

**Flora and Fauna Assessment
Proposed Rushall Railway Station Bike Path Bypass**



December 2014

Flora and Fauna Assessment for the Proposed Rushall Railway Station Bike Path Bypass

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Contents

1.	INTRODUCTION	6
1.1	Project scope	6
1.2	Subject site	7
1.2.1	Site description	7
1.2.2	Adjacent land	7
1.2.3	Landscape context	7
1.2.4	Geology and soils	7
1.2.5	Land-use history	7
1.2.6	Zoning and Overlays	8
2.	METHODS	9
2.1	Site assessment	9
2.2	Vegetation categorisation, classification and quality	9
2.2.1	Vegetation categories	9
2.2.2	Ecological Vegetation Classes	10
2.2.3	Vegetation quality assessment	10
2.2.4	Tree census and classification	10
2.3	Flora	11
2.3.1	Plant taxonomy	11
2.3.2	Existing information	11
2.3.3	Flora survey	11
2.3.4	Plant identification	11
2.3.5	Limitations of flora survey	11
2.4	Fauna	12
2.4.1	Fauna taxonomy	12
2.4.2	Existing information	12
2.4.3	New information	12
2.4.4	Limitations of fauna survey	12
2.5	Potentially occurring rare or threatened species	13
2.6	Mapping	13
3.	RESULTS	14
3.1	Historic records of vegetation at the site	14
3.2	Vegetation categorisation, classification and quality	17
3.2.1	Habitat Zone 1 (HZ 1)	18
3.2.2	Habitat Zone 2 (HZ 2)	19
3.2.3	Habitat Zone 3 (HZ 3)	20
3.2.4	Habitat hectare assessment	21
3.2.5	Tree census	22
3.3	Flora	23
3.3.1	State or nationally significant flora	23
3.4	Fauna and fauna habitat	23
3.4.1	State or nationally significant fauna	24
4.	RELEVANT POLICY AND LEGISLATION	25
4.1	Environment Protection and Biodiversity Conservation Act	25
4.1.1	Relevance to proposed development	26
4.2	Flora and Fauna Guarantee Act 1988	28
4.3	Planning and Environment Act 1987	28
4.3.1	State Planning Policy Framework	28

4.3.2	Zoning and overlays	29
4.3.3	Particular Provisions – Clause 52.17	30
5.	VICTORIA'S PERMITTED CLEARING OF NATIVE VEGETATION	32
5.1.1	Risk-based Pathway	32
5.1.2	Location risk	33
5.1.3	Appraisal of the path options relating to the extent of vegetation that may be removed	33
5.1.4	Low risk-based pathway	34
5.1.5	Application requirements	35
5.1.6	Referral authorities	35
5.1.7	Decision guidelines	35
5.1.8	Offsets	36
6.	SUMMARY AND CONSIDERATIONS FOR PROPOSED DEVELOPMENT	38
7.	REFERENCES	40

APPENDICES

Appendix 1.	Flora recorded at study site	42
Appendix 2.	Potentially occurring significant flora species	44
Appendix 3.	Potentially occurring significant fauna species	47
Appendix 4.	Maps	62

TABLES

Table 1.	Criteria for potential occurrence of significant species	13
Table 2.	Bioregional Conservation Status for extant EVCs at site	17
Table 3.	Habitat Hectare assessment	21
Table 4.	Scattered tree census	22
Table 5.	Summary of plant species recorded	23
Table 6.	Incidental fauna list recorded during site visit	23
Table 7.	Diagnostic characteristics and condition thresholds for Grassy Eucalypt Woodland of the Victorian Volcanic Plain	27
Table 8.	Determining risk-based pathway	32
Table 9.	Estimates of native vegetation loss for the path options and the fixed section of pathway	33
Table 10.	Risk-based pathways for proposed vegetation removal on site	34
Table 11.	Potentially occurring State and Nationally Significant fauna species	47

FIGURES

Figure 1.	Photo from 1898 looking south-east towards the railway bridge, to the north of the study site. Although this image does not show the study site itself, it provides some evidence of the extensive historic clearing within the area. Source: Melbourne Museum.	14
Figure 2.	Photo from 1989 looking south across the narrow Merri Creek Bridge towards Rushall Station. This photo shows that the escarpment was largely devoid of native vegetation at that time and that the first revegetation efforts were being undertaken. Source: Merri Creek Management Committee.	15
Figure 3.	Photo taken in October 2014 of the same view as above. Native vegetation is established and the station building is obscured from view.	15
Figure 4.	Photo looking east along the path adjacent to Rushall Station (northern side). Again showing the lack of native vegetation. With the exception of a young Drooping Sheoak in the background. It is likely that this was planted in early revegetation efforts by the Friends of Merri Creek. Source: Merri Creek Management Committee.	15
Figure 5.	An historic sign adjacent to the narrow bridge crossing the Merri. Source: Merri Creek Management Committee.	16
Figure 6.	A list of remnant species from 1992 prior to the significant revegetation at the site. Source: Merri Creek Management Committee.	16
Figure 7.	Habitat Zone 1 looking south-east	18
Figure 8.	Habitat Zone 1 looking north-west	18
Figure 9.	Habitat Zone 1 looking south-east and including remnant Sheoak	18
Figure 10.	Habitat Zone 1, indigenous shrubs adjacent to train platform	18
Figure 11.	Habitat Zone 1 looking north-west, from corner of underpass path	19
Figure 12.	Habitat Zone 1 looking south-east, adjacent to underpass path	19
Figure 13.	Habitat Zone 1 looking north-west, from turnoff to bridge over the Merri	19
Figure 14.	Habitat Zone 2, northern end	20
Figure 15.	Habitat Zone 2, southern end	20
Figure 16.	Habitat Zone 3, located in the west of the open, grassed area	20
Figure 18.	Decision making for low risk-based pathway applications	36
Figure 19.	Steps in determining offset requirements.	37

MAPS

Map 1.	Study site	63
Map 2.	Landscape context	64
Map 3.	Proposed Path Options and Native Vegetation	65

1. INTRODUCTION

Practical Ecology Pty Ltd was commissioned by Yarra City Council to undertake a flora and fauna assessment to assist with decision-making, regarding the potential development of a new pathway to bypass the underpass that runs beneath the station.

Yarra City Council aims to establish a new pathway that would link the Merri Creek Trail and the Capital City Trail in such a way that will encourage bike riders, in particular, to use the new link and avoid using the Rushall Station underpass. The current situation involves cyclists and pedestrians being funnelled through a narrow underpass that has become more and more problematic as cycling levels in the region have grown.

This report was sought to determine the ecological values of the site in order to provide input into the planning and decision-making process for finalising the route of the pathway. It will also serve to inform any decisions that are required in response to any relevant permit requirements for this proposal.

1.1 Project scope

In order to inform the decision-making process for the proposed Underpass Bypass pathway development at the Rushall Station site, the following activities were undertaken as part of the scope of works for this project:

- a study of the flora and fauna of the site, including:
 - the compilation of a list of all vascular plants including an assessment of their biological significance
 - identification and mapping of EVCs and habitat zones;
 - a review of information within the arborist's report prepared by Tree Dimensions (2014) for the site;
 - photographs of any remnant vegetation proposed for removal;
 - a review of relevant literature, flora and fauna records and habitat conditions on the site to determine the likelihood of the presence of EPBC listed flora and fauna.
- an assessment of existing and potential impacts on flora and fauna from the proposed development including:
 - a review of relevant biodiversity legislation, policies, strategies, conventions or agreements and recommendations
 - an assessment of the impact of the proposed development in regard to ecological values within the study area, and recommendations for how to best mitigate these impacts
 - recommendations for options that will result in the least impact on ecological values and whether there are any other considerations that could assist in reducing the impacts of the proposed development
 - documentation of any other considerations relevant to the potential ecological impact of the proposed development, including whether additional targeted surveys are required.

1.2 Subject site

1.2.1 Site description

The subject site (study area) comprises approximately 1 ha. It consists of an area of land to the east side of Rushall Railway Station, on the South Morang railway line, extending to the north between the railway line and the Merri Creek. The northern most extent is where the railway line curves to the east and crosses the creek via an elevated bridge.

The northern portion of the site is a wide, open grassed space with a few mature eucalypt trees. A sealed pathway runs along the eastern portion of this area. The study site narrows in the mid and southern assessment areas to include a portion of escarpment area of the Merri Creek that adjoins the Rushall Railway Station and its platform. A narrow, informal dirt track has been established at the top of the escarpment by pedestrian and bicycle traffic.

Associated with the station itself, are paved paths, barrier fencing and a revegetated garden bed that includes native and locally native plants.

Refer to Map 1 for an overview of the site.

1.2.2 Adjacent land

The land that is immediately adjacent to the study area comprises the railway line corridor to the west, beyond which is the Inner Circle Railway Linear Park (henceforth referred to as Linear Park), and to the east is the Merri Creek. In both directions, beyond these relatively linear corridors, the landscape is largely of urban, residential nature.

1.2.3 Landscape context

The site occurs within metropolitan Melbourne and as such is dominated by an urban environment. However, there are many natural features that are associated, in particular, with the Merri Creek, but also with Linear Park, which is associated with the Capital City Trail which extends to the west along Park Street.

There are other urban open parklands nearby including Edinburgh Gardens, 650 m to the south-west.

The site occurs within the Victorian Volcanic Plains Bioregion and the Port Phillip Catchment (DEPI 2013a).

1.2.4 Geology and soils

The underlying geology is quaternary basalt that produces yellow to dark clayey soils that are poorly drained. This basalt rock structure is clearly visible near the escarpment vegetation adjacent to Rushall Station, forming a cliff at a small bend in the Merri Creek.

1.2.5 Land-use history

Rushall Station was built in 1926–7 (City of Yarra 2014) and the associated land-use has been consistent with the primary use as a railway station ever since. Records, obtained via the Merri Creek Management Committee, demonstrate that although some limited revegetation effort was undertaken in the 1980s, the majority of revegetation commenced in 1992 and continued through to the early 2000s with some infill plantings of indigenous grasses and herbs. However, a species list of remnant indigenous plants compiled in 1992 shows

that despite being highly disturbed and modified a number of indigenous grasses, herbs and a shrub were remnant at the site.

1.2.6 Zoning and Overlays

Portions of the site outside of the railway corridor are zoned Public Park and Recreation Zone (PPRZ) and the land within the site associated with the railway corridor is zoned Public Use Zone – Transport (PUZ4).

Additionally, the site is subject to the following overlays:

- Design and Development Overlay – Schedule 1 (DDO1)
- Environmental Significance Overlay – Schedule 2 (ESO2). This ESO is for the Merri Creek and Environs to protect the environmental values of this system.
- Heritage Overlay (HO327)
- Land Subject to Inundation Overlay (LSIO)

The site also occurs within an area that is identified as an area of Aboriginal Cultural Heritage Significance which extends from the Merri Creek in both directions for at least 150 metres covering the entirety of the study site.

2. METHODS

2.1 Site assessment

A site assessment was undertaken by Yasmin Kelsall on 15th and 17th October 2014, involving

- the compilation of a list of vascular plants, including an assessment of their biological significance, recorded within the assessment site during the site visit;
- determination of habitat zones and their habitat score, and/or scattered trees according to DEPI procedures (as appropriate);
- a review of vegetation condition based on describing different qualities of remnant and exotic vegetation and types of weed infestation;
- a description of the existing and/or original Ecological Vegetation Classes found within the site;
- the preparation of a list of fauna species incidentally observed on site;
- the completion of a fauna habitat assessment to identify habitat important to fauna (e.g. for feeding, roosting, etc.) and determine the sites ability to support significant fauna species.

2.2 Vegetation categorisation, classification and quality

Vegetation was assessed for its categorisation according to *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Department of Environment & Primary Industries 2013), then its Ecological Vegetation Class and finally, quality, as determined through a Habitat Hectare assessment.

2.2.1 Vegetation categories

Vegetation in the study area was surveyed for categorisation as per the definitions within *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Department of Environment & Primary Industries 2013):

- **Native Vegetation**

Native Vegetation as per the Victorian Planning Provisions (Clause 72): plants that are indigenous to Victoria, including trees shrubs, herbs and grasses.

- **Remnant Vegetation**

Remnant patch of native vegetation is either:

- an area of vegetation where at least 25 % of the total perennial understorey plant cover is native
- any area with three or more native canopy trees where the canopy foliage cover is at least 20 % of the area

- **Scattered tree:**

A *scattered tree* is a native canopy tree that does not form part of a remnant patch. A canopy tree is a mature tree that is greater than 3 m in height and is normally found in the upper layer of a vegetation type.

