



# EES chapter 8 – Biodiversity and habitats

Warburton Mountain Bike Destination

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## 8.0 Biodiversity and habitats

This chapter assesses the potential biodiversity and habitat impacts associated with the construction and operation of the Warburton Mountain Bike Destination (the project). The information in this chapter is a summary of the impact assessment presented in **Technical Report A: Biodiversity and Habitats** and describes the key potential impacts arising from the project and the proposed measures to mitigate impacts. A specific summary of the assessment of potential impacts on Matters of National Environmental Significance (MNES) is presented in **Chapter 14: Matters of National Environmental Significance**.

### 8.1 Overview

Project construction and operation has the potential to impact on a range of biodiversity and habitat values, including Leadbeater's Possum, Cool Temperate Rainforest (CTR) and Cool Temperate Mixed Forest (CTMF), and Mount Donna Buang Wingless Stonefly. Understanding how the project could affect biodiversity and habitats is important to the development of effective mitigation measures. Biodiversity impacts to trail heads and other associated infrastructure are not anticipated to occur during construction or operation as detailed in **Attachment II: Alternative Assessment Report**. Additionally, migratory species are not considered a controlling provision under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) controlled decision. They have been included in this assessment as some migratory species are also threatened species and it was deemed appropriate to assess all migratory species for completeness.

#### Construction

During construction, native vegetation removal would be limited to understorey impacts within a variable trail width construction and operational footprint. The vast majority (around 90%) of native vegetation impacts would occur in three EVCs that have a bioregional conservation status of Least Concern; Damp Forest, Wet Forest and Shrubby Foothill Forest. The trail network with Trail 1 would require up to 37.047 hectares of understorey vegetation removal and the trail network including the alternative (Trails 45, 46 and 47) would require 35.754 hectares of understorey vegetation removal. Based on advice and recommendations from the project arborist no large trees have been included in patch vegetation removal as sensitive construction measures are considered unlikely to cause tree decline where TPZ and SRZ encroachment occurs. Impacts to EVCs in the project area equate to less than 0.03% of bioregional extant distribution of these vegetation types. In total 13 species (none of Commonwealth significance) would require offsets totalling 263.637 species habitat units for a trail network with Trail 1, and 240.087 species habitat units for a trail network with the alternative (Trails 45, 46 and 47). Approximately 9.51 hectares of understorey vegetation removal would be required in the National Park for a trail network with Trail 1, and 9.15 hectares for a trail network with the alternative.

Within the National Park, a trail network with Trail 1 would intersect approximately 6.442 kilometres of Cool Temperate Mixed Forest and Cool Temperate Rainforest (CTMF/CTR) compared to a trail network with the alternative (Trails 45, 46 and 47) which would intersect approximately 3.069 kilometres of CTMF/CTR community. For both trail networks, Trail 50 would intersect approximately 40 metres of CTR in the Yarra State Forest. A trail network with Trail 1 would require approximately 1.587 ha of understorey vegetation removal in EVC 31 (CTR/CTMF) and the trail network including the alternative would require 0.504 hectares of understorey vegetation removal in EVC 31 (CTR/CTMF). At a bioregion scale, the proportional bioregional impact on the remaining mapped rainforest area would be 0.001% in the Highlands Southern Fall bioregion and 0.02% in the Victorian Alps for a trail network with Trail 1, and 0.003% in the Highlands Southern Fall bioregion and 0.007% in the Victorian Alps for a trail network with the alternative. Impacts to Cool Temperate Mixed Forest and Cool Temperate Rainforest would be minimised by hand building of all trails that intersect these communities in order to reduce soil disturbance, reduce understorey vegetation removal and minimise the chance of pathogen infection and spread.

The project area supports known colonies of Leadbeater's Possum. Areas of dense montane thickets in the Yarra Ranges National Park have been avoided through trail realignment. The project would also avoid removal of hollow-bearing trees, artificial nest boxes and removal of dense stands of sub-canopy stems that provide movement opportunities for this species and these considerations have guided trail alignments. Trail 1 has been realigned to avoid direct impacts on key habitat, and to provide a 100 to 300 metre buffer to known dense thicket habitat and nest box sites. Between Mount Donna Buang summit and Ben Cairn, where the trail intersects CTR/CTMF, the project is committed to hand building Trail 1 to reduce the construction footprint. Hand building would also reduce the noise

profile during construction. With these important avoidance, impact minimisation and mitigation measures, noise, vibration and disturbance during construction is unlikely to result in significant impacts to the Leadbeater's Possum population in the project area.

There is potential for residual construction impacts to Mount Donna Buang Wingless Stonefly and its habitat due the sensitivity of this species to soil and hydrological disturbance. Micro-siting trail works between Mount Donna Buang, Mount Victoria and Ben Cairn and installing elevated structures in headwater habitats would minimise but not necessarily eliminate the potential residual impacts to this species.

The construction of the project is considered unlikely to result in a significant impact to any EPBC Act listed threatened species. However, similar to state significant flora and fauna species, impacts during construction could still occur as a result of removal of native vegetation, potential for sedimentation during construction, disturbance of flora and fauna, introduction of weeds and pathogens as a result of poor hygiene practices and pollution of waterways as a result of litter or any chemicals used during trail construction. It is considered that the majority of impacts can be avoided, minimised and mitigated through pre-construction trail micro-siting, sensitive construction techniques and monitoring. Mitigation measures and monitoring during construction are intended to reduce impact during construction as far as reasonably practicable.

Residual construction impacts on threatened fish species are considered low to negligible and can be readily managed through proven and effective soil erosion and sedimentation control measures in the catchment of the Yarra River and its tributaries. Similarly, impacts to GDEs are expected to be minimal in magnitude, highly localised and short in duration during construction.

## Operation

During operation, monitoring and maintenance would include regular trail inspections in accordance with the inspection program detailed in the OEMP. Whilst mountain bike trails would have been located, designed and built to avoid and minimise environmental impacts, monitoring through an effective inspection program enables unforeseen impacts to be detected and adaptive management to be adopted. Additionally, a comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers. The project would also work with relevant land managers to support existing pest animal management programs. Both the weed management program and support for the pest animal management program would be provided for the entire life of the project (i.e. as long as the trails remain in use).

The operational trail corridor would be maintained to support the trail bench, typically 0.6 metres to 1.2 metres wide and an overhead height clearance of 2.5 metres. The remaining areas disturbed during construction would be rehabilitated and allowed to regenerate with native vegetation during the trail operational phase. There may be the occasional need to undertake one-off works such as hazardous tree treatment and these activities would be done in consultation with the relevant land manager.

Noise, vibration and disturbance generated during trail operation is unlikely to result in significant impacts to the Leadbeater's Possum population in the project area, predominantly due to the dispersed nature of trail use. Night riding would not be permitted in the Yarra Ranges National Park to minimise impacts to nocturnal fauna disturbance. Residual impacts to Leadbeater's Possum, following the implementation of measures would relate to disturbance of animals, disruption to research and translocation programs/locations, increased localised predation events, habitat modification through weed and pathogen invasion, accidental habitat damage during trail maintenance and ongoing management of hollowing-bearing trees adjacent to the trail network.

There is potential for residual operational impacts to Mount Donna Buang Wingless Stonefly and its habitat due the sensitivity of this species to soil and hydrological disturbance. Targeted surveys for this project have located new populations of Mount Donna Buang Wingless Stonefly between Mount Donna Buang and Mount Victoria. There is potential that this species is more widespread in the vicinity of Mount Donna Buang and the project and/or land managers could support ongoing eDNA-based monitoring and detection of more new populations in the Yarra Ranges National Park and Melbourne Water catchment.

The operation of the project is considered unlikely to result in a significant impact to any EPBC Act listed threatened species. However, similar to state significant flora and fauna species, impacts during operation could still occur as a result of potential for sedimentation during trail use, disturbance of flora and fauna, introduction of weeds and pathogens as a result of poor hygiene practices, and pollution of

waterways as a result of litter. Mitigation measures and monitoring during operation are intended to reduce impact during operation as far as reasonably practicable.

Residual operation impacts on threatened fish species are considered low to negligible and can be readily managed through proven and effective soil erosion and sedimentation control measures in the catchment of the Yarra River and its tributaries. Similarly, impacts to GDEs are expected to be minimal in magnitude, highly localised and short in duration during construction.

In response to the EES evaluation objective, impacts of the project on biodiversity and habitat have been assessed and mitigation measures have been identified to avoid and minimise adverse impacts.

## 8.2 EES Evaluation objectives

The scoping requirements for the project set out the specific environmental matters to be investigated and documented in the project's EES in order to satisfy the Commonwealth and Victoria assessment and approval requirements.

The scoping requirements include a set of evaluation objectives that identify the desired outcomes to be achieved in managing the potential impacts of constructing and operating the project.

The following evaluation objective is relevant to the biodiversity and habitats study:

- **Biodiversity and habitat** – Avoid, and where avoidance is not possible, minimise potential adverse effects of native vegetation and animals (particularly listed threatened species and their habitat and listed ecological communities), as well as address offset requirements consistent with state and Commonwealth policies.

A secondary evaluation objective relevant to the biodiversity and habitats study is:

- **Water and catchments** – Maintain the functions and values of groundwater, surface water and floodplain environments and minimise effects on water quality and beneficial uses.

This chapter and **Technical Report A: Biodiversity and habitat** address the specific biodiversity and habitat related matters set out in the EES scoping requirements. The water and catchments aspects are not addressed in detail in this chapter except where they relate to aquatic habitats and fauna.

**Technical Report B: Surface water, groundwater and geotechnical hazards** and **Chapter 9: Surface water, groundwater and geotechnical hazards** provide a detailed assessment of water and catchment aspects.

## 8.3 Applicable legislation and policy

### 8.3.1 Key legislation and policy

The key legislation and policy relevant to the biodiversity and habitat impact assessment is as follows:

- *Environment Protection and Biodiversity Conservation Act 1999* (Commonwealth) ('EPBC Act')
- *Environment Effects Act 1978* (Vic) ('EE Act')
- *Flora and Fauna Guarantee Act 1988* (Vic) ('FFG Act')
- *Planning and Environment Act 1987*
  - Yarra Ranges Shire Planning Scheme
- *Catchment and Land Protection Act 1994* (Vic)
- *Water Act 1989* (Vic)
- *Fisheries Act 1995* (Vic)
- *Environment Protection Act 2017* (Vic)
- *Wildlife Act 1975* (Vic)
- *National Parks Act 1975* (Vic)

### 8.3.2 DELWPs Advisory list

The updates to FFG Act listing status gazetted in May 2021 and released to the public in July 2021 supersede the conservation status for rare and threatened plants specified within DELWP's Advisory

list. Despite these changes the *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017) still retain and use the previous DELWP Advisory listing status to determine the significance of potential biodiversity impacts that might arise from native vegetation removal.

The type of offsets required (general and/or species) is a critical component in understanding the significance of a project's impacts on native vegetation and Victoria's biodiversity under the *Guidelines for the removal, destruction or lopping of native vegetation*. The general-species offset test is specifically referred to as a measure of 'significant impacts' on Victoria's rare and threatened species, or their habitats. The FFG Act does not contain any statutory guidance or criteria for determining significant impacts or effects on listed threatened species. Accordingly, the conservation status information contained in the DELWP Advisory list has been retained and used in the biodiversity and habitats study.

## 8.4 Method

The purpose of the biodiversity and habitat impact assessment was to assess the potential impacts associated with the project and inform preparation of the EES. A detailed methodology is presented in Section 6.0 of **Technical Report A: Biodiversity and habitats**. Potential impacts were assessed by undertaking the following:

- A review of relevant Commonwealth and Victorian legislation and policy and local government law.
- Establishment of an assessment corridor, defined as ten metres either side of the trail centreline where biodiversity data was collected. Establishment of a project area, defined as all trail alignments with an outwards buffer of two kilometres and establishment of the development footprint which is based on a variable construction width driven by underlying terrain and proposed construction methods (hand versus machine built trail).
- An existing conditions assessment which involved a background and desktop investigation using publicly available information and spatial datasets to identify biodiversity and habitat values.
- Searches of Commonwealth and Victorian biodiversity databases within a search area defined by a 10 kilometre buffer outward from the project area. Ten kilometres is considered to be an adequate distance to accommodate species records that exist in the region that are relevant to the project.
- A review and collation of field data and findings from previous project specific technical studies completed between 2017 and 2019 to identify data gaps.
- Additional field studies conducted between May 2020 and July 2021 of trails not previously assessed and where data gaps had been identified. Field studies included the commissioning of arboriculture investigations and consultation with species experts and government agency representatives. Field studies undertaken have seen the entire trail alignment walked by qualified ecologists.
- Use of a risk assessment as described in **Chapter 6: EES assessment framework** as a prioritisation tool to inform the impact assessment and development of mitigation measures.
- Assessment of the potential direct and indirect impacts on biodiversity and habitats as a result of construction and operation of the project, including quantification of the impacts that could produce a loss, reduction or reduced viability of biodiversity and habitat values.
- **Chapter 14: Matters of National Environmental Significance** assesses whether the project would have significant impact on Matters of National Environmental Significance using the significant impact criteria as defined in the *Matters of National Environmental Significance: Significant impact guidelines 1.1*.
- Assessment of the alternative to Trail 1 (the combination of Trail 45, Trail 46 and Trail 47) including describing existing conditions, assessment of impacts and a comparative analysis against Trail 1 (Figure 8-1).
- Development of mitigation measures for the construction and operation of the project, based on adoption of the mitigation hierarchy.
- Evaluation of the residual environmental impacts, being the remaining impacts once mitigation measures have been implemented.

## Technical assessment methods

### Vegetation Quality Assessment (Habitat Hectares Method)

Vegetation condition is determined using Victoria's standard metric for quantifying native vegetation losses and gains (habitat hectare method). The method considers elements such as density of large trees, understorey complexity, plant species richness, weediness, plant recruitment and coarse woody debris. It also considers the physical connectivity of native vegetation in the landscape.

### Targeted surveys

Threatened flora and fauna species having a medium or higher likelihood of occurrence were considered for whether targeted surveys would inform the impact assessment. This was further refined based on the assessment of 'survey effort proportionate with project impacts'. Where targeted surveys were not undertaken for listed species, but suitable habitat is present, the species were assumed to be present for the purposes of impact mitigation considerations. Only those species where a significant impact is likely, were considered for biodiversity offset requirements. For further information regarding survey methods and justification for targeted surveys, refer to Section 6.2.7 of **Technical Report A: Biodiversity and habitats**.

### Offsets

Offsets are calculated in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017)*, which is an incorporated document within the Victoria Planning Provisions under Clause 52.17 (Native Vegetation). For forest and woodland vegetation, a partial clearing score (i.e. half the recorded habitat score using the VQA method) has been applied to calculate native vegetation offset requirements as outlined in the guidelines and the *Assessor's Handbook (DELWP 2018)*.

## 8.4.1 Reports and publications

Key reports and publications (excluding previous assessments undertaken for this project) that informed the biodiversity and habitats assessment are detailed in Table 8-1. **Technical Report A: Biodiversity and habitats** also lists the spatial and species record datasets that informed the assessment.

Table 8-1 Reports and publications that informed the assessment

Title	Scope/Abstract
<b>Government publications</b>	
Flora and Fauna Guarantee Act 1988 Action Statement: Cool Temperate Rainforest (DSE 2009c).	Provides a description of Cool Temperate Rainforest (CTR) from the Final Recommendation of the Scientific Advisory Committee (SAC 1992) in regard to Nomination Number 207, which forms the basis for the listing under the FFG Act. The Action Statement is divided into three sections: <ol style="list-style-type: none"> <li>1) information on the nature and extent of the communities and accordance with Section 19 of the FFG Act;</li> <li>2) brief discussion of the relevant management issues, previous management action and existing protection measures; and</li> <li>3) management actions that the Victorian Government intends to undertake to conserve the communities and manage the potentially threatening process.</li> </ol>
FFG Act: Processes List – December 2016 (DELWP 2016c)	Provides a list of threatening processes listed under the FFG Act 1988.

