.

Benefits and Opportunities

The Concept Design would avoid the majority of terrestrial flora and fauna issues in the study area. Where impacts, particularly to individual scattered trees under the *Permitted clearing of native vegetation – Biodiversity assessment guidelines* occur, losses would be offset accordingly. Revegetation opportunities would help improve the overall biodiversity values in the study area through suitable landscaping and legacy plantings.

Environmental Performance Requirements

The following Environmental Performance Requirements are recommended

Environmental Performance Requirements
Prior to construction commencing of main works or shafts in affected areas, prepare and implement Tree Protection Plans for each Precinct in accordance with AS4970-2009 Protection of Trees on Development Sites, addressing the detailed design and construction methodology of the project. Within precincts 1, 4 and 7, a Tree Protection Plan must be developed for each heritage place as relevant to the satisfaction of Heritage Victoria or the responsible authority.
Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity. Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered.
Develop and implement measures to avoid the spread or introduction of weeds and pathogens during construction, including vehicle hygiene.
Re-establish trees to replace loss of canopy cover and achieve canopy size equal to (or greater than) healthy, mature examples of the species in Melbourne. Consult with the City of Melbourne, the City of Port Phillip, the City of Stonnington, the Shrine of Remembrance and Shrine Trustees and Heritage Victoria as applicable. Policy documents that must be followed to re-establish trees and valued landscape character include: • The City of Melbourne's Tree Retention and Removal Policy and Urban Forest Strategy • The City of Port Phillip's Community Amenity Local Law No. 1 and Greening Port Phillip - An Urban Forest Approach • The City of Stonnington's General Local Law 2008 (No 1) and City of Stonnington Street Tree Strategy • Any associated precinct plans • Specific policies of the Domain Parklands Conservation Management Plan (CMP), for trees within Domain Parklands • Shrine of Remembrance: Shrine of Remembrance CMP (Lovell Chen, 2010) or any future review and the Shrine of Remembrance Landscape Improvement Plan (rush Wright Associates, 2010) • South African Soldiers Memorial: Any relevant CMP for the South African Soldiers Memorial • Fawkner Park Conservation Analysis (Hassell, 2002) and the Fawkner Park Masterplan (City of Melbourne, 2005) • The preferred future character of the University of Melbourne, for trees in the grounds of the University of Melbourne.
Where 'unavoidable' native vegetation (as defined under relevant policy) needs to be removed, meet the requirements of the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines*.

1 Introduction

This report provides an assessment of the terrestrial flora and fauna impacts resulting from the proposed Melbourne Metro Rail Project (Melbourne Metro). Related issues - arboriculture and aquatic ecology and river health – are addressed in the following reports:

- Technical Appendix L *Landscape and Visual*
- Technical Appendix R and S *Arboriculture*
- Technical Appendix U *Aquatic Ecology and River Health.*

1.1 Project Description

Melbourne Metro comprises two nine-kilometre long rail tunnels from Kensington to South Yarra, travelling underneath Swanston Street in the Central Business District (CBD), as part of a new Sunbury to Cranbourne/Pakenham line to form the new Sunshine-Dandenong Line.

The infrastructure proposed to be constructed as part of Melbourne Metro broadly comprises:

- Twin nine-kilometre rail tunnels from Kensington to South Yarra connecting the Sunbury and Cranbourne/ Pakenham railway lines (with the tunnels to be used by electric trains)
- Rail tunnel portals (entrances) at Kensington and South Yarra
- New underground stations at Arden, Parkville, CBD North, CBD South and Domain with longer platforms to accommodate longer High Capacity Metro Trains (HCMTs). The stations at CBD North and CBD South would feature direct interchange with the existing Melbourne Central and Flinders Street Stations respectively
- Train/tram interchange at Domain station.

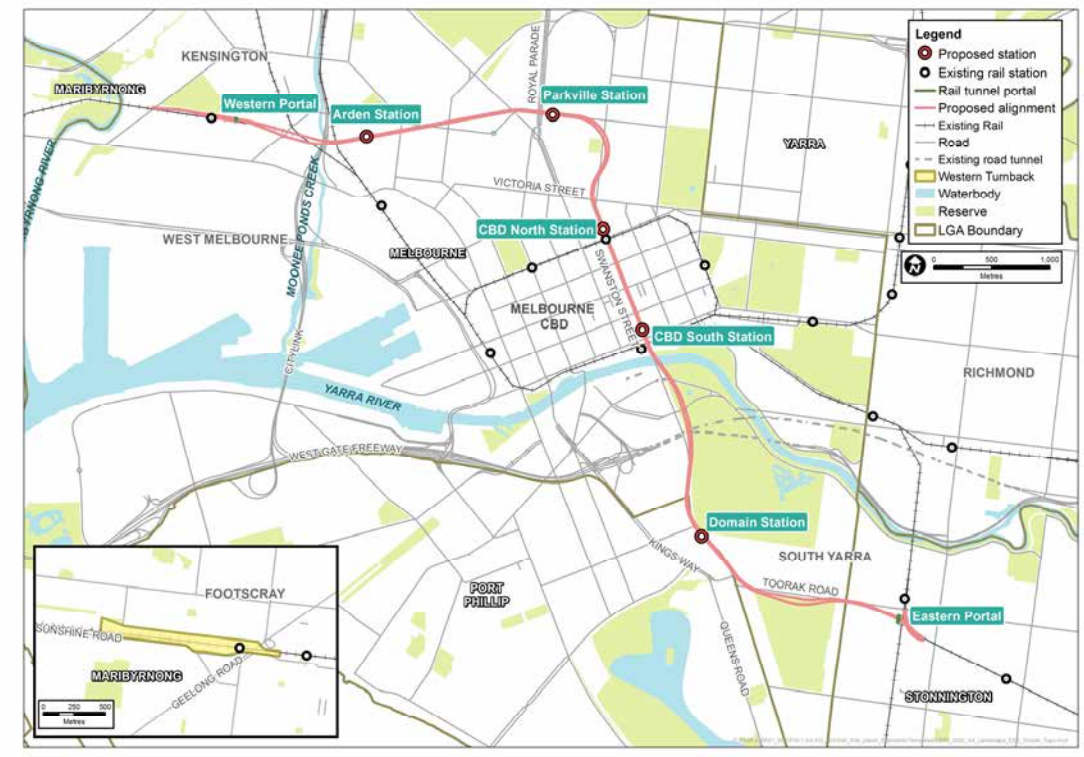

Figure 1-1 Map of the proposed Melbourne Metro alignment and five underground stations

Proposed construction methods would involve bored and mined tunnels, cut and cover construction of station boxes at Arden, Parkville and Domain and portals, and cavern construction at CBD North and South stations. The project would require planning, environmental and land tenure related approvals to proceed.

1.2 Purpose of this Report

The purpose of this report is to provide an understanding of the biodiversity present within Melbourne Metro's proposed project boundary and to identify potential risk, as it relates to threatened flora and fauna, and remnant vegetation and relevant management (statutory and practical) requirements. The outcome of this assessment provides context for the risk assessment process and to meet the Environment Effects Statement (EES) assessment requirements.

1.3 Project Precincts

For assessment purposes, the proposed project boundary has been divided into precincts as outlined below. The precincts have been defined based on the location of project components and required construction works, the potential impacts on local areas and the character of surrounding communities.

The proposed precincts are:

- Precinct 1: Tunnels (outside other precincts)
- Precinct 2: Western portal (Kensington)
- Precinct 3: Arden station (including substations)
- Precinct 4: Parkville station
- Precinct 5: CBD North station
- Precinct 6: CBD South station
- Precinct 7: Domain station
- Precinct 8: Eastern portal (South Yarra)
- Precinct 9: Western Turnback (West Footscray).

The nine precincts are shown in Figure 1-2.

1.4 Study Area

The terrestrial ecology impact assessment considered potential impacts associated with above ground works, where they occur within the proposed Melbourne Metro boundary. Such surface interactions are associated with the proposed station sites, eastern and western portal sites and emergency access shafts. In addition, areas associated with the proposed early works and the western turnback were also assessed.

It is also noted that areas associated with the four substation options were also considered. These are all located within proposed precinct boundaries (one within western portal and three within Arden station precinct), and as such, the impact of all substation options are considered to be represented within the respective precinct summaries.

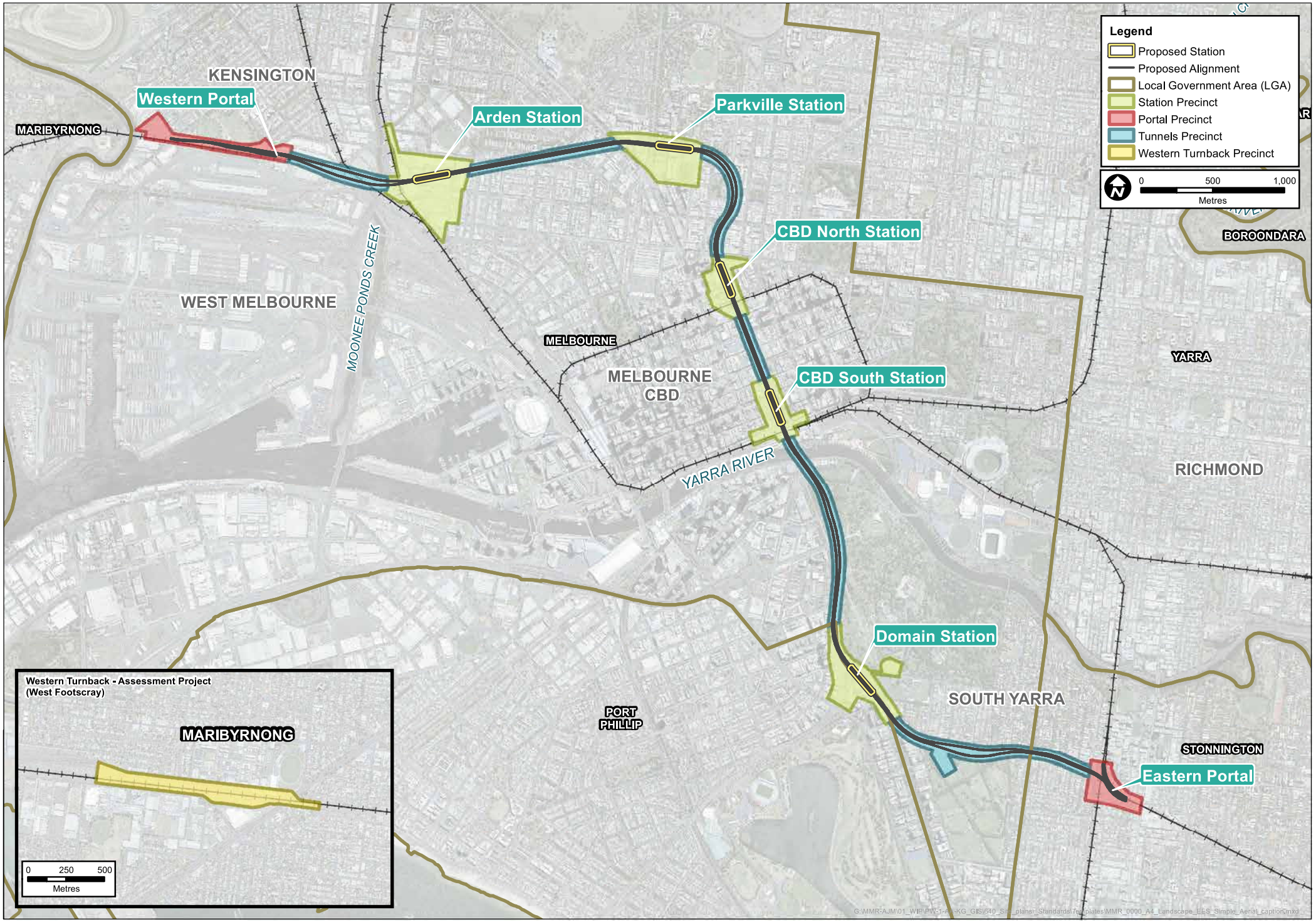

Figure 1-2 Melbourne Metro precincts

2 Scoping Requirements

2.1 EES Objectives

The following draft evaluation objective (Table 2-1) is relevant to terrestrial flora and fauna and identifies the desired outcomes in the context of potential project effects. The draft evaluation objectives guide an integrated assessment of environmental effects of the project, in accordance with the *Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978.*

Table 2-1 Biodiversity draft evaluation objective

Draft evaluation objective	Key legislation
Biodiversity: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	*Flora and Fauna Guarantee Act 1988* *Wildlife Act 1975.*

2.2 EES Scoping Requirements

The following extracts from the Scoping Requirements, issued by the Minister for Planning, are relevant to the biodiversity draft evaluation objective.

Table 2-2 Biodiversity Scoping Requirements

Aspect	Relevant response
Key issues	• Potential survival of remnant vegetation in areas to be affected by project works. • Use of planted vegetation or other landscape elements as habitat by native terrestrial fauna.
Priorities for characterising the existing environment	• Identify and describe existing terrestrial flora and fauna that could be affected by project works, especially species listed as threatened under the *Flora and Fauna Guarantee Act 1988* or listed under DELWP advisory lists.
Design and mitigation measures	• Describe measures proposed to protect significant terrestrial and (if relevant) aquatic flora and fauna values. • If relevant, describe measures to offset identified adverse effects on flora and fauna values.
Assessment of likely effects	• In the context of the project's urban and highly modified setting, assess the potential adverse residual effects of the project on biodiversity values.
Approach to manage performance	• Describe principles to be adopted to develop monitoring programs to measure adverse effects on significant flora and fauna values resulting from the project. • Describe the approach to develop contingency measures to be implemented in the event of adverse residual effects on flora and fauna values requiring further management.