2.2.2 Ecological Vegetation Classes

Ecological Vegetation Classes (EVCs) are a method of systematic organisation of plant communities into common types that occur in similar environmental conditions throughout Victoria. Each vegetation type is identified on the basis of its floristic composition (the plant species present), vegetation structure (woodland, grassland, saltmarsh), landform (gully, foothill, plain) and environmental characteristics (soil type, climate).

DEPI EVC mapping (DEPI 2013a) was accessed to assess the EVC likely to occur on the study area. EVCs were then identified in the field according to observable attributes including dominant and characteristic species consistent with the benchmark descriptions (DEPI 2013b).

2.2.3 Vegetation quality assessment

A Habitat Hectare assessment was undertaken to determine the condition of the vegetation and significance of areas of remnant vegetation. This methodology is outlined in *Vegetation Quality Assessment Manual–Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004b). The Habitat Hectare method involves making visual and quantitative assessments on various characteristics of native vegetation according to established criteria that are set against an optimum benchmark.

This process begins with the identification of the EVC. Each EVC has a benchmark of optimal values relating to the vegetation conditions. In addition to this, the ecological landscape context is scored, this is assessable via the DEPI Biodiversity Interactive Map (DEPI 2014b). If a site meets or exceeds all benchmark criteria, it will receive a total score of 100 %.

Large Old Tree

When undertaking a habitat hectare assessment a **Large Old Tree (LOT)** is a tree with a DBH equal to or greater than the large tree diameter as specified in the relevant EVC benchmark.

2.2.4 Tree census and classification

Victoria's Native Vegetation Management – A Framework for Action (DNRE 2002) places canopy species trees into one of three categories. The following definitions were taken from DSE (DSE 2007b) and the Port Phillip and Western Port Catchment Management Authority (PPWCMA 2006):

Very Large Old Tree (VLOT) is a tree with a Diameter at Breast Height (DBH) measured at 1.3 metres above ground, equal to or greater than 1.5 times the large tree diameter as specified in the relevant EVC benchmark.

Large Old Tree (LOT) is a tree with a DBH equal to or greater than the large tree diameter as specified in the relevant EVC benchmark.

Medium Old Tree (MOT) is a tree with a DBH equal to or greater than 0.75 of the large tree diameter in the relevant EVC benchmark, but less than the DBH for a large old tree.

Small Tree (ST) is a tree with a DBH equal to or greater than 0.25 of the large tree diameter in the relevant EVC benchmark but less than the DBH for a medium old tree.

All trees qualifying as scattered trees were assessed with the species determined, DBH measured and location mapped. Other indigenous trees were also assessed, including all VLOTs, LOTs, MOTs, and some smaller trees within HZs, including significantly-sized individual trees that are of non-canopy species.

All naturalised trees across the site were identified, the species determined, DBH measured and location mapped.

Tree Retention Zones

A tree retention zone is an area around the trunk of a tree which has a radius of 12 times the diameter at breast height to a maximum of 15 metres but no less than 2 metres. Dead trees should be protected with a radius of 15 metres from the base (DEPI 2013c).

2.3 Flora

2.3.1 Plant taxonomy

Plant taxonomy used in this report are generally in accordance with Walsh and Stajsic (2008) and/or Victorian Biodiversity Atlas (DEPI 2014c)

2.3.2 Existing information

Existing database records on the Victorian Biodiversity Atlas for a five kilometre radius around the study area was obtained (DEPI 2014c).

2.3.3 Flora survey

During the assessment, the study area was inspected on foot and all indigenous and naturalised vascular flora species were recorded. Some non-indigenous planted species were also noted but a definitive list not developed.

2.3.4 Plant identification

Species that could not be identified in the field were recorded to the nearest possible family or genera. These were then collected as per the protocols associated with Practical Ecology's *Flora and Fauna Guarantee (FFG) Act 1988* permit (No. 10006484) for the collection of plant material. In order to assist in the identification of some flora, major features of the specimens were collected where possible, including leaves, parts of branches, fruit and/or flowers.

2.3.5 Limitations of flora survey

The following considerations should be made regarding the limitations or otherwise of the flora survey:

- it was undertaken in spring which is a generally a good time for plant identification
- it is possible that some other species, particularly herbaceous species that can only be observed for a limited period of time, may not have been recorded during the present assessment
- flora surveys were undertaken over a short period of time and focussed on areas of the site most impacted upon by the proposed development
- some additional species are likely to be identified on-site with additional survey effort

- the list developed provides a very good indication of the ecological values on-site and additional efforts are very unlikely to significantly affect the study's conclusions.

2.4 Fauna

2.4.1 Fauna taxonomy

Animal taxonomy is consistent with the Victorian Biodiversity Atlas (DEPI 2014c).

2.4.2 Existing information

Existing information on the Victorian Biodiversity Atlas (DEPI 2014c) for a five kilometre radius around the study site was obtained.

2.4.3 New information

An incidental fauna survey was undertaken for this study as well as an assessment of fauna habitat on site. The habitat assessment relies upon making judgements on the suitability of habitat present within the study site for any significant species recorded on existing databases.

Potential habitat values considered include:

- old hollow-bearing trees
- organic litter, logs and rocks/boulders
- intact EVCs including the understorey strata
- connectivity to existing reserves and other remnant vegetation
- water bodies, wetlands or wet depressions
- dense vegetation

2.4.4 Limitations of fauna survey

Only an incidental fauna survey was undertaken. Given that focus was also given to undertaking other tasks it is highly likely some species were not observed. Furthermore, incidental fauna surveys are only likely to identify the very small subset of species active and occurring on-site during the time of assessment; many more species are likely to use the site than those identified in the very small timeframe of this survey.

Whilst this is the case, we are confident that our report is adequately informed as we have accessed all available fauna species records for the site via the Victorian Biodiversity Atlas. Furthermore, in the case of this site, there are a large number of species records as the site has been well surveyed relative to other locations that are perhaps more remote.

2.5 Potentially occurring rare or threatened species

Information derived from available databases was used to determine likelihood of occurrence of rare or threatened species that occur or are predicted to occur within five kilometres of the study area. In determining this 'likelihood of occurrence' and utilisation of the study area by national or state significant flora and fauna, the following factors were considered:

- the conservation status of the species and its distribution;
- previous recordings of species in the local area;
- date of last record;
- the habitat requirements of individual species;
- the physical attributes of the site, such as topography, geology, soils, aspect and other habitat features such as trees with hollows, the presence of rocks or boulders, logs on the ground;
- the history of land use at the study site; and
- how fragmented and modified the environment surrounding the study site is.

A basic matrix that describes the justification for the likelihood of occurrence is presented below.

Table 1. Criteria for potential occurrence of significant species

Likelihood of occurrence	Criteria
Nil	Species known to be extinct in local area and/or absent from the site.
Low	Unsuitable habitat at study site; or habitat conditions intermediate and records very limited and dated; or if it were present, it is highly likely to have been observed on site.
Moderate	Habitat conditions are intermediate, and/or optimal habitat conditions for species but local records limited or dated and/or if it were present, it is not likely to have been observed on site.
High	Optimal habitat conditions for species or species recorded at site, or intermediate habitat conditions but extensive local records and/or if it were present, it is not likely to have been observed on site.

2.6 Mapping

Geographical positioning data collection in the field for the purposes of map display was carried out using a combination of a handheld GPS device, aerial photography and existing site survey plans. Determination of vegetation boundaries was undertaken using a combination of GPS data and ground-truthing with aerial photography. Our maps are then prepared using ArcGIS version 10.2. Due to inaccuracy with GPS data the mapping should be considered approximate only.

3. RESULTS

The site comprised a mixture of built assets associated with the railway station and landscaped areas. There are areas of remnant indigenous vegetation, regenerated indigenous vegetation and recent indigenous and native plant revegetation.

3.1 Historic records of vegetation at the site

Historic records show that it is likely that much of the remnant native vegetation at the site was removed prior to the 1890's. Review of historic photographs, records and discussion with staff of the Merri Creek Management Committee staff have identified that from this time, it is likely that there was little native vegetation present at the site prior to 1992 when the Merri Creek Management Committee commenced a dedicated revegetation program. In 1992 a survey of remnant species at the site reveals that there were fifteen remnant indigenous species at the site (Figure 6) comprising one shrub species (Black Wattle *Acacia mearnsii*) and the remainder being grasses and herbs. The MCMC records show that revegetation was complemented with management of these remnant patches in order to enhance and conserve them in subsequent years throughout the 1990s and 2000s.



Figure 1. Photo from 1898 looking south-east towards the railway bridge, to the north of the study site. Although this image does not show the study site itself, it provides some evidence of the extensive historic clearing within the area. Source: Melbourne Museum.



Figure 2. Photo from 1989 looking south across the narrow Merri Creek Bridge towards Rushall Station. This photo shows that the escarpment was largely devoid of native vegetation at that time and that the first revegetation efforts were being undertaken. Source: Merri Creek Management Committee.



Figure 3. Photo taken in October 2014 of the same view as above. Native vegetation is established and the station building is obscured from view.



Figure 4. Photo looking east along the path adjacent to Rushall Station (northern side). Again showing the lack of native vegetation. With the exception of a young Drooping Sheoak in the background. It is likely that this was planted in early revegetation efforts by the Friends of Merri Creek. Source: Merri Creek Management Committee.



Figure 5. An historic sign adjacent to the narrow bridge crossing the Merri. Source: Merri Creek Management Committee.

Date observed.	Rushall station Escarpment. Remnant species list.
14/2/92	<p>Bab / Nany / Male.</p> <p><i>Acacia meunsi</i></p> <p><i>Chloris tuncata</i></p> <p><i>Danthonea racemosa</i></p> <p><i>Danthonea</i> spp.</p> <p><i>Elymus scabrus</i></p> <p><i>Senecio quadridentatus</i></p> <p><i>Veronica gracilis</i></p> <p><i>Vittidivina cuneata</i></p> <p>Wattle <i>Waltherbergia luteola</i></p> <p><i>Waltherbergia</i> ? communis.</p> <p><small>2004</small> <i>Stipa</i> (spp) <i>scabra</i> sp? <i>falcata</i></p> <p><i>Convolvulus erubescens</i>.</p> <p><i>Eriodra nutans</i>.</p> <p><i>Microlaena stipoides</i>.</p> <p><i>Stipa</i></p>

Figure 6. A list of remnant species from 1992 prior to the significant revegetation at the site. Source: Merri Creek Management Committee.

3.2 Vegetation categorisation, classification and quality

Three areas qualify as remnant patches (i.e. Habitat Zones (HZ)) under *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (Department of Environment & Primary Industries 2013) due to the cover of indigenous vegetation. The indigenous flora within these areas includes presumably remnant (i.e. not from planted origin) River Red-gums *Eucalyptus camaldulensis*, a range of planted species, some of which are successfully regenerating, and a relatively small number of cosmopolitan native species. There is a reasonable cover of native grass and some herbaceous species adjacent to the train platform. While it is difficult to be certain on the level of cover represented by remnant vegetation in this area, it appears that it is likely that the majority of the shrubs and trees that contribute to the indigenous cover are planted.

There are also scattered indigenous and non-indigenous trees, mainly within the northern section of the site, which is largely comprised of planted native plant beds, non-native grassed areas and non-vegetated areas.

Map 3 presents the indigenous vegetation on-site in terms of Habitat Zones and scattered trees; other indigenous trees are also presented, including all VLOTs, LOTs, MOTs, some smaller trees within HZs and some significant larger non-canopy species individuals.

A vegetation survey, undertaken by Biosis in 2001, indicates that EVC 895: Escarpment Shrubland is likely to be present on the site. The species present at the site (both revegetation and remnant/regenerated) on-site has been consistent with the creation of a similar community.

The Ecological Vegetation Classes on site and their bioregional conservation status within the Victorian Volcanic Plain bioregion are indicated in Table 2, below.

Table 2. Bioregional Conservation Status for extant EVCs at site

EVC No.	EVC	Bioregional Conservation Status
895	Escarpment Shrubland	Endangered
55_61	Plains Grassy Woodland	Endangered

3.2.1 Habitat Zone 1 (HZ 1)

Habitat Zone 1 (see figures 7–13, below) comprises an area of revegetation interspersed with small amounts of remnant and regenerating indigenous species along the top of an escarpment area associated with the Merri Creek. This Habitat Zone occurs within a relatively linear strip, on the northern side of the train line.

Within this Habitat Zone, is a mid-aged canopy of eucalypts, primarily River Red-gums *Eucalyptus camaldulensis*. But, which also include non-indigenous species, including Swamp Mahogany *Eucalyptus botryoides* and Swamp Gum *Eucalyptus ovata*.