Title	Scope/Abstract
Approved Conservation Advice for EPBC Act listed flora: <i>Pomaderris vacciniifolia</i> (Round-leaf Pomaderris) (DoE 2014)	DAWE endorsed description of species, distribution, habitat, threats, research priorities and priority actions for the species.
National Recovery Plan for the Tall Astelia <i>Astelia australiana</i> (Cutler & Murphy 2010)	DAWE endorsed description of species, distribution, habitat, threats, research priorities and priority actions for the species.
Approved Conservation Advice for EPBC Act listed fauna: <ul style="list-style-type: none"> <li>• Leadbeater's Possum</li> <li>• Greater Glider</li> <li>• Broad-toothed Rat</li> <li>• Smoky Mouse</li> <li>• Spot-tailed Quoll</li> <li>• Southern Brown Bandicoot</li> <li>• Swift Parrot</li> <li>• White-throated Needle-tail</li> <li>• Macquarie Perch</li> </ul>	These documents provide a description of each species along with their distribution, habitat, and threats.
National Recovery Plans for EPBC Act listed fauna including: <ul style="list-style-type: none"> <li>• Leadbeater's Possum</li> <li>• Smoky Mouse</li> <li>• Swift Parrot</li> <li>• Australian Grayling</li> <li>• Murray Cod</li> <li>• Macquarie Perch</li> </ul>	These documents provide a description of each species along with their distribution, habitat, threats, research priorities and priority actions for management and recovery.
Action statements prepared under the FFG Act for the following listed fauna species: <ul style="list-style-type: none"> <li>• Greater Glider</li> <li>• Spot-tailed Quoll</li> <li>• Leadbeater's Possum</li> <li>• Smoky Mouse</li> <li>• Barking Owl</li> <li>• Masked Owl</li> <li>• Powerful Owl</li> <li>• Sooty Owl</li> <li>• Mount Donna Buang Wingless Stonefly</li> <li>• Brush-tailed Phascogale</li> </ul>	These documents provide a description of each species along with their distribution, habitat, threats, research priorities and priority actions for management and recovery.
EPBC Act: Species Profile and Threats Database - Listed Key Threatening Processes (DAWE 2020)	Provides a list of threatening processes listed under the EPBC Act 1999.
Approved Conservation Advice for Alpine Sphagnum Bogs and Associated Fens ecological community (DEWHA 2008)	DAWE description of the national ecological community, condition thresholds and rationale for listing as a threatened community under the EPBC Act. Also includes a summary of threatening processes that may impact the community.
Advisory list of environmental weeds in Victoria (White et al. 2018)	Describes an objective 'expert system' for ranking environmental weed species with respect to management urgency, and presents the application of this method as an annotated list
Yarra Ranges National Park Management Plan (Parks Victoria 2002)	Describes the long-term management framework and strategic direction for conservation, water resource and recreation values of the park and provide appropriate opportunities for visitors to enjoy its special features.
<b>Other reports and publications</b>	



Title	Scope/Abstract
<p><i>Chalara australis</i> sp nov (Hyphomycetes), a Vascular Pathogen of <i>Nothofagus cunninghamii</i> (Fagaceae) in Australia and Its Relationship to Other <i>Chalara</i> Species GA Kile and J Walker (1987). Australian Journal of Botany 35(1) 1 – 32.</p>	<p>Discusses the general significance of <i>Chalara</i> spp. in relation to the Fagaceae.</p>
<p>Shedding some light on <i>Thismia rodwayi</i> F. Muell. (Fairy Lanterns) in Tasmania: Distribution, Habitat and Conservation Status (Roberts et al. 2003)</p>	<p>This paper reports on the ecology and distribution of the species.</p>
<p>A review of the conservation ecology of Round-leaf Pomaderris <i>Pomaderris vacciniifolia</i> F. Muell. ex Reissek (Rhamnaceae) (Patykowski, Gibson &amp; Dell 2014)</p>	<p>Summarises the current ecological understanding of Round-leaf Pomaderris.</p>
<p><i>Cyathea cunninghamii</i> Slender Tree-fern – Tasmanian Threatened Flora Listing Statement (DPIPWE 2006)</p>	<p>Summarises ecology of Slender Tree-fern and provides conservation information mostly relevant to Tasmanian populations.</p>
<p>Primary Rainforest Mapping in Victoria 2018 - extent and type (White et al. 2019)</p>	<p>Report summarising approach to map extent of Victoria's remaining primary rainforest. Provides useful definitions for CTR / CTMF.</p>

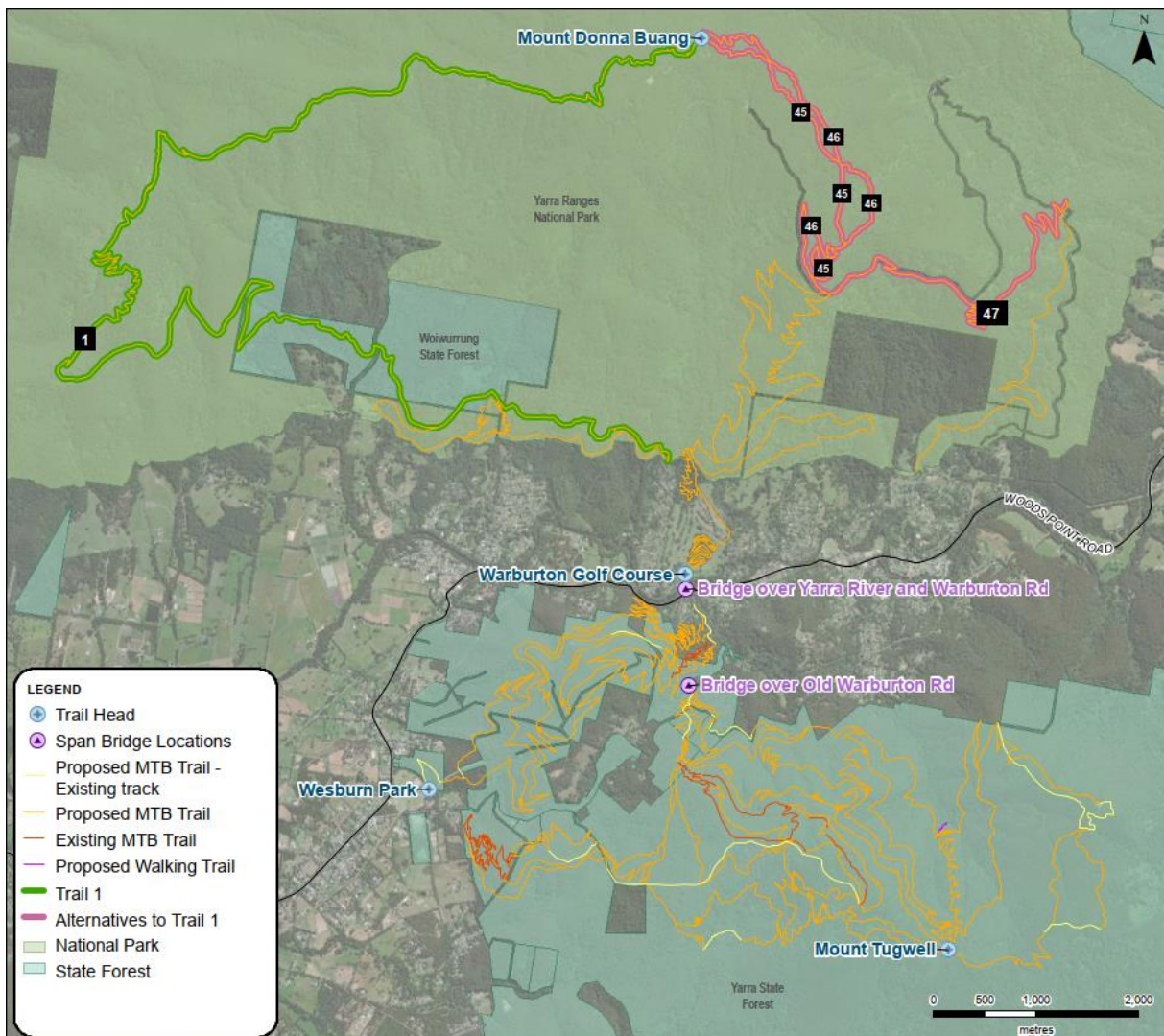


Figure 8-1 Project overview

## 8.5 Avoidance and minimisation through design

It is recognised that there are opportunities to avoid and minimise environmental impacts during the many stages of project development which has culminated in the preparation of a project description presented in **Chapter 3: Project description**. During project inception and early design development stages of the project, decisions on the location of the project, its design and construction techniques have enabled impacts to be significantly avoided and minimised. These investigations as part of project development are summarised in **Chapter 4: Project development and alternatives** and demonstrate application of the mitigation hierarchy described in **Chapter 6: EES assessment framework**.

For biodiversity the key avoidance and minimisation measures that have been incorporated into the design include:

- Placement of the proposed Visitor's Hub and other major trail head infrastructure in areas absent of native vegetation or areas subject to previous disturbance to avoid the need to remove significant amounts of native vegetation, i.e. in cleared areas at Wesburn Park and the Warburton Golf Course, and previously logged areas at Mount Tugwell along Mount Bride Road.
- Siting several new trails on existing formal and informal tracks and benches where possible, especially in State Forest areas with a recent history of logging operations and recreational access.
- Where possible, designing trails to be within proximity to existing roads, walking trails or informal mountain bike trails. This has resulted in 45% of the proposed trail network being within 100 metres of an existing track or trail (i.e. existing linear disturbance footprints).
- Choice of shuttle bus routes that avoid the need for road widening in forested environments.
- The new bridge over the Yarra River to fully span the river and not require works in the waterway.
- Ensuring trail styles and construction methods only require the removal of understorey vegetation so the forest canopy and sub-canopy would remain intact.
- Designing trails to follow land contours and take advantage of flat spurs and ridges, where possible, minimising the need for major soil excavation.
- Using trail designs and styles to achieve a balance of cut and fill soil material in trail construction, meaning that surplus spoil would not require disposal and fill would not be imported into the project area.
- Using the design principle of elevating all waterway crossings to minimise disturbance of aquatic habitats and to reduce ongoing point sources for sedimentation of local waterways.
- Committing to the principle of pre-construction micro-siting as described in the project Construction Environmental Management Plan (CEMP) within the 20 metre assessment corridor to achieve avoidance of key habitat features for threatened fauna, avoid significant flora species populations, minimise disturbance of wildlife habitat, minimise indirect impacts on significant trees and minimise impacts on waterways, other watercourses, springs and soaks.
- Engaging a professional arborist at the design stage to review existing conditions for trees in the project area provide sensitive construction techniques that can be applied to ensure encroachment into tree protection zones and structural root zones does not lead to the long-term decline of forest trees.
- Applying trail operation and maintenance standards to minimise ongoing residual impacts. These include prohibiting night riding in the Yarra Ranges National Park and high quality forest habitats in the Yarra State Forest to minimise nocturnal fauna disturbance, and applying seasonal closures of high elevation trails to maintain trail integrity and to minimise sedimentation during the winter months.
- Siting of trails to **avoid** areas of high ecological value, including:

### Micro-siting

Micro-siting is the process where trail builders and technical specialists walk the approved trail alignment to review and inspect the proposed alignment during construction and make any required minor changes to the alignment to avoid and minimise impacts.

- Avoiding siting trails in dense montane thicket vegetation that provides high quality habitat and translocation recipient sites for Leadbeater's Possum between Mount Donna Buang, Mount Victoria and Ben Cairn.
- Avoiding any direct removal of hollow-bearing trees, and avoiding the removal of any tree stems greater than 10 centimetres diameter breast height (DBH) in Yarra Ranges National Park and tree stems greater than 20 centimetres DBH in Yarra State Forest.
- Siting and construction of trails to **minimise** impacts to the extent possible on areas of high ecological value, including:
  - Minimising impacts on headwater springs and soaks between Mount Donna Buang, Mount Victoria and Ben Cairn that provide habitat for Mount Donna Buang Wingless Stonefly. It is proposed to elevate any trails that intersect these habitat types. The intention of using low impact elevated structures is to minimise soil disturbance and reduce sources of sedimentation.
  - Minimising impacts on CTR and CTMF threatened communities through reducing trail alignments that intersect these communities and committing to hand build any trails that intersect with CTR and CTMF threatened communities. Hand built trails have a significantly smaller impact footprint than machine built trails and also reduce the risk of wounding and damage to rainforest vegetation and Myrtle Beech trees.
  - Minimising the removal of understorey or sub-canopy vegetation that provides structural connectivity in forest habitats, this would be achieved in part through having a maximum overhead height clearance of 2.5 metres from ground level.
  - Committing to hand build a range of trails within Yarra Ranges National Park and Yarra State Forest to minimise overall understorey vegetation removal and project offset requirements.
  - Minimising impacts on watercourses and headwater areas that provide Mount Donna Buang Wingless Stonefly habitat.
- Adoption of specific measures to avoid and minimise ecological values for the trail network that involves development of Trail 1:
  - Realigning this trail in July 2021 after consultation with species experts to avoid direct impacts on high quality Leadbeater's Possum habitat and translocation recipient sites along the headwaters of Walker Creek, parallel to the summit section of the Donna Buang Road. This alignment has now been shifted upslope into open forest to the north-west out of this gully system that supports dense thickets. This has pushed the Trail 1 alignment into the Melbourne Water catchment but has avoided impacts on high quality Leadbeater's Possum habitat.
  - Realigning this trail in July 2021 to use the Donna Buang Road surface near Ben Cairn to avoid disturbing a second high quality Leadbeater's Possum habitat, translocation recipient site and research sites.
  - Committing to hand build Trail 1 from Mount Donna Buang summit to beyond Ben Cairn. The remaining section below Ben Cairn (except for rainforest vegetation) would be machine built.
- Investigating feasible alternative alignments to achieve further avoidance and minimisation of biodiversity impacts, as discussed in Section 8.10.

After opportunities to avoid and minimise impact through design were exhausted, minimisation and rehabilitation measures were developed. These are described in the construction and operation impact assessment sections below.

## 8.6 Existing conditions

### 8.6.1 Landscape context and public use history

The project area consists mainly of foothill and montane forest within a heavily vegetated environment, situated within the Yarra Ranges National Park and Yarra State Forest (Figure 8-1). The project area traverses other small areas of private and public land, including small areas of cleared and modified land close to Warburton and along the Yarra River.

The project area has been subject to various forestry, mining, recreation and agricultural land uses over the last 150 years. The disturbance history of the Yarra Ranges National Park and Melbourne Water catchment areas in the northern part of the project area has been less intensive but the influence of recreational land uses is ongoing in these areas. These land uses include roads, snow play areas, pest animal proliferation, resource extraction (spring water removal) and illegal firewood collection.

The Yarra State Forest areas have been subject to more recent intensive forestry, regularly planned burning, firewood removal, farming activities and un-regulated recreational activities such as four-wheel driving. An extensive track and trail network and other linear disturbances already exist across public land throughout the project area. Based on an analysis of topographic information and existing trail mapping, there is approximately 340 kilometres of existing roads, streets, forest tracks, walking trails and illegal mountain bike trails in the project area.

In the vicinity of Warburton, a number of illegally built trails exist, for example at Mount Tugwell where a number of trails have been constructed illegally in the Yarra State Forest. Because these trails are not professionally designed and built, they have not been developed with regard to potential environmental impacts. As a consequence, these trails not only have had direct impacts on native vegetation and waterways but are the cause of extensive ongoing erosion.