3 Legislation, Policy and Guidelines

Table 3-1 summarises the relevant primary legislation related to terrestrial ecology that applies to the project as well as the implications, required approvals and interdependencies and information requirements associated with obtaining approvals. Descriptions of all relevant legislation are contained in Appendix A.

Table 3-1 Primary legislation and associated information

Legislation / policy	Key policies / strategies	Implications for this project	Approvals required	Timing / interdependencies
Commonwealth				
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**	The EPBC Act provides for the listing of threatened species, threatened ecological communities and key threatening processes. It also relates to actions likely to have a significant impact on 'matters of national environmental significance' (MNES) and Commonwealth land.	The following MNES relating to terrestrial ecology have been found to exist within the study area: • The grey-headed flying-fox • Migratory species. **Grey-headed flying-fox (*Pteropus poliocephalus*)** While potential impacts to fig trees in Fawkner Park that support the grey-headed Flying-fox may impact the species, the impact is not considered significant in relation to the relevant guidelines (DoE, 2014). The Concept Design avoids grey-headed flying-fox temporary camp trees in Fawkner Park. **Listed migratory species** Impacts to listed migratory species are considered unlikely given limited habitat in the study area.	Melbourne Metro Rail Authority (MMRA) has referred the project to the Commonwealth Department of Environment (DoE) in relation to potential impacts on the Australian grayling in the Yarra River and matters associated with Commonwealth land. Potential impacts to the grey-headed flying-fox were also addressed in the EPBC referral described above.	It has been determined by the delegate of the Commonwealth Minister for Environment on 22 September 2015 that the Concept Design is a not a 'controlled action' subject to being undertaken in the manner set out in the delegate's decision (the matters relate to heritage related issues on Commonwealth land).

Legislation / policy	Key policies / strategies	Implications for this project	Approvals required	Timing / interdependencies
Draft EPBC Act Policy Statement: Camp management guidelines for the grey-headed and spectacled flying-fox	Provides an outline in relation to the assessment of significant impacts relating to the management of the flying-fox (or more specifically, their camps)	Consideration as to the significance of habitat in Fawkner Park that historically may have been used for temporary flying-fox camps. Although impacts to habitat in Fawkner Park are largely avoided and as historical (abandoned) camp-sites are not considered significant, or currently utilised, local noise/activity issues are not considered significant.	No approvals required	N/A
State				
Environment Effects Act 1978	The *Environment Effects Act 1978* provides for the assessment of actions that are capable of having a significant environmental effect.	The Victorian Minister for Planning has determined that an EES would be required.		An assessment under this Act would inform decision-making under other legislation.
Flora and Fauna Guarantee Act 1988	The *Flora and Fauna Guarantee Act 1988* provides a framework for biodiversity conservation in Victoria. Threatened species and communities of flora and fauna, as well as threatening processes, are listed under this Act. A number of non-threatened flora species are also listed as protected under the *Flora and Fauna Guarantee Act 1988*. A Permit to Take is required to remove these species from public land.	This Act applies to public land, which includes the rail corridor, road reserves and public spaces such as the Domain Parklands which are located on land reserved under the *Crown Land (Reserves) Act 1978.* No remnant threatened or protected flora was identified within the study area. A number of likely planted species listed under the *Flora and Fauna Guarantee Act 1988* would be impacted as a result of works. The permit requirements of the *Flora and Fauna Guarantee Act 1988* apply only to indigenous species.	FFG Permits may be required for the removal of some indigenous *Flora and Fauna Guarantee Act 1988* listed species established within the construction areas.	The assessment under the *Environment Effects Act 1978* would inform decision-making under this Act.
DELWP (formally DEPI) Victorian Advisory Lists	The DELWP Victorian Advisory Lists (VicAdv) are not a statutory list of threatened species, but rather species for which conservation management is recommended by DELWP. The VicAdv Lists are comprised of the *Advisory List*	The study area supports some foraging habitat for VicAdv listed fauna species, the grey-headed flying fox, grey goshawk and the powerful owl.	Impacts to VicAdv species assessed using modelled data as part of the assessment of native vegetation impacts	No further action required

Legislation / policy	Key policies / strategies	Implications for this project	Approvals required	Timing / interdependencies
	of Rare or Threatened Plants in Victoria – 2014 (DEPI, 2014), the *Advisory List of Threatened Vertebrate Fauna in Victoria – 2013* (DSE, 2013), and the *Advisory List of Threatened Invertebrate Fauna in Victoria – 2009* (DSE, 2009). The presence, or likely presence, of a species listed on the VicAdv Lists is used to determine if offsets are required for species-specific habitat.	No VicAdv listed threatened flora species were previously recorded or identified within the study area.		
Planning and Environment Act 1987	Applications to remove, destroy, or lop native vegetation in Victoria invoke relevant municipal planning schemes and the *Planning and Environment Act 1987*, which are given authority through the Victorian Planning Provisions. Clause 52.17 (Native Vegetation) of all planning schemes requires planning approval to remove, destroy or lop indigenous vegetation, with some exceptions. While planted 'indigenous' vegetation less than ten years old is generally exempt, this is not the case where public funding has been utilised for the establishment of environmental plantings. Depending on the scale of the native vegetation clearance, statutory referral to the DELWP may be required.	The removal of 41 planted indigenous trees covered by the permitted clearing regulations would be required within the cities of Melbourne, Port Phillip and Stonnington.	Planning approval would be required for the lopping, destruction or removal of any native vegetation	The assessment under the *Environment Effects Act 1978* would inform decision-making under this Act. Among other things, the EES considers the likely impact of the project on 41 planted indigenous species throughout the alignment that are considered 'unavoidable'. The number, type and size of amenity/exotic trees that would be impacted are considered in Technical Appendices R and S *Arboriculture.*
Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines (Guidelines)	These Guidelines are given effect through the State Planning Policy Framework and Clause 52.17 (Native Vegetation) of the *Planning and Environment Act 1987*. The purpose of these Guidelines (DEPI, 2013b) is to guide how impacts on biodiversity should be considered when assessing an application for a permit to	The removal of planted indigenous vegetation less than 10 years old does not require a planning permit except where public funding has been used for establishment of environmental plantings. The removal of 41 planted indigenous trees covered by the permitted clearing regulations	The removal of the 41 scattered trees would require an offset in accordance with the Guidelines.	Among other things, the EES considers the likely impact of the project on the identified on 41 planted indigenous species throughout the alignment that are considered unavoidable.

Legislation / policy	Key policies / strategies	Implications for this project	Approvals required	Timing / interdependencies
	remove, lop or destroy native vegetation. For the purpose of these Guidelines, the term 'remove native vegetation' includes to lop or destroy native vegetation.	would be required within the cities of Melbourne, Port Phillip and Stonnington as they tend to occur on public land, and it is therefore assumed public funding has been utilised for their establishment.		
Wildlife Act 1975	The *Wildlife Act 1975* establishes procedures for: • The protection and conservation of wildlife • The prevention of wildlife becoming extinct • The sustainable use of and access to wildlife • To prohibit and regulate the conduct of persons engaged in activities concerning wildlife.	Given the very small amount of habitat impacted by this project and its isolated urban setting, no permits for the loss of wildlife or wildlife habitat are required for Melbourne Metro. However, a permit would need to be held by the environmental officers/wildlife handlers responsible for pre-clearance surveys of trees being removed. Wildlife management requirements are expected to be restricted to common native and exotic birds and possums.	No approvals are required under the *Wildlife Act 1975.* Suitable licencing would need to be sought for environmental officers/wildlife handlers responsible for pre-clearance surveys of trees being removed.	Relevant permits for environmental officers/wildlife handlers responsible for pre-clearance surveys prior to vegetation removal.
Catchment and Land Protection Act 1994 **(CaLP Act)**	The *Catchment and Land Protection Act 1994* defines requirements to: • Avoid land degradation • Conserve soil • Protect water resources • Eradicate and prevent the spread and establishment of noxious weed and pest animal species. The Act defines four categories of noxious weeds: State prohibited weeds, regionally prohibited weeds, regionally controlled weeds and restricted weeds. Noxious weed species and the category they are placed in is specific to individual Catchment Management Authority regions.	Pest animal species are not likely to be influenced in any way by works. Pest plant species (noxious weeds) would need to be considered against current distribution (once the works area is determined) and treatment of existing infestations. Work methods to manage the importation of new weed species would be managed through the performance requirements. No major noxious weed infestations were observed at the time of assessment.	The project has potential to result in the spread and establishment of noxious weeds due to the movement of a large number of vehicles, equipment and soil.	The assessment under the *Environment Effects Act 1978* would inform decision-making under this Act. Mitigation measures would need to be implemented to minimise the spread of noxious weeds.

Legislation / policy	Key policies / strategies	Implications for this project	Approvals required	Timing / interdependencies
Local				
Tree Retention and Removal Policy 2012 (City of Melbourne)	The policy applies to all trees within the City of Melbourne municipality that are either owned or managed by the City of Melbourne. The policy outlines: • Tree protection standards to be implemented to protect public trees • Circumstances where public trees may be removed or pruned • Compensatory measures to be implemented where public trees are permitted to be removed.	Sets out standards for the priority status and approval of tree removals from Council managed land in the context of development, as well as tree protection requirements for the successful retention of trees as part of development.	The *Major Transport Projects Facilitation Act 2009* provides that a local law permit would not be required for Melbourne Metro.	Prior to commencement of a development project, a property owner or representative shall prepare a Tree Protection Management Plan if any activity is within the tree protection zone of a public tree' defined in accordance with the Australian Standard"[1] AS4970 Protection of Trees on Development Sites. The policy sets out bonds for tree protection adjacent to works as well as costs for removal and replacement. The number, type and size of amenity/exotic trees that would be impacted has been considered in the Technical Appendix R *Arboriculture.*
City of Stonnington General Local Law 2008 (No. 1) (Part 7, Division 4, Clause 719)	The law states that significant trees may not be removed, damaged or destroyed. Significant trees include those that meet the following criteria: • Have a trunk circumference of 180 cm or greater measured at its base, or • Have a trunk circumference of 140 cm or greater measured at 1.5 m above its base, or • Are listed on the Significant Tree Register.	Where trees are to be removed that meet the criteria to be classified as a significant tree, a local laws permit would need to be obtained from the City of Stonnington.	The *Major Transport Projects Facilitation Act 2009* provides that a local law permit would not be required for Melbourne Metro.	The number, type and size of trees that meet the criteria of significant trees within the study area have been considered in the Technical Appendix S *Arboriculture*.

[1] City of Melbourne *Tree Retention and Removal Policy* 2012 p. 6

Legislation / policy	Key policies / strategies	Implications for this project	Approvals required	Timing / interdependencies
City of Port Phillip Tree Management Technical Guidelines	Trees managed by the City of Port Phillip are subject to the Tree Management Technical Guidelines.	A small number of trees would be impacted at the Albert Road Reserve located within the City of Port Phillip.	The *Major Transport Projects Facilitation Act 2009* provides that a local law permit would not be required for Melbourne Metro.	The number, type and size of trees that require removal in the City of Port Phillip is considered in the arboriculture impact assessments.

4 Method

4.1 Existing Conditions

This terrestrial flora and fauna impact assessment was undertaken in two stages: a desktop assessment based on State and Commonwealth government databases, and a field survey to test and validate the desktop findings.

4.1.1 Desktop Assessment

A review of the following databases and documents was undertaken to provide information on threatened flora and fauna species and vegetation communities previously identified or modelled to occur within the study area.

- **Biodiversity mapping** (DELWP 2015a) – This database comprises large-scale mapping and classification of native vegetation across Victoria. It also classifies areas of mapped native vegetation according to importance to biodiversity.
- **Victorian Biodiversity Atlas** (DELWP 2015b) – This database comprises historical records of flora and fauna species from across the state. Records are added opportunistically, as flora and fauna surveys are conducted within Victoria for a variety of purposes. Records from a 5 km radius of the proposed project boundary have been reviewed for this assessment. See Appendix B of this report.
- **Protected Matters Search Tool** (DoE 2015) – The Protected Matters Search Tool lists any MNES relevant to the EPBC Act that could occur within an area.

4.1.2 Site Investigations

Ecologists completed a field assessment on 8 May 2015. The study area (see Figure 2.1) was assessed for the presence of native vegetation and potential for threatened flora and fauna and associated habitat. Given Melbourne Metro's proposed location within a highly urbanised area with very limited native vegetation, this assessment was sufficient to establish the nature and extent of the area's ecological characteristics and validate the desktop investigations described Section 4.1.1.

The health and significance of amenity trees within the proposed project boundary has been assessed in an arboriculture impact assessment (refer to Technical Appendix R and S *Arboriculture*). This assessment considered the habitat value of non-indigenous trees for threatened fauna species as well as indigenous trees. No measurements of trees were taken as part of the terrestrial ecology impact assessment (refer to Technical Appendix R and S *Arboriculture*).

4.2 Risk and Impact Assessment

4.2.1 Overview

An environmental risk assessment has been completed for Melbourne Metro's potential impacts. The risk-based approach is integral to the EES as required by Section 3.1 of the Scoping Requirements. Importantly, an environmental risk is different from an environmental impact.

The overall risk assessment process adopted was based on AS/NZS ISO 31000:2009, as illustrated in Figure 4-1.