There are also various other planted trees and shrubs, including: Drooping Sheoak *Allocasuarina verticillata*, Sweet Bursaria *Bursaria spinosa*, Sticky Hop-bush *Dodonaea viscosa*, Tree Violet *Melicytus dentatus* and Lightwood *Acacia implexa*. The groundstorey mostly consists of weedy grasses, but also includes some indigenous species that are possibly remnant or naturally regenerated; these include Rough Spear Grass *Austrostipa scabra*, Wallaby-grasses *Rytidosperma spp*, Ruby Salt-bush *Enchylaena tomentosa*, Creeping Saltbush *Atriplex semibaccata* and Small-leaf Clematis *Clematis microphylla*.



Figure 7. Habitat Zone 1 looking south-east



Figure 8. Habitat Zone 1 looking north-west



Figure 9. Habitat Zone 1 looking south-east and including remnant Sheoak



Figure 10. Habitat Zone 1, indigenous shrubs adjacent to train platform



Figure 11.Habitat Zone 1 looking north-west, from corner of underpass path

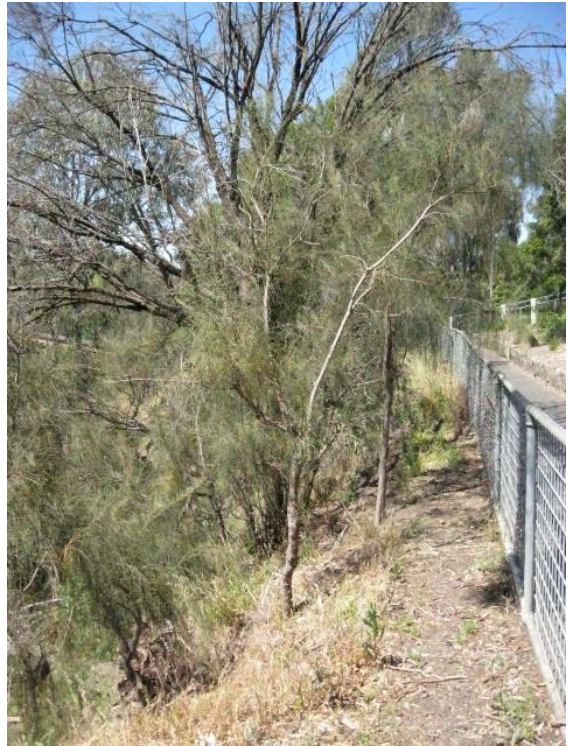


Figure 12.Habitat Zone 1 looking south-east, adjacent to underpass path

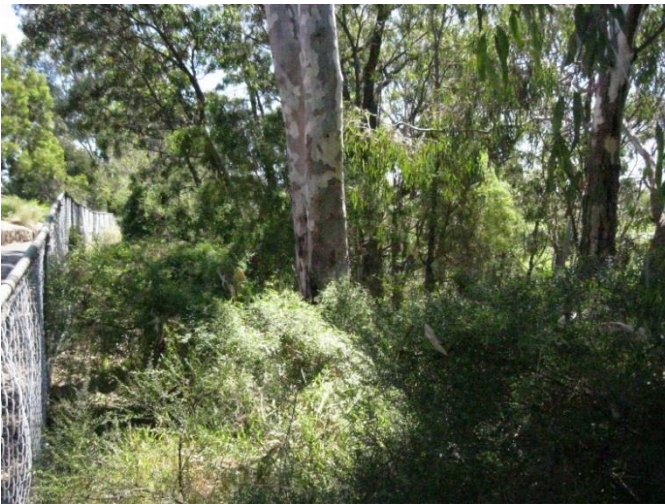


Figure 13.Habitat Zone 1 looking north-west, from turnoff to bridge over the Merri

3.2.2 Habitat Zone 2 (HZ 2)

Habitat Zone 2 (Figure 14 and Figure 15) is a planted, triangular-shaped garden bed adjacent to the railway station and surrounded by paved pathways.

It consists of some planted understorey shrubs, grasses and herbs. The shrubs include Lightwood, Rock Correa *Correa glabra*, Sweet Bursaria and Hop Goodenia *Goodenia ovata*. Planted groundstorey vegetation includes Spiny-headed Mat-rush *Lomandra longifolia*, Tall Tussock Grass *Poa labillardieri*, Weeping Grass *Microlaena stipoides* spp. *stipoides*, Stiped Wallaby-grass *Rytidosperma racemosum* and Kangaroo Grass *Themeda triandra*. These garden beds have been heavily mulched and there is a very low cover of grassy weed species.



Figure 14. Habitat Zone 2, northern end

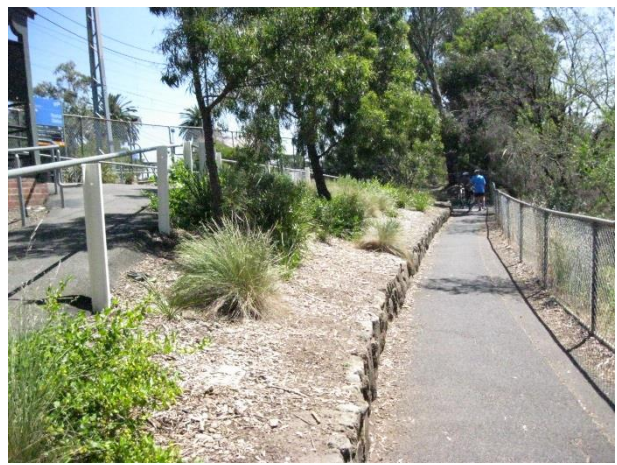


Figure 15. Habitat Zone 2, southern end

3.2.3 Habitat Zone 3 (HZ 3)

Habitat Zone 3 (Figure 16) comprises of a group of three canopy trees, and some shrubs. It is likely that under natural conditions these trees would be associated with Plains Grassy Woodland EVC.

In addition to the canopy of Manna Gums, there is also a small cluster of Blackwood shrubs beneath.

The groundstorey is wholly comprised of exotic grassy and herbaceous weed species with Kikuyu **Pennisetum clandestinum* dominating.



Figure 16. Habitat Zone 3, located in the west of the open, grassed area

3.2.4 Habitat hectare assessment

Table 3, below, presents the results of the Habitat Hectare assessments carried out on site. The higher rating for HZ2 is somewhat artificial, as it is due to the higher 'lack of weeds' score which is a result of the sparse groundstorey and use of mulch.

Table 3. Habitat Hectare assessment

Habitat Zone			1	2	3
Bioregion			VVP	VVP	VVP
EVC Name (initials)			ES	ES	PGW
EVC Number			895	895	55_61
EVC Conservation Status			EN	EN	EN
Size of Zone (ha)			0.320	0.009	0.041
		Max Score	Score	Score	Score
Site Condition	Large Old Trees	10	8	0	10
	Canopy Cover	5	5	0	5
	Understorey	25	15	5	0
	Lack of Weeds	15	2	13	0
	Recruitment	10	3	1	0
	Organic Litter	5	5	5	2
	Logs	5	0	0	0
	EVC Standardiser		1	1	1
	Standardised Site Score	75	38	24	17
Landscape value	Patch Size	10	2	2	2
	Neighbourhood	10			
	Distance to Core	5			
Habitat points		100	40	26	19
No. of Large Old Trees			3	0	1

3.2.5 Tree census

All trees onsite qualifying as scattered trees were assessed with the species determined, DBH measured and location mapped. Other trees within patches of native vegetation were also assessed and the DBH measured in most cases to compare and confirm the results within the arborist's report. Other non-indigenous trees outside of habitat zones were also assessed.

Other trees within the study area for this report were also assessed in the manner described above, but as they are incorporated into Habitat Zones, they have not been reported upon separately, as scattered trees, here.

Map 3 provides the location of each of these trees and shows their Tree Protection Zones.

The results of the tree census are summarised in Table 4, below, and Tree Retention Zone diameters are also provided for indigenous and native scattered trees.

Table 4. Scattered tree census

Tree number	Scientific Name	Common Name	Indigenous?	Planted?	DBH (m)	TPZ (m)
72	<i>Eucalyptus camaldulensis</i>	River Red Gum	Y	Y	0.77	9.24
73	<i>Eucalyptus camaldulensis</i>	River Red Gum	Y	Y	0.41	4.92
74	<i>Eucalyptus camaldulensis</i>	River Red Gum	Y	Y	0.51	6.12
75	<i>Eucalyptus melliodora</i>	Yellow Box	Y	Y	0.53	6.36
76	<i>Eucalyptus camaldulensis</i>	River Red Gum	Y	Y	0.52	6.24
77	<i>Eucalyptus maculata</i>	Spotted Gum	N	Y	0.82	9.84
78	<i>Eucalyptus maculata</i>	Spotted Gum	N	Y	0.38	4.56

*Tree numbers have been assigned to provide consistency with the arboricultural assessment undertaken at the site by Tree Dimensions (Galbraith 2013). There are trees that were assessed by Practical Ecology and not by Tree Dimensions (2013) these being trees 76 to 78, which were located to the west of the Tree Dimensions (2013) study area.

3.3 Flora

A total of 55 plant taxa were recorded in the study area; of these, 24 species were considered to be consistent with likely indigenous vegetation that would have formerly occurred at the site (i.e. planted and now regenerating or remnant). Four species were considered to be Victorian native plants but unlikely to have ever occurred at the site and 27 species were exotic.

Appendix 1 lists all flora recorded within the study site, including an assessment of whether their presence was due to planted specimens only. Table 5, below, summarises plant taxa recorded in the study area during this survey.

Table 5. Summary of plant species recorded

Flora Status	Number of Taxa
Indigenous vascular species	24
Exotic species	27
Native species outside of natural range	4
TOTAL	55

3.3.1 State or nationally significant flora

No species of state or national significance were recorded on-site.

A search for nationally or state significant flora species recorded within 5 km of the site area in VBA (DEPI 2014c) revealed 12 species. None of these species were considered as being highly likely to occur on site. Some species with local records were most likely due to the result of revegetation or garden plantings locally.

Appendix 2 lists the species recorded on the VBA and its likelihood of occurrence within the site.

3.4 Fauna and fauna habitat

An incidental fauna list was taken during fieldwork. Conditions on the first day were poor for observation of fauna species as the weather was cold with gusty winds and occasional rain storms. On the second day, the weather was fine and sunny with temperatures in the low twenties. The results of the survey are presented in Table 6 below.

Table 6. Incidental fauna list recorded during site visit

Origin	Common name	Scientific name
	Australian Magpie	<i>Cracticus tibicen</i>
	Australian Wood Duck	<i>Chenonetta jubata</i>
	White-faced Heron	<i>Egretta novaehollandiae</i>
	Little Raven	<i>Corvus mellori</i>
	Noisy Miner	<i>Manorina melanocephala</i>
	Red Wattlebird	<i>Anthochaera carunculata</i>
*	Common Blackbird	<i>Turdus merula</i>
*	Indian Myna	<i>Acridotheres tristis</i>
	Small White (Cabbage Butterfly)	<i>Pieris rapae</i>

Given that an incidental fauna survey is only likely to identify a very small subset of species active and occurring on site, during the time of assessment, and that many more species are likely to use the site than those identified. The main focus with regards to fauna is the consideration of the site's potential to provide fauna habitat. The habitat observed within the site included:

- leaf litter, logs and rocks/boulders
- the adjoining creek and a small backwater providing a swampy area
- tree canopies and shrubs
- while tree hollows were not observed during a quick look around, there is potential for them to occur given the size and age of the trees present
- dense understorey vegetation
- grassy understorey vegetation.

The habitat on site is connected via a linear corridor of varying habitat quality and in general will require highly mobile species or species adapted to urban environments for its utilisation. Avifauna are the most diverse group of vertebrates that may potentially utilise the site. Mammals that are likely to occur include the Common Ringtail Possum and Common Brushtail Possum, Grey-headed Flying-fox, microbats, Black Rat and House Mouse. Snakes and skinks, such as Eastern Blue-tongue Lizards and several smaller skinks, are also likely to occur.

3.4.1 State or nationally significant fauna

No fauna of state or national significance was recorded during the site inspection.

A total of 42 state or nationally significant fauna species are recorded within a five-kilometre radius of the study area in the VBA (DEPI 2014c). Details of these species are given in Appendix 3.

Four species are considered to have a 'high' likelihood of using the habitat within the study site, the Grey-headed Flying-fox, Powerful Owl, Eastern Great Egret and Nankeen Night-heron and three a 'medium to high' likelihood, the Australian Grayling, Macquarie Perch and Azure Kingfisher. The remainder were considered to be of moderate to low likelihood for utilising the site.

Of the seven species with most likelihood potential to use the site, the two fish species and the Eastern Great Egret would be restricted to habitat associated with the Merri Creek.