Two major bushfires in 1939 and 2009 occurred in the vicinity of the project area, with native vegetation south of Warburton (i.e. Mount Little Joe, Mount Tugwell and Mount Bride) burning multiple times since the 1980s. The project area was not burnt in the 2009 or 2019/20 bushfires.

### 8.6.2 Vegetation type, extent, condition and threatened communities

The assessment corridor where trail construction and operation would occur supports nine forest ecological vegetation classes (EVCs) across the Highland Southern Falls and Victorian Alps bioregions (Figure 8-2 and Figure 8-3). The bioregional conservation status, condition, extent within the assessment corridor and the trail length that intersects the EVC are described in Table 8-2.

Native vegetation within the project area is mostly of high quality with a very low cover of weeds observed along the majority of the assessment corridor. High quality vegetation is considered valuable at a local and regional level in the Port Phillip catchment due to ongoing development, land uses and threatening processes that have diminished native vegetation extent and quality since European settlement. The impacts of past disturbance as described in Section 8.6.1 is still evident with some areas displaying low numbers of large trees relative to other areas of the same EVC. The impact of fire is most notable in Lowland Forest and Shrubby Foothill Forest EVCs in Yarra State Forest which are variously dominated by fire tolerant woody species.

#### What is an EVC?

An ecological vegetation class (EVC) contains one or more floristic plant communities and represents a grouping of broadly similar environments.

#### What is the bioregional conservation status?

The combination of the EVC and bioregion is used to determine the bioregional conservation status. The status is a measure of the current extent and quality for each EVC, compared to its original (pre-1750) extent and condition.

#### What is native vegetation?

Native vegetation is defined in the Victoria Planning Provisions as '*plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses.*'

Table 8-2 Summary of EVCs recorded within the assessment corridor

Bioregion	EVC	Bioregional conservation status	Condition	Extent	Trail length that intersects EVC (km)
Highland Southern Falls	EVC 16 Lowland Forest	Least Concern	Moderate to high quality	1.6%	2.69
	EVC 18 Riparian Forest	Least Concern	Low to high quality	0.002%	Minor occurrence at proposed Yarra River bridge crossing
	EVC 23 Herb-rich Foothill Forest	Least Concern	Lower quality	0.9%	1.53
	EVC 29 Damp Forest	Least Concern	High to very high quality with small sections of moderate quality on lower slopes near cleared land	24.8%	42.67
	EVC 30 Wet Forest	Least Concern	High to very high quality with small sections of moderate quality near the golf course	31.4%	52.32
	EVC 31 Cool Temperate Rainforest ( <b>pure CTR</b> )	Endangered	High quality	0.6%	0.96
	EVC 31 Cool Temperate Rainforest ( <b>CTMF</b> )	Endangered	High quality	0.2%	0.40
	EVC 39 Montane Wet Forest	Least Concern	High quality	0.6%	1.06
	EVC 45 Shrubby Foothill Forest	Least Concern	High to very high quality with small sections of low to moderate quality	28.3%	48.92
	EVC 127 Heathy Valley Forest	Vulnerable	High quality	0.3%	0.46
Vic Alps	EVC 30 Wet Forest	Least Concern	High to very high quality with small sections of moderate quality near the golf course	1.8%	3.03
	EVC 31 Cool Temperate Rainforest ( <b>pure CTR</b> )	Endangered	High quality	1.0%	1.57
	EVC 31 Cool Temperate Rainforest ( <b>CTMF</b> )	Endangered	High quality	4.1%	6.61
	EVC 39 Montane Wet Forest	Least Concern	High quality	4.4%	7.28

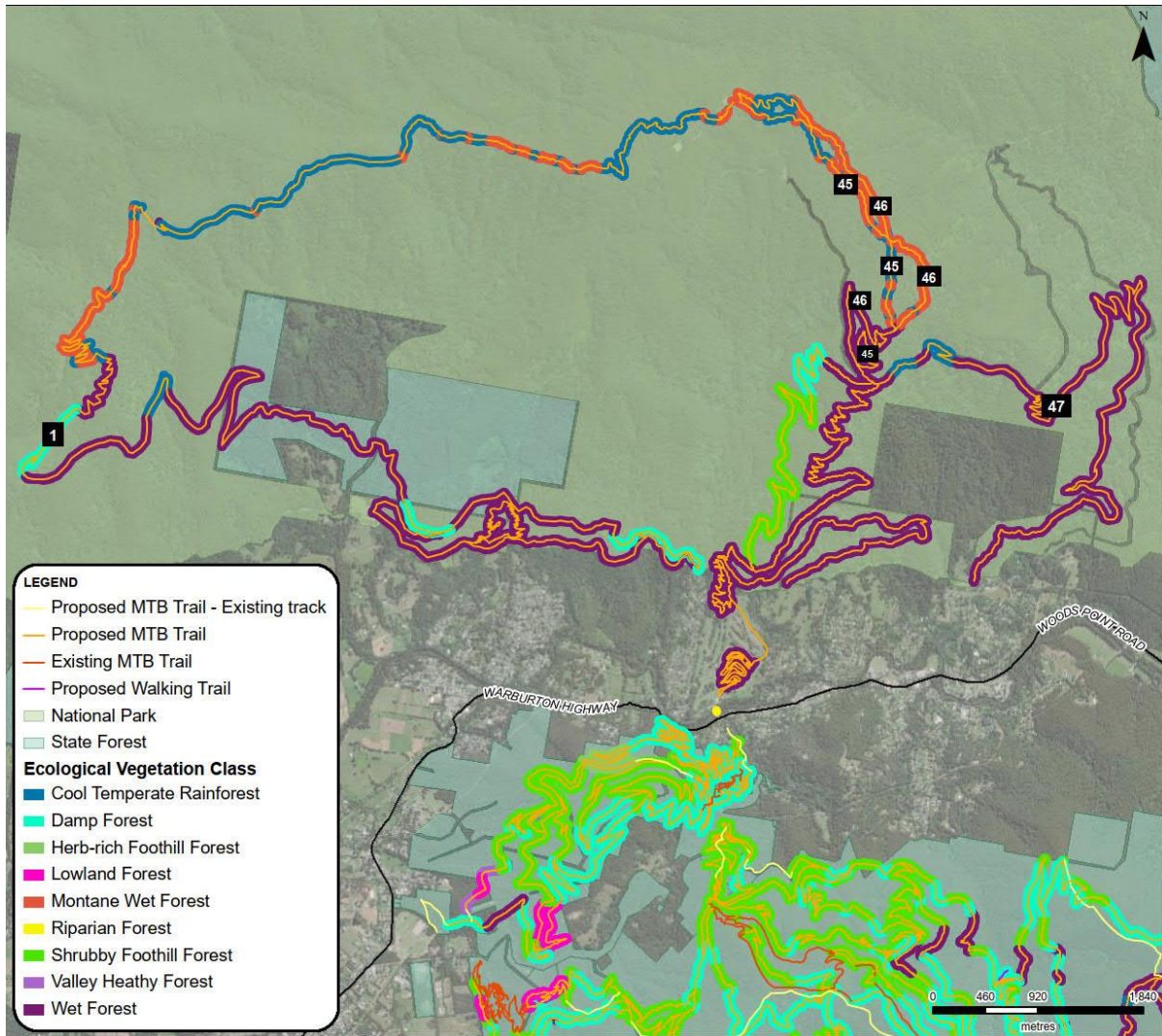


Figure 8-2 Ecological vegetation classes within the northern extent of the project area

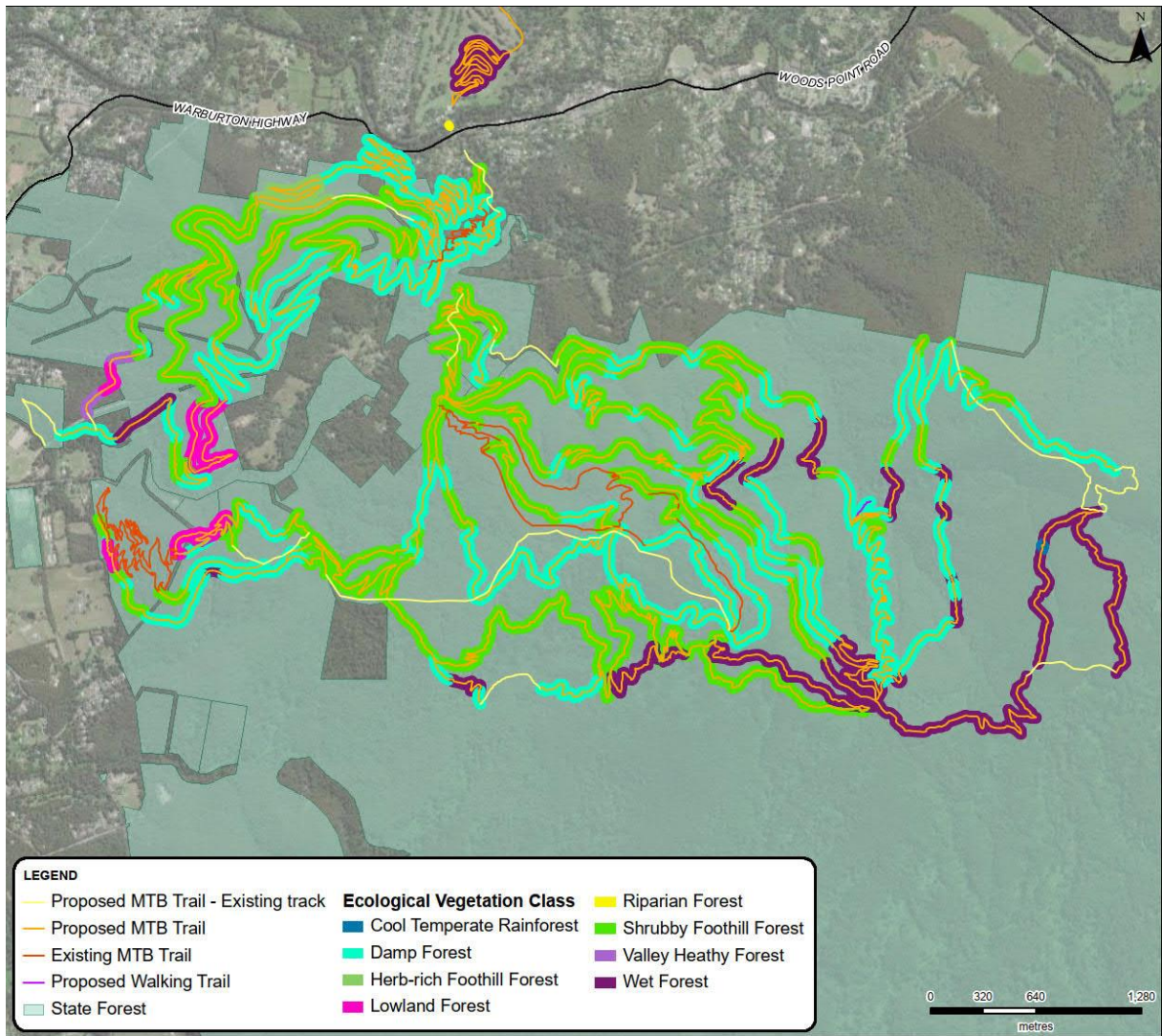


Figure 8-3 Ecological vegetation classes within the southern extent of the project area

### 8.6.2.1 Significant ecological communities

#### 8.6.2.1.1 EPBC Act listed ecological communities

The background desktop review identified the following EPBC listed threatened ecological community as having potential to occur within the project area:

- Alpine Sphagnum Bogs and Associated Fens (Critically Endangered under EPBC Act)

Native vegetation was assessed to determine whether it corresponded to this significant ecological community by assessing the vegetation against relevant condition thresholds and community descriptions published by the Commonwealth of Australia.

#### Threatened ecological community

An ecological community is considered threatened when it is at risk of extinction. The risk is due to potentially threatening processes such as land clearing that result in a rapid and significant reduction in geographic distribution or ecological function.

Alpine Sphagnum Bogs and Associated Fens can be found in small pockets in alpine, subalpine and montane areas. The community is typically defined by the presence of *Sphagnum* species. on an underlying peat substrate though *Sphagnum* species. may also be absent. In Victoria there are seven EVCs that are associated with the ecological community. These EVCs are summarised in Table 8-3. None of these EVCs were mapped or observed within the assessment corridor or within the project area during field investigations. The National Recovery Plan for this community indicates that the closest occurrences of this community to Warburton are in the vicinity of Lake Mountain and Baw Baw plateau. These two locations are not in the same catchment as the project area and are at higher elevations indicating indirect or off-site impacts are negligible.

No other EPBC Act listed ecological communities were recorded within the project area.

**Table 8-3 EVCs that correspond to Alpine Sphagnum Bogs and Associated Fens TEC**

Classification	Community Name
EVC 171	Alpine Fen
EVC 210	Sub-alpine Wet Heathland
EVC 221	Sub-alpine Wet Heathland/Alpine Fen Mosaic
EVC 288-61	Alpine Valley Peatland (Raised Bog)
EVC 288-62	Alpine Valley Peatland (Valley Bog)
EVC 917	Sub-alpine Wet Sedgeland
EVC 1011	Alpine Peaty Heathland

#### 8.6.2.1.2 FFG Act listed ecological communities

The EPBC Act listed alpine bog community discussed in Section 8.6.2.1.1 also corresponds with a number of FFG Act listed alpine vegetation communities. None of these were recorded or are likely to occur in the project area.

Two FFG Act listed threatened communities, CTR and CTMF, occur within the project area in the Yarra Ranges National Park between Mount Donna Buang, Mount Victoria and Ben Cairn. The extent of these communities within the project area is summarised under EVC 31 in Table 8-2 in Section 8.6.2.

The slopes of Mount Donna Buang are modelled by DELWP as Montane Wet Forest (EVC 39). This EVC is variously dominated by Alpine Ash, Mountain Ash or Shining Gum. The lower slopes then give way to Wet Forest (EVC 30) dominated by Mountain Ash with the drainage lines often supporting ribbons of CTR (EVC 31) dominated by Myrtle Beech and / or Southern Sassafras. The DELWP 2005 EVC mapping rarely extends CTR to the ridgelines above these drainage lines.

CTR is also classified by DELWP as an endangered EVC within the Victorian Alps and Highlands Southern Fall bioregions. The presence of CTR (both the EVC and the FFG Act listed threatened ecological community) was confirmed on-site, however, much of the vegetation that contains dominant tree species characteristic of CTR, most notably Myrtle Beech, is better described as the CTMF ecological community and Montane Wet Forest EVC.



CTMF is not acknowledged or mapped as a separate EVC by DELWP. However, it is listed under the FFG Act as a threatened community in Victoria. The community is acknowledged under the listing recommendation as effectively the CTR community occurring under a canopy of eucalypts and that this, in the absence of fire, would develop into CTR over time. The community description highlights that CTMF mostly occurs in geographically sheltered locations such as saddles on mountain plateaus, cool, permanently moist valley sides and in gullies.

The mountain slopes east and west of Mount Donna Buang are relatively gentle and are initially dominated by Montane Wet Forest. Within this forest, Myrtle Beech is a relatively common understorey tree which sometimes forms a continuous dense understorey with a cover of greater than 70%. This dense understorey tree cover occurs in various sizes and shapes, often occurring as linear ribbons or broader occurrences. Myrtle Beech also occurs as a scattered understorey tree, providing a variable cover as scattered individuals or small clusters.

Relatively large areas (greater than one hectare) of Montane Wet Forest supporting an understorey dominated by Myrtle Beech were considered to represent examples of the CTMF ecological community. However, this includes relatively narrow bands of Myrtle Beech being only one tree wide (estimated at 10 metres) linking broader areas dominated by this species. Beyond these, Myrtle Beech also occurs as scattered individuals or smaller understorey stands.