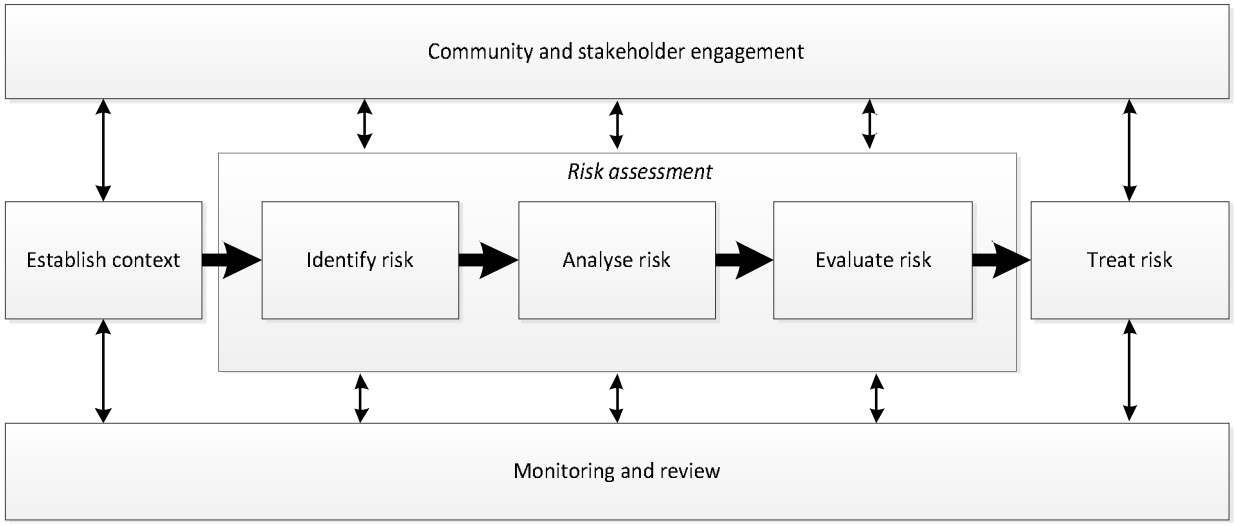

Figure 4-1 Overview of AS/NZS ISO 31000-2009 risk process

The following tasks were undertaken to determine the impact pathways and assess the risks:

- Setting of the context for the environmental risk assessment
- Development of consequence and likelihood frameworks and the risk assessment matrix
- Review of project description and identification of impact assessment pathways by specialists in each relevant discipline area
- Allocation of consequence and likelihood categories and determination of preliminary initial risks
- Workshops with specialist team members from different, yet related, discipline areas that focussed on very high, high and moderate initial risks to ensure a consistent approach to risk assessment and to identify possible interactions between discipline areas
- Follow-up liaison with specialist team members and consolidation of the risk register.

A more detailed description of each step in the risk assessment process is provided in Technical Appendix B *Environmental Risk Assessment Report*.

4.2.2 Context

The overall context for the risk assessment and a specific context for each specialist study is described in Technical Appendix B of the EES. The context describes the setting for evaluation of risks arising from the project. The specific context for the terrestrial flora and fauna impact assessment follows:

> *Melbourne Metro would be wholly located within the highly urbanised central area of Melbourne. With approximately 180 years of urban development associated with the evolution of the city, much of the original biodiversity values of the area have been significantly disturbed, modified or destroyed.*
>
> *The baseline assessment of terrestrial flora and fauna for the project has concluded that the proposed study area contains no remnant flora and that only one terrestrial fauna species of conservation significance – the grey-headed flying fox - is known to inhabit the proposed study area. The grey-headed flying fox is known to forage in Fawkner Park and the Domain parklands on occasions.*

The likelihood rating criteria used in the risk assessment by all specialists is shown in Table **4-1** on the following page.

Table 4-1 Likelihood rating criteria

Level	Description
Rare	The event is very unlikely to occur but may occur in exceptional circumstances.
Unlikely	The event may occur under unusual circumstances but is not expected.
Possible	The event may occur once within a five-year timeframe.
Likely	The event is likely to occur several times within a five-year timeframe.
Almost certain	The event almost certain to occur one or more times a year.

The consequence criteria framework used in the risk assessment is contained in Table 4-2. Each specialist has used this framework to develop criteria for their assessment.

Table 4-2 Consequence framework

Level	Qualitative description of biophysical / environmental consequence	Qualitative description of socio-economic consequence
Negligible	No detectable change in a local environmental setting.	No detectable impact on economic, cultural, recreational, aesthetic or social values.
Minor	Short-term, reversible changes, within natural variability range, in a local environmental setting.	Short-term, localised impact on economic, cultural, recreational, aesthetic or social values.
Moderate	Long-term but limited changes to local environmental setting that are able to be managed.	Significant and/or long-term change in quality of economic, cultural, recreational, aesthetic or social values in local setting Limited impacts at regional level
Major	Long-term, significant changes resulting in risks to human health and/or the environment beyond the local environmental setting	Significant, long-term change in quality of economic, cultural, recreational, aesthetic or social values at local, regional and state levels Limited impacts at national level
Severe	Irreversible, significant changes resulting in widespread risks to human health and/or the environment at a regional scale or broader.	Significant, permanent impact on regional economy and/or irreversible changes to cultural, recreational, aesthetic or social values at regional, state and national levels.

The consequence rating criteria used in the risk assessment specifically for terrestrial flora and fauna is shown in Table 4-3.

Table 4-3 Consequence rating criteria - removal of remnant native vegetation and habitat

Level of consequence	Consequence criteria
Negligible	• No measurable impacts on the extent of remnant vegetation and/or habitat.
Minor	• Loss of less than 1 ha of remnant vegetation. • Permanent loss of habitat that is greater than 1 per cent of the site extent of a habitat, but less than 1 per cent of the local, regional or state extent of a habitat, and/or

Level of consequence	Consequence criteria
	• permanent loss of connectivity of a wildlife corridor that is important at the site level, but not higher
Moderate	• Loss of 1 – 5 ha of remnant vegetation • Permanent loss of habitat that is greater than 1 per cent of the local extent of a habitat, but less than 1 per cent of the regional or state extent of a habitat, and/or permanent loss of connectivity of a wildlife corridor that is important at the local level, but not higher.
Major	• Loss of 5 – 10 ha of remnant vegetation. • Permanent loss of habitat that is greater than 1 percent of the regional extent of a habitat, but less than 1 per cent of the state extent of a habitat, and/or permanent loss of connectivity of a wildlife corridor that is important at the regional level, but not higher.
Severe	• Loss of greater than 10 ha of remnant vegetation. • Permanent loss of habitat that is greater than 1 per cent of the state extent of a habitat, and/or permanent loss of connectivity of a wildlife corridor that is important at the state level.

The environmental risk assessment matrix used by all specialists to determine levels of risk from the likelihood and consequence ratings is shown in Table 4-4.

Table 4-4 Risk Matrix

		Consequence rating				
		Negligible	**Minor**	**Moderate**	**Major**	**Severe**
Likelihood rating	**Rare**	Very Low	Very Low	Low	Medium	Medium
	Unlikely	Very Low	Low	Low	Medium	High
	Possible	Low	Low	Medium	High	High
	Likely	Low	Medium	Medium	High	Very High
	Almost Certain	Low	Medium	High	Very High	Very High

Section 6 provides a summary of the terrestrial flora and fauna risks assessed as part of the EES.

4.3 Stakeholder Engagement

As part of this assessment, the following specific engagement with stakeholders was undertaken:

Table 4-5 Summary of stakeholder engagement

Activity	When	Matters discussed / issues raised	Consultation outcomes
Phone call - Senior Strategic Analyst - Climate Change and Adaptation, VicRoads	18 May 2015	Progress of the Memorandum of Understanding for Native Vegetation Offsets between DEDJTR and DELWP and relevance to the project.	Advice received was that the Memorandum of Understanding is currently being reviewed; however there is no timeline as to when an updated Memorandum of Understanding may take effect.

In addition to the specific agency and Technical Reference Group (TRG) engagement and the engagement listed in the table above, general engagement and consultation with the community was also conducted as part of this assessment. Written feedback was obtained through feedback forms and the online engagement platform, and face-to-face consultation occurred at the drop-in sessions (refer to Technical Appendix C *Community and Stakeholder Feedback Summary Report* for further information).

Although the community were given the opportunity to offer feedback in regards to terrestrial flora and fauna, no comments or concerns were provided. This is likely due to the limited interaction Melbourne Metro would have with terrestrial flora and fauna, as works would predominately take place in areas with limited biodiversity value.

4.4 Limitations

The limitations associated with this assessment are as follows:

- Various biodiversity spatial data layers assessed were the most current available at the time of assessment. These are maintained by State and Federal government environmental departments. These provide relevant records as they are registered with DELWP and may not contain a complete list of biodiversity for a given area
- The assessment was based on the Concept Design and alternative design option at the time of assessment. If design details were to change, the outcomes of this report may potentially require updating
- Vegetation mapping provided from the DELWP comes from their Native Vegetation Modelling, 2010. The dataset is modelled and therefore should be considered accordingly. Vegetation presence is indicated by 25 m^2 polygons that can over-represent vegetation attributes when viewed at the fine scale which has been used on this project
- No assessment was undertaken on private land.

5 Regional Context

Melbourne Metro is wholly located within the highly urbanised central area of Melbourne. With approximately 180 years of urban development associated with the evolution of the city, much of the original biodiversity values of the area have been significantly disturbed, modified or destroyed. Remaining areas of native vegetation, presented as ecological vegetation class (EVC), are shown in Figure 5-1. This 'map' provides modelled results of EVC distribution, and was not field validated as part of the investigation, but rather shows row results of modelled data. The modelled vegetation presented shows native vegetation remaining in the general study area as being largely semi- aquatic communities associated with the Port Phillip estuary and associated drainage lines.

Widespread, historic clearing of the original native vegetation, the infilling of large areas of coastal and estuarine habitat in land reclamation programs in low laying areas and the realignment of water courses to facilitate improved drainage (addressed in Technical Appendix U *Aquatic Ecology and River Health*) have all contributed to enormous changes in the natural character of the area. This has greatly altered, and in large parts removed altogether, any habitat that supported the diversity of species that originally inhabited the area. These areas have been cleared and now support buildings, parks, roads and other infrastructure. The majority of the area in which the project is located no longer supports the original biodiversity values due to the wide scale loss of supporting habitat. The lack of habitat characteristic of the highly developed and urbanised area retains limited value for threatened species and a great deal of the other elements of the former biodiversity that originally characterised the area.

While the study area is generally devoid of remnant vegetation and significant habitat features, the small areas of 'native' plantings and individual native and exotic trees do provide important habitat in the context of the otherwise cleared landscape.

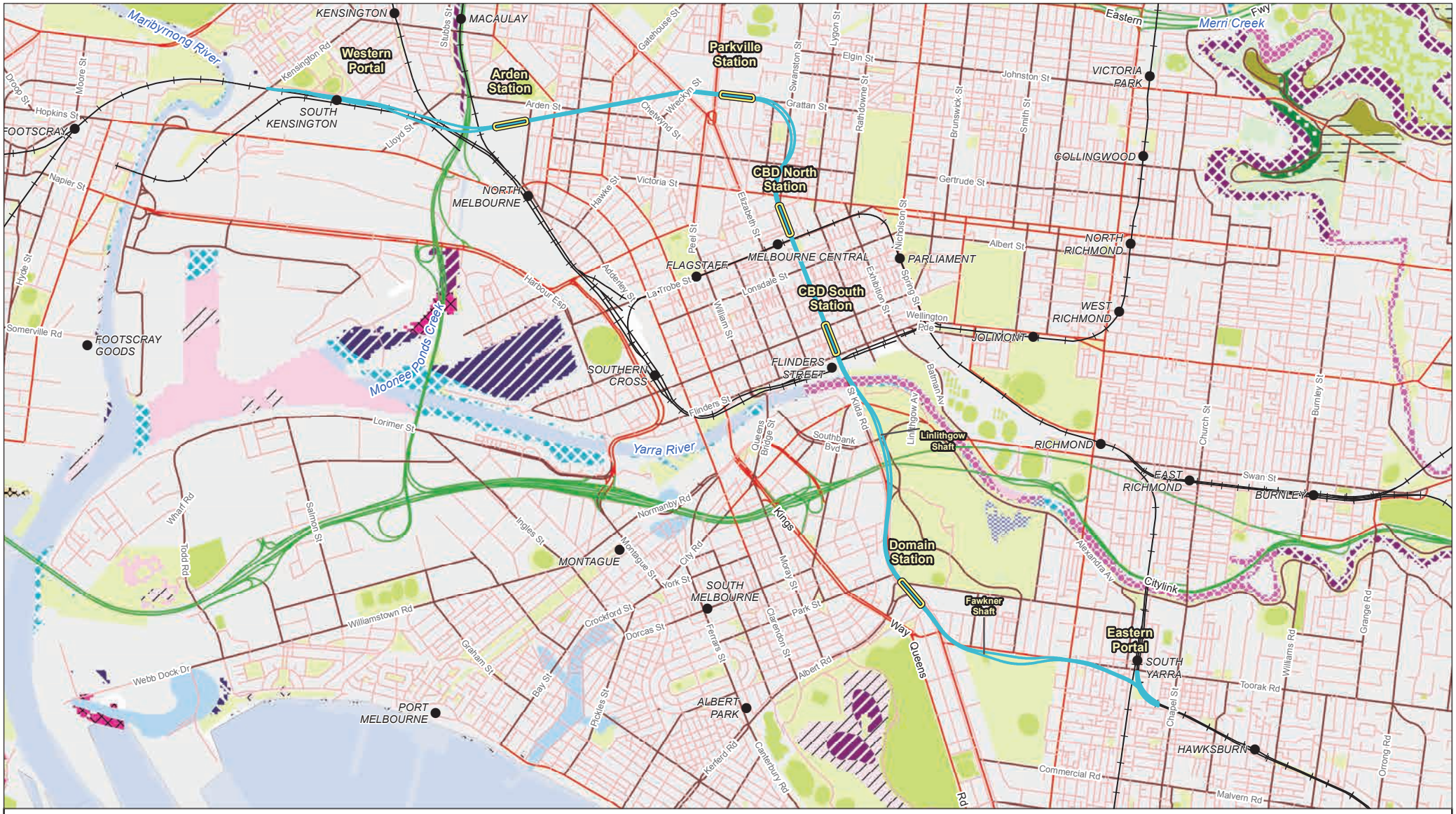

Figure 5-1 Modelled native vegetation (EVC) within the proposed Melbourne Metro study area (DELWP, 2015)

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6 Risk Assessment

Table 6-1 presents the terrestrial flora and fauna risks associated with the project, by precinct. The environmental risk assessment methodology is outlined in Section 4.2.