However, the remaining four species (Grey-headed Flying-fox, Powerful Owl, Nankeen Night Heron and Azure Kingfisher) would possibly utilise the terrestrial and vegetation adjacent to the creek either for roosting, foraging/hunting and possibly nesting. Observations by Alice Ewing (a zoologist at Practical Ecology), who lived locally in the area and visited the study site many times during the late 1980s through to the early 2000s, has observed many Grey-headed Flying Foxes, and an Azure Kingfisher flying over the identified study area, and particularly, foraging along the adjacent creek corridor (Alice Ewing, pers. comm.).

Although this is the case, the bicycle path proposal is unlikely to significantly affect the tree or shrub cover within the study site, being the dominant habitat type for these species, rather than ground-storey vegetation.

Furthermore, some of these species are relatively well adapted to utilising other portions of the urban environment.

4. RELEVANT POLICY AND LEGISLATION

The following section explores relevant policy and legislation pertaining to the ecology from the national level through to the local level.

4.1 Environment Protection and Biodiversity Conservation Act

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to sites where proposed developments or projects may have a significant impact on matters of National Environmental Significance (NES). There are currently seven matters of National Environmental Significance:

- World Heritage properties
- National Heritage places
- nationally listed threatened species and ecological communities
- listed migratory species
- Ramsar wetlands of international importance
- Commonwealth marine areas
- nuclear actions (including uranium mining).

Under the EPBC Act, a proponent must refer proposed actions that may have a significant impact on matters of national environmental significance to the Australian Government Environment Minister (or delegate). After receiving a referral the minister may decide that the action:

- is likely to have a significant impact on a matter of national environmental significance, and then the action requires approval under the EPBC Act (it is a controlled action)
- is not likely to have a significant impact on a matter of national environmental significance, and then the action does not require approval under the EPBC Act (it is a not controlled action)
- is not likely to have a significant impact on a matter of national environmental significance, and does not require approval under the EPBC Act, because it will be taken in a 'particular manner'. However, the action must be undertaken in a way that is consistent with the manner specified in this decision, or penalties apply.

The minister is generally required to make a binding decision on whether an action requires approval within 20 business days of receiving a referral. If the minister's decision is that an action does not require approval, a person will not contravene the Act if the action is taken in accordance with that decision.

4.1.1 Relevance to proposed development

Listed fauna

The Macquarie Perch (En), Australian Grayling (Vu) and Grey-headed Flying-fox (Vu) are all EPBC listed species that were determined to have a high likelihood of utilising the study site. Whilst the two fish species have moderate to high numbers of local and recent records, as they are limited to the waterway, it is considered unlikely that they will be affected by the proposed pathway that will be developed wholly within the terrestrial environment. However, this development should occur in accordance with an appropriate Construction Management Plan that includes adequate protections for biodiversity and waterway health, particularly erosion and sediment control.

The Grey-headed Flying-fox is known to utilise the Merri Creek to travel to and from its main Melbourne roost within Yarra Bend Park and foraging habitat. However, this species is highly adapted to utilising a wide range of urban habitats for its food sources and the impact of the proposed works upon the habitat values at the site is likely to be low. On this basis we do not consider that the development of the site will have a significant impact on the species.

Listed flora

There are no EPBC listed flora species that are likely to occur on site, and as such the proposal is not likely to have a significant impact on such species.

Listed communities

Habitat Zone 3 was identified as potentially comprising Plains Grassy Woodland. Whilst this EVC is synonymous with the EPBC-listed vegetation community, *Grassy Eucalypt Woodland of the Victorian Volcanic Plain*, to qualify as a remnant patch of this community diagnostic characteristics and condition thresholds must be met. This patch comprises of just three planted Manna Gum trees and a couple of Blackwoods with no groundstorey native vegetation present.

Table 7, below, presents these criteria and indicates that the vegetation on site do not meet them, and as such require no further consideration under the EPBC Act.

Summary

Development within the study site is not likely to have a significant impact on species, nor any other matters of environmental significance protected under this Act.

Table 7. Diagnostic characteristics and condition thresholds for Grassy Eucalypt Woodland of the Victorian Volcanic Plain

	Criteria	Habitat Zone 3
Key Diagnostic Characteristics	Distribution is limited to the Victorian Volcanic Plain Bioregion	
	Occurrences are limited to Quaternary basalt soils on low elevation plains and stony rises on the basalt flows.	Yes
	The tree canopy is typically dominated by <i>Eucalyptus camaldulensis</i> (River Red-gum) but may be dominated by other species in response to variations in rainfall and/or localised landscape features.	Yes (but planted)
	The understorey is dominated by a native ground layer with these features: <ul style="list-style-type: none"> one or more of the following native grass genera typically dominates the perennial ground layer: Themeda, Rytidosperma, Austrostipa, Poa and/or Microlaena; and one or more of the following native herb genera are typically present: Acaena, Arthropodium, Calocephalus, Chrysocephalum, Dianella, Dichondra, Geranium, Leptorhynchos or Solenogyne* 	No
Condition Thresholds	Patch size for the listed ecological community is at least 0.5 hectare	No
	AND	AND
	One or more of the following native grass genera accounts for at least 50% of the perennial ground layer cover: Themeda, Rytidosperma, Austrostipa, Poa and/or Microlaena	No
	OR	OR
	If native grasses account for less than 50% of the perennial ground layer cover, then the patch is either: <ul style="list-style-type: none"> a valuable wildflower site where at least 50% of the ground layer vegetative cover is represented by native dryland forbs (including geophytes) during spring–summer (i.e. September to February inclusive but noting that the ground layer may be sparse in some situations); OR not heavily invaded by perennial weeds such that perennial weeds comprise less than 70% of the ground layer vegetative cover; OR if perennial weeds comprise more than 70% of the ground layer vegetative cover, then the patch must have more than ten native perennial species per 100 m² AND a density of at least three big trees per hectare. Big trees are defined here as trees with at least 70 centimetres diameter at breast height (DBH) for eucalypts and at least 40 centimetres DBH for non- eucalypt species, in line with DSE. 	No
Summary		Criteria not met

*** Contra-indicative species in Grassy Eucalypt Woodland** Contra-indicative species are here defined as species that may be present in a locality but their dominant occurrence clearly indicates that the Grassy Eucalypt Woodland of the Victorian Volcanic Plain ecological community is NOT present. Dominance is here taken to mean that a species comprises the major component of its vegetation layer, usually measured as 50% or more of the projective foliage cover. Contra-indicative species are *Allocasuarina luehmannii* (Buloke); Chenopod shrub layer; *Eragrostis infecunda* (Cane Grass); *Eucalyptus leucoxylon* (Yellow Gum); or *Muehlenbeckia florulenta* (Lignum). The presence of these species indicates affinities with either wetland or semi-arid vegetation communities rather than with temperate grassy woodlands.

4.2 Flora and Fauna Guarantee Act 1988

The *Flora and Fauna Guarantee Act 1988* (FFG Act) was legislated to ensure the continued survival of all Victorian species of flora and fauna and all Victorian communities of plants and animals. The FFG Act provides a number of ways to help achieve its objectives including:

- listing of threatened taxa, communities of flora or fauna and potentially threatening processes, and creation of Action Statements and Management Plans for all listed taxa communities of flora or fauna and processes
- declaration of a Critical Habitat if the habitat is critical for the survival of a species or a community of flora or fauna, if listed as Critical Habitat, the Minister for Environment may then make an Interim Conservation Order (ICO) to conserve the Critical Habitat
- protection of flora and fauna through listing offences such as penalties relating to not following an ICO and taking, trading in, keeping, moving or processing protected flora without a licence. Although this does not apply to taking listed flora species from private land.

The Department of Environment and Primary Industries is the referral authority for matters under the FFG Act.

Relevance to proposed development

There are five species of fauna listed under the FFG Act 1988, recorded within a 5 km radius of the study area, that may potentially utilise the site. These are the Grey-headed Flying-fox; the Powerful Owl, Eastern Great Egret, Australian Grayling and Macquarie Perch.

Whilst this is the case, development of the site is unlikely to have a significant impact on these species given that some of these species are reliant on the creek environment for their habitat needs, whilst the remainder are largely reliant on canopy species and the proposal is unlikely to significantly affect these.

Whilst one Habitat Zone, HZ3, was classified for purposes under Clause 52.17 as Plains Grassy Woodland, it was not consistent with the FFG-listed community: *Western Basalt Plains (River Red-gum) Grassy Woodland Floristic Community 55-04*, in that it comprised of planted Manna Gums and Blackwoods (not generally consistent with this community) and contained no remnant native understorey species. However, should any vegetation within the study site be otherwise deemed to consistent with this FFG-listed community, as the subject site is public land, a permit may be required if proposed works may kill, injure or disturb flora species associated with this community and other species listed as protected under this Act.

4.3 Planning and Environment Act 1987

The *Planning and Environment Act 1987* establishes the framework for planning the use, development and protection of land in Victoria in the present and long-term interests of all Victorians. This includes providing the structure for and administering the implementation of Planning Schemes. The following section considers relevant sections of the Planning Scheme.

4.3.1 State Planning Policy Framework

Clause 12 Environmental and Landscape Values

Clause 12 of the planning scheme recognises that planning:

- should help to protect the health of ecological systems and the biodiversity they support (including ecosystems, habitats, species and genetic diversity) and conserve areas with identified environmental and landscape values.
- must implement environmental principles for ecologically sustainable development that have been established by international and national agreements.
- should protect sites and features of nature conservation, biodiversity, geological or landscape value.

Clauses of particular relevance include:

- Clause 12.01–1 Protection of biodiversity
- Clause 12.01–2 Native vegetation management

Relevance to proposed development

The objectives of these clauses are considered in the body of this report that relate to avoiding and minimising impacts to biodiversity.

Clause 13 Environmental Risks

This clause recognises that planning should adopt a best practice environmental management and risk management approach which aims to avoid or minimise environmental degradation and hazards. This includes consideration of:

- climate change
- floodplains
- soil degradation
- erosion and landslip
- noise and air
- air quality
- bushfire.

4.3.2 Zoning and overlays

The site is zoned Public Park and Recreation Zone (PPRZ) and Public Use Zone – Transport (PUZ4) and is subject to a Design and Development Overlay – Schedule 1 (DDO1), Environmental Significance Overlay – Schedule 2 (ESO2) and Heritage Overlay (HO327).

One of the objectives of the PPRZ is *to protect and conserve areas of significance where appropriate*. However under this zoning, the construction of a pathway does not require a permit.

Under the PUZ4, there are no specific requirements for a permit and there are no particular considerations relevant to flora and fauna under this zone.

Under the DDO a permit is required for works, which we take to be applicable to the building of the pathway. The schedule to this overlay is concerned with the Yarra River Corridor, inclusive of the Merri and Darebin Creeks. The schedule provides guidelines that relate to ensuring that the amenity of the waterway corridors is maintained in the face of future development. The relevant section of the schedule, Park Landscape River Edge states that *buildings and works should be set back from the river bank*.

Under the ESO, a permit is specifically required to construct bicycle pathways or trails and also to clear or lop native vegetation. Schedule 2 to this overlay aims to conserve the Merri Creek and Environs. A number of decision guidelines that consider the environmental values of the site will apply. These include:

- The Merri Creek and Environs Strategy.
- Development Guidelines for the Merri Creek.
- The views of the Merri Creek Management Committee, Melbourne Water or Aboriginal Affairs, Victoria Heritage Services Branch as considered appropriate by the responsible authority.
- Any adopted Open Space Strategy and, in particular, the relevant open space category and preferred recreational uses and development guidelines.

Under the Heritage Overlay, a permit is required to construct a bicycle pathway or trail.

We understand that whilst we have identified that there are a number of requirements for a permit under the various overlays that are described above, the City of Yarra may be exempt from these. We also understand that this requirement would likely be determined by the statutory planning branch of the council.

4.3.3 Particular Provisions – Clause 52.17

Under Clause 52.17 a permit is required to remove, destroy or lop native vegetation on sites greater than 0.4 hectares (exemptions apply). The purpose of the clause (amongst others) is to minimise impacts on Victoria's biodiversity from the removal of native vegetation and to manage native vegetation to minimise land and water degradation.

Application requirements and decision guidelines are listed within the Clause. Applications may fall into a low, moderate or high risk pathway depending on the location and extent of vegetation removed. The application requirements and decisions depend on the relevant risk pathway.

Referral by the responsible authority (City of Yarra) to DEPI as a recommending authority may be required under Clause 66.02 for an application to remove native vegetation:

- if clearing is greater than 0.5 ha or
- the application follows the high-risk pathway
- if a property vegetation plan applies to the site.
- on Crown land which is occupied or managed by the responsible authority.