While a prolonged absence of fire in this environment would see the eucalypts senesce (deteriorate with age) and Myrtle Beech form a closed canopy (i.e. transition to CTR in terms of canopy composition), the occurrence of Myrtle Beech in this area of Montane Wet Forest is not confined to otherwise geographically sheltered locations. The vegetation community composition associated with these stands of CTMF is therefore more closely aligned with the surrounding Montane Wet Forest EVC rather than supporting a suit of species otherwise more closely associated with the CTR EVC.

Areas identified as the CTR ecological community to the west of Mount Donna Buang during initial field investigations were refined as a combination of areas of CTR in more sheltered locations and CTMF in more exposed locations where Myrtle Beech was present amongst Montane Wet Forest.

Of the areas assigned to Cool Temperate Rainforest EVC 31 in the assessment corridor, 4.96 hectares is considered Cool Temperate Rainforest and 14.05 hectares is considered Cool Temperate Mixed Forest. Figure 8-5 and Figure 8-4 show the difference between CTR and CTMF in the project area.

Figure 8-6 provides an overview of the extent of CTR and CTMF within the project area.



Figure 8-4 EVC 31 Cool Temperate Rainforest (CTR) along the upper drainage lines of Mount Donna Buang



Figure 8-5 Cool Temperate Mixed Forest (CTMF) on the upper slopes of Mount Donna Buang

### Cool Temperate Rainforest (CTR)

The FFG Act described CTR as '*Combinations of Myrtle Beech, Southern Sassafras, Black Olive-berry, and Blackwood according to the site, the dominant tree species varying with the longitude. Cool Temperate Rainforest includes closed transitional and seral communities, with emergent eucalypts, that are similar in botanical composition to mature rainforests in which eucalypts are absent. In these situations, a more or less closed rainforest canopy occurs beneath the emergent eucalypts. The understorey is typically dominated by Musk Daisy-bush, Austral Mulberry and tree-ferns, with a ground stratum dominated by ferns. Epiphytes are abundant on both trees and tree-ferns, and a rich bryophyte flora is also present. In undisturbed conditions, Cool Temperate Rainforest has a closed canopy.*

The primary management issues associated with the protection of CTMF and providing opportunities for this community to develop into CTR includes protection from fire and minimising the potential impact of Myrtle Wilt. Potential construction and operation impacts and mitigation measures are discussed from Section 8.7 onwards.

No other FFG Act listed ecological communities were recorded within the project area.

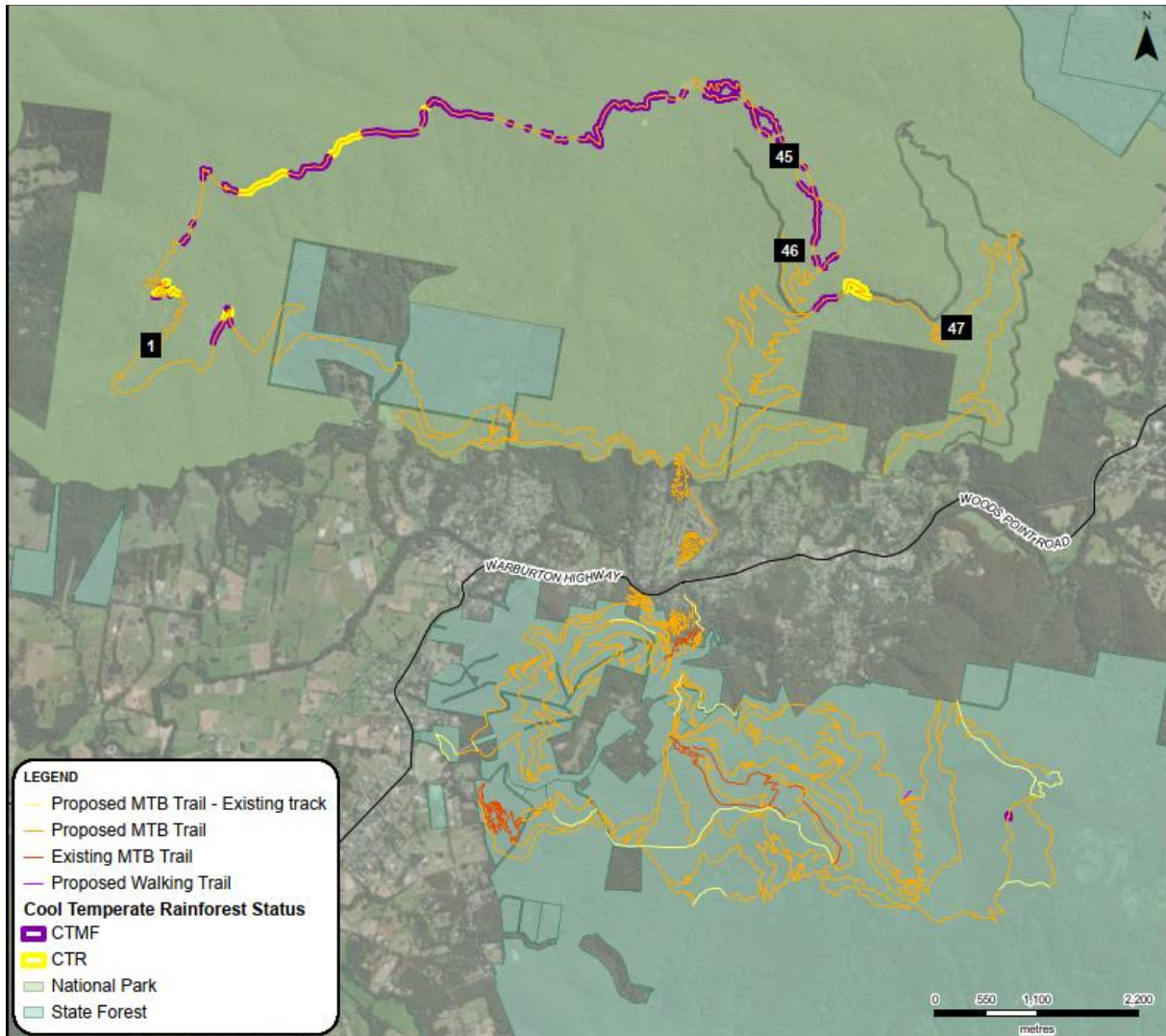


Figure 8-6 Cool Temperate Rainforest (CTR) and Cool Temperate Mixed Forest (CTMF) extent within the northern project area

### 8.6.3 Flora, including significant species

Ecological surveys have recorded 288 indigenous plant species in the assessment corridor including 50 introduced plant species, seven of which are listed noxious weeds and 11 that are ranked as very high risk environmental weeds.

An assessment of the likelihood of these species to occur in the project area was undertaken. Of the significant species recorded or predicted to occur within the project search area (within 10 kilometres of the project area), 49 are considered to have a medium or higher likelihood of occurrence within the project area and assessment corridor including:

- Two EPBC Act listed threatened species (Round-leaf Pomaderris *Pomaderris vacciniifolia* and Tall Astelia *Astelia australiana*). These two species are also listed on the FFG Act.
- Forty-four FFG Act listed threatened species according to recent updates to this Act
- Two species that have not been included in new FFG Act listings but are retained on DELWP's Advisory list and used in Guidelines assessments.

A summary of the species recorded during site assessments or likely to occur within the project area or assessment corridor is provided in Table 8-4

**Table 8-4 Significant flora species recorded during site assessments or predicted to have a likelihood of occurrence of medium or higher within the project area**

Species scientific name	Species common name	Type	Conservation status			Significance (as defined in Section 6.3.11)	Recorded on-site during assessments?
			EPBC	Adv. List	New FFG Status		
<b>EPBC Act listed flora species</b>							
<i>Astelia australiana</i>	Tall Astelia	HG	VU	v	cr	Threatened species	No
<i>Pomaderris vacciniifolia</i>	Round-leaf Pomaderris	MSs	CR	e	cr	Threatened species	No
<b>FFG Act listed or state significant flora species</b>							
<i>Cyathea cunninghamii</i>	Slender Tree-fern	F		v	cr	Threatened species	No
<i>Hypocreopsis amplexans</i>	Clasping Hypocreopsis	C		v	cr	Threatened species	No
<i>Thismia rodwayi</i>	Fairy Lanterns	HG		v	e	Threatened species	No
<i>Eucalyptus</i> aff. <i>camphora</i> (Upper Yarra)	Upper Yarra Swamp-gum	LT		e	Not listed	Threatened species	No
<i>Acrobolbus cinerascens</i>	Grey Pouchwort	C		v	cr	Threatened species	No
<i>Notogrammitis angustifolia</i> subsp. <i>nothofageti</i>	Beech Finger-fern	F		v	e	Threatened species	No
<i>Persoonia arborea</i>	Tree Geebung	UT/Is		v	e	Threatened species	Yes
<i>Utricularia gibba</i>	Floating Bladderwort	HG		v	e	Threatened species	No

Species scientific name	Species common name	Type	Conservation status			Significance (as defined in Section 6.3.11)	Recorded on-site during assessments?
			EPBC	Adv. List	New FFG Status		
<i>Abrodictyum caudatum</i>	Jungle Bristle-fern	F		r	e	Threatened species	No
<i>Acacia leprosa</i> var. <i>uninervia</i>	Large-leaf Cinnamon-wattle	MSs		r	e	Threatened species	No
<i>Acacia nanodealbata</i>	Dwarf Silver-wattle	UT/Is		r	v	Threatened species	No
<i>Adelanthus (Pseudomarsipidium) bisetulus</i>	Twin-tooth Featherwort	C		r	e	Threatened species	No
<i>Austrostipa rudis</i> subsp. <i>australis</i>	Veined Spear-grass			r	e	Threatened species	No
<i>Bossiaea cordigera</i>	Wiry Bossiaea	MSs		r	e	Threatened species	No
<i>Caladenia flavovirens</i>	Christmas Spider-orchid	HG		r	cr	Threatened species	No
<i>Calochilus imberbis</i>	Naked Beard-orchid	HG		r	cr	Threatened species	No
<i>Calypstrochaeta brownii</i>	Brown's Mitre-moss	C		r	e	Threatened species	No
<i>Carex alsophila</i>	Forest Sedge	HG		r	e	Threatened species	No
<i>Chiloglottis jeanesii</i>	Mountain Bird-orchid	HG		r	v	Threatened species	Yes
<i>Chlorovibrissea bicolor</i>	Two-tone Vibrissea	C		r	e	Threatened species	No
<i>Correa reflexa</i> var. <i>lobata</i>	Powelltown Correa	MSs		r	e	Threatened species	No
<i>Corybas aconitiflorus</i>	Spurred Helmet-orchid	HG		r	e	Threatened species	No
<i>Corybas grumulus</i>	Mountain Helmet-orchid	HG		r	e	Threatened species	No
<i>Dicranoloma platycaulon</i>	Wavy Fork-moss	C		r	e	Threatened species	No
<i>Distichophyllum crispulum</i>	Crisped Mitre-moss	C		r	e	Threatened species	No
<i>Echinodium hispidum</i>	Madeira Moss	C		r	v	Threatened species	No
<i>Eucalyptus fulgens</i>	Green Scentbark	LT		r	e	Threatened species	No
<i>Eucalyptus ignorabilis</i> s.s.	Grey Scentbark	LT		r	v	Threatened species	No
<i>Goodia pubescens</i>	Silky Golden-tip	MSs		r	e	Threatened species	No

Species scientific name	Species common name	Type	Conservation status			Significance (as defined in Section 6.3.11)	Recorded on-site during assessments?
			EPBC	Adv. List	New FFG Status		
<i>Hampeella alaris</i>	Arc Moss	C		r	e	Threatened species	No
<i>Leionema bilobum</i> subsp. <i>serrulatum</i>	Toothed Leionema	MSs		r	Not listed	Significant species	Yes
<i>Lindsaea microphylla</i>	Lacy Wedge-fern	F		r	e	Threatened species	No
<i>Ozothamnus rogersianus</i>	Nunniong Everlasting	MSs		r	e	Threatened species	No
<i>Phebalium squamulosum</i> subsp. <i>squamulosum</i>	Forest Phebalium	MSs		r	e	Threatened species	Yes
<i>Pittosporum bicolor</i> x <i>undulatum</i>	Hybrid Pittosporum	UT/Is		r	Not listed	Significant species	No
<i>Platylobium reflexum</i>	Victorian Flat-pea	MSs		r	e	Threatened species	Yes
<i>Pomaderris pilifera</i> subsp. <i>pilifera</i>	Striped Pomaderris	MSs		r	e	Threatened species	No
<i>Pterostylis X ingens</i>	Sharp Greenhood	HG		r	v	Threatened species	No
<i>Senecio campylocarpus</i>	Floodplain Fireweed	HG		r	e	Threatened species	No
<i>Senecio distallobatus</i>	Distal-lobe Fireweed	HG		r	v	Threatened species	No
<i>Sticherus tener</i> s.s.	Tasman Fan-fern	F		r	e	Threatened species	No
<i>Tetrateca stenocarpa</i>	Long Pink-bells	MSs		r	e	Threatened species	Yes
<i>Tetrateca subaphylla</i>	Leafless Pink-bells	MSs		r	v	Threatened species	No
<i>Tmesipteris ovata</i>	Oval Fork-fern	F		r	e	Threatened species	Yes

Species scientific name	Species common name	Type	Conservation status			Significance (as defined in Section 6.3.11)	Recorded on-site during assessments?
			EPBC	Adv. List	New FFG Status		
<i>Tmesipteris parva</i>	Small Fork-fern	F		r	e	Threatened species	No
<i>Westringia senifolia</i>	Alpine Westringia	MSs		r	e	Threatened species	No
<i>Wittsteinia vacciniacea</i>	Baw Baw Berry	MSs		r	v	Threatened species	No

**Notes to table:** CR/cr – Critically Endangered, EN/e – Endangered, VU/v – Vulnerable, r – Rare, LT – Large Tree, UT/lS – Understorey (sub-canopy) trees and large shrubs, MSs – Medium and small shrubs, HG – Herbs and graminoids, including orchids, F – ferns, C – Cryptogams

### 8.6.3.1 EPBC Act listed flora species

#### Tall Astelia

Tall Astelia is a native lily endemic to Victoria. The species is known to grow in wet forests and rainforests in two widely separated locations; the Powelltown-Beenak area of the Central Highlands and near Lavers Hill in the Otways. Eleven of the 12 known populations are in the Central Highlands. Tall Astelia is typically found in the moist soils of gully heads and along stream margins in association with CTR (dominated by Myrtle Beech) or CTMF. The species is slow growing, taking at least 10 years to reach reproductive maturity, reaching a height of approximately 1.8 metres. Tall Astelia typically forms dense groves as a result of its rhizomatous habitat. The species flowers from November to February, though incidence of flowering is extremely low and seed production is sparse. Major threats include weed invasion, wildfire, altered hydrology and disturbance / destruction to plants and habitat. The species' highly restricted geographic distribution and susceptibility to threatening processes both contribute to its listing as vulnerable under the EPBC Act.

There are seven records of Tall Astelia within 10 kilometres of the project area. All records are to the south of the project area and are associated with Powelltown-Beenak populations. The closest record, from 1980, is 7.5 kilometres to the south. No targeted surveys for the species have been conducted within the assessment corridor to date. However, as the species is highly distinctive and can be detected year-round, it is highly likely that any individuals within the assessment corridor would have been detected during field surveys conducted for this project in wet forest and rainforest vegetation. Given the survey effort to date we consider it highly unlikely that unrecorded populations of Tall Astelia remain within the assessment corridor.