Existing Environmental Performance Requirements were identified to inform the assessment of initial risk ratings - these are based on standard requirements typically incorporated into construction contracts for rail projects. The potential impacts of the identified risks have been assessed, the findings of which are summarised in subsequent chapters.

Given the highly urbanised area in which the project is proposed, the extent of native vegetation likely to be removed and the impact that this would have on terrestrial fauna species, is limited. As a result, all terrestrial ecology risks identified within the risk register have been classified as having a low initial risk.

As a result of the impact assessment, project-specific Environmental Performance Requirements have been proposed to reduce risks and hence determine the residual risk rating. These Environmental Performance Requirements are outlined in the following sections of the impact assessment and collated in Table 17-1. All Environmental Performance Requirements are incorporated into the Environmental Management Framework for the project (Chapter 2). This has resulted in the risk level associated with some of the identified risk events being further reduced to very low.

For further details refer to the Technical Appendix B *Environmental Risk Assessment Report* of the EES, which includes the full risk register, with existing and recommended Environmental Performance Requirements assigned to each risk. The specific nature of the potential impacts identified and their associated risk is further described by precinct in the following sections.

Table 6-1 Risk register for impact assessment

Impact pathway		Precinct	Initial risk			Residual risk			Risk no.
Category	Event		C	L	Risk	C	L	Risk	
Construction									
Undertaking early works: removal and/or installation of underground services	Removal or impact to street trees in close proximity to utilities (gas, electrical water supply, sewer, telecommunications) that may require alteration in preparation for construction	2 - Western portal 3 - Arden station 4 - Parkville station 5 - CBD North station 6 - CBD South station 7 - Domain station 8 - Eastern portal	Minor	Possible	Low	Negligible	Possible	Low	TE001
Construction activity within Fawkner Park	Removal of existing healthy, mature trees (indigenous and exotic) from the proximity of Fawkner Park tunnel boring machine (TBM) launch site	1 – Tunnels	Minor	Possible	Low	Minor	Possible	Low	TE002
Construction activity within Fawkner Park	Potential impact to existing trees (indigenous and exotic) that may provide habitat for the grey-headed flying-fox from the proximity of Fawkner Park TBM launch site and emergency access shaft	1 – Tunnels	Minor	Possible	Low	Negligible	Possible	Low	TE003
Removal of landscaping elements within the proposed western portal and eastern portal precincts	Loss of, or impact to, landscaping elements (containing a mix of indigenous and native species, including some mature trees). This could result in loss of or impact to non-critical habitat for roosting birds.	2 - Western portal 8 - Eastern portal	Minor	Possible	Low	Negligible	Possible	Low	TE004
Removal of planted indigenous amenity trees from throughout the alignment	A total of 41 indigenous planted trees established with public funding are considered ‘unavoidable’ throughout the impact areas associated with construction (Refer Technical Appendices R and S).	1 - Tunnels 2 - Western portal 3 - Arden station 4 - Parkville station 5 - CBD North station 6 - CBD South station 7 - Domain station	Minor	Possible	Low	Negligible	Possible	Low	TE005

Impact pathway		Precinct	Initial risk			Residual risk			Risk no.
Category	Event		C	L	Risk	C	L	Risk	
Construction activity throughout the study area	Loss of or impact to habitat due to the potential removal of a number of exotic street trees from throughout the study area, some of which may provide roosting habitat for a variety of bird species	2 - Western portal 3 - Arden station 4 - Parkville station 5 - CBD North station 6 - CBD South station 7 - Domain station	Minor	Possible	Low	Negligible	Unlikely	Very Low	TE006

7 Precinct 1: Tunnels

7.1 Project Components

The majority of the works associated with the tunnels are located entirely underground, and therefore have limited impact on terrestrial ecology. Potential impacts to groundwater dependent ecosystems, which have been assessed in Technical Appendix O *Groundwater* and Technical Appendix R *Arboriculture*, are unlikely. The relevant above ground elements of the tunnels are:

- TBM southern launch site at the Fawkner Park (open space and tennis courts) site
- Emergency access shafts proposed for:
  - Fawkner Park, located in the north-east section of the park if the TBM is launched from the proposed Domain station site
  - Adjacent to Linlithgow Avenue in the Queen Victoria Gardens
- CityLink tunnels crossing (Above Citylink):
  - In relation to the CityLink crossing, the tunnels would be located underground and there would be minimal surface impacts to terrestrial flora and fauna. The potential for tree root impacts associated with the proposed tunnels are addressed in Technical Appendix R *Arboriculture*.

The location of tunnel entry portals and alignments can be seen in Figure 1-1 and Figure 1-2 and relevant sections of the accompanying EES Map Book.

7.1.1 Alternative Design Options

- CityLink Tunnels Crossing (below- CityLink)
  - The tunnels would be located underground and there would be minimal surface impacts to terrestrial flora and fauna. The potential impacts to the root zones of amenity trees are addressed in the Technical Appendix R *Arboriculture.*
- Emergency access shafts
  - The Fawkner Park TBM launch site, if the TBM is launched from Fawkner Park
  - Tom's Block (instead of adjacent to Linlithgow Avenue in the Queen Victoria Gardens).

7.2 Construction

The relevant construction activities for this report are:

- The siting of the construction work sites in Domain or Domain and Fawkner Park
- The siting of the TBM launch site and emergency access shafts.

7.2.1 Alternative Design Options

The relevant construction activities for the alternative design options are very similar to those for the Design Concept.

7.3 Operation

Once initial disturbance is undertaken to facilitate the development of Melbourne Metro, no further ecological impacts are envisaged.

7.4 Existing Conditions

There are potentially three threatened fauna species within the proposed project boundary based on existing records. The grey goshawk (*Accipiter novaehollandiae novaehollandiae*) and powerful owl (*Ninox strenua*), both listed as threatened under the *Flora and Fauna Guarantee Act 1988* and vulnerable on the VicAdv, and the grey-headed flying-fox, listed as vulnerable EPBC Act and VicAdv and listed under the *Flora and Fauna Guarantee* Act *1988*. No listed threatened flora species were observed or are considered to make significant use of the limited habitat within the study area.

Figure 7-1 English elms to the right of the photograph that may be impacted

Vegetation is largely avoided in Fawkner Park. The park includes many mature planted trees as well as a number of newly planted species as part of the City of Melbourne's tree renewal program for the park.

Large mature tree specimens at Fawkner Park include Moreton Bay figs (*Ficus macrophylla*) (Figure 7-2), a sugar gum (*Eucalyptus cladocalyx*), English elms, English oaks and Canary Island date palms. The Moreton Bay figs provide foraging habitat for the grey-headed flying-fox as well as a number of common birds and possums. A number of roosting records of the grey-headed flying-fox are also present within the Victorian Biodiversity Atlas for Fawkner Park (DELWP, 2015b), although these are specifically associated with transient bats forcibly discouraged from their then camp areas in the Botanic Gardens. A new 'camp' has since developed at Yarra Bend and Fawkner Park no longer retains roosting areas.

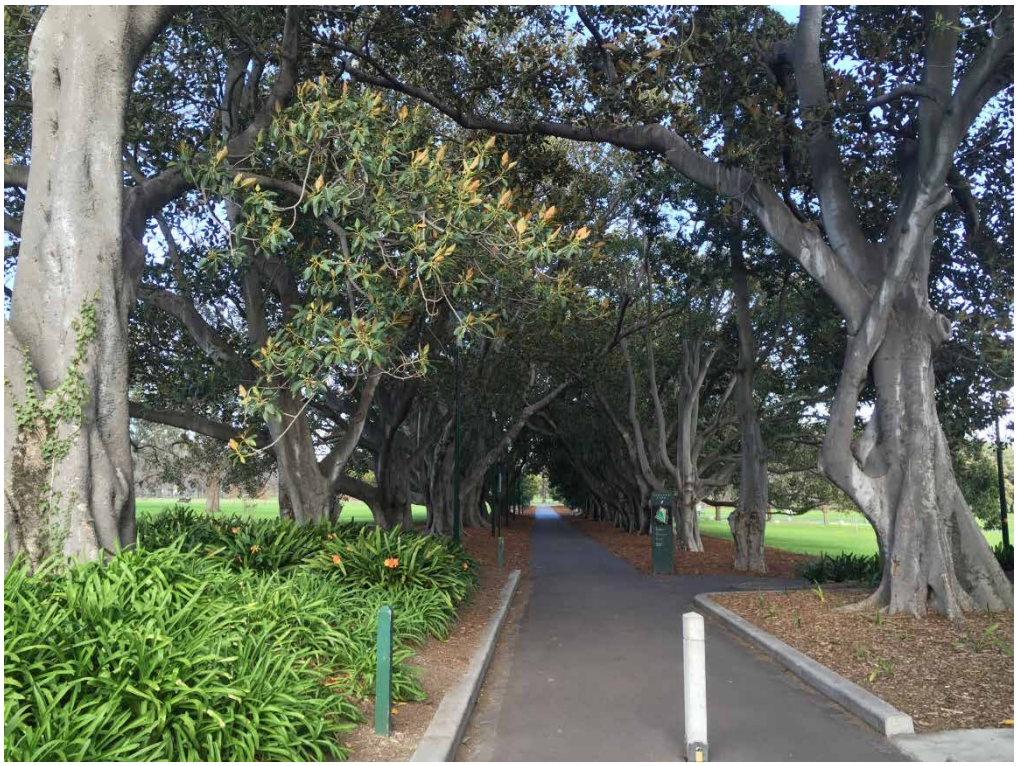

Figure 7-2 Moreton Bay figs within Fawkner Park

7.4.1 Alternative Design Options

7.4.1.1 Using the location of the Fawkner Park TBM launch site, if the TBM is launched from Fawkner Park

The proposed emergency access shaft would be constructed within an open, lawned parkland surrounded by English elms. No native vegetation or significant habitat for threatened species is present in this area. A number of large, mature Moreton Bay figs (*Ficus macophylla*) occur in close proximity to the proposed access shaft location.

7.4.1.2 Located in Tom's Block (Instead of adjacent to Linlithgow Avenue in the Queen Victoria Gardens)

The proposed emergency access shaft would be constructed within open parkland surrounded by English elms. No native vegetation or suitable habitat for threatened species is present.

7.4.2 Asset Values

The asset values for the tunnels precinct are described in Table 7-1.

Table 7-1 Asset / values for the Tunnels precinct

Asset / value	Details
Fauna habitat, Yarra River	The Yarra River provides some habitat for water birds, however there is limited nesting habitat. The banks have been cleared and the trees planted, liquidambars and Canary Island date palms are of minimal habitat value. Fish are addressed in the aquatic ecology and river health impact assessment.
Planted trees on the banks of the Yarra	Planted trees on the banks of the Yarra River include liquidambars and Canary Island date palms that are of minimal habitat value.

Asset / value	Details
Planted mature trees within Fawkner Park	Mature Moreton Bay figs are present within the area under consideration for construction, although these trees would be retained and subject to tree retention measures. Roosting and foraging records for the EPBC/*Flora and Fauna Guarantee Act 1988* listed grey-headed flying-foxes are present within Fawkner Park, although dated.

7.5 Key Issues

As identified in the risk assessment (Table 6-1), the key issues associated with the tunnels precinct are listed in Table 7-2.

Table 7-2 Key issues associated with the Concept Design

Concept Design	Issue	Risk #
TBM southern launch site at Fawkner Park (open space and tennis courts)	Avoidance of existing amenity trees and potential flying-fox roosting and feeding trees.	TE002 TE003
Domain station site	Avoidance of existing amenity trees and potential flying-fox feeding trees.	TE002 TE003
Emergency access shafts		
Fawkner Park north east location (if the TBM is launched from Domain)	Avoidance of existing amenity trees and potential flying-fox roosting and feeding trees.	TE002 TE003

7.5.1.1 Alternative Design Options

The impacts of the proposed alternative design option are similar to those of the Concept Design.

7.6 Benefits and Opportunities

The benefits and opportunities associated with terrestrial flora and fauna in this precinct relate to the offset/legacy plantings to be determined through consultation with City of Melbourne.

7.7 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 7-3 Draft evaluation objectives and assessment criteria for the proposed tunnels

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

This impact assessment has determined that the potential terrestrial ecology impacts associated with the Concept Design for the tunnels precinct would be limited, involving the potential removal of a small number of amenity trees (native and exotic species) (**Risk #TE002**). Potential impact to existing trees (indigenous and exotic) that may provide habitat for the grey-headed flying-fox is considered to be low (**Risk #TE003**).

The project is consistent with draft EES evaluation objective for biodiversity as:

- There is no impact on the terrestrial ecology values within this precinct
- No remnant vegetation or threatened species habitat is located within the proposed shaft sites
- No permit requirements relating to the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines*.

7.7.1.1 Alternative Design Options

The impact assessment has determined that the terrestrial flora and fauna impacts associated with the alternative design options are consistent with those of the Concept Design for the tunnels precinct.