Two possible exemptions for not requiring a permit relates to regrowth and also to planted vegetation. Each are considered below:

Regrowth:

For regrowth which has naturally established or regenerated on land lawfully cleared of naturally established native vegetation and is:

- *Less than 10 years old; or*
- *Bracken (*Pteridium esculentum*); or*
- *Less than ten years old at the time of a Property Vegetation Plan being signed by the Secretary of the Department of Environment and Primary Industries (as constituted under Part 2 of the Conservation, Forest and Lands Act 1987), and is shown on that Plan as being 'certified regrowth', and is on land that is to be used or maintained for cultivation or pasture during the term of that Plan; or*
- *Within the boundary of a timber production plantation, as indicated on a Plantation Development Notice or other documented record, and has established after the plantation.*

This exemption does not apply to land on which native vegetation has been cleared or otherwise destroyed or damaged as a result of flood, fire or other natural disaster.

The last three dot points are not relevant to the site and for any vegetation that has regenerated as a result of natural regrowth this exemption is not likely to be relevant as it will be difficult to prove that it is less than ten years old.

Planted vegetation:

The native vegetation has been planted or grown as a result ofamenity purposes, including: ... shelter belts, woodlots, street trees, gardens or the like. This exemption does not apply if public funding was provided to assist in planting or managing the native vegetation and the terms of the funding did not anticipate removal or harvesting of the vegetation.

It is clear that revegetation of native species has occurred on the site since 1992. As the work was primarily undertaken by the Merri Creek Management Committee, it is likely that public funding was provided to assist in these works. It is assumed that the terms of the funding did not anticipate removal of the vegetation and as such it appears the exemption does not apply. Therefore unless other exemptions periphery to the planning scheme apply (e.g. agreement with Secretary to the Department of Environment and Primary Industries) it appears that a permit to remove native vegetation may be required. The following section details the process for an application under Clause 52.17.

5. Victoria's Permitted Clearing of Native Vegetation

A permit may be required to remove native vegetation on the site under Clause 52.17 of the planning scheme; this section considers the requirements of this Clause. The objective for the permitted clearing of native vegetation under Clause 52.17 and detailed in *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI 2013c) is

"...no net loss' in the contribution that native vegetation makes to Victoria's biodiversity."

Thus where native vegetation is permitted to be removed, an offset is to be provided that is considered equivalent to the contribution to Victoria's biodiversity that is made by the native vegetation to be removed.

5.1.1 Risk-based Pathway

An application to remove, destroy or lop native vegetation must be classified as one of the following risk-based pathways:

- low
- moderate
- high.

The application requirements and decision guidelines in Clause 52.17 must be applied in accordance with the correct pathway. There are more stringent permit applications for moderate and high risk applications including the requirement for an ecologist to undertake an onsite Habitat Hectare assessment. There are also more involved decision making guidelines for moderate and high risk applications.

To determine the risk-based pathway, the following risks are considered in relation to the native vegetation proposed to be removed:

- the location risk.
- the extent risk.

Table 8. Determining risk-based pathway

	Location		
Extent*	Location A	Location B	Location C
< 0.5 hectares	Low	Low	High
≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
≥ 1 hectare	Moderate	High	High

	Location		
Extent*	Location A	Location B	Location C
< 15 scattered trees	Low	Moderate	High
≥ 15 scattered trees	Moderate	High	High

Source: Table 3 and 4, Permitted clearing of native vegetation – Biodiversity assessment guidelines (DEPI 2013c)

5.1.2 Location risk

The location risk has been determined by DEPI for all locations in Victoria. Native vegetation will be in either location A, B or C. If more than one location risks apply to vegetation proposed for removal the higher letter is to be used.

The site is located within Location A (0).

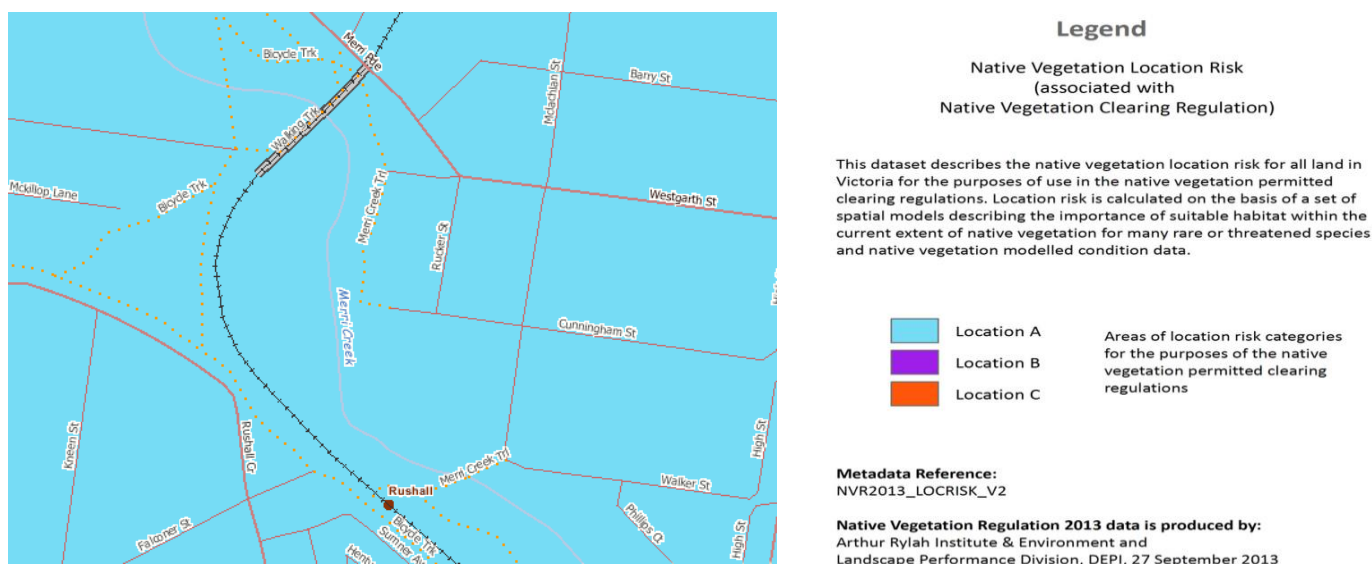


Figure 17.Location risk for subject site (DEPI 2014b)

5.1.3 Appraisal of the path options relating to the extent of vegetation that may be removed

There are two options for the establishment of the proposed Rushall Station bicycle path bypass. These relate to the northern section of the path, shown on Map 3.

- **Option 1** would follow the existing pathway in a southerly direction underneath the railway bridge and then join a new pathway adjacent to the railway line at the top of the escarpment at the southern end of Rushall Park.
- **Option 2** would veer to the west, just south of the railway bridge, and run along the western edge of Rushall Park, again joining the remainder of the new pathway that will run along the top of the escarpment.

Where native vegetation is proposed to be removed, the extent of removal will determine the risk based pathway. A scattered tree will be considered 'lost' in accordance with the Biodiversity Assessment Guidelines (DEPI 2013c) if more than 10 % of its Tree Protection Zone is affected by the development proposal.

If an application proposes to remove both remnant patches and scattered trees, the extent of the scattered trees is converted to an area by assigning a standard area of 0.071 hectares per tree.

As our brief did not include the exact determination of the potential areas of loss under each scenario, we have not calculated these, however an estimate is given in Table 9 below that provides an approximate overview of the potential impacts.

Table 9. Estimates of native vegetation loss for the path options and the fixed section of pathway

Section of path	Remnant vegetation affected	Scattered trees affected
Path at top of escarpment (relevant to both options)	Portions of HZ1 (approximately 100 m in length)	–
Option 1	Small portion of HZ1 (approximately 10 m in length)	Likely to result in the 'loss' of Tree 74, a River Red Gum. This tree will need to be offset. Depending on the width of the path other trees could be lost.
Option 2	Moderate portion of HZ3 (approximately 30 m in length)	Likely to result in the 'loss' of Tree 77, a Spotted Gum, a species which is not considered indigenous to the site. This may mean that this may not need to be offset. Depending on the width of the path other trees could be lost.

* Each scattered tree is equivalent to 0.071 ha

The main section of path (along the escarpment) will result in the biggest impact on native vegetation associated with this proposal. We estimate that of the two options for the path approaches from the north, Option 2 will affect a larger amount of native vegetation than Option 1.

5.1.4 Low risk-based pathway

As the vegetation is within location A and the total amount of native vegetation within the study site is less than 0.5 ha, any proposed clearing within the site is determined to have a Low risk-based pathway.

Table 10. Risk-based pathways for proposed vegetation removal on site

Extent*	Location		
	Location A	Location B	Location C
< 0.5 hectares	Low	Low	High
≥ 0.5 hectares and < 1 hectare	Low	Moderate	High
≥ 1 hectare	Moderate	High	High

Source: Table 3 – Permitted clearing of native vegetation Biodiversity assessment guidelines (DEPI 2013c).

5.1.5 Application requirements

An application included in the low risk-based pathway must include:

- completed low risk-based pathway permit application form
- biodiversity assessment report from the NVIM tool
- photographs of native vegetation to be removed
- defensible (bushfire) space statement (if applicable)
- property vegetation plan (if applicable)
- details of previous clearing (if applicable)
- topographic information
- Native Vegetation Precinct Plan (NVPP) statement (if applicable).

5.1.6 Referral authorities

Referral by the responsible authority (City of Yarra) to DEPI as a recommending authority may be required under Clause 66.02 for an application to remove native vegetation:

- if clearing is greater than 0.5 ha or
- the application follows the high-risk pathway
- if a property vegetation plan applies to the site.
- on Crown land which is occupied or managed by the responsible authority.

As there is potential for clearing to be greater than 0.5 ha, referral may be required. It should be noted that DEPI would be acting as only a recommending referral authority and the responsible authority is not required to make a decision about granting a permit that is consistent with the recommending referral authority's recommendation.

5.1.7 Decision guidelines

The decision guidelines within Clause 52.17 are listed as either:

- Biodiversity considerations
- Other matters.

Biodiversity considerations

The biodiversity assessment of applications in the low risk-based pathway is restricted to verifying the information presented by the applicant. If the information provided is correct, the planning permit should not be refused or objected to on the basis of the biodiversity considerations in Clause 52.17. A compliant offset

must be secured, to the satisfaction of the responsible or referral authority, before the native vegetation is removed (DEPI 2014a). This is detailed in Figure 18 below.

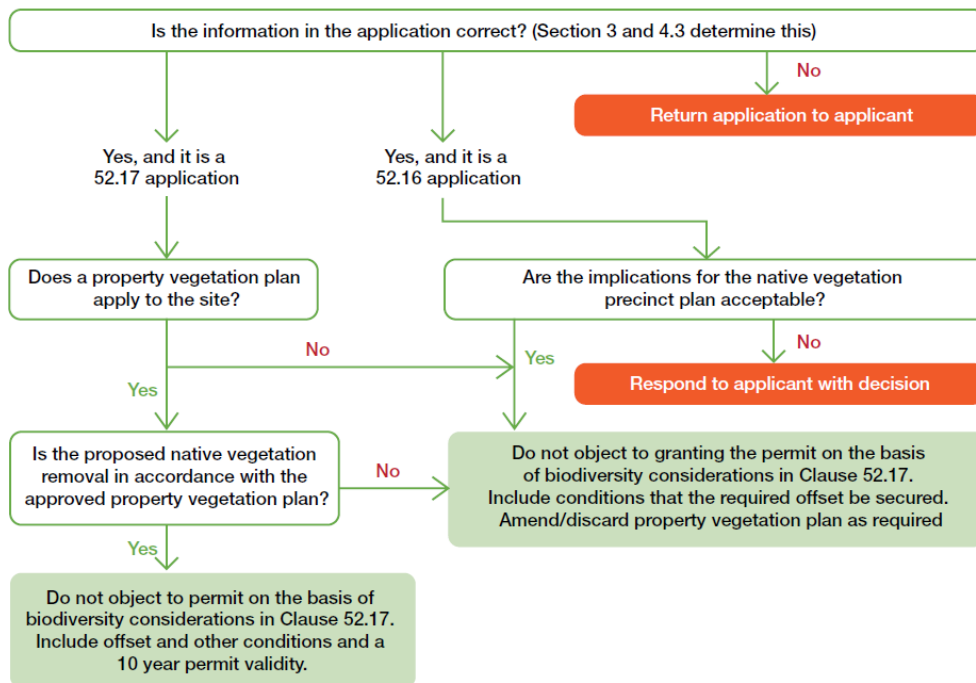


Figure 18. Decision making for low risk-based pathway applications

Source: Permitted clearing of native vegetation: Biodiversity assessment handbook (DEPI 2014a).