#### Round-leaf Pomaderris

Endemic to Victoria, Round-leaf Pomaderris is a slender shrub with distinctive foliage that is largely confined to moist forests and scrubs in the middle and upper catchments of the Yarra, Plenty and Yea Rivers. The species' highly restricted geographic distribution and susceptibility to threatening processes, contribute to its listing as critically endangered under the EPBC Act. Key threats to the species include inappropriate fire regimes (the species is an obligate seed regenerator), weed invasion (primarily Blackberry and Montpellier Broom *Genista monspessula*) and damage by Sambar Deer *Cervus unicolor*. The species flowers in September and November, but is able to be easily detected year-round.

There are three records of the species within 500 metres of the project area all near the Yarra River in East Warburton. These three records are 2.5 kilometres east of the closest trail (Trail 8). The occurrence of Round-leaf Pomaderris at previously recorded locations outside of the project area was confirmed during field surveys (i.e. reference populations). According to DELWP mapping, the location is within the lower elevations of Shrubby Foothill Forest (EVC 45) near the transition boundary to Riparian Forest (EVC 18). The next closest records of the species are approximately 12 kilometres north-west of the project area around Healesville. These Healesville records are primarily scattered along New Chum Creek in Riparian Forest (EVC 18) with some records on the surrounding lower slopes within Lowland Forest (EVC 16). Table 8-5 summarises Round-leaf Pomaderris VBA records in the Yarra Ranges (from Warrandyte through Kinglake and Toolangi to Healesville) according to DELWP mapped EVC. Records of the species are primarily associated with Riparian Forest (EVC 18)

or EVCs that are directly upslope of Riparian Forest, primarily Shrubby Foothill Forest (EVC 45). These EVC affinities for VBA records suggest that Round-leaf Pomaderris is most likely to occur in the project area at lower elevations in close proximity to major drainage lines; namely the Yarra River, Dee River, and the lower reaches of Scotchmans Creek, Backstairs Creek, Four Mile Creek, Cemetery Creek and Yankee Jims Creek. With the exception of Four Mile Creek, trail works are proposed in proximity to these drainage lines though they represent a small fraction of the total network.

**Table 8-5 Round-leaf Pomaderris EVC affinities - VBA records in the Yarra Ranges intersected DELWP mapped EVC**

EVC	Number of VBA records
18 Riparian Forest	61
45 Shrubby Foothill Forest	48
23 Herb-rich Foothill Forest	17
16 Lowland Forest	16
29 Damp Forest	13
No EVC	11
22 Grassy Dry Forest	6
20 Heathy Dry Forest	6
47 Valley Grassy Forest	6
902 Gully Woodland	3
126 Swampy Riparian Complex	3
164 Creekline Herb-rich Woodland	2
30 Wet Forest	2
793 Damp Heathy Woodland	1
<b>TOTAL</b>	<b>195</b>

Patykowski, Gibson & Dell (2014) suggest the species occurs in the following vegetation associations (Table 8-6), two of which have been mapped within the project area. Note that neither Riparian Forest (EVC 18) nor Shrubby Foothill Forest (EVC 45), which represent 109 of 195 (56%) of Round-leaf Pomaderris VBA records in the local area are mentioned by Patykowski, Gibson & Dell (2014) (see Table 8-6). Records of the species in the local area suggest that optimum habitat for the species, at least within the project area, occurs at lower elevations in proximity to major drainage lines.

**Table 8-6 EVCs known to support Round-leaf Pomaderris (Patykowski, Gibson & Dell 2014)**

EVC	Habitat suitability	Mapped within project area
<b>23 Herb-rich Foothill Forest</b>	Optimum	Yes
<b>29 Damp Forest</b>	Optimum	Yes
<b>22 Grassy Dry Forest</b>	Sub-optimum	No
<b>47 Valley Grassy Forest</b>	Sub-optimum	No
<b>164 Creekline Herb-rich Woodland</b>	Sub-optimum	No
<b>937 Swampy Woodland</b>	One known location, possible more frequent historically	No

No targeted surveys for the species have been conducted within the assessment corridor to date. However, as the species is highly distinctive and can be detected year-round, it is highly likely that any individuals within the assessment corridor would have been detected during field surveys.

### 8.6.3.2 DELWP advisory listed flora species

Species listed as rare are often locally abundant where they do occur. These species are not given further consideration beyond the estimated impacts from habitat modelling, the details of which are described in Section 8.7.2.3.

Round-leaf Pomaderris (DELWP advisory list endangered) and Tall Astelia (DELWP advisory list vulnerable) have been discussed above as they are both EPBC Act listed. The remaining eight threatened species (DELWP advisory list vulnerable) are discussed below.

#### Slender Tree-fern

In Victoria the Slender Tree-fern is confined to deep gullies in wet forests. As few of these features occur within the assessment corridor it is unlikely that the assessment corridor supports large numbers of this species. The species has been recorded in the project area twice. In 1981, north of Donna Buang Road and again 2.7 kilometres from the project area in 1989 along Coranderrk Creek, also north of Donna Buang Road. As the species is conspicuous and can be detected year-round, it is highly likely that any individuals within the assessment corridor would have been detected during field surveys.

#### Clasping Hypocreopsis

Clasping Hypocreopsis is a target species of the Royal Botanic Garden's 'Fungimap' fungi mapping project. Despite it being a target of this program for several decades, it is one of the least reported species. Clasping Hypocreopsis is thought to be an obligate mycoparasite forming its own sporing bodies on top of the sporing bodies of another fungus in the *Hymenochaete* family. The host fungus usually grows on dead branches of Tea-tree *Leptospermum* spp., Paperbark *Melaleuca* spp. and Burgan *Kunzea* spp. in long unburnt areas. Most of the southern section of the project area has been burnt multiple times since the 1980s and is unlikely to provide suitable habitat. The slopes of Mount Donna Buang in the northern section of the project area contain patches of suitable habitat. The species has been recorded three times between 2017 and 2018 within four kilometres of the project area. This extremely cryptic species is unlikely to be detected without an extensive survey effort in areas of suitable habitat within the assessment corridor, which is unlikely to be proportionate with potential impacts to the species from the project.

#### Fairy Lanterns

Fairy Lanterns is a small saprophytic plant that is restricted to damp humus and leaf-litter in deeply shaded tall forests and fern gullies. The vegetative part of the plant is entirely subterranean and colourless. The species' small, orange and red, fleshy flowers appear from spring to autumn, barely penetrate the soil surface and are typically covered by leaf-litter. This extremely cryptic species is unlikely to be detected without an extensive survey effort in areas of suitable habitat within the assessment corridor, which is unlikely to be proportionate with potential impacts from the project.

#### Upper Yarra Swamp-gum

This species is known to occur at one location in Victoria which is within the project area around Yarra Junction. The species appears closely related to Mountain Swamp Gum *Eucalyptus camphora* subsp. *humeana* and its taxonomy remains somewhat uncertain. VicFlora recognises the trees growing on flats of the Yarra River around Yarra Junction as *E. camphora* subsp. *humeana* but unusually short, and with small, glossy green adult leaves. Given the apparently extremely restricted range of the species, its overwhelming morphological overlap with Mountain Swamp Gum, and the very minor disturbance to suitable habitat associated with the project, targeted surveys for the species are considered unlikely to be proportionate with potential impacts to the species from the project.

#### Grey Pouchwort

Grey Pouchwort is an epiphytic or log-dwelling rainforest liverwort with shoots scarcely over one millimetre wide. There are no records of the species within the search area however DELWP's habitat importance modelling indicates suitable habitat for the species occurs within the project area. Given the species' habitat preferences, small size and lack of any records in the search area, targeted surveys are considered unlikely to provide value in reducing the likelihood of potential impacts to the species.

#### Beech Finger-fern

Beech Finger-fern is a small epiphytic or lithophytic fern of wet forests. The species has been recorded once in the project area in 1999. This species is unlikely to be detected without an extensive survey



effort in areas of suitable habitat within the assessment corridor, which is unlikely to be proportionate with potential impacts from the project.

### Tree Geebung

This species of *Persoonia* is endemic to the Central Highlands of Victoria and has distinctive foliage, flowers and fruit that readily identify it year-round. This species grows as a tall understorey shrub to small tree in Wet Forest and on the margins of CTR. Field surveys in 2019 encountered this species numerous times nearby, but not within, the assessment corridor. Further field surveys recorded this species in November 2020 and July 2021 between Mount Donna Buang, Mount Victoria and Ben Cairn, and in February 2021 near Mount Bride. As the species can be detected year-round, and the entire trail alignment (current design) has been surveyed, it is unlikely that there remain significant numbers of undetected individuals within the assessment corridor.

### Floating Bladderwort

Floating Bladderwort is a carnivorous aquatic herb that in Victoria occurs in freshwater swamps and wetlands at low elevations. As the species is also a common weed of aquaria and botanic gardens throughout the world the origin of individuals around Melbourne remains contentious. As elevated structures would be used to cross waterways within the assessment corridor, targeted surveys for this species is not considered proportionate with the minor impacts expected from the project.

#### 8.6.4 Trees

The majority of the assessment corridor supports medium to tall forest types with a typical eucalypt forest structure and varying densities of large trees, primarily as a result of disturbance history (fire and logging). Large tree health is generally moderate to high throughout the project area. Average large tree density across all forest types in the assessment corridor is 23 large trees per hectare, which is reflective of benchmark conditions for forest EVCs. Herb-rich Foothill Forest and Lowland Forest have the lowest densities of large trees. Cool Temperate Rainforest and Montane Wet Forest have the highest densities of large trees.

As identified in Table 8-4, three state significant large tree species of eucalypt are considered to have a medium or high likelihood of occurrence within the project area and potentially in the assessment corridor. However, these species were not recorded during ecological surveys. The three species include:

- Upper Yarra Swamp-gum *Eucalyptus aff. camphora* (Upper Yarra)
- Green Scentbark *Eucalyptus fulgens*
- Grey Scentbark *Eucalyptus ignorabilis*.

The arboricultural investigation commissioned for the project used sample-based tree condition assessments to investigate forest tree conditions and potential impacts on tree protection zones (TPZs) and structural root zones (SRZs) from trail construction and operation. In summary, there were 675 trees assessed in 30 representative sample locations across the assessment corridor. All assessed trees were of indigenous species. The majority of the assessed trees were considered to be in the fair condition category. A detailed report of the arboricultural assessment reports is provided in Appendix 9 of **Technical Report A: Biodiversity and habitats**.

## 8.6.5 Fauna and habitat (terrestrial and aquatic)

Terrestrial and aquatic habitat types are generally of high to moderate quality given the forested nature of the project area. A detailed description of the different terrestrial and aquatic fauna habitats are described in the following sections.

### 8.6.5.1 Terrestrial fauna habitat types

#### Wet and damp forests

The majority of the project area consists of wet and damp forest communities including Damp Forest, Montane Wet Forest and Wet Forest. These vegetation communities occur across the south-facing slopes of the Yarra Ranges National Park within the project area, and on much of the more sheltered north-facing slopes and gullies of the southern section of the project area within Yarra State Forest. These wetter, closed forests provide a variety of resources for a diverse range of local fauna. Flowering eucalypts provide food for nectar-feeding fauna, such as honeyeaters and gliders. Large old trees and dead stags provide nesting resources for a range of hollow-dependent fauna, including forest owls, possums and gliders. In particular, hollow-bearing trees in these forests provide nesting resources for the EPBC Act listed Southern Greater Glider *Petauroides Volans* and Leadbeater's Possum *Gymnobelideus leadbeateri*, as well as FFG Act listed Powerful Owl *Ninox strenua* and Sooty Owl *Tyto tenebricosa*. Trees and shrubs provide habitat for insectivorous birds that forage on tree trunks, limbs, underneath the bark, on leaves, around flowers and in coarse woody debris and leaf litter at ground level. The arboreal Spencer's Skink *Pseudemoia spenceri* is also likely to be present and utilise trees within these forest types.

#### Terrestrial fauna habitat

Habitat types include wet and damp forests, rainforests, dry forest, disturbed areas and planted vegetation. These habitat vegetation types include important habitat components for terrestrial fauna including tree canopies, and trees with small and large hollows, including dead stags, dense understorey vegetation including shrubs and grasses, vegetation (foliage, fruit and grasses) that provide food resources, leaf litter and rocks, moist depressions and wet areas along gully lines and large fallen logs that are hollow or concave.

The ground layer is structurally diverse with dense shrubs, ferns, grasses and a deep layer of bark and leaf litter, along with coarse woody debris. This provides foraging habitat and cover for a number of small ground-dwelling mammals such as Bush Rat *Rattus fuscipes*, Agile Antechinus *Antechinus agilis* and Mainland Dusky Antechinus *Antechinus mimetes*. Small birds that utilise this layer include White-browed Scrubwren *Sericornis frontalis* and Superb Fairy-wren *Malurus cyaneus*, and a number of small skinks associated with forest habitat are also likely to be present including McCoy's Skink *Anepischtos maccoyi* and Garden Skink *Lampropholis guichenoti*.

Larger fallen branches and the occasional presence of sub-canopy trees provides foraging opportunities for small insectivorous birds such as Eastern Yellow Robin *Eopsaltria australis* and Grey Fantail *Rhipidura albiscapa*, both of which are recorded regularly from the local area. Areas where stem densities allow for a dense and well connected sub-canopy layer, including thickets dominated by Mountain Tea-tree or Lemon Bottlebrush, represent critical habitat for the EPBC Act listed Leadbeater's Possum, particularly in proximity to known colonies occurring around Mount Donna Buang, Ben Cairn and Mount Bride.

Creeks and streams that occur within these forest types are likely to support semi-aquatic vertebrate fauna including common frog and water skink species such as Common Froglet *Crinia signifera*, Victorian Smooth Froglet *Geocrinia Victoriana* and Southern Water Skink *Eulamprus tympanum tympanum*, all of which have been recorded within the project area or broader project search area.

#### Rainforest

Rainforest and other forest located in sheltered, wet gullies support similar resources for fauna as adjacent vegetation types throughout the surrounding landscape. Rainforest within the project area is confined to south-facing gullies around the Ben Cairn and Mount Donna Buang areas, and is represented by a closed canopy of Myrtle Beech and Southern Sassafras with a ground layer dominated by ferns and mosses, and a deep litter layer and presence of coarse woody debris. There are a number of fauna species that are more commonly associated with rainforest habitat, which are likely to utilise these parts of the project area. These species include a number of insectivorous birds that utilise the ground-layer of rainforest habitats, such as Bassian Thrush *Zoothera lunulata*, Pilotbird *Pycnoptilus floccosus*, Superb Lyrebird *Menura novaehollandiae* and Large-billed Scrubwren *Sericornis magnirostra*. Rainforest habitat within the project area is also likely to support breeding

habitat for Rose Robin *Petroica rosea*, Pink Robin *Petroica rodinogaster* and the EPBC Act listed migratory Rufous Fantail *Rhipidura rufifrons*. The EPBC Act listed Leadbeater's Possum is also likely to utilise these areas.

### Drier forest habitat

Drier forest habitat occurs on the lower north and west facing foothills and ridges of the southern section of the project area. These relatively drier habitats largely correspond with Shrubby Foothill Forest and also include occurrences of Lowland Forest, Herb-rich Foothill Forest and Heathy Valley Forest. These drier habitats typically contain a denser and more diverse herb and shrub layer that is made up of heaths and other fire-adapted species. Drier forest habitat provides a similar range of resources for fauna to wetter forest habitats. However, the composition of species is slightly different, and includes a diverse range of birds, reptiles and some additional mammal species that are unlikely to be present in wetter forest habitats such as Short-beaked Echidna *Tachyglossus aculeatus* and Koala *Phascolarctos cinereus*. Reptiles that are more likely to occur in these areas include Lace Monitor *Varanus varius* and Tree Dragon *Amphibolurus muricatus*. The EPBC Act listed Smoky Mouse *Pseudomys fumeus* and Southern Brown Bandicoot *Isodon obesulus obesulus* are also considered to have potential to occur within these drier and heathier forest habitats.