The project is consistent with draft EES evaluation objective for biodiversity as:

- There is no impact on the statutory terrestrial flora and fauna values within this precinct
- There is no remnant vegetation or threatened species habitat is located within the proposed emergency access shaft sites
- There are no permit or offset requirements.

7.8 Environmental Performance Requirements

Table 7-4 provides the recommended Environmental Performance Requirements and proposed mitigation measures for the precinct.

Table 7-4 Environmental Performance Requirements for the precinct

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
Planted mature trees within Fawkner Park	Potential impact to existing trees (indigenous and exotic) that provide habitat for the grey-headed flying-fox from proximity of Fawkner Park construction work site and Fawkner Park emergency access shaft.	Prior to construction commencing of main works or shafts in affected areas, prepare and implement Tree Protection Plans for each Precinct in accordance with AS4970-2009 Protection of Trees on Development Sites, addressing the detailed design and construction methodology of the project. Tree Protection Plans for precinct 1 must be developed for each heritage place as relevant to the satisfaction of Heritage Victoria or the responsible authority.	Develop and implement measures to minimise impacts on all native and non-native vegetation and fauna habitat through detailed design and construction methodology, including: • Minimise the removal of mature trees • Protect trees (native and exotic) where they occur in close proximity to work areas • Minimising footprint and surface disturbance/compaction of temporary and permanent works • Managing the spread and introduction of weeds and pathogens during construction • Appoint a qualified wildlife handler to check any tree hollows present • Wildlife handler to hold appropriate permits for works that may impact on habitat for all fauna • Areas for site offices, car parking, machinery access and stockpiling are to be contained within designated areas.	TE003
Planted vegetation including indigenous and non-indigenous species	Potential for loss of, or impact to, landscaping elements (containing a mix of indigenous and native species, including some mature trees).	As above Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where	• As above, for Tree Protection Plan • Prepare a detailed re-instatement and revegetation plan to the satisfaction of the MMRA.	TE002

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
		nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity. Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered. Develop and implement measures to avoid the spread or introduction of weeds and pathogens during construction, including vehicle hygiene.		

8 Precinct 2: Western Portal (Kensington)

8.1 Project Components

The components of the Concept Design, associated with the Western Portal precinct, include:

- Twin track decline structure and retaining wall along Childers Street to carry the Melbourne Metro tracks from embankment level to below ground. This would result in widening of parts of the existing rail embankment into the south side of Childers Street. The gradient of the decline structure is 3 per cent
- Twin track cut-and-cover tunnel from the decline structure to the driven (bored) tunnel entrance (i.e. tunnel precinct)

The Concept Design includes an emergency relief facility/TBM retrieval box located adjacent to the railway reserve on the eastern side of Tennyson Street in the 50 Lloyd Street Business Estate.

8.1.1.1 Alternative Design Option

There is a proposed alternative design option for a substation to be located in the western portal precinct (within the 50 Lloyd Street Business Estate). Given that this would be located wholly within the Western Portal precinct, the potential impacts associated with this substation option are considered to be represented by the broader precinct summary findings below.

An alternative design option for the decline structure, with the TBM retrieval box opposite the pavilion on Childers Street, is not anticipated to require the removal of any additional trees from the public realm.

8.1.2 Construction

The main proposed construction activities at the site would be:

- Establishment of construction work sites
- Construction of a piled structure to the east end of the skate park in the JJ Holland Park
- Construction of decline structure to the centre of South Kensington station
- Cut and cover tunnel construction to the east end of Childers Street, including an area of excavation of approx. 5,300 m^2
- Construction of services and relief shaft in the west corner of the 50 Lloyd Street Business Estate
- Tunnel excavation and TBM retrieval
- Track works and installation of rail systems.

A construction work site is proposed to be located at 1 - 39 Hobsons Road to support activities at the proposed western portal. This site would be used for site offices and facilities, laydown areas and materials and equipment storage.

8.1.3 Operation

Once initial disturbance is undertaken to facilitate the development of Melbourne Metro, no further ecological impacts are envisaged.

8.2 Existing Conditions

Threatened species listed for the vicinity of the western portal are largely associated with the Maribynong River, which provides potential habitat for four VicAdv listed water bird species including:

- The hardhead (*Aytha australis*)
- Musk duck (*Biziura lobate*)

- Blue-billed duck (*Oxyura australis*) (also listed under the *Flora and Fauna Guarantee Act 1988*)
- Eastern great egret (*Ardea modesta*) (also listed under the *Flora and Fauna Guarantee Act 1988*).

However, the Maribyrnong River is located further west of the proposed western portal, and no works are proposed in the immediate vicinity of the river. There is therefore no habitat for, or presence of EPBC Act-listed or Flora and Fauna Guarantee Act 1988 listed flora or fauna species in this location.

The western portal precinct has been cleared of indigenous vegetation. Planted vegetation includes a row of planted river sheoaks (*Casuarina cunninghamiana*) along the southern perimeter of J.J. Holland Park (outside of construction footprint) and a planted hedge of bottlebrush (*Callistemon spp.)* to the south of Childers Street (Figure 8-1). The garden beds in between parking bays have been planted with juvenile water gums (*Tristaniopsis laurina*) and black-anther flax-lily (*Dianella revoluta*).

The area is likely to attract common urban generalist birds including the introduced common mynas (*Acridotheres tristis*), native red wattlebirds (*Anthochaera carunculata*) and native Australian magpies (*Craticus tibicen*), but is unlikely to support any threatened fauna species due to the disturbed and modified nature of the area.

A total of 12 indigenous planted trees, subject to the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines*, and one FFG listed planted tree have been mapped within the study area (refer to Technical Appendix R *Arboriculture*).

Figure 8-1 Hedge of callistemon to the south of Childers Street and river sheoak to the north

8.2.1 Asset Values

The asset values for the proposed Western Portal precinct are described in Table 8-1.

Table 8-1 Asset / values for the western portal precinct

Asset / value	Details
Planted vegetation including indigenous and non-indigenous species	Vegetation provides some roosting and foraging habitat for generalist bird species, but it is not considered significant.

8.3 Key Issues

The key issues in this precinct are associated with the Concept Design TBM retrieval box within the 50 Lloyd Street Business Estate. In this area there is a small area of poorly developed amenity landscaping, which provides some roosting and foraging habitat for generalist bird species (**Risk #TE004**).

Technical Appendix R *Arboriculture* identifies 12 trees native to Victoria for which planning approval is required, including 11 indigenous planted trees and one tree listed under the *Flora and Fauna Guarantee Act 1988* (**Risk #TE005**).

8.4 Benefits and Opportunities

The benefits and opportunities associated with the Concept Design in this precinct involve avoiding established/mature street/amenity trees and increasing amenity plantings with suitable indigenous species.

8.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment, relating to identified impact pathways (**Risks #TE004** and **#TE005**).

Table 8-2 Draft evaluation objectives and assessment criteria for the proposed Western Portal precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

There are no ecological impacts with the works associated with the TBM retrieval box given the highly disturbed and modified nature of industrial estate. Some amenity landscaping on the southern side of the 50 Lloyd Street Business Estate would likely require removal, although this has limited habitat value. Future reinstatement could improve habitat values of such plantings if a focus on suitable indigenous species is made (**Risk #TE004**).

The project is consistent with the draft EES evaluation objective for biodiversity as:

- There would be no impact (direct or indirect) on the terrestrial flora and fauna values within this precinct
- Impact to surface areas restricted to the proposed portal entrance and associated construction area, located in highly disturbed and modified areas with only amenity landscaped plantings present
- No remnant vegetation or threatened species habitat is located within the portal area.

8.5.1.1 Alternative Design Options

The alternative design option is consistent with the draft EES evaluation objective to avoid or minimise adverse effects on native biodiversity values as far as practicable. While the alternative design option would result in the removal of additional trees from the public realm and the temporary occupation of a section of JJ Holland Park, these trees are not indigenous. It is noted one of the planted 'native' species is *Flora and Fauna Guarantee Act 1988* listed species.

8.6 Environmental Performance Requirements

Table 8-3 below provides the recommended Environmental Performance Requirements and proposed mitigation measures for the precinct.

Table 8-3 Environmental Performance Requirements for the precinct

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
Planted vegetation including indigenous and non-indigenous species	Potential for loss of or impact to landscaping elements (containing a mix of indigenous and native species, including some mature trees).	Prior to construction commencing of main works or shafts in affected areas, prepare and implement Tree Protection Plans for each Precinct in accordance with AS4970-2009 Protection of Trees on Development Sites, addressing the detailed design and construction methodology of the project.	Construction methodology as per Table 7-4	TE004 TE005 TE006
		Re-establish trees to replace loss of canopy cover and achieve canopy size equal to (or greater than) healthy, mature examples of the species in Melbourne. Consult with the City of Melbourne, the City of Port Phillip, the City of Stonnington, the Shrine of Remembrance and Shrine Trustees and Heritage Victoria as applicable. Policy documents that must be followed to re-establish trees and valued landscape character include: • The City of Melbourne's Tree Retention and Removal Policy and Urban Forest Strategy • Any associated precinct plans.		
		Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity.		

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
		Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered.		
		Develop and implement measures to avoid the spread or introduction of weeds and pathogens during construction, including vehicle hygiene.		

9 Precinct 3: Arden Station

9.1 Project Components

The relevant components of the Concept Design for this assessment are:

- The location of the proposed station
- The location of the proposed intake substation to the north of Arden Street, between CityLink to the west and Langford Street to the east.

Three alternative design options for the substation are also located in the Arden station precinct and are:

- Option 2 would be co-located at the Metro Trains Melbourne (MTM) traction substation site.
- Option 3 would be located at the southern section of the precinct between rail tracks to the west and Laurens Street to the east
- Option 4 would be located to the north of the western portal at the existing 50 Lloyd Street Business Estate.

Option 4 is only an option should the Concept Design be pursued at the western portal, as land within the 50 Lloyd Street Business Estate acquired for the Concept Design would be used.

Options 1 and 2 would be located on publicly owned land. There is potential that three private properties would need to be acquired if option 3 were chosen. Option 4 would also require the acquisition of private land, and would prevent the return of the land to commercial uses after construction.

9.1.1 Construction

The main relevant construction activities relating to potential impacts include:

- Establishment of construction work sites
- Tunnel excavation and TBM launch (with the TBM driving first to the proposed western portal before being retrieved and re-launched from Arden station for the second drive to CBD North station)
- The siting of tunnel construction water treatment plant and water tanks, and a tunnel air ventilation and extraction plant
- The siting of the substations and associated cabling.

9.1.2 Operation

Once initial disturbance is undertaken to develop Melbourne Metro, no further ecological impacts are envisaged.

9.2 Existing Conditions

The Arden station precinct does not support significant habitat for or presence of EPBC Act-listed or *Flora and Fauna Guarantee Act 1988* listed flora species.

Street trees along Lauren Street include plane trees (*Platanus* spp.) and pepper trees (*Schinus molle*). The Arden station site has been predominantly cleared of vegetation. The area supports a number of pepper trees and one large river red gum (*Eucalyptus camaldulensis*) (Figure 9-1). There are 10 indigenous trees subject to the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines* present within Precinct 3, as well as eight FFG listed non-indigenous species. These trees are considered as scattered trees in accordance with the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines.*

The location of the proposed Concept Design substation is a vacant lot on the corner of Langford Street and Arden Street. The site has previously been developed and exists as a highly disturbed and modified site with

the only ecology present being weeds such as the exotic grass kikuyu and a mix of exotic trees around the perimeter, including peppercorn trees and desert ash trees, both exotic.

There are six non-indigenous, but FFG listed spotted gums (*Corymbia maculata*) trees and two snow in summer (*Melaleuca armillaris*) bushes which have been recorded in Technical Appendix R *Arboriculture*.

Figure 9-1 Proposed Arden station site. Large river red gum in the background, Peppertree in the foreground.

9.2.1 Asset Values

The asset values for the Arden station precinct are described in Table 9-1.

Table 9-1 Asset / values for the Arden station precinct

Asset / value	Details
Indigenous trees within Arden Station site	The removal of the tree would need to be offset in accordance with the Biodiversity Assessment Guidelines. It is in poor condition. The arboriculture impact assessment identified a further 10 indigenous trees**.**
Mature planted trees	Planted trees include plane trees and peppertrees that are of minimal habitat value and do not provide significant habitat for threatened fauna species.
Planted vegetation including indigenous and non-indigenous species	All three of the potential substation sites located within the Arden Station precinct exist as former industrial sites generally devoid of all vegetation. The arboriculture impact assessment identified a further 10 indigenous trees and eight *Flora and Fauna Guarantee Act 1988* (non indigenous) trees in the wider study area.

9.3 Key Issues

The key issues associated with the Concept Design from a flora and fauna perspective is the removal of indigenous trees present in the investigation area outlined in Section 9.2 and considered in relation to identified impact pathways (**Risk #TE005**). No terrestrial ecology issues are considered relevant for the

proposed alternative design options for this precinct in relation to the substation sites as the sites do not contain indigenous vegetation or threatened species habitat.

9.4 Benefits and Opportunities

The benefits and opportunities associated with the Concept Design relate to the potential for an indigenous amenity planting program to improve the local environment.

9.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 9-2 Draft evaluation objectives and assessment criteria for the Arden station precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation, including non-invasive exotic vegetation, functioning of natural ecosystems, (including terrestrial and aquatic flora and fauna, and maintain biological diversity.

There are 10 indigenous trees, which would be subject to the requirements of *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines* require consideration in this section. The loss of a small number of indigenous planted trees from the Arden site is considered a 'negligible' consequence in relation to terrestrial ecology (**Risk #TE005**). Offset/amenity plantings would compensate for the loss of indigenous planted vegetation in this area.