Other matters

There are other matters to be considered in the decision making process, amongst others, these include the role of native vegetation in the prevention of land degradation and water quality and preserving identified landscape values. Each of these considerations will be relevant to this site as it is close to a waterway and the path will be located at the top of an escarpment and potentially susceptible to erosion. Additionally the preservation of landscape values is also of consideration at this site, especially as natural spaces have become increasingly important in urban areas.

In order to mitigate the potential for other impacts associated with the removal of native vegetation as well as impacts associated with the construction of the path itself, we would recommend the use of least impact construction methods and infrastructure. Options to be considered would include, use of an elevated pathway for the section that occurs at the top of the escarpment. Furthermore if there is any scope to realign the pathway in this section, it should be located as far from the edge of the escarpment as is possible.

5.1.8 Offsets

General offsets will be required to account for the removal of native vegetation in low risk applications.

Offsets can be either:

- First party – located on land owned by the landholder who is proposing to remove the native vegetation
- Third party – located on land owned by a third party;

We understand that the City of Yarra is not in a position to provide any first party offsets in this case. Third party offsets can be purchased from a range of providers in the form of a native vegetation credit that is listed on the Native Vegetation Credit Register.

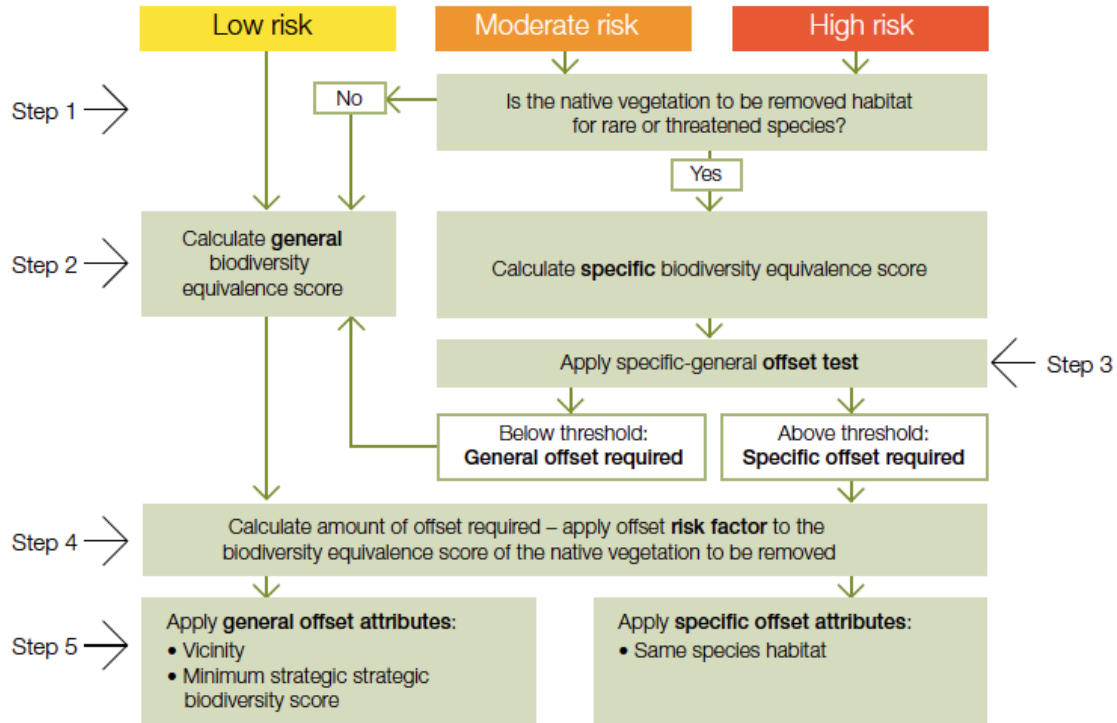


Figure 19.Steps in determining offset requirements.

Source: Figure 3, Permitted clearing of native vegetation: Biodiversity assessment guidelines (DEPI 2013c).

6. Summary and considerations for proposed development

The most significant conservation values on site are associated with HZ1. This patch has the general appearance of natural Escarpment Shrubland and some areas of the remnant groundstorey are indistinguishable from remnant vegetation.

The proposed bicycle pathway will impact upon HZ1 in the vicinity of the top of the escarpment. We understand that this pathway is set. The two options for the northern approach to the escarpment area will each have some impact upon native vegetation with Option 1 resulting in less of an impact.

In order to mitigate some of the impacts associated with the removal of native vegetation in the vicinity of the escarpment, we recommend the use of least impact construction methods and infrastructure. Options to be considered include the use of an elevated pathway for the section that occurs at the top of the escarpment. Furthermore if there is any scope to realign the pathway in this section, it should be located as far from the edge of the escarpment as is possible.

All native vegetation that is impacted will need to be documented and offset in accordance with Clause 52.17 of the Planning Scheme. We understand that the City of Yarra is not in a position to provide any first party offsets in this case and therefore a third-party offset would be required.

Whilst the native vegetation and individual species were not found to be of a level of significance that would require a referral under the *EPBC Act 1999* or consideration under the *FFG Act 1988* this site is of local significance and the removal of canopy species in particular may impact threatened fauna which utilise this habitat. Furthermore, the groundstorey may harbour some remnant grass and herb species. Whilst none of these species are of state of national significance, occurrences such as these are now rare in urban environments.

While it is somewhat outside the scope of this study to consider the impacts of the two options in relation to existing use of the study area, it should be considered what impacts increased bicycle traffic might have on wildlife and corresponding park use by other users. Whichever option is chosen, people walking their dogs will be obliged to keep their dogs on leash within close proximity of the bicycle path, to avoid collision between off-leash dogs and cyclists. As a result, if Option 2 is chosen, dog-walkers may focus their dogs' off-leash activity, much closer and more regularly, to the creekline corridor, and this is likely to increase disturbance of wildlife. There is research in the 'flight initiation' of wild birds as a result of disturbance, and this has shown that wetland birds are more likely to be disturbed by dogs, than cyclists, passing nearby. As the creekline vegetation corridor is much more likely to support significant species, the use of Option 1 could act as a low-key buffer for wildlife, between off-leash dogs in the cleared area, and the main vegetated areas, including within the southern portion of the study area and along the creekline corridor. This option would also focus most dog off-leash activity towards the main, cleared areas, and bound by the embankment of the railway to the west, rather than the creekline vegetation.

The development proposal should also consider ways in which impacts on native vegetation (trees, shrubs and groundstorey) and fauna can be reduced. This should include identifying path design (including use of materials) that minimises the pathway and construction footprint associated with the works. Construction methods should also be considered where the aim is to reduce the impact upon the adjoining native vegetation and fauna (noise, lights and physical disturbance or removal of habitat).

In order to protect trees during any construction works and into the future the minimum Tree Retention Zones, as shown in Table 4, should be referenced. The provision of suitably protected areas such as fencing or edging around these trees will help protect root zones by preventing impacts associated with ground compaction and

disturbance. The arboricultural assessment (Tree Dimensions 2013) identified that some of the larger trees have hazard risks and suitable design and treatment options will require consideration.

If large old trees are to be removed they should be thoroughly inspected, in conjunction with native vegetation to be removed, by a qualified zoologist for fauna activity, presence of active nests, possum dens or tree-hollows and treated with care to enable the salvage and/or translocation of resident fauna by a qualified zoologist.

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Appendix 1. Flora recorded at study site

Flora species recorded in the study area during fieldwork.

* denotes exotic species; # denotes native species extended beyond natural range; P denotes specimens all appear planted.

Origin	Scientific Name	Common Name
	<i>Acacia acinacea s.l.</i>	Gold-dust Wattle
	<i>Acacia implexa</i>	Lightwood
	<i>Acacia mearnsii</i>	Black Wattle
	<i>Acacia melanoxylon</i>	Blackwood
	<i>Acacia pycnantha</i>	Golden Wattle
	<i>Acacia verticillata</i>	Prickly Moses
	<i>Acaena novae-zelandiae</i>	Bidgee-widgee
	<i>Allocasuarina verticillata</i>	Drooping Sheoak
	<i>Atriplex semibaccata</i>	Berry Saltbush
	<i>Austrostipa scabra</i>	Rough Spear-grass
	<i>Austrostipa spp.</i>	Spear Grass
*	<i>Avena fatua</i>	Wild Oat
*	<i>Bromus catharticus</i>	Prairie Grass
*	<i>Bromus diandrus</i>	Great Brome
	<i>Bursaria spinosa subsp. spinosa</i>	Sweet Bursaria
#	<i>Corymbia maculata</i>	Spotted Gum
*	<i>Erodium brachycarpum</i>	Hairy-pit Heron's-bill
*	<i>Dactylis glomerata</i>	Cocksfoot
#	<i>Dodonaea viscosa</i>	Sticky Hop-bush
*	<i>Ehrharta erecta var. erecta</i>	Panic Veldt-grass
*	<i>Ehrharta longiflora</i>	Annual Veldt-grass
	<i>Enchylaena tomentosa var. tomentosa</i>	Ruby Saltbush
#	<i>Eucalyptus botryoides</i>	Southern Mahogany
	<i>Eucalyptus camaldulensis</i>	River Red-gum
#	<i>Eucalyptus globulus subsp. globulus</i>	Southern Blue-gum
	<i>Eucalyptus leucoxylon</i>	Yellow Gum
	<i>Eucalyptus ovata</i>	Swamp Gum
	<i>Eucalyptus melliodora</i>	Yellow Box
	<i>Eucalyptus viminalis</i>	Manna Gum
*	<i>Foeniculum vulgare</i>	Fennel
*	<i>Fumaria capreolata</i>	White Fumitory
*	<i>Galium aparine</i>	Cleavers
*	<i>Geranium molle var. molle</i>	Dove's Foot
*	<i>Lactuca serriola</i>	Prickly Lettuce
*	<i>Lepidium spp.</i>	Peppercress
*	<i>Lolium perenne</i>	Perennial Rye-grass
*	<i>Malva spp.</i>	Mallow
	<i>Melicytus dentatus s.l.</i>	Tree Violet
*	<i>Modiola caroliniana</i>	Red-flower Mallow
*	<i>Nassella trichotoma</i>	Serrated Tussock
*	<i>Opuntia stricta</i>	Common Prickly-pear

Origin	Scientific Name	Common Name
*	<i>Pennisetum clandestinum</i>	Kikuyu
*	<i>Plantago lanceolata</i>	Ribwort
*	<i>Poa annua</i>	Annual Meadow-grass
*	<i>Rapistrum rugosum</i>	Giant Mustard
	<i>Rytidosperma bipartitum</i>	Leafy Wallaby-grass
	<i>Rytidosperma racemosum</i>	Slender Wallaby-grass
*	<i>Rubus fruticosus spp. agg.</i>	Blackberry
*	<i>Schinus molle</i>	Pepper Tree
	<i>Themeda triandra</i>	Kangaroo Grass
*	<i>Trifolium campestre var. campestre</i>	Hop Clover
*	<i>Trifolium repens var. repens</i>	White Clover
	<i>Solanum laciniatum</i>	Large Kangaroo Apple
	<i>Vittadinia cuneata</i>	Fuzzy New Holland Daisy
*	<i>Vulpia myuros</i>	Rat's-tail Fescue

Appendix 2. Potentially occurring significant flora species

EPBC	FFG	VROT	Origin	Scientific name	Common name	No. records	Date last record	Likelihood of occurrence	Habitat/species notes (with endnote)	Likelihood Reasoning
		e		<i>Eucalyptus X studleyensis</i>	Studley Park Gum	12	1998	High	A naturally occurring hybrid (E. ovata × E. camaldulensis) found in Studley Park/Yarra Bend and along the Yarra Valley (Australian Plants Society Maroondah 2001).	The site is likely to be outside the natural distribution of this species.
		e		<i>Geranium sp. 1</i>	Large-flower Crane's-bill	2	2010	Low	Last recorded in 1903 from the Broadmeadows area (Walsh and Entwisle 1999, p. 224).	Whilst it is possible that this species could occur at this site, it is highly unlikely.
		k		<i>Bolboschoenus fluviatilis</i>	Tall Club-sedge	2	1997	Low	Scattered and rather uncommon, requires moist to wet habitat, usually in shallow water on swamp or lake margins of valley sclerophyll forest (Australian Plants Society Maroondah 2001, p. 322: Walsh and Entwisle 1994).	Little suitable habitat within the site. Low numbers of records.