### Planted vegetation and urban areas

The project area includes proposed trails in and around the townships of Warburton and Wesburn, which contain cleared areas, built structures and planted vegetation associated with landscape plantings, golf courses and private gardens. Many of these plantings are exotic or non-indigenous, and provide an alternative food source for common local fauna that are wide-ranging and well-adapted to disturbed environments. The township is also located on relatively flat land adjacent to the Yarra River, and therefore, a number of wetlands, dams and ephemeral flooded areas occur, which provide habitat for locally common waterbirds such as Pacific Black Duck *Anas superciliosa* and the FFG Act listed Great Egret *Ardea alba*, and common frogs including Southern Brown Tree Frog *Litoria ewingii* and Southern Bullfrog *Limnodynastes dumerilii*. Planted flowering trees may also be utilised by the EPBC Act listed Swift Parrot *Lathamus discolor* and Grey-headed Flying-Fox *Pteropus poliocephalus*.

#### 8.6.5.2 Aquatic habitat types

The project area contains a diversity of aquatic and riparian habitat consisting of numerous creeks, rivers, drainage lines, seasonal gullies, damp depressions and riparian vegetation. Spatial analysis identifies approximately 64 named waterways in the project area defined according to the *Waterway Determination Guidelines*. Of these waterways, 18 are crossed by the assessment corridor. These waterways are listed in **Chapter 8: Surface water, groundwater and geotechnical hazards**.

Waterways and smaller watercourses within the project area are predominantly comprised of fern gullies and small creeks. The majority of waterways within the project area are surrounded by forested areas of the Yarra Ranges National Park and broader public land estate, which is contiguous with large tracts of Wet Forest, Damp Forest and Shrubby Foothill Forest. The limited modification of terrestrial riparian habitat infers limited disturbance or modification to existing ephemeral, semi-permanent or permanent instream pool or riffle environments and that high quality instream habitats containing woody debris and aquatic epifauna are likely to exist.

Several of the drainage lines and damp depressions encountered during vegetation mapping were observed to contain a dense mid-storey shrub layer of tree ferns and tall shrubs typical of mesic environments. This vegetation structure provides protective cover and foraging resources for small insectivorous birds. Damp areas of Montane Wet Forest are also likely to be closely associated with habitat utilised by the listed Curve-tailed Burrowing Crayfish and Mount Donna Buang Wingless Stonefly (>900 metres above sea level).

Small to medium creeks (such as Big Pats Creek and Britannia Creek) are typically known to be four to six metres in width, containing shallow riffles (20 - 40 centimetres), pools 50 to 85 centimetres, and a mix of both rubble and sand substrate. Habitats in these environments are noted to be of excellent condition, and are known to provide habitat for a diversity of common aquatic fauna including Short-finned Eel, Brown Trout, River Blackfish and Small Spiny Crayfish as well as the potential for threatened species such as the Macquarie Perch. Boulders and small areas of exposed rock adjacent to waterways are also likely to provide potential basking and foraging habitat for reptiles.

Several small wetlands also occur within the project area. These environments were not visually assessed but it is likely they contain a high diversity of macrophytes due to their occurrence within

undisturbed environments and are thus likely to provide high quality breeding habitat for a small number of locally common waterbirds, fish and frogs.

Large waterways within the project area include the Yarra River, which is typically surrounded by open forest or modified riparian environments ranging in levels of disturbance. Instream habitat of the Yarra River is characterised as being four to 16 metres in width, with numerous shallow riffles and pools up to 1.7 metres in depth. Substrate is a mixture of gravel and rubble, with an increase in the presence of boulders to the east and described generally as being of excellent condition despite mild levels of disturbance where it passes through the Warburton Township.

Instream habitat of the Yarra River within this section is known to provide habitat for a diversity of locally common waterbirds, frogs and fish species including Brown Trout, River Blackfish, Pouched Lamprey, Shorthead Lamprey, Mountain Galaxias, Rainbow Trout, Redfin and Australian Smelt. European Carp are described as being present in the Yarra River downstream of the Warburton township but not common. It is likely that instream habitat in this reach, and associated tributaries, may also provide habitat for the threatened species Australian Grayling and Macquarie Perch.

A desktop aquatic habitat condition assessment of waterways was undertaken for all 18 named waterways crossed by the 20 metre wide assessment corridor. The assessment indicated that all named waterways have high aquatic habitat values for a single or combination of reasons related to the presence of continuous riparian vegetation, near natural or excellent instream habitat, and/or presence of Platypus habitat, and/or priority aquatic species habitat. Small watercourses such as unnamed waterways, gullies and headwater tributaries were not assessed individually, but where they support the seasonal presence of water these features also provide high value aquatic habitats based on the forested catchments they occur in and the lack of major hydrological disruption in the upstream catchments.

### 8.6.5.3 Significant fauna

Based on desktop investigations, a total of 153 aquatic fauna species have been recorded within the Yarra River basin, including 35 fish species, 13 frog species, 80 aquatic invertebrates, 17 crustacea and eight molluscs. The desktop investigation for terrestrial fauna identified a total of 772 species within 10 kilometres of the project area.

An assessment of the likelihood of species identified from the desktop assessment for both terrestrial and aquatic fauna to occur was undertaken. Of the significant terrestrial and aquatic fauna species recorded or predicted to occur within the project search area, 26 species are considered to have a medium or higher likelihood of occurrence within the project area or assessment corridor. A summary of the species recorded or likely to occur within the project area is provided in Table 8-7.

Species may fall into more than one category of legislative listing; therefore the combined sum of the below numbers totals more than 26 significant fauna species:

- 11 EPBC Act listed threatened species.
- 27 with new FFG Act listing.
- 29 DELWP Advisory Listed threatened or near-threatened species.

During field assessments, a total of 61 terrestrial fauna species (five introduced) were recorded within the project area. This includes 50 bird species (two introduced), seven mammal species (three introduced), two reptile species and two frog species. No significant fauna species were recorded during the field assessments.

**Table 8-7 Significant fauna species recorded or predicted to have a likelihood of occurrence of medium or higher within the project area**

Species scientific name	Species common name	Conservation status			Significance	Area of value within the project area
		EPBC	Advisory list	FFG		
<b>Commonwealth listed fauna species</b>						
<i>Lathamus discolor</i>	Swift Parrot	CR	e	cr	Threatened	Flowering eucalypts throughout the project area provide an occasional foraging resource.

Species scientific name	Species common name	Conservation status			Significance	Area of value within the project area
		EPBC	Advisory list	FFG		
<i>Hirundapus caudacutus</i>	White-throated Needletail	VU	v	v	Threatened	Aerial species that is likely to forage over the majority of the project area.
<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	EN	e	e	Threatened	Potential habitat located throughout the project area, though few local records.
<i>Petauroides volans</i>	Southern Greater Glider	VU	v	v	Threatened	Wet and damp forest throughout the project area, likely to be widespread within the project area.
<i>Gymnobelideus leadbeateri</i>	Leadbeater's Possum	CR	e	cr	Threatened	Areas of damp and wet forest with a well-connected sub-canopy and hollow-bearing trees (Mount Donna Buang and Mount Bride areas where old growth trees occur).
<i>Pseudomys fumeus</i>	Smoky Mouse	EN	e	e	Threatened	Forest with a diverse understorey of heath and bush-pea species, such as areas of Shrubby Foothill Forest.
<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot	EN	nt	e	Threatened	Potential suitable habitat in areas with a heathy understorey, such as Shrubby Foothill Forest and Valley Heathy Forest.
<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	VU	v	v	Threatened	Flowering eucalypts, including planted trees in and around Warburton and the Golf Course.
<i>Prototroctes maraena</i>	Australian Grayling	VU	v	e	Threatened	Known to occur in the Yarra River.
<i>Maccullochella peelii</i>	Murray Cod	VU	v	e	Threatened	Introduced population within the Yarra River.
<i>Macquaria australasica</i>	Macquarie Perch	EN	e	e	Threatened	Introduced population within the Yarra River.
<b>FFG Act listed fauna species</b>						
<i>Egretta garzetta</i>	Little Egret		e	e	Threatened	Yarra River Floodplain, including flooded pasture.
<i>Ardea alba</i>	Great Egret		v	v	Threatened	Yarra River Floodplain, including flooded pasture.
<i>Accipiter novaehollandiae</i>	Grey Goshawk		v	e	Threatened	A variety of forest types throughout the project area.
<i>Ninox connivens</i>	Barking Owl		e	cr	Threatened	Some potential to occur in areas of drier, more open forest.
<i>Ninox strenua</i>	Powerful Owl		v	v	Threatened	A variety of forest types throughout the project area.
<i>Tyto novaehollandiae</i>	Masked Owl		e	cr	Threatened	A variety of forest types.
<i>Tyto tenebricosa</i>	Sooty Owl		v	e	Threatened	Wet and Damp Forest.
<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale		v	v	Threatened	A variety of forest types.
<i>Ornithorhynchus anatinus</i>	Platypus		v	v	Threatened	Yarra River and other permanent waterways containing suitable habitat.
<i>Rhinolophus megaphyllus megaphyllus</i>	Eastern Horseshoe Bat		e	e	Threatened	A variety of forest types throughout the project area.

Species scientific name	Species common name	Conservation status			Significance	Area of value within the project area
		EPBC	Advisory list	FFG		
<i>Miniopterus orianae oceanensis</i>	Common Bent-wing Bat (eastern ssp.)		cr	cr	Threatened	A variety of forest types throughout the project area.
<i>Varanus varius</i>	Lace Monitor		e	e	Threatened	A variety of forest types.
<i>Riekoperla darlingtoni</i>	Mount Donna Buang Wingless Stonefly		cr	cr	Threatened	Streams and springs within the Mount Donna Buang area.
<i>Engaeus curvisuturus</i>	Curve-tail Burrowing Crayfish		e	e	Threatened	Damp and occasionally inundated areas within the project area.
<i>Engaeus tuberculatus</i>	Tubercle Burrowing Crayfish		e	e	Threatened	Damp and occasionally inundated areas within the project area.

**Notes to table:** CR/cr– Critically Endangered, EN/e – Endangered, VU/v – Vulnerable, nt – near threatened (DELWP Advisory list)

### 8.6.5.3.1 EPBC Act listed fauna species

#### Swift Parrot

The project area does not contain preferred foraging habitat for the Swift Parrot, and there are only six previous records of the species from the project search area. The species was recently recorded in the project search area in 2019 along Scotchmans Creek in Warburton. This observation was of a single bird perched high in a Manna Gum, and was the first time the species had been recorded in the local area for approximately 40 years. The remaining five previous records of the species from the project search area are located to the west of the project area, at three locations north of Launching Place. Swift Parrots, when seasonally present on mainland Australia, typically favour certain winter tree species for foraging including a number of box and ironbark species; Swamp Mahogany, Forest Red Gum, Blackbutt and Spotted Gum. None of these species naturally occur within the project area, however planted specimens are likely to be present in and around the township of Warburton. For this reason, and given the highly mobile nature of the species, individuals may occasionally utilise planted trees within the project area, and fly over other sections of the project area. The project area is not within the core range of the species on mainland Australia, and is within a broader area identified as secondary range by BirdLife Australia. Most native vegetation within the project area is dominated by a canopy of eucalypts (except for rainforest areas) and is therefore considered to provide occasional foraging habitat within the secondary range of the Swift Parrot.

#### White-throated Needle-tail

The White-throated Needle-tail occurs over most habitats in Australia. The species is listed as vulnerable under the EPBC Act and FFG Act, and is also listed as a migratory species under the EPBC Act. White-throated Needle-tails breed in a number of locations throughout Asia and spend the non-breeding portion of the year in Australia, and occasionally Papua New Guinea and New Zealand. The species is present in Australia between roughly October and March, during which time it is likely to be almost exclusively aerial. However, the species has occasionally been recorded roosting in the canopy foliage or within hollows of tall trees.

The project search area returned 63 previous records of White-throated Needle-tail, most recently from 2019. As the species is wide-ranging and occurs over most habitats in southern Australia, it is considered to have a medium likelihood of occurrence over all parts of the project area. The species may utilise forest habitat within the project area for roosting, particularly hollows and canopy foliage of tall trees in large tracts of vegetation. The species is likely to forage over all parts of the project area, on occasions, and sometimes in large numbers, and may utilise tall trees for roosting during their non-breeding period.

#### Spot-tailed Quoll

The Spot-tailed Quoll is known to occur within a range of forest habitats characterised by high rainfall, which is consistent with the habitat present throughout the project area. Den sites comprise of rock

crevices, caves, hollow logs and hollows within trees. The species typically occupies large home ranges and occurs in low densities, with distribution being patchy throughout their broader range. The project search area returned two records for Spot-tailed Quoll, including a 2006 record to the east of Powelltown, approximately 10 kilometres south-east of the project area, and a 1994 record from Badger Creek, approximately eight kilometres north-west of the project area. The species is therefore considered to have a medium likelihood of occurrence within all forest habitat present within the project area.

### Southern Greater Glider

The Southern Greater Glider occurs in forest environments in eastern Australia, particularly tall, moist montane forest, where the density of hollow-bearing trees is a key factor determining population numbers. The species was listed as vulnerable under the EPBC Act in 2016 largely due to impacts associated with forest clearance and habitat loss. Southern Greater Gliders typically occupy small home ranges and have poor dispersal ability. The project search area returned 376 records for the species, of which the most recent was from 2020. The species is known to occur throughout forest habitat in the local area and is therefore considered to have a high likelihood of occurrence within the project area. Hollow-bearing trees within the project area provide an important resource for shelter and breeding.

### Leadbeater's Possum

The Leadbeater's Possum is endemic to Victoria, where it has a patchy distribution throughout the Central Highlands in montane forest and sub-alpine woodland above 400 metres elevation. An outlying lowland population also occurs near Yellingbo, in lowland floodplain forest. The species is listed as critically endangered under the EPBC Act, with the effects of extensive wildfire being one of the key threats to their recovery, along with clear-fell logging and predation by cats. Extensive and intense wildfires have burnt significant areas of Leadbeater's Possum habitat in the broader region, particularly the 1939 and 2009 fires. Prior to the 2009 fires, the species occurred in good numbers at Lake Mountain, Mount Bullfight and Mount Baw Baw. Leadbeater's Possum do not occur on burnt sites until required conditions have returned, which includes the presence of large hollow-bearing trees and a structurally dense interlocking canopy and/or sub-canopy layer to facilitate movement. Trees that provide suitable hollows for the species typically need to be at least 190 years old, and many of these large ash trees have been killed by extensive wildfire through much of the central highlands. Fire-killed stags provide alternative denning sites in previously burnt areas. However, these are now decaying at unsustainable rates, prompting research and efforts into providing artificial nest boxes while the next generation of hollow-bearing trees establish. Several of these nest boxes (installed by Parks Victoria) are located within the project area, around Mount Donna Buang and Ben Cairn, to increase the density of available denning sites (Figure 8-8).

Some of these locations have also been recipient sites for translocations undertaken in accordance with objectives outlined in the Action Statement for the species. High stem densities of mid-storey plants appear to be an important habitat feature, as found in lowland sites by Greet et al., and within the project area. The loss of such stems, is likely to result in structural fragmentation and make individuals more susceptible to predation. Lateral sub-canopy branches and laterally suspended fallen stems are also important habitat features that facilitate movement. The project area supports known colonies of Leadbeater's Possum in patchy habitat around Mount Donna Buang and Ben Cairn (Figure 8-7). Sub-canopy connectivity is a critical habitat feature in these locations, which is typically



**Figure 8-7 High quality Leadbeater's Possum montane thicket habitat near Mount Donna Buang with high stem density and lateral stems to facilitate movements. Such areas are to be avoided.**

provided by high stem density of mid-storey species including *Acacia* spp., *Callistemon* spp. and Mountain Tea-tree. The project search area contains a total of 303 VBA records for the species, with the most recent being from 2020. Zoos Victoria holds an additional seven unpublished records of the species, all for new locations in the Mount Donna Buang and Ben Cairn areas. The species has also been previously recorded in Yarra State Forest in and around the Mount Bride area as recently as 2015, and from Groom Hill in 1976. The majority of habitat located within the project area near Mount Bride and Groom Hill is tall forest with a history of logging from the 1970s to late 1980s.