Potential removal of a number of exotic street trees, some of which may provide some roosting habitat for a variety of bird species, may be required (**Risk #TE006**).

9.5.1 Alternative Design Options

The impact assessment has determined that there are no terrestrial flora and fauna impacts associated with the alternative design option as the alternative sites have no indigenous, or otherwise, flora and fauna present.

The alternative design option are therefore consistent with draft EES evaluation objectives as native flora and fauna values are not impacted as a result of works associated with them.

9.6 Environmental Performance Requirements

Table 9-4 below provides the recommended Environmental Performance Requirements and proposed mitigation measures for the precinct.

Table 9-3 Environmental Performance Requirements for the precinct

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
Indigenous trees within Arden station site	Potential loss or impact to 10 indigenous trees and eight native *Flora and Fauna Guarantee Act 1988* listed species within the Arden station precinct	Where 'unavoidable' native vegetation (as defined under relevant policy) needs to be removed, meet the requirements of the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines*.	Develop and implement measures to minimise impacts on all native vegetation and fauna habitat through detailed design and construction as per Table 7-4. Minimise removal of existing vegetation. Offset loss of existing vegetation with replacement planting at a ratio as required by relevant project approvals.	TE005
		Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity. Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered.		
Mature planted trees	Potential removal of a number of exotic street trees, some of which may provide some roosting habitat for a variety of bird species	Refer to Table 7.4 for Further Environmental Performance Requirements.	Construction methodology as per Table 7-4. Minimise removal of existing vegetation. Offset loss of existing vegetation with replacement planting at a ratio >1:1. Offset loss with a more ecologically relevant planting mix that achieves the amenity purpose.	TE006

10 Precinct 4: Parkville Station

10.1 Project Components

The relevant components of the Concept Design for this assessment are:

- The siting of the proposed station
- Construction activities relating to the use of the top down cut and cover construction method.

10.1.1 Operation

Once initial disturbance is undertaken to develop Melbourne Metro, no further ecological impacts are envisaged.

10.2 Existing Conditions

There is no habitat for, or presence of EPBC Act-listed or *Flora and Fauna Guarantee Act 1988* listed flora and fauna species in this location.

The proposed Parkville station site supports avenues of English elms (*Ulmus procera*) (Figure 10-1). A garden of mature planted trees is present at the eastern end of the Parkville station area (Figure 10-2). Species include sheoaks (*Cassuarina cunninghamiana*) and southern mahogany (*Eucalyptus botryoides*) which are both native but not indigenous to the area. Given the built up nature of this area, heavy vehicular traffic load and lack of indigenous vegetation, it is considered that the Parkville station precinct does not support any threatened flora and fauna species.

Figure 10-1 Avenues of English elms on Royal Parade

Figure 10-2 Planted garden of mature trees at the eastern end of Parkville station precinct

10.2.1 Asset Values

The asset values for the Parkville station precinct relate to the planted mature elms, which are of minimal habitat value.

10.3 Key Issues

There are no issues associated with terrestrial flora and fauna in this precinct associated with either the Concept Design. Loss of exotic vegetation is considered in relation to identified risk pathways (**Risk #TE006**).

10.3.1.1 Benefits and Opportunities

The benefits and opportunities associated with the Concept Design relate to the potential for indigenous amenity and reinstatement plantings to promote greater biodiversity in the area.

10.4 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 10-1 Draft evaluation objectives and assessment criteria for the Parkville station precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

There are no impacts on terrestrial flora and fauna in this precinct.

10.5 Environmental Performance Requirements

There are no Environmental Performance Requirements recommended for this precinct.

11 Precinct 5: CBD North Station

11.1 Project Components

The relevant component of the Concept Design for this assessment is the siting of the proposed station.

11.1.1 Operation

Once initial disturbance is undertaken to develop Melbourne Metro, no further ecological impacts are envisaged.

11.2 Existing Conditions

There is no habitat for, or presence of EPBC Act-listed or *Flora and Fauna Guarantee Act 1988* listed flora and fauna species in this location.

The CBD North location supports planted trees. Species present include spotted gums (*Corymbia maculata*), plane trees (*Plantanus* sp.) and kurrajongs (*Brachychiton populneus*). Trees planted in front of the State Library of Victoria include nettle trees (*Celtis australis*). A number of firewheel trees (*Stenocarpus sinuatus*) have been planted in front of the RMIT buildings to the south of Swanston Street (Figure 11-1 below). Although native, these species are not indigenous to the area. Given the built up nature of the locality, heavy vehicular traffic load and lack of vegetation, it is considered that this locality does not support any threatened flora and fauna species.

A total of eight non-indigenous, but *Flora and Fauna Guarantee Act 1988* listed spotted gums (*Corymbia maculata*) trees have been recorded in Technical Appendix R *Arboriculture*.

Figure 11-1 Planted firewheel trees

11.2.1 Asset Values

The asset values for the CBD North station precinct are described in Table 11-1.

Table 11-1 Asset values for the CBD North station precinct

Asset / value	Details
Planted Australian native trees	Trees provide some foraging habitat however, they are located within a highly urbanised area within the Melbourne CBD. There are 8 native trees listed under the *Flora and Fauna Guarantee Act 1988* in the precinct.

11.3 Key Issues

There are eight FFG listed spotted gums (*Corymbia maculata*) occurring within the CBD North precinct that are likely to be impacted by works. These trees are clearly planted and are considered in the risk assessment, along with other non-indigenous species (**Risk #TE006**).

11.4 Benefits and Opportunities

The benefits and opportunities associated with the Concept Design relate to the potential for indigenous amenity and reinstatement plantings to promote greater biodiversity in the area.

11.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 11-2 Draft evaluation objectives and assessment criteria for the CBD North station precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

Terrestrial flora and fauna issues in this precinct are limited to the *Flora and Fauna Guarantee Act 1988* listed planted vegetation present.

11.6 Environmental Performance Requirements

The recommended Environmental Performance Requirements for this precinct are provided in the table below.

Table 11-3 Environmental Performance Requirements for the precinct

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk #
Mature planted trees	Potential removal of a number of native amenity trees (including FFG listed species), some of which may provide some roosting habitat for a variety of bird species.	Refer to Table 7-4 for Environmental Performance Requirements.	Construction methodology as per Table 7-4. Minimise removal of existing vegetation. Offset loss of existing vegetation with replacement planting at a ratio >1:1. Offset loss with a more ecologically relevant planting mix that achieves the amenity purpose.	TE006

12 Precinct 6: CBD South Station

12.1 Project Components

The relevant component of the Concept Design for this assessment is the siting of the proposed station.

12.1.1 Construction

The main relevant construction activities are:

- Establishment of construction work sites
- Establishment of site offices, materials storage and laydown at the City Square.

12.1.2 Operation

Once initial disturbance is undertaken to develop Melbourne Metro, no further ecological impacts are envisaged.

12.2 Existing Conditions

There is no habitat for, or presence of, EPBC Act-listed or *Flora and Fauna Guarantee Act 1988* listed fauna species, although eight non indigenous (planted) spotted gums (*Corymbia maculata*) occur in this locality.

The CBD South station locality supports a mature avenue of London plane trees. Trees planted in City Square include spotted gums and one English elm. Two lilly pillies (*Syzygium spp*) are planted in front of St Paul's Cathedral. Given the built up nature of the locality, heavy vehicular traffic load and lack of vegetation, this precinct is not expected to support any threatened flora and fauna species.

12.2.1 Asset Values

The asset values for the CBD South station precinct are described in Table 13-1.

Table 12-1 Asset / values for the CBD South station precinct

Asset / value	Details
Mature exotic trees	Trees present are mature plane trees. These trees are of minimal habitat value (other than roosting birds), however they do provide an amenity value, principally derived from their landscape and visual relief benefits.
Planted Australian native trees	Trees provide some foraging habitat. However, they are located within a highly urbanised area within the Melbourne CBD. There are 8 native trees listed under the *Flora and Fauna Guarantee Act 1988* in the precinct.

12.3 Key Issues

There are eight FFG listed spotted gums (*Corymbia maculata*) within the CBD South precinct that are likely to be impacted by works. These trees are clearly planted and are considered in the risk assessment, along with other non-indigenous species in **Risk #TE006**.

12.4 Benefits and Opportunities

The benefits and opportunities associated with the Concept Design relate to the potential for indigenous amenity and reinstatement plantings.

12.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 12-2 Draft evaluation objectives and assessment criteria for the CBD South station precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

There are no impacts to terrestrial flora and fauna in this precinct.

12.6 Environmental Performance Requirements

The recommended Environmental Performance Requirements for this precinct are provided in the table below.

Table 12-3 Environmental Performance Requirements for the precinct

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
Mature planted trees	Potential removal of a number of native amenity trees (including FFG listed species), some of which may provide some roosting habitat for a variety of bird species	Refer to Table 7-4for Environmental Performance Requirements.	Construction methodology as per Table 7-4. Minimise removal of existing vegetation. Offset loss of existing vegetation with replacement planting at a ratio >1:1. Offset loss with a more ecologically relevant planting mix that achieves the amenity purpose.	TE006

13 Precinct 7: Domain Station

13.1 Project Components

The relevant component of the Concept Design for this assessment is the siting of the proposed station.

13.1.1 Construction

The main relevant construction activities relating to potential impacts on Domain are:

- TBM southern launch site at the proposed Domain station site
- Establishment of construction work sites, including a work-site on the Edmund Herring Oval
- Station structural works, including an excavation area of approximately 19,400 m^2.

13.1.2 Operation

Once initial disturbance is undertaken to develop Melbourne Metro, no further ecological impacts are envisaged.

13.2 Existing Conditions

Biodiversity data reviewed indicates this precinct is considered to potentially provide some habitat for three threatened fauna species: the grey goshawk and powerful owl, both listed under the *Flora and Fauna Guarantee Act 1988* and the VicAdv, and the grey-headed flying-fox listed under the EPBC Act, *Flora and Fauna Guarantee Act 1988* and the VicAdv.

Trees planted on the embankment leading up to the Shrine of Remembrance include a wide variety of native and non-native species that have been planted as memorials to various military units and individuals. Species that are within the study area include prickly paperbark (*Melaleuca stypheloides*), river red gum (*Eucalyptus camaldulensis*) (Figure 13-1), English elm, English oak and Monterey cypress (*Cupressus macrocarpa*), although the final project construction footprint avoids many of these individuals. Some of the larger mature trees may provide foraging habitat for threatened species, listed above. These species are all highly mobile and similar habitat is present throughout the Royal Botanic Gardens. As such , the project constitutes a low potential risk to these species.

Trees present along St Kilda Road include English elms and plane trees. To the west of St Kilda Road, is the Albert Road Reserve. The reserve is planted with English elms and English oaks (Figure 13-2), with a ground cover of cultivated lawn. Exotic English elms and plane trees provide limited habitat for threatened fauna species.

Figure 13-1 River red gums planted on the embankment lawn of the Shrine of Remembrance.

Figure 13-2 Albert Road Reserve planted with English elms and English oaks.

13.2.1 Asset Values

The asset values for the Domain station precinct are described in Table 13-1.

Table 13-1 Asset / values for the Domain station precinct

Asset / value	Details
Planted trees including indigenous and non-indigenous species	Mature eucalypts provide some foraging habitat for the grey-headed flying-fox and powerful owl. The mature pines may provide roosting habitat for the powerful owl Elm trees and plane trees are of limited habitat value.

13.3 Key Issues

As identified in the risk assessment (Table 6-1), the key issues associated with the Domain station precinct are listed in Table 13-2.

Table 13-2 Key issues associated with the Concept Design

Concept Design	Issue	Risk #
Domain TBM launch site	Avoidance of existing amenity trees and potential flying-fox feeding trees.	TE005 TE006

13.4 Benefits and Opportunities

The benefits and opportunities associated with the Concept Design relate to the potential for indigenous amenity and reinstatement or offset plantings.

13.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment. These issues have been considered in the risk assessment in relation to **Risk #TE006**.

Table 13-3 Draft evaluation objectives and assessment criteria for the Domain station precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

No remnant vegetation or significant threatened species habitat remains within the precinct.

13.6 Environmental Performance Requirements

There are no Environmental Performance Requirements recommended for this precinct.

14 Precinct 8: Eastern Portal (South Yarra)

14.1 Project Components

The relevant component of the Concept Design for this assessment is the siting of the proposed eastern portal.

14.1.1 Construction

The main relevant construction activities relating to the eastern portal are:

- Establishment of construction work sites
- Cut and cover excavation of the tunnel box, including an excavation area of approximately 720 m^2
- Widening of the existing rail corridor and construction of retaining walls
- Construction of ventilation shaft, emergency access shaft and substation in Osborne Street Reserve
- Retrieval of the TBM from Osborne Street and the adjoining rail reserve
- Upgrade including revegetation of South Yarra Siding Reserve, Osborne Street Reserve and Lovers Walk.

14.1.2 Operation

Once initial disturbance is undertaken to develop Melbourne Metro, no further ecological impacts are envisaged.

14.2 Existing Conditions

This precinct is considered to potentially provide habitat for two threatened fauna species: the grey goshawk listed under the *Flora and Fauna Guarantee Act 1988* and the VicAdv, and the grey-headed flying-fox listed under the EPBC Act, *Flora and Fauna Guarantee Act 1988* and the VicAdv, based on existing records.

The eastern portal site includes planted vegetation along Osborne Street. Planted species include silky oak (*Grevillea robusta*), river red gums, cootamundra wattle (*Acacia baileyana*), southern blue gum (*Eucalyptus globulus*) and narrow-leaf peppermint (*Eucalyptus radiata*).