						Uncommon plant, most recent reports from heavy soils of the Murray River floodplain in the far north-west (Walsh and Entwisle 1996, p. 421).	Although outside the reported range for this species, contains suitable habitat. Moderate numbers of records and recent.
k		<i>Lepidium pseudohyssopifolium</i>	Native Peppercress	7	2008	Moderate	
						Rosemary Grevillea grows in dry sclerophyll forest and plains grassland, on well-drained soils. This species has a very limited range, just outside Melbourne (Werribee, Hurstbridge/Eltham, and Diamond Creek) and is a popular garden plant. (Australian Plants Society Maroondah 2001).	Most records outside of the natural range are planted. It is likely that many of the records fall into this category.
r	#	<i>Grevillea rosmarinifolia subsp. rosmarinifolia</i>	Rosemary Grevillea	9	2010	Moderate	
						Widespread, particularly in drier inland areas, often in rocky places (Walsh and Entwisle 1999, p. 339).	Little suitable habitat onsite and outside of range although some local records.
r		<i>Nicotiana suaveolens</i>	Austral Tobacco	7	1997	Moderate	
r	#	<i>Acacia cupularis</i>	Cup Wattle	2	2002	Low	Low numbers of records.
r	#	<i>Leptochloa fusca subsp. fusca</i>	Brown Beetle-grass	2	1987	Low	Low numbers of records.

							In Victoria confined to few steep rocky slopes and broad ridges between Sunbury and Geelong (e.g. Jacksons creek, Long Forest, Werribee Gorge, Steiglitz, Buckley's Falls on the Barwon River) (Walsh and Entwisle 1996, p. 158).	Most records outside of the natural range are planted. It is likely that many of the records fall into this category.
r	#	<i>Rhagodia parabolica</i>	Fragrant Saltbush	7	2010	Moderate		
r	#	<i>Tragus australianus</i>	Small Burr-grass	1	1992	Low		Low numbers of records.
								Moderate numbers of records and recent.
v		<i>Eucalyptus leucoxylon subsp. connata</i>	Melbourne Yellow-gum	12	2007	High	Generally found in well-watered areas with deep soil, or on stony hills (Walsh and Entwisle 1996, pp. 991–93)	Occurs locally although plants onsite are likely revegetated.
							Grows on basalt plains; rarely reported in western Victoria and only present at two known locations north and north-east of Melbourne (Walsh and Entwisle 1996).	Whislt habitat is present on site, low numbers of records and older.
E	f	e	<i>Lepidium hyssopifolium</i>	Basalt Peppercreess	2	1978	Low	

Status Codes

EPBC Act 1999: EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable CD: Conservation dependant

FFG Act 1988: L: Listed, N: Nominated, I: Invalid or ineligible, D: Delisted

VROT: x: Presumed extinct, e: Endangered, v: Vulnerable, r: rare, k: poorly known

Appendix 3. Potentially occurring significant fauna species

Table 11. Potentially occurring State and Nationally Significant fauna species

Int Treaty	Mig/Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
			L	VU	<i>Miniopterus schreibersii oceanensis</i>	Eastern Bent-wing Bat	1	1966	Low	East coast of Australia from Cape York, N Qld to Castlemaine, Vic, predominantly E of Great Dividing Range. Habitat: Rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, Melaleuca forests and open grasslands. (Churchill 2008, p.184)	Low records, older
			L	CR	<i>Neochanna cleaveri</i>	Australian Mudfish	2	1991	Low	Prefers thickly vegetated muddy marshes and swamps. Also found in small ponds, billabongs, subterranean streams or man-made drains in and around swampy areas. A rare species, particularly in Victoria where large areas of suitable habitat have been destroyed (Allen et al. 2002).	Outside of primary habitat area.
			L	DD	<i>Chelodina longicollis</i>	Common Long-necked Turtle	8	2005	Moderate	Distributed throughout south eastern Australia, Coastal Rivers of Victoria, occurs in a broad range of habitats including permanent riverine waterholes, lakes, farm dams and shallow temporary ponds, greatest abundance in shallow, ephemeral waterholes or in bodies of water that are remote from remanent rivers, often in the absence of other turtle species. Able to distribute overland. {Kennet, 2009 #11099}	Within range, habitat present in creek, moderate numbers of records and recent.

Int Treaty	Mig/Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
			L	EN	<i>Ardea intermedia</i>	Intermediate Egret	1	2004	Moderate	The Intermediate Egret occurs in the shallows of mainly grassy inland wetlands, flooded pastures or grasslands. They only occasionally visit coastal wetlands and are generally rare in Victoria. They are sometimes seen foraging in pastures with grazing cattle. This species builds platform nests which are built in trees in riverine forest, swamp woodland and mangroves (Pizzey and Knight 2007).	Within range, habitat present in creek, recent records.
			L	EN	<i>Egretta garzetta</i>	Little Egret	1	2000	Moderate	Inhabits terrestrial wetlands and shallow margins of tidal estuaries and inland lakes and rivers. Feed in shallow water and nest colonially, often with other waterbirds. Stick-nests are usually built in trees over water, although occasionally in reedbeds (Marchant and Higgins 1990).	Within range, habitat present in creek, recent records.
			L	EN	<i>Ninox connivens connivens</i>	Barking Owl	2	1989	Low	Occurs in dry woodlands, wooded farmlands and dry forests in the 500–800mm annual rainfall zone and extend into semi-arid areas in River Red Gum forests along the Murray River. Hollow dependent species (Higgins 1999: Pizzey and Knight 2007).	Little habitat present onsite.
			L	EN	<i>Pseudophryne bibronii</i>	Brown Toadlet	1	2005	Low	Frequent dry forest, woodland, shrubland and grassland; sheltering under leaf-litter and other debris in moist soaks and depressions. Eggs are spawned in shallow burrows (or nets) under litter, in low areas, near water, that will later be flooded. Tadpoles are aquatic in ponds, flooded grassland and roadside ditches (Hero et al. 1991).	Within range and some habitat present adjacent to creek. However low numbers of records.

Int Treaty	Mig/Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
			L	EN	<i>Tandanus tandanus</i>	Freshwater Catfish	2	2005	Low	Found in slow-moving streams lakes and ponds with fringing vegetation. More abundant in lakes than in flowing water. Widely distributed throughout the Murray–Darling River system, but numbers are now declining possibly due to introductions of carp (which have similar feeding habits) and/or degradation of suitable breeding habitat (Allen et al. 2002, p. 88).	Outside of primary range. Little appropriate habitat.
				NT	<i>Alcedo azurea</i>	Azure Kingfisher	26	2008	Moderate – high	This species is usually found near well vegetated wetlands. Uses root–festooned banks of fresh or tidal creeks, rivers, streams, lakes, swamps, estuaries or mangroves for perching. It forages by plunge–diving from perches to below surface of still or slow moving water, which may sometimes be only a few centimetres deep (Higgins 1999). Nesting occurs in small burrows in creek banks (Pizzey and Knight 2007).	Within range, habitat present in creek, high numbers of records and recent.
				NT	<i>Circus assimilis</i>	Spotted Harrier	1	1983	Low	This species occurs in open grasslands, open shrublands, saltbush, open woodlands, crops and similar low vegetation that allows hunting. Their stick nests are built in low trees (Pizzey and Knight 2007).	Outside of primary range. Little appropriate habitat.

Int Treaty	Mig/Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
B, C, J, R	M 1, M 2		N	NT	<i>Gallinago hardwickii</i>	Latham's Snipe	1	2008	Low	Latham's Snipe is a migratory species. The species migrates to Victoria from breeding grounds in Japan. In Victoria this species is widely distributed in a range of habits including heavily vegetated freshwater swamps, and pools or ditches in heaths or subalpine herblands (Pizzey and Knight 2007). Also occurs in small ephemeral wetlands such as wet depressions after floods recede. Generally roosts in thick vegetation during the day, sometimes under shrubs away from wetlands, and will feed in swamps at night. They are occasionally seen feeding during the day. This species feeds by probing in soft mud and rarely moves far from concealing vegetation (Higgins and Davies 1996).	Outside of primary range. Little appropriate habitat.
				NT	<i>Larus pacificus pacificus</i>	Pacific Gull	1	1999	Low	The Pacific Gull is one of the largest gulls within the Australian and New Zealand territories, confined to the coast where flocks occur on intertidal mudflats and nearby rubbish tips in Port Phillip Bay, Western Port and Corner Inlet, with smaller numbers elsewhere on estuaries, along beaches and on other intertidal habitats (Higgins and Davies 1996). This species breeds mainly on islands in Bass Strait and off Tasmania. Some smaller numbers breed on islands off Wilsons Promontory. Their nests are built on the ground on the tops of steep-sided islands (Higgins and Davies 1996).	Outside of primary range. Little appropriate habitat.

Int Treaty	Mig/Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
				NT	<i>Myotis macropus</i>	Southern Myotis	1	1993	Low	A range of open forests of coastal northern, eastern and south-eastern Australia, preferring low-altitude vegetated areas with a strong association with streams and permanent water bodies in flat/undulating country. The species has a requirement for caves (mineshafts) or tree hollows for roosting and breeding (Churchill 2008).	Outside of primary range. Little appropriate habitat.
				NT	<i>Nycticorax caledonicus</i>	Nankeen Night Heron	46	2008	High	The Nankeen Night Heron has a widespread distribution in wetlands throughout Australia, particularly in the north, south, and southwest. This species inhabits shorelines of lakes and rivers, estuaries, terrestrial wetlands and grasslands. Particularly those sheltered by tall ground vegetation and/or trees, with shallow, slow-moving water. Breeds in colonies, usually in the crown or canopy of trees, in forks or on horizontal boughs; also in reed beds or atop shrubs. In Victoria, most numerous in the Murray River region, and in smaller numbers in more coastal/near-coastal regions (Marchant and Higgins 1990: Pizzey and Knight 2007).	High number of species, within range and habitat present.
				NT	<i>Phalacrocorax varius</i>	Pied Cormorant	4	2001	Moderate	This species is most often found along the coast, however are known to use inland wetlands including billabongs, deep and open swamps and rivers (large freshwater and saline wetlands). They nest in colonies, building platforms nests in mangroves or other trees (Marchant and Higgins 1990: Pizzey and Knight 2007).	Habitat present, some records.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
				NT	<i>Platalea regia</i>	Royal Spoonbill	3	1994	Low-moderate	The Royal Spoonbill inhabits the shallow parts of fresh and saline wetlands; these birds are gregarious in small flocks. They are mostly common on intertidal mudflats in coastal bays. Their stick-nests are built in reeds, shrubs or trees, singly or in loose colonies and are often seen with other species (Marchant and Higgins 1990).	Some habitat present within certain seasons. Some records.
			L	NT	<i>Anseranas semipalmata</i>	Magpie Goose	1	1999	Low	Most of the populations of this species has been re-introduced. They breed colonially and build platform nests over water, usually among tall rushes or reedbeds. The Magpie Goose feeds by digging in mud or by up-ending in shallow water, they have also been seen grazing and digging well away from water (Marchant and Higgins 1990).	Little habitat present onsite. Low numbers of records.
			L	NT	<i>Hydroprogne caspia</i>	Caspian Tern	2	1988	Low	Mostly sheltered coastal embayments, including harbours, lagoons, inlets, bays, estuaries and river deltas, usually with sandy or muddy margins. Will use artificial wetlands, including reservoirs, sewage ponds and saltworks (Higgins and Davies 1996).	Little habitat present onsite. Low numbers of records.
			I	NT	<i>Macquaria ambigua</i>	Golden Perch	9	1994	Moderate	Occurs in a variety of riverine habitats, but prefers warm, slow-moving, turbid sections of streams. Also found in flooded lakes, backwaters and impoundments. Tolerant of temperatures between 4° and 35°C and high salinity levels (up to 35 p.p.t) (Allen et al. 2002, p. 199).	Some habitat present within certain seasons. Some records.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
B, C, J, R	M, 1, M, 2			VU	<i>Actitis hypoleucos</i>	Common Sandpiper	1	2007	Low	Regular, widespread but mostly uncommon summer migrant to Australia (Aug–May) (Pizzey and Knight 2007). Wide range of coastal or inland wetlands, with varying levels of salinity. Mainly muddy margins of rocky shores of wetlands; often around estuaries and deltas of streams; also lakes, pools, billabongs, reservoirs, dams and claypans; associated with mangroves. Large coastal mudflats are not favoured (Higgins and Davies 1996).	Little habitat present onsite. Low numbers of records.
				VU	<i>Anas rhynchos</i>	Australasian Shoveler	2	1994	Low	The Australasian Shoveler occurs mainly on large well vegetated wetlands and lakes, occasionally including areas with saline waters. Populations are found in higher numbers on permanent, well-vegetated freshwater swamps with areas of open water. This species nests in grass nests on the ground, usually in dense cover and near water (Marchant and Higgins 1990: Pizzey and Knight 2007).	Little habitat present onsite. Low numbers of records.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
				VU	<i>Aythya australis</i>	Hardhead	14	2008	Moderate	Hardheads inhabit deep to shallow wetlands with open water and fringing emergent vegetation (Pizzey and Knight 2007). The species feeds by diving in deep water and occasionally by dabbling just under the water surface (Rogers 1990a). Nests are built in thick vegetation (e.g. reeds, lignum, cumbungi), usually over water (Halse et al. 2005: Rogers 1990b). These birds are most common in the wetland systems of inland Australia (Halse et al. 2005). Birds do visit Victoria from these areas in spring and summer, returning as the northern wetlands is replenished by rain (Halse et al. 2005). However, some birds are present in Victoria all year round depending on the suitability of the wetland (Pizzey and Knight 2007).	Some habitat present within certain seasons. Moderate numbers of records.
				VU	<i>Falco subniger</i>	Black Falcon	4	2007	Low	The Black Falcon has a stronghold in inland Australia. Most Victorian records come from the lowlands and only occasionally from the foothills. It occurs mainly over croplands, grasslands and wooded farmlands. To catch flushed prey, they sweep low over croplands and grasslands and are often attracted by smoke from grassfires and late-summer burning off. This species nests in trees in old stick-nests of other birds (Marchant and Higgins 1993: Pizzey and Knight 2007).	Little habitat present onsite. Low numbers of records.