As a species that is listed as critically endangered under the EPBC Act, and due to their restricted distribution, ongoing population decline and risk of future fires, all populations of the species are considered important. The draft National Recovery Plan and FFG Act Action Statement both identify the southern parts of the Yarra Ranges National Park, which encompasses part of the project area around Mount Donna Buang and Ben Cairn (Figure 8-8), as one of several strongholds for this species located in the southern Central Highlands. This is due to large areas of reserved tall wet forest and associated habitat and more recently as translocation recipient sites based on advice from species experts.

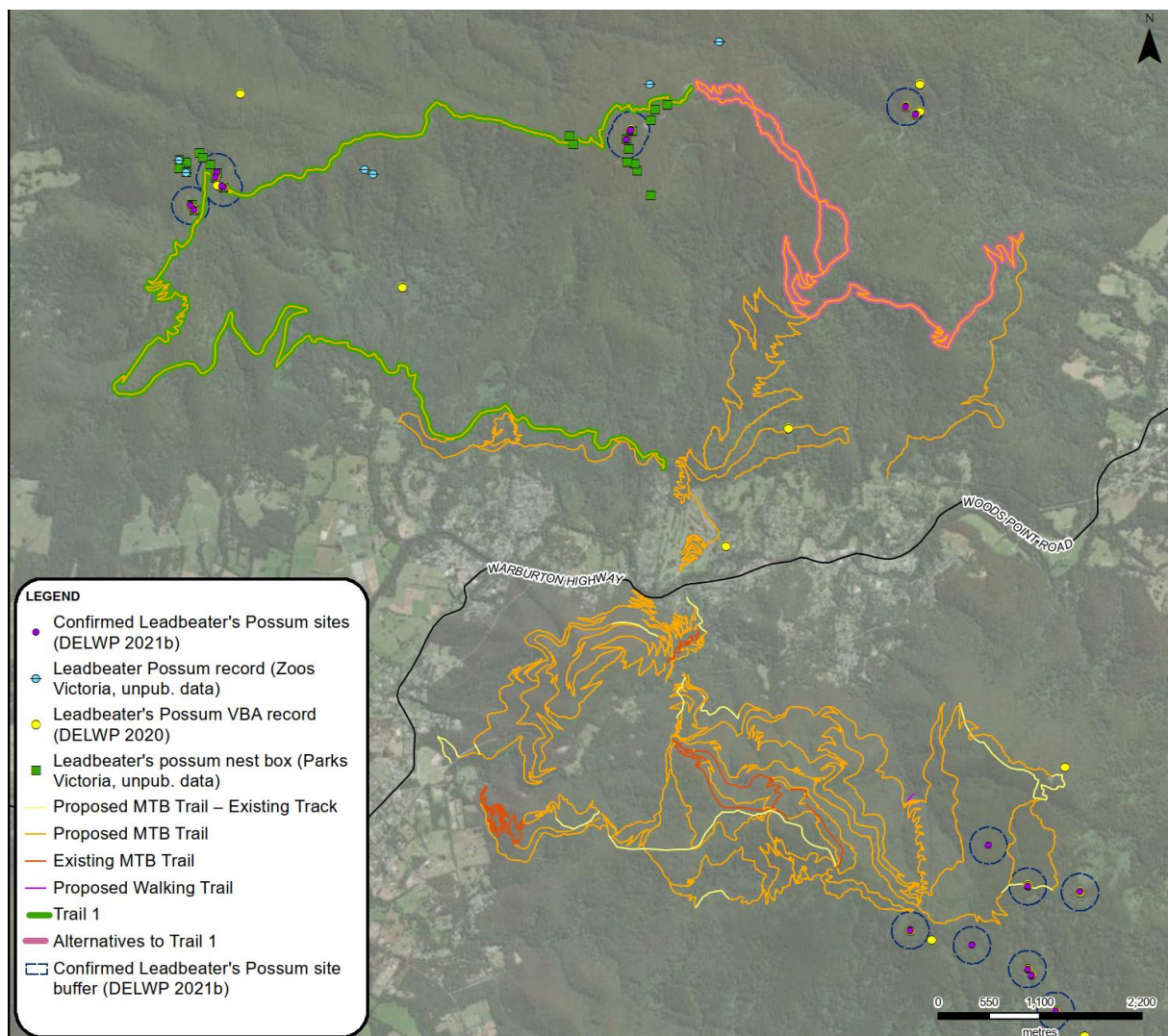


Figure 8-8 Leadbeater's Possum habitat values within the project search area

### Broad-toothed Rat

Broad-toothed Rat occupies structurally dense vegetation communities in high rainfall areas in south-eastern Australia, and has a highly fragmented and patchy distribution. The species typically inhabits closed vegetation communities such as heathland, grassland and sedgeland and is a specialist feeder on the stems of plants from the families *Poaceae* and *Cyperaceae*. Broad-toothed Rats occur at a



range of elevations within their range. However, they tend to occur in higher densities in sub-alpine and alpine areas, where they use a wider variety of habitats including disturbed areas associated with ski resorts. The species was listed as vulnerable under the EPBC Act in 2016 due a range of threats including introduced predators, fire, habitat loss, fragmentation and climate change. Being well adapted to stable environments, Broad-toothed Rat populations are particularly sensitive to large-scale disturbance events such as fire. In a recent study, Shipway et al. found that Broad-toothed Rats had disappeared from 53% of historically occupied sites across their range in Victoria.

According to database search results, Broad-toothed Rat has been recorded from the project search area 10 times, with the most recent record being from 1991. However, only one previous record occurs within five kilometres of the project area, which is a 1977 record from the Mount Bride area that occurs within 150 metres of the project area, near the intersection of Burns Road and Mount Bride Road in Yarra State Forest.

A field-based habitat assessment was undertaken within the project area from the 24<sup>th</sup> to the 26<sup>th</sup> of February 2021, to determine the likely presence of Broad-toothed Rat within the project area. Active searching was undertaken in any areas of potential habitat in an attempt to detect the characteristic scats of the species, which is a highly effective method of determining species presence in areas of suitable habitat. Habitat assessments were undertaken in areas flagged during vegetation assessments as supporting high cover of grasses and/or sedges, and any additional areas potentially supporting suitable habitat features that were opportunistically encountered, including the following:

- An open sedgy area near Mount Victoria that was flagged during vegetation assessments. This area was deemed unsuitable due to being dominated by Tall Sword-sedge *Lepidosperma elatius*, which is not known to provide habitat or foraging resources for Broad-toothed Rat and does not structurally resemble Broad-toothed Rat habitat. No runways or scats were located.
- The area surrounding the 1977 Broad-toothed Rat record near Mount Bride. This area was logged in the late 1970s and the record is likely to be the result of a pre-logging audit. The regenerated forest at this location contains an understorey dominated by ferns, and only scattered, small occurrences of grasses and sedges. No suitable Broad-toothed Rat habitat was recorded at this location, and no runways or scats located.
- Several scattered occurrences of sedgy habitat flagged during vegetation assessments along Cumming Spur Track. These areas were subsequently flagged as unsuitable habitat due to presence of Tall Sword-sedge.
- Potentially suitable areas identified near Groom, based on identification of canopy gaps in aerial photography and presence of gentle topography that could represent perched, open wet sedgy areas above drainage lines. No suitable habitat was identified within these areas.
- Opportunistic searching around Scotchmans Creek, Mount Donna Buang, Aqueduct trail and Ben Cairn also failed to locate any suitable Broad-toothed Rat habitat.

In summary, no areas of suitable habitat for Broad-toothed Rat were identified within the project area near the assessment corridor. Areas flagged during vegetation assessments as containing the closest representation of Broad-toothed Rat habitat were subsequently inspected by zoologists and determined to be unsuitable, and further opportunistic searching around areas that were identified as potentially supporting suitable features also failed to identify suitable habitat. Broad-toothed Rat is now considered to have a low likelihood of occurrence within the assessment corridor, but is still considered in the assessment of impacts.

### Smoky Mouse

The Smoky Mouse has a disconnected Victorian distribution with populations in the Snowfields, Eastern Highlands, East Gippsland, Otway Range and the Grampians. The species has been recorded from a variety of vegetation communities ranging from coastal heath and heathy woodland in East Gippsland to sub-alpine heath and dry forest, and typically occupies vegetation dominated by heathy shrubs. The project search area returned two previous records for Smoky Mouse, both from 2019 in the State Forest near East Warburton, approximately 10 kilometres east of Mount Bride. These recent records were obtained from Shrubby Foothill Forest occurring amongst Damp Forest and Wet Forest, which is much like the vegetation in the lower south and west facing slopes of the southern section of the project area. The field assessment confirmed the presence of epacrid heath and leguminous vegetation in patches of Shrubby Foothill Forest, which form part of the diet for this species. These areas are therefore considered to represent potential habitat for this species.

This cryptic species is unlikely to be detected without an extensive survey effort in areas of suitable habitat within the assessment corridor, which is unlikely to be proportionate with expected impacts from the project. Even if assumed to be present in areas of suitable Shrubby Foothill Forest habitat in the southern section of the project area, a previous study by Macak and Menkhorst on the impact of fire breaks, suggest that the construction of a mountain bike trail is unlikely to significantly impact the species.

### Southern Brown Bandicoot

The Southern Brown Bandicoot occurs in a range of dense vegetation types, including predominately introduced vegetation, throughout south-eastern Australia, including south, central and east Gippsland, the southern and eastern outskirts of Melbourne and south-west Victoria. They occur in a range of habitats, including tall open forest, woodland and heathland, but do not typically occur in closed wet forest types, such as those that make up the majority of the project area. The species has previously been recorded 18 times from the project search area. However, the majority of those records are more than five kilometres from the project area, and of those within five kilometres all but one is from 1972 or earlier. The most recent record of the species within the project search area is a 1999 record from Millgrove. The species is known to occur in Bunyip State Park, approximately 20 kilometres south of the project area. There are additional records to the north of the project area. Within the project area, the species is considered to have some potential to occur in drier forest types located in the southern sections of the project area, particularly around Wesburn. The species is not likely to be present in other parts of the project area. This cryptic species is unlikely to be detected without an extensive survey effort in areas of suitable habitat within the assessment corridor, which is unlikely to be proportionate with expected impacts from the project.

### Grey-headed Flying-fox

The Grey-headed Flying-fox occurs throughout much of Victoria and is a wide-ranging species with the ability to travel up to 50 kilometres from their roost to forage. They feed on nectar and pollen of *Myrtaceae* and *Proteaceae* plants, as well as fruit from both introduced and native trees. A large, permanent and nationally important Flying-fox camp is located at Yarra Bend in Kew, Melbourne, approximately 55 kilometres west of the project area at its closest point. A permanent camp is also located in Doveton, approximately 45 kilometres to the south-west. The project search area returned four previous records of Grey-headed Flying-fox, the most recent of which was a 2015 record from Warburton. Plants within the *Myrtaceae* family are distributed throughout the project area in patches of native vegetation and as planted trees around Warburton. This wide-ranging species is therefore considered likely to utilise food resources within the project area on occasion, however, these would not constitute an important food resource for the species and the species is not expected to make significant use of these areas.

### Australian Grayling

Australian Grayling spend most of their lives in freshwater, preferring to inhabit streams with a moderate flow, alternating pool and riffle zones and a gravel substrate, but it is also known to inhabit turbid water. Whilst spending most of its life in freshwater, the species is diadromous, meaning adults respond to flow events in autumn (April-May) by undertaking downstream migrations to lower freshwater reaches of rivers to spawn. Eggs and larvae then drift downstream into marine or estuarine waters, before juveniles migrate back into freshwater in spring and early summer (September-December) during high flow events.

Approximately 231 observations have been recorded as recently as 2015, within the Yarra River basin. An additional five individuals were also detected in the Yarra River in 2018 (four individuals) and 2019 (one individual) as a result of surveying undertaken as part of the Native Fish Report Program (a partnership between DELWP, Arthur Rylah Institute and the Victorian Fisheries Authority (VFA) and recreational fishing license holders).

Since the installation of the fish ladder at Dight Falls in 1994, records for Australian Grayling have been documented by anglers in the Yarra River as far upstream as Wesburn (approximately 400 metres downstream of the project area). Suitable habitat values for Australian Grayling including clear water pools (less than 170 centimetres in depth) and extensive rapids (consisting predominantly of gravel, rubble and boulder substrate) are known to exist within the confines of the project area. Due to the diadromous nature of the species, proximity of recent records and existence of preferred habitat values (including a moderate flow, with alternating pools and riffles zones) it is considered a high likelihood for individuals of Yarra River Australian Grayling population to occasionally occur within the project area.

## Murray Cod

Murray Cod is the largest of Australia's native freshwater fishes. Although occurring in a range of flowing and standing waters, the species is most frequently observed in sluggish, turbid waters that contain complex structural cover such as large rocks, large woody debris (Instream Woody Habitat: IWH) and/or undercut banks with over-hanging vegetation. Both Murray Cod and Macquarie Perch have been introduced into the Yarra River Basin at various times since the first translocation from King Parrot Creek (Goulburn River basin) to the Plenty River in 1857.

Approximately 121 observations of Murray Cod have been recorded as recently as 2015 within the Yarra River basin, including one record at Launching Place in 1970 (approximately three kilometres downstream of the project area). An additional 65 individuals were also detected in the Yarra River in 2017 (24 individuals), 2018 (14 individuals) and 2019 (27 individuals) as a result of surveying undertaken as part of the Native Fish Report Program. The majority of the Yarra River population are known to exist between Warrandyte and Lower Plenty, where the Yarra River flows through a lightly timbered gorge, providing suitable habitat values of IWH and extensive sluggish and deep pools (less than three metres) consisting of both mud and rock substrate. Typically, lesser numbers of individuals are known to inhabit Warrandyte upstream to Healesville.

The species is generally considered to be sedentary during the months of autumn and winter, with most long-distance movements associated with the spawning or rising waters. It is therefore, considered a low likelihood for a significant number of individuals of this species, to reside within the confines of the project area. This is predominantly attributed to the project area not being known as a spawning site for migrating adults, the general sedentary nature of the species, angler knowledge and the limited distribution of deep pools, and undercutting banks or holes pertaining IWH which it requires for cover. Nevertheless, occupation of a rare number of individuals within the project area cannot be discounted.

## Macquarie Perch

Macquarie Perch naturally reside in cool, rocky, slow-flowing rivers with deep holes; predominantly in the upper reaches of forested catchments with intact riparian vegetation. Several self-sustaining, introduced populations also exist, including in the Yarra River and its associated tributaries, from fish translocated (from its natural range within the Murray Darling Basin) at various times since 1909.

Approximately 480 observations of Macquarie Perch have been recorded as recently as 2015 within the Yarra River basin. An additional 122 individuals were also detected in the Yarra River in 2017 (46 individuals), 2018 (47 individuals) and 2019 (29 individuals) as a result of surveying undertaken as part of the Native Fish Report Program.

Whilst one record of the species has been documented from Cement Creek (a tributary of the Yarra River, from within the confines of the project area), a significant proportion of the Yarra River population are known to exist between Tarrawarra and Yarra Glen; where the river width is up to 25 metres in width, contains depths up to three metres and the substrate is predominantly sand (although there are extensive areas of mud and gravel). Some individuals also occur downstream near Wonga Park through Warrandyte. Although greater numbers are often found further downstream between Warrandyte and Lower Plenty, where extensive sluggish pools with mud and rock substrate exists, and major River Health Program works have been undertaken, involving improving riparian vegetation and bank stability.