The South Yarra Siding Reserve also includes a mix of planted species. Species include a very large sugar gum (Figure 14-1) as well as lemon-scented gum (*Corymbia citriodora*), spotted gum (*Corymbia maculata*), river red gum, sweet pittosporum, peppertree and kurrajong.

Vegetation present along Lovers Walk (Figure 14-2) includes pepper trees, cherry plum (*Prunus cerasifera*), large leaf privet (*Ligustrum lucidum)* and English elm.

The vegetation present is not considered to provide significant habitat for threatened fauna species, but may be used for seasonal foraging by native and exotic bird species, mainly, but not limited to, the passerine order.

14.2.1 Asset Values

The asset values for the eastern portal precinct are described in Table 14-1.

Table 14-1 Asset / values for the eastern portal precinct

Asset / value	Details
Planted vegetation including indigenous and non-indigenous species	The removal of the trees would need to be offset in accordance with the Guidelines. A further 19 planted 'indigenous' trees were identified in the eastern portal that would require a permit for removal and relevant offset (refer Technical Appendix S *Arboriculture* for further details). There is one (non-indigenous *Flora and Fauna Guarantee Act 1988* listed species in the area.

Figure 14-1 Large sugar gum present within South Yarra Siding Reserve to be retained.

Figure 14-2 Vegetation present along Lovers Walk.

14.3 Key Issues

The key issues associated with the Concept Design TBM Shaft in the rail reserve between Osborne Street and the existing Sandringham line relate to the removal of some indigenous planted vegetation requiring planning approval and offsetting under the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines* and relevant offset. There are 19 indigenous planted trees that would require a permit. This is considered in the risk assessment in relation to **Risk #TE006**.

14.4 Benefits and Opportunities

The benefits and opportunities associated with the Concept Design relate to the potential for indigenous amenity and reinstatement or offset plantings.

14.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 14-2 Draft evaluation objectives and assessment criteria for the Eastern Portal precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

South Yarra Siding Reserve does not contain any remnant vegetation of significant fauna habitat. Large trees present are sugar gums (not indigenous), but may present non-significant roosting habitat for some threatened birds and mammals. There is an opportunity to improve the habitat of the area through post construction plantings.

Some of the trees present within the reserve are indigenous, however these tend to be smaller, and likely, more recently established. Planning approval would be required for their removal and a relevant offset applied.

14.6 Environmental Performance Requirements

Table 14-3 below provides the recommended Environmental Performance Requirements and proposed mitigation measures for the precinct.

Table 14-3 Environmental Performance Requirements for the precinct

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
Planted vegetation including indigenous and non-indigenous species	Potential for loss, of or impact, to landscaping elements containing a mix of indigenous and native species from the eastern portal precinct This could result in loss of or impact to some mature trees that may provide habitat for roosting a variety of bird birds.	Re-establish trees to replace loss of canopy cover and achieve canopy size equal to (or greater than) healthy, mature examples of the species in Melbourne. Consult with the City of Stonnington. Policy documents that must be followed to re-establish trees and valued landscape character include: • The City of Stonnington's General Local Law 2008 (No 1) and City of Stonnington Street Tree Strategy • Any associated precinct plans	Construction methodology as per Table 7-4.	TE006
		Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity. Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered.		
		Develop and implement measures to avoid the spread or introduction of weeds and pathogens during construction, including vehicle hygiene.		

15 Precinct 9: Western Turnback

15.1 Project Components

The western turnback located at West Footscray option is located entirely within the rail corridor.

The main relevant construction activities relating to turnback are track re-alignment and construction of a new platform. All activities would be conducted within the existing rail corridor.

15.1.1 Operation

No terrestrial flora and fauna issues are envisaged in the operational phase.

15.2 Existing Conditions

The western turnback is located in a highly disturbed and modified landscape recently 'revitalised' as part of the new West Footscray station precinct upgrade (Figure 15-1). The area is generally characterised by the pedestrian rail interchange and associated landscaping. While some of the planting is native themed, the plantings are generally too young to provide any useful habitat.

Figure 15-1 General environment of the West Footscray turnback

15.2.1 Asset Values

The asset values for the Western Turnback precinct are described in Table 14-1.

Table 15-1 Asset / values for the Concept design for the Western Turnback precinct

Asset / value	Details
Planted trees including indigenous and non-indigenous species	A variety of native and exotic vegetation was recently established as part of the West Footscray station precinct upgrade. No remnant trees or vegetation occur in the vicinity of the site.

15.3 Key Issues

There are no terrestrial flora and fauna issues considered relevant for the Concept Design.

15.4 Benefits and Opportunities

The benefits and opportunities relate to the potential for indigenous amenity and reinstatement or offset plantings.

15.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 15-2 Draft evaluation objectives and assessment criteria for the Western Turnback precinct

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

The western turnback precinct contains no habitat, or presence of EPBC Act-listed or *Flora and Fauna Guarantee Act 1988* listed flora or fauna species. The study area has been cleared of native vegetation.

The project is consistent with draft EES evaluation objective for biodiversity as:

- There is no impact on the terrestrial ecology values within this precinct
- No remnant vegetation or threatened species habitat is located within the proposed works area.

15.6 Environmental Performance Requirements

The recommended Environmental Performance Requirements and proposed mitigation measures for this precinct are the same as for Precinct 2 - Western Portal (Kensington) as shown in Table 8-3.

16 Early Works

16.1 Project Components

A number of early works would be required prior to the commencement of the main construction works. The early works all comprise modifications, temporary works, relocations or new works associated with existing utilities and services as follows:

- Electrical
- Sewer
- Gas
- Water
- Stormwater
- Communications
- Tram works.

All these works are associated with the stations and the portals. The only works of relevance to terrestrial ecology are those impacting upon indigenous vegetation. These are likely to relate to works requiring the removal of or impacting the root zone of indigenous street trees or amenity trees (refer to arboriculture impact assessments).

16.2 Existing Conditions

16.2.1 Asset Values

The asset values for the early works are detailed in Table 16-1. In general, early works seek to modify existing services as they relate to water, sewerage, drainage, power, telecommunications and tramways. Most of the activities associated with the early works component are small-scale and located in previously developed areas, therefore limiting potential impact to biodiversity. Some requirements may impact on the root zone of existing street trees.

Table 16-1 Asset / values for the early works

Asset / value	Details
Planted vegetation including indigenous and non-indigenous species	Potential impact to the tree retention zone (TRZ) of a number of native and exotic street trees throughout the proposed project boundary. Specific assessments are reported in Technical Appendices R and S *Arboriculture*.

16.3 Key Issues

The key issues associated with the Concept Design are identified in Table 16-2. Terrestrial ecology issues associated with early works are considered in the risk assessment in **Risk #TE001**.

Table 16-2 Key issues associated with the Concept Design

Concept Design	Issue
As above.	Potential impact to existing street trees.

16.4 Benefits and Opportunities

There are no benefits or opportunities associated with early works as no trees would be removed for them.

16.5 Impact Assessment

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Table 16-3 Draft EES evaluation objectives and assessment criteria for early works

Draft EES evaluation objectives	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

There is a very low likelihood of any threatened species issues (habitat or location) being relevant to early works given the location, as with other project elements, within central Melbourne. Also, as no native vegetation as EVC is present, the project would not present issues in this regard. There is potential for indigenous planted trees to be impacted by early works, which have been addressed in Technical Appendix R and S *Arboriculture*.

16.6 Environmental Performance Requirements

Table 14-3 below provides the recommended Environmental Performance Requirements and proposed mitigation measures for the early works.

Table 16-4 Environmental Performance Requirements for the precinct

Asset / value	Impact	Environmental Performance Requirements	Proposed mitigation measures	Risk no.
Planted vegetation including indigenous and non-indigenous species	Potential for loss, of or impact, to street trees in close proximity to utilities (gas, electrical water supply, sewer, telecommunications) that may require alteration in preparation for construction.	Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity. Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered.		TE001

17 Environmental Performance Requirements

This section provides a consolidated list of the recommended Environmental Performance Requirements and proposed mitigation measures identified as a result of this impact assessment. Table 17-1 provides the Environmental Performance Requirements which apply across the project and on a precinct basis, linked to the EES evaluation objective.

Many of the suggested Environmental Performance Requirements seek to protect existing flora and fauna assets in close proximity to works through suitable Environmental Management Plan inputs such as implementation of tree protection zones. Management of any fauna management requirements associated with the removal of unavoidable vegetation (native or exotic) that may be utilised as habitat, would be achieved through the use of licenced wildlife handlers to clear any nests, nesting hollows of birds and possums or any other animals in residence.

Table 17-1 Environmental Performance Requirements

Draft EES evaluation objective	Impact	Environmental Performance Requirements	Proposed mitigation measures	Precinct	Timing	Risk no.
Biodiversity - To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting	Potential impact to existing trees (native and exotic) that provide habitat for the grey-headed flying-fox from proximity of Fawkner Park construction site and Fawkner Park emergency access shaft.	Prior to construction commencing of main works or shafts in affected areas, prepare and implement Tree Protection Plans for each Precinct in accordance with AS4970-2009 Protection of Trees on Development Sites, addressing the detailed design and construction methodology of the project. Within precincts 1, 4 and 7 a Tree Protection Plan must be developed for each heritage place as relevant to the satisfaction of Heritage Victoria or the responsible authority.	Develop and implement measures to minimise impacts on all native and non-native vegetation and fauna habitat through detailed design and construction methodology, including: • Minimise the removal of mature trees • Protect trees (native and exotic) where they occur in close proximity to work areas • Minimising footprint and surface disturbance/compaction of temporary and permanent works • Fencing defined protected areas and no go zones for protected native vegetation • Managing the spread and introduction of weeds and pathogens during construction • Appoint a site ecologist and qualified wildlife handler (if separate to site	Tunnels	Construction	TE003

Draft EES evaluation objective	Impact	Environmental Performance Requirements	Proposed mitigation measures	Precinct	Timing	Risk no.
			ecologist) • Wildlife handler to hold appropriate permits for works that may impact on habitat for protected fauna • Areas for site offices, car parking, machinery access and stockpiling are to be contained within designated areas that are clearly demarcated.			
	Potential for loss of or impact to landscaping elements and street trees (indigenous and native species, including some mature trees).	Re-establish trees to replace loss of canopy cover and achieve canopy size equal to (or greater than) healthy, mature examples of the species in Melbourne. Consult with the City of Melbourne, the City of Port Phillip, the City of Stonnington, the Shrine of Remembrance and Shrine Trustees and Heritage Victoria as applicable. Policy documents that must be followed to re-establish trees and valued landscape character include: • The City of Melbourne's Tree Retention and Removal Policy and Urban Forest Strategy • The City of Port Phillip's Community Amenity Local Law No. 1 and Greening Port Phillip - An Urban Forest Approach • The City of Stonnington's General Local Law 2008 (No 1) and City of Stonnington Street Tree Strategy • Any associated precinct plans • Specific policies of the Domain Parklands Conservation Management Plan (CMP), for trees within Domain Parklands • Shrine of Remembrance: Shrine of	As above, for Tree Protection Plan Prepare a detailed re-instatement and revegetation plan to the satisfaction of the MMRA.	Tunnels	Construction	TE005 TE006

Draft EES evaluation objective	Impact	Environmental Performance Requirements	Proposed mitigation measures	Precinct	Timing	Risk no.
		Remembrance CMP (Lovell Chen, 2010) or any future review and the Shrine of Remembrance Landscape Improvement Plan (Rush Wright Associates, 2010) • South African Soldiers Memorial: Any relevant CMP for the South African Soldiers Memorial • Fawkner Park Conservation Analysis (Hassell, 2002) and the Fawkner Park Masterplan (City of Melbourne, 2005) • The preferred future character of the University of Melbourne, for trees in the grounds of the University of Melbourne.				
		Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity. Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered.		All precincts	Construction	
		Develop and implement measures to avoid the spread or introduction of weeds and pathogens during construction, including vehicle hygiene.		All precincts	Construction	TE005 TE006
	Potential loss or impact to 10	Where ‘unavoidable’ native vegetation (as defined under relevant policy) needs	Develop and implement measures to minimise impacts on all native vegetation and fauna	All precincts	Construction	TE005 TE006

Draft EES evaluation objective	Impact	Environmental Performance Requirements	Proposed mitigation measures	Precinct	Timing	Risk no.
	indigenous trees and six native FFG listed species within the Arden station precinct	to be removed, meet the requirements of the *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines*.	habitat through detailed design and construction as per above. Minimise removal of existing vegetation. Offset loss of existing vegetation with replacement planting at a ratio as required by relevant project approvals.			
	Potential removal of a number of exotic street trees, some of which may provide some roosting habitat for a variety of bird species	Refer to Environmental Performance Requirements for Tunnels above.	Construction methodology as per above. Minimise removal of existing vegetation. Offset loss of existing vegetation with replacement planting at a ratio >1:1. Offset loss with a more ecologically relevant planting mix that achieves the amenity purpose.	All precincts	Construction	TE006
	Potential for loss, of or impact, to street trees in close proximity to utilities (gas, electrical water supply, sewer, telecommunications) that may require alteration in preparation for construction	Prior to site clearance for construction, all vegetation being removed is to be inspected by a suitably experienced and qualified environmental officer for habitat features and fauna occupancy. Where non-listed species (native and exotic) are encountered, any individuals will be encouraged to leave the tree or vegetation. Where nests/young are encountered, they will be relocated to a similar tree (or habitat) in close proximity. Prior to site clearance for construction, develop a translocation plan for the management of listed fauna species if encountered.		Western portal Arden Parkville CBD North CBD South Domain Eastern portal	Construction	TE001

18 Conclusion

This report documents the outcomes of an assessment of the risks to terrestrial flora and fauna from activities associated with construction and operation of Melbourne Metro.