Int Treaty	Mig/Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
C, J, R	M 1, M 2			VU	<i>Hirundapus caudacutus</i>	White-throated Needletail	9	2007	Low – moderate	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable. In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats (Higgins 1999).	Although little actual use made of the site, habitat within the site may contribute to this species (insects for food etc). Moderate numbers of records.
				VU	<i>Pelagodroma marina</i>	White-faced Storm-Petrel	1	1970	Low	Temperate and subtropical regions of Atlantic, Indian and s. Pacific Oceans. Breeds on islands around New Zealand, southern Australia and in Atlantic ocean (Marchant and Higgins 1990).	Outside of primary range. Little appropriate habitat.
			L	VU	<i>Accipiter novaehollandiae</i>	Grey Goshawk	1	1983	Low	The Grey Goshawk has a stronghold in Victoria, particularly the white form, in the Otway Ranges, where wet forests and gullies containing Mountain Grey Gum adjoin partly cleared farmlands. They occur in lower densities in similar habitats in the Strzelecki Ranges, Gippsland Plains and Otway Plains. Elsewhere in the State they are occasionally seen in woodlands, dry forests, suburban parks and wooded farmlands (Marchant and Higgins 1993).	Outside of primary range. Little appropriate habitat.

Int Treaty	Mig/Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
C, J	M 1, M 2		L	VU	<i>Ardea modesta</i>	Eastern Great Egret	22	2003	High	Eastern Great Egret is widespread in Australia and has been observed in a wide range of wetland habitats including swamps and marshes; margins of rivers and lakes; damp or flooded grasslands, pastures or agricultural lands; reservoirs; sewage treatment ponds; drainage channels; salt pans and salt lakes; salt marshes; estuarine mudflats, tidal streams; mangrove swamps; coastal lagoons; and offshore reefs (DEWHA 2010).	Within range, habitat present in creek, high numbers of records and recent.
			L	VU	<i>Lophocroa leadbeateri</i>	Major Mitchell's Cockatoo	4	2008	Low-moderate	Occur mainly in uncleared parts of the Mallee where they inhabit woodlands of Slender Cypress Pine (<i>Callitris preissii</i>)–Belah (<i>Allocasuarina cristata</i>) and Black Box (<i>Eucalyptus largiflorens</i>)–Buloke (<i>Allocasuarina luehmannii</i>), and adjacent mallee scrubs (esp. White Mallee <i>E. gracilis</i> and Dumosa Mallee <i>E. dumosa</i>). Occasionally visit nearby croplands that still have mallee and woodland remnants. Seldom occur in large areas of mallee heath. Feeds on the ground and in trees or shrubs; nests in tree hollows, often in old cypress pines	Outside primary range although some recent records.
			L	VU	<i>Ninox strenua</i>	Powerful Owl	24	2008	High	Widespread in foothill and coastal forests where they especially favour gullies with peppermint–Manna Gum forests. Occasionally seen in wetter mountain forests, drier box–ironbark forests and woodlands, and softwood plantations. Hunts at night by flying through the forest canopy catching prey from tree branches. They nest in large holes in trees (DSE 2004a).	Within range although relatively poor habitat present. However numerous records and some recent.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
			L	VU	<i>Porzana pusilla</i>	Baillon's Crane	2	1991	Low	This species returns to northern Victoria in spring, but few details on migration. It inhabits freshwater wetlands and floodwaters usually containing floating plants or tall emergent vegetation. The Baillon's Crane feeds in shallow water, mud and emergent aquatic plants. It has been found to nest in clumps or tussocks of vegetation surrounded by water (Marchant and Higgins 1993; Pizzey and Knight 2007).	Outside primary range although may frequent area during migration.
J	M 1	EN	L	CR	<i>Anthochaera phrygia</i>	Regent Honeyeater	1	1993	Low	Occurs mainly in box-ironbark forests and woodlands north of the Great Divide. There are historical and recent isolated records from drier parts of south-eastern Victoria. Highly nomadic, their movements are determined by the flowering of eucalypts (DSE 2003).	Outside of primary range. Little appropriate habitat.
		EN	L	CR	<i>Craterocephalus fluviatilis</i>	Murray Hardyhead	2	1989	Low		Outside of primary range. Little appropriate habitat.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
		EN	L	EN	<i>Lathamus discolor</i>	Swift Parrot	6	2006	Low-moderate	The Swift Parrot is a winter migrant to Victoria (Swift Parrot Recovery Team 2001). Arriving from their breeding areas in Tasmania, however small numbers of non-breeding birds may remain here during summer (Higgins 1999: Swift Parrot Recovery Team 2001). They are nomadic, and follow the flowering of trees and psyllid infestations. In Victoria their distribution is centred on box-ironbark forests, but they are often seen in town parks and occur sporadically elsewhere in dry forests, dry woodlands and wooded farmlands but are seldom seen in treeless areas, rainforests or wet forests (Higgins 1999: Pizzey and Knight 2007). Feed mainly in winter-flowering plants, especially Red Ironbarks and ornamental trees and shrubs (Higgins 1999: Swift Parrot Recovery Team 2001).	Some habitat present, some recent records.
		EN	L	EN	<i>Macquaria australasica</i>	Macquarie Perch	28	1993	Moderate-high	The Macquarie Perch is found in the Murray River and its tributaries and is also found in parts of the Yarra River. It is most often found as a solitary individual, however can form schools during breeding season. The Macquarie Perch is more commonly found in slow moving rivers, reservoirs and lakes (Allen et al. 2002).	Within range, habitat present in creek, moderate numbers of records and recent.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
		VU	L	CR	<i>Pedionomus torquatus</i>	Plains-wanderer	1	1972	Low	Main distribution is within the Riverina of NSW, patchy elsewhere, and only occurring in small numbers in northern Victoria. Inhabits open grasslands with preference towards <i>Danthonia</i> and <i>Stipa</i> species. However, vegetation structure is more important than floristic composition. Does not occur in dense grasslands and woodlands (Marchant and Higgins 1993: Pizzey and Knight 2007).	Little habitat present now. Old record.
C	M 1, M 2	VU	L	CR	<i>Rostratula australis</i>	Australian Painted Snipe	1	1970	Low	Generally uncommon in Australia and scattered records in Victoria. Uses terrestrial shallow freshwater (occasionally brackish) wetlands; ephemeral and permanent: lakes, swamps, claypans, inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains with rank emergent tussocks of grass, sedges, rushes or reeds, or samphire; often with scattered clumps lignum, canegrass or tea-tree (Marchant and Higgins 1993).	Outside of primary range, little habitat present and older single record.
		VU	L	EN	<i>Delma impar</i>	Striped Legless Lizard	2	1975	Low	Native grasslands and open grassy woodlands; also known to occur in areas with cover of exotic species. Shelters beneath loose rocks and in grass tussocks (Wilson and Swan 2008).	Little habitat present now. Old record.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
		VU	L	EN	<i>Litoria raniformis</i>	Growling Grass Frog	7	1987	Low	The species often inhabits water bodies with a diverse assemblage of aquatic vegetation, including emergent species such as sedges (<i>Gahnia</i> spp.), submergent species such as curly pondweed (<i>Potamogeton</i> spp.), floating species such as water ribbon (<i>Triglochin</i> spp.) and filamentous algae (Hamer and Organ 2006: Heard et al. 2004). The aquatic vegetation provides sites for male frogs to call from, sites for eggs to be deposited and relatively safe development, and food and shelter for tadpoles. Dense submergent vegetation is especially important to protect eggs and tadpoles from predation (Heard et al. 2004). However, it is also known to occur in ditches, dams and swamps or sheltering under discarded debris near those sites (Tyler and Knight 2009, pp. 38–39).	In current condition, site unlikely to support this species.
		VU	L	VU	<i>Maccullochella peelii peelii</i>	Murray Cod	8	2000	Low–moderate	The Murray Cod lives in a wide variety of habitats from silty slow moving rivers to clear rivers with pools and riffles. This fish prefers instream habitat of rocks and logs with over–hanging vegetation (Allen et al. 2002).	Some habitat present within creek, some records and recent.
		VU	L	VU	<i>Prototroctes maraena</i>	Australian Grayling	49	1993	Moderate–high	This species only spends part of its life in freshwater streams, Australian Graylings migrate between freshwater streams and the ocean. Streams where this species occur tend to be clear with gravel bottoms and a variety of instream habitat such as pools and riffles. The upstream migration of this species has been effectively terminated in some rivers by dams (Allen et al. 2002).	Habitat present, within range and high numbers of records.

Int Treaty	Mig /Mar	EPBC	FFG	DEPI	Scientific name	Common name	No. local records	Date last record	Likelihood occurrence	Habitat (with endnote)	Likelihood Reasoning
		VU	L	VU	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	453	2004	High	Eastern coastal Australia from Gladstone in Qld to South Gippsland and Melbourne in Vic, rare influxes further west and south. Rarely more than 200km inland. In warmer months gathers in very large camps, usually in dense forest in gullies; population more dispersed in winter. Size of camps fluctuates in response to local food supplies; in south numbers fluctuate in regular pattern, being highest in late summer-autumn and lowest in winter (Menkhorst and Knight 2001).	Many recent records. Known to actively utilise the creek corridor.

Status Code

International Treaty

JAMBA / CAMBA, ROKAMBA and/or Bonn Convention Listed Species

Migratory/Marine (EBPC Act)

M1: Migratory Listed Species under the EPBC Act;

M2: Marine Listed Species under the EPBC Act.

EPBC Act 1999 conservation status

EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and CD: Conservation dependent.

FFG Act 1988 status

L: Listed, N: Nominated, I: Invalid or ineligible and D: Delisted

Victorian Rare or Threatened Species (VROTS) (DSE 2007a)

EX: Extinct, RX: Regionally Extinct, WX: Extinct in the Wild,

CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened, DD: Data Deficient

Appendix 4. Maps



Map 1 Study Site

Rushall Station Bypass Bicycle Track

Legend



Study_site

Roadways (don't display in legend)

Details

Mapping by: Yasmin Kelsall, Andrew Stephens and Colin Broughton

Date: 10/11/2014

Data Source: Aerial photography courtesy of Google Earth Pro



Scale 1:1,060 (Page size A3)

Disclaimer

Practical Ecology bears no responsibility for the accuracy and completeness of this information and any decisions or actions taken on the basis of the map. While information appears accurate at publication, nature and circumstances are constantly changing.

Map 2 Landscape Context
Rushall Station Bypass Bicycle Track



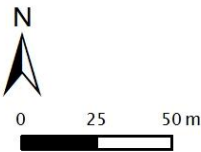
Image © 2014 Sinclair Knight Merz & Fugro

Legend

 Study_site

Details

Mapping by: Yasmin Kelsall, Andrew Stephens
and Colin Broughton
Date: 10/11/2014
Data Source: Aerial photography courtesy of
Google Earth Pro



Scale 1:2,500 (Page size A3)

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information appears accurate at publication, nature
and circumstances are constantly changing.



Map 3 Proposed Path Options
and Mapped Native Vegetation
Rushall Station Bypass Bicycle Track

Legend

- Scattered_trees
- Miscellaneous_point_features
- Study_site
- Miscellaneous_polygon_features
- Habitat_zones
- TPZ
- Roadways (don't display in legend)

Rushall_Reserve_path_op...

RGB

- Red: Band_1
- Green: Band_2
- Blue: Band_3

Details

Mapping by: Yasmin Kelsall, Andrew Stephens
and Colin Broughton
Date: 10/11/2014
Data Source: Aerial photography courtesy of
Google Earth Pro

0 25 50m

Scale 1:1,059 (Page size A3)

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