The focus for the assessment is indigenous flora and fauna issues relating to relevant state and federal environmental legislation and permit requirements, including remnant/indigenous vegetation and threatened species.

18.1 Relevant EES objectives

The following draft EES evaluation objectives and assessment criteria (and indicators where relevant) are relevant to this assessment.

Draft EES evaluation objective	Assessment criteria
Biodiversity objective: To avoid or minimise adverse effects on native terrestrial and aquatic flora and fauna, in the context of the project's components and urban setting.	Protect significant vegetation (including non-invasive exotic vegetation), functioning of natural ecosystems (including terrestrial and aquatic flora and fauna) and maintain biological diversity.

The project is consistent with draft EES evaluation objective as:

- There is little remnant or indigenous vegetation remaining in the study area due to the location within central Melbourne
- Given the lack of intact indigenous vegetation, very little habitat for threatened species or other indigenous biodiversity remains in the study area
- Where other biodiversity issues have been encountered, largely relating to planted indigenous vegetation, the Concept Design has been able to minimise or avoid such features, generally apparent as scattered indigenous trees
- Unavoidable indigenous or otherwise relevant trees, subject to the requirements of Victoria's *Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines* would be offset accordingly in-line with the no net loss directive of biodiversity management in Victoria
- No referral or permit requirements relating to state or federal threatened species area required.

18.2 Impact Assessment Summary

The assessment addresses the specified EES Scoping Requirements and specifically evaluates potential impacts to terrestrial flora and fauna based on the assessment criteria.

A risk assessment process was adopted that identified potential construction and operational hazards, impact pathways, consequences to values (terrestrial flora and fauna) and likelihood of impacts. Risk to values was determined as the combination of consequence and likelihood. Where possible, mitigation measures were identified to reduce risks.

To inform the risk assessment, the current condition of the study area was assessed in relation to the presence and quality of indigenous vegetation and the habitat potential for relevant threatened species was described. A review of existing biodiversity databases held by state and federal environmental departments was made to determine the flora and fauna issues that needed to be specifically addressed with in the assessment.

Although little indigenous biodiversity remains in the study area, vegetation including indigenous trees species were mapped and assessed and, where unavoidable, included in the project permit requirements.

Relevant offsets included with permit conditions would help limit the long term impact of the project on biodiversity.

The Concept Design involves:

- The loss of 29 native trees that are listed under the *Flora and Fauna Guarantee Act 1988,* some of which are clearly planted
- The loss of 41 indigenous trees that are subject to the requirements of Victoria's *Permitted Clearing Regulations.*

Suitable offsets would need to be applied to compensate for the loss of these biodiversity resources from the study area.

Environmental Performance Requirements were identified that in all instances minimise impacts to terrestrial flora and fauna and on this basis all project risks to terrestrial flora and fauna are considered low.

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Appendices

Appendix A
Legislation

Summary of Relevant Legislation

Policy / legislation	Description
Federal	
***Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)**	The EPBC Act has significant implications for natural resource and environmental management in Australia. This Act provides for the listing of threatened species, threatened ecological communities and key threatening processes. It also relates to actions likely to have a significant impact on matters of national environmental significance (MNES). There are nine MNES: • World Heritage Sites • National Heritage Places • Ramsar Wetlands • Nationally threatened species and ecological communities • Migratory species • Commonwealth marine areas • Nuclear actions • The Great Barrier Reef Marine Park • Water resources from coal seam gas development or large coal mining development.
State	
***Environment Effects Act 1978* (EE Act)**	The *Environment Effects Act 1978* provides for the assessment of actions that are capable of having a significant environmental effect. Actions which might have a significant environmental effect should be referred to the Victorian Minister for Planning, who decides if an Environment Effects Statement (EES) is required. An EES might be required where: • There is a likelihood of regionally or state significant adverse environmental effects • There is a need for an integrated assessment of social and economic effects of a project or relevant alternatives • Normal statutory processes would not provide a sufficiently comprehensive, integrated and transparent assessment.
Flora and Fauna Guarantee Act 1988	The *Flora and Fauna Guarantee Act 1988* provides a framework for biodiversity conservation in Victoria. Threatened species and communities of flora and fauna, as well as threatening processes, are listed under this Act. A number of non-threatened flora species are also listed as protected under the *Flora and Fauna Guarantee Act 1988*. A Permit to Take is required to remove these species from public land.
DELWP (formally DEPI) Victorian Advisory Lists (VicAdv)	The DELWP Victorian Advisory Lists (VicAdv) are not a statutory list of threatened species, but rather list species for which conservation management is recommended by DELWP. The VicAdv lists are comprised of the *Advisory List of Rare or Threatened Plants in Victoria – 2014* (DEPI, 2014), the *Advisory List of Threatened Vertebrate Fauna in Victoria – 2013* (DSE, 2013), and the *Advisory List of Threatened Invertebrate Fauna in Victoria – 2009* (DSE, 2009). The presence, or likely presence, of a species listed on the VicAdv Lists is used to determine whether species specific habitat is required to be offset.
Planning and Environment Act 1987	Applications to remove, destroy, or lop native vegetation in Victoria invoke relevant municipal planning schemes and the *Planning and Environment Act 1987*, which are given authority through the Victorian Planning Provisions. A range of exemptions apply under this Act. Depending on the scale of the native vegetation clearance, statutory referral to the DELWP may be required.

Policy / legislation	Description
Permitted Clearing of Native Vegetation – Biodiversity Assessment Guidelines (Guidelines)	The purpose of these guidelines (DEPI, 2013b) is to guide how impacts on biodiversity should be considered when assessing an application for a permit to remove, lop or destroy native vegetation. For the purpose of these guidelines the term 'remove native vegetation' includes to lop or destroy native vegetation.
***Catchment and Land Protection Act* 1994 (CaLP Act)**	The CaLP Act defines requirements to: • Avoid land degradation • Conserve soil • Protect water resources • Eradicate and prevent the spread and establishment of noxious weed and pest animal species. The Act defines four categories of noxious weeds: State prohibited weeds, Regionally prohibited weeds, regionally controlled weeds and Restricted weeds. Noxious weeds species and the category they are placed in is specific to individual CMA regions.

Appendix B
Threatened Species

Threatened Fauna relevant to the study area (DELWP, 2015a)

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact								
				Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
Birds												
Accipiter novaehollandiae novaehollandiae	Grey goshawk	**FFG** Listed **Vic Adv** Vulnerable	Rainforests, forests; forest gullies and valleys; taller woodlands, timber on watercourses; open country in autumn dispersal.	**Possible.** May roost in large trees.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Possible.** May roost in large trees.	**Possible.** May roost in large trees.	**Unlikely**. Suitable habitat not present.
Actitis hypoleucos	Common sandpiper	**Vic Adv** Vulnerable	Shallow, pebbly, muddy or sandy edges of rivers and streams, coastal to far inland; dams, lakes, sewage ponds; margins of tidal rivers; waterways in mangroves or saltmarsh; mudflats;	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
			rocky or sandy beaches; causeways, riverside lawns, drains, street gutters.									
Alcedo azurea	Azure kingfisher	**Vic Adv** Near Threatened	Root-festooned banks of fresh or tidal creeks, rivers and streams in rainforest, lakes, swamps, estuaries, mangroves.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Anseranas semipalmata	Magpie goose	**FFG** Listed **Vic Adv** Near Threatened	Large seasonal wetlands and well-vegetated dams with rushes and sedges, wet grasslands, floodplains.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Ardea intermedia	Intermediate egret	**FFG** Listed	Freshwater wetlands, pastures and	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
		Vic Adv Endangered	croplands, tidal mudflats, floodplains.	present.	present.	present.	present.	present.	present.	present.	present.	present.
Ardea modesta	Eastern great egret	**FFG** Listed **Vic Adv** Vulnerable	Shallows of rivers, estuaries, tidal mudflats, freshwater wetlands; sewage ponds, irrigation areas, larger dams etc.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Aythya australis	Hardhead	**Vic Adv** Vulnerable	Deep, permanent wetlands, large open waters, brackish coastal swamps, farm dams, ornamental lakes, sewage ponds.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Biziura lobata	Musk duck	**Vic Adv** Vulnerable	Well-vegetated swamps, wetlands,	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not	**Unlikely**. Suitable habitat not

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
			both brackish and fresh, lakes, reservoirs, shallow bays, inlets; occasionally at sea.	present.	present.	present.	present.	present.	present.	present.	present.	present.
Chelodina longicollis	Common long-necked turtle	**Vic Adv** Data deficient	Typical inhabitant of swamps, oxbow lakes and billabongs, or slow-moving rivers. Sometimes extensive overland migrations occur in summer. Feeds on a variety of aquatic organisms - molluscs, crustaceans, tadpoles and small fishes. Usually lays	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
			eggs in banks.									
Egretta garzetta nigripes	Little egret	**FFG** Listed **Vic Adv** Endangered	Tidal mudflats, saltmarshes, mangroves, freshwater wetlands, sewage ponds.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Gallinago hardwickii	Latham's snipe	**Vic Adv** Near Threatened	Freshwater or brackish wetlands, preferring to be close to protective vegetation cover.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Larus pacificus pacificus	Pacific gull	**Vic Adv** Near Threatened	Coasts, bays, offshore islands, coastal farmland, swamps, garbage tips; some follow rivers inland.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Lathamus discolor	Swift parrot	**EPBC** Endangered **FFG**	Migrates annually from breeding sites	**Unlikely** No impact to preferred	**Limited** Removal of one (non-	**Limited** Removal of eight (non-	**Unlikely** Suitable habitat not	**Unlikely** CBD location	**Unlikely** CBD location	**Limited** Removal of eight (non-	**Limited** Removal of one (non-	**Unlikely** Suitable habitat not

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact								
				Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
		Listed **Vic Adv** Endangered	in Tasmania to mainland Australia (autumn) where it ranges over the Box Ironbark Woodlands of the northern slopes. Species may migrate through the study area.	habitat trees	indigenous) feed tree (Spotted Gum).	indigenous) feed tree (Spotted Gum).	present.	hostile to the species.	hostile to the species.	indigenous) feed tree (Spotted Gum).	indigenous) feed tree (Spotted Gum).	present.
Ninox strenua	Powerful owl	**FFG** Listed **Vic Adv** Vulnerable	Pairs occupy a large, probably permanent, home range in mountain forests, gullies and forest margins, sparser hilly woodlands, coastal forests, woodlands, scrubs, exotic	**Likely.** May roost in large trees and forage across precinct.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Likely.** May roost in large trees and forage across precinct.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
			pine plantations, large trees in private/public gardens, some in cities.									
Nycticorax caledonicus hillii	Nankeen night heron	**Vic Adv** Near Threatened	Shallow margins of rivers, wetlands, mangrove-lined estuaries, offshore islands, floodwaters, garden trees.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Oxyura australis	Blue-billed duck	**FFG** Listed **Vic Adv** Endangered	Found on temperate, fresh to saline, terrestrial wetlands including sewerage ponds, rivers, salt lakes and saltpans. Preferring deep,	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
			permanent open water within or near dense vegetation.									
Phalacrocorax varius	Pied cormorant	**Vic Adv** Near Threatened	Coastal waters with sloping shorelines; estuaries, bays, tidal inlets, large inland lakes and rivers, irrigation ponds, coastal mangroves and offshore islands.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Frogs												
Litoria raniformis	Growling grass frog	**EPBC** Vulnerable **FFG** Listed **Vic Adv** Endangered	A largely aquatic species found among vegetation within or at the edges of permanent water – streams,	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
			swamps, lagoons, farm dams and ornamental ponds. Often found under debris on low, often flooded river flats. Frequently active by day.									
Mammals												
Miniopterus schreibersii GROUP	Common bent-wing bat	**FFG** Listed	By day in caves, old mines, stormwater channels and comparable structures including buildings. Found in well-timbered valleys.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.	**Unlikely**. Suitable habitat not present.
Pteropus poliocephalus	Grey-headed flying-fox	**EPBC** Vulnerable **FFG** Listed **Vic Adv** Vulnerable	Camps of this species are found in gullies, typically not far from water and usually in	**Known.** Large trees surroundin g the Portals may provide	**Unlikely**. May overfly site but suitable foraging and roosting	**Unlikely**. May overfly site but suitable foraging and roosting	**Unlikely**. May overfly site but suitable foraging and	**Unlikely**. May overfly site but suitable foraging and	**Unlikely**. May overfly site but suitable foraging and	**Known.** Large trees surroundin g the shrine may provide roosting	**Known**. Large trees surroundin g the shrine may provide roosting	**Unlikely**. May overfly site but suitable foraging and

Scientific Name	Common Name	Conservation Status	Habitat	Likelihood of impact								
				Precinct 1 Tunnels	Precinct 2 Western portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western turnback
			vegetation with a dense canopy.	seasonal foraging habitat.	habitat not present.	habitat not present.	roosting habitat not present.	roosting habitat not present.	roosting habitat not present.	and foraging habitat.	and foraging habitat.	roosting habitat not present.

Threatened Flora relevant to the study area (DELWP, 2015a)

Scientific Name	Common Name	Conservation Status	Habitat	Precinct 1 Tunnels	Precinct 2 Western Portal	Precinct 3 Arden station	Precinct 4 Parkville station	Precinct 5 CBD North station	Precinct 6 CBD South station	Precinct 7 Domain station	Precinct 8 Eastern portal	Precinct 9 Western Turnback
Tragus australianus	Small burr-grass	**Vic Adv** Rare	Grows on sandy soil and considered a native coloniser, tending to nuisance species in some areas.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.	**Unlikely**. Suitable habitat not present due to lack of native understorey throughout alignment.

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