Macquarie Perch tagged and released in the Yarra River over a ten month period between Heidelberg and Wonga Park typically occupied restricted reaches (less than 450 metres). Although it is noted that some individuals in the study undertook occasional upstream or downstream movements (less than 1000 metres) from their usual locations, associated with large flow variations during the spawning season. Due to presence of suitable habitat values, the species restricted range movements, and a recent record from within the project area, it is considered a medium likelihood for a small number of individuals to reside within the Yarra River, and its associated tributaries, within the confines of the project area.

### 8.6.5.3.2 DEWLP advisory listed fauna species

#### Little Egret

Little Egrets can occur within a variety of wetlands containing open water throughout lowland areas of Victoria. The project search area only returned one previous record of the species, which is a record from 1994 near Healesville. More broadly, the species has been recorded more recently near Lake

Eildon, and around the greater Melbourne area. This species is considered highly unlikely to occur in steep, forested parts of the study area, but may utilise wetlands and flooded areas in and around the township of Warburton, on the Yarra River floodplain.

### Eastern Great Egret

Eastern Great Egrets utilise a range of shallow wetland habitats throughout Victoria, including flooded crops and pasture. The project search area contains 60 previous records of the species, the most recent of which was from 2019. Almost all of these records occur within the Yarra River floodplain, including in and around East Warburton, Warburton, Launching Place and Woori Yallock. This species is considered unlikely to occur in steep and forested parts of the project area, but is likely to occur in wetlands and flooded areas in and around the Warburton township, on the Yarra River floodplain.

### Grey Goshawk

The Grey Goshawk occurs in a variety of forest habitats, including rainforest and montane forest. There are 28 previous records of this species from the project search area, mostly around Wesburn and Launching Place, to the west of the project area. While the species has not been previously recorded in more forested habitat located within the project search area, the species is known to utilise these types of habitats and is therefore considered to have the potential to occur throughout the project area.

### Barking Owl

The Barking Owl occurs within a range of forest and woodlands, particularly in central and north-eastern Victoria. The species has been previously recorded within the project search area four times, the most recent sighting being from 2001 near Wesburn, near the south-western extent of the project area. More recently, the species has been recorded near Lake Mountain in 2019 (30 kilometres north-east of the project area) and near Monbulk in 2018 (15 kilometres south-west of the project area). There are several additional older records from the broader region. While there are few recent records from the local area, and the species typically occupies drier habitat types than other forest owls, the presence of recent records in similar vegetation types in the broader landscape suggests that this species has potential to occur within the project area. The drier forest habitat located in the southern section of the study area in Yarra State Forest is considered to provide potential habitat for the species.

### Powerful Owl

The Powerful Owl occupies a variety of forest habitats throughout Victoria, as well as urban areas around the north-eastern and eastern suburbs of Melbourne. The species largely feeds on arboreal mammals, and requires very large tree hollows for breeding. The project search area returned 114 previous records for the species, the most recent of which was from 2020. These records occur throughout the broader forest environment in which the project area occurs. All forest within the project area contains suitable habitat for the breeding, roosting and foraging activities of this species and is highly likely to support current populations of the species.

### Masked Owl

The Masked Owl occupies a range of lowland forests and woodlands in southern and eastern parts of Victoria south of the Great Dividing Range, particularly in the coastal forests and woodlands of East Gippsland. The species has not been previously recorded within the project search area, however suitable habitat elements exist and the species has been recorded several times within Bunyip State Park to the south, and as recently as 2019 from Toolangi to the north-west. The majority of the assessment area for the project does not contain DELWP modelled habitat for the species. The species is often considered an edge specialist as it is commonly associated with cleared farmland adjacent to forested environments. Potential habitat is considered to be present throughout the project area.

### Sooty Owl

The Sooty Owl occupies a range of closed forests, including rainforests, and some open forests across their range. In the central highlands of Victoria, the species occurs in montane forest, wet forest and riparian forest. The species feeds on a range of arboreal and terrestrial mammals. The project search area contains 110 previous Sooty Owl records, the most recent of which is from 2020. While the species is largely associated with wetter vegetation types, the species has also been recorded in drier vegetation near Wesburn. The entire project area is therefore considered to support habitat for

the species, where large old trees support potential breeding habitat in the form of large tree hollows, and densely vegetated gullies or slopes provide potential roosting habitat.

### Brush-tailed Phascogale

The Brush-tailed Phascogale is a nocturnal, arboreal dasyurid that occurs throughout eastern mainland Australia. In Victoria, the species' distribution is fragmented, but is largely associated with dry open woodlands dominated by ironbark, box and stringybark eucalypts through central Victoria. The species has six previous records within the project search area, with the most recent being from Warramate Hills in 1998, to the west of the project area. The species has also been recorded near Healesville in 2005, to the north-west of the project area. The species is known to occur around Warrandyte, Yarra Glen and Christmas Hills, with numerous recent records from those areas. There are also a number of historical records to the south-east of the project area, in the foothill forests north of the Princes Highway between Warragul and Sale, however the majority of these are from before 1970, with only a small number of recent records from 2004-2006 near Moondarra and Erica. Within the project area, the species is only considered to have potential to occur in drier, more open woodland located near Wesburn. The species is unlikely to be present throughout the remainder of the project area dominated by tall forest.

### Platypus

The Platypus occupies a wide range of waterways and wetlands throughout Victoria, particularly where banks are stable and vegetated to allow for burrows, and where shallow waters occur for foraging activities. The species was listed as threatened in Victoria in early 2021, due to concerns about population declines and local extinctions. The species has been previously recorded a total of 102 times in the project search area, with the most recent sighting being from 2013 at Warburton. The species is known to occur in and around Warburton, and could potentially occupy additional streams and tributaries supporting suitable habitat features further upstream within forested sections of the project area (e.g., the lower slopes of Yarra Ranges National Park).

### Common Bent-wing Bat (eastern ssp.)

The eastern subspecies of the Common Bent-wing Bat occurs along the east coast of Australia, including eastern Victoria and parts of central and south-western Victoria. They are a cave-roosting species, and therefore utilise caves and disused mines for breeding. They forage above a range of habitats, including tall forest. The species has been recorded from the project search area a total of 514 times, with the most recent record being from 2000. Suitable foraging habitat occurs throughout the project area. However, the assessment corridor is not considered likely to support any breeding habitat with only one capped mineshaft known to be present along an existing 4WD track on Mineshaft Hill Track near Trails 62 and 63.

### Eastern Horseshoe Bat

Like the Common Bent-wing Bat (eastern ssp.) described above, the Eastern Horseshoe Bat is also a cave-dwelling bat species that is distributed across the eastern coast of Australia. In Victoria, this species is more confined to the eastern section of the state than the Common Bent-wing Bat (eastern ssp.), and is also more closely associated with forest and woodland habitats. The Eastern Horseshoe Bat has only been recorded from the project search area once, in 1998 near Wesburn. There are three additional records from 1998 and 1999 near Reefton to the north-east, as well as several records in and around Kinglake National Park to the north-west. The project area represents the southern extent of previous records for the species; only a small number of records near Lakes Entrance in East Gippsland are slightly further south. Suitable foraging habitat occurs throughout the project area. However, the assessment corridor is not considered likely to support any breeding habitat with only one capped mineshaft known to be present along an existing 4WD track on Mineshaft Hill Track near Trails 62 and 63.

### Lace Monitor

Lace Monitors occur within a variety of woodland and forest habitats throughout much of south-eastern Australia. They largely forage on the ground but are proficient climbers and will also climb trees to prey on nests and when disturbed. The project search area returned 39 previous records of the species, with the most recent being from 2019. The majority of these records occur in drier vegetation to the west of the project area, and along the Yarra River to the east of the project area. The species is considered most likely to occur in drier vegetation located in the lower north and west facing foothills

and ridges of the southern section of the project area, such as around Wesburn, and is less likely to occur in wetter forests at higher elevations.

### Mount Donna Buang Wingless Stonefly

Mount Donna Buang Wingless Stonefly *Riekoperla darlingtoni* is known to occur near the summit of Mount Donna Buang (greater than 900 metres above sea level), in suitable habitat of slow-flowing ephemeral springs and trickles associated with forest and high water quality. Surveys for this project have revealed the species also occurs in headwater streams towards Mount Victoria, including Cement Creek and Ythan Creek.

Approximately nine observations of the Mount Donna Buang Wingless Stonefly have been recorded as recently as 1999 in the Yarra Ranges National Park, within the project search area. Additional surveying undertaken by Eddie Tysrlin in 2019 and in 2021 specifically for this project also detected two probable stonefly locations using environmental DNA (eDNA) at two locations to the west of Mount Donna Buang along the Donna Buang Road near Trail 2 (2019 observations), and addition nymphs and eDNA between Mount Donna Buang and Mount Victoria along alternative Trails 45 and 46 (2021 observations). This species has been demonstrated to occur in the project area and in proximity to assessment corridors between Mount Donna Buang, Mount Victoria and Ben Cairn, in areas of Montane Wet Forest and Cool Temperate Rainforest that are associated with low-flowing ephemeral springs or trickles (Figure 8-9). Detailed results of targeted surveys undertaken for Mount Donna Buang Wingless Stonefly are provided in Appendix 10 of **Technical Report A: Biodiversity and habitats**.

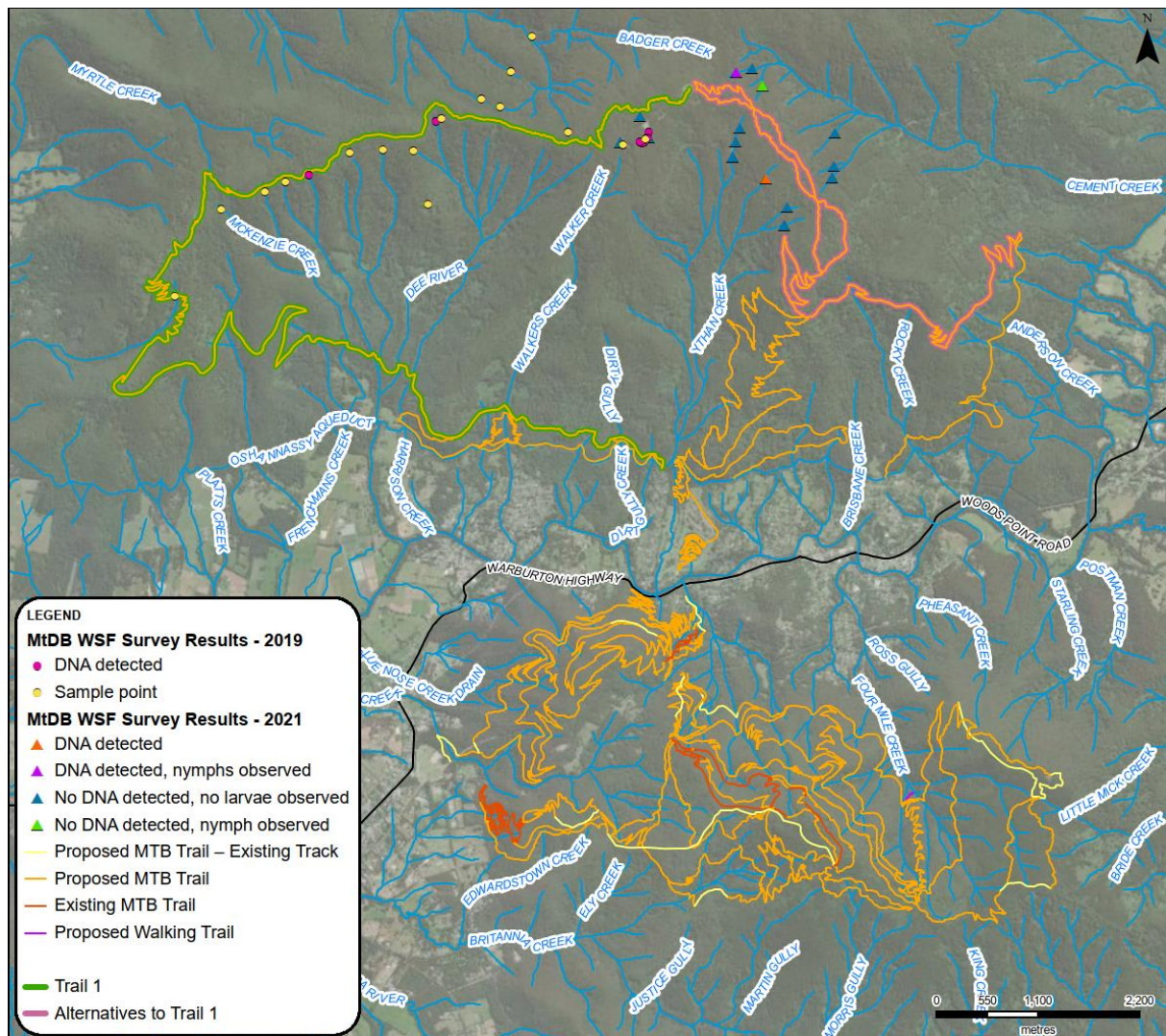


Figure 8-9 Mount Donna Buang Wingless Stonefly survey results

### Curve-tail Burrowing Crayfish

The Curve-tail Burrowing Crayfish is found in wet, muddy floodplains in areas of native forest adjacent to creeks and rivers. They have a limited distribution, spending the majority of their life in large underground burrows where they feed on a variety of plant material such as roots, decomposing leaves, rotting logs and small invertebrates. The Curve-tail Burrowing Crayfish forms characteristic chimneys of soil around the openings of their burrows, which are classified as 'Type 2' burrows as they occur in association with the water table, rather than permanent waterbodies. Type 2 burrows of this species are unlikely to occur away from the influence of the water table.

Approximately six observations of Curve-tail Burrowing Crayfish have been recorded as recently as 1983 from within the Yarra River basin. These records include two from within the project area and two from within the project search area. Due to the limited number of records and cryptic nature of the species, understanding the current presence and distribution of Curve-tail Burrowing Crayfish within the project area remains difficult to assess. Due to the species limited dispersal abilities and preferred habitat requirements, it is considered a medium likelihood that the Curve-tailed Burrowing Crayfish occurs throughout wet forests associated with low-flowing ephemeral springs, drainage lines or low order streams.

### Tubercle Burrowing Crayfish

The Tubercle Burrowing Crayfish is found in Mountain Ash forests where there is an abundance of ferns at ground level. Like other burrowing crayfish, they feed on rotting wood, detritus, root material and occasionally animal material. Like the Curve-tail Burrowing Crayfish described above, Tubercle Burrowing Crayfish also produce 'Type 2' burrows in association with the water table. However, they primarily produce 'Type 3' burrows, which are independent of the water table and any waterbodies. Burrows are usually created in clay-dominated soil of hill slopes. Pellets of soil from the burrow excavation are brought to the surface where they often fall down the hill slope, creating a fan of soil, rather than the characteristic chimney that other *Engaeus* species build. The Tubercle Burrowing Crayfish is found primarily in the Dandenong Ranges, with a single observation recorded in the project search area in 1963. Due to their patchy distribution, cryptic nature and limited number of past records, the abundance of the Tubercle Burrowing Crayfish within the project area is difficult to accurately determine without extensive and impractical surveys. It is therefore considered to be a medium likelihood that the Tubercle Burrowing Crayfish occurs in a patchy distribution throughout Mountain Ash forests associated with ferns growing at ground level.

#### 8.6.6 Groundwater dependent ecosystems

Groundwater dependent ecosystems (GDEs) are ecosystems that are partially or completely dependent on underground water, or the surface expression of this water, for their existence or health. These ecosystems include flora and fauna species and communities that are dependent on water discharge to the surface at a level where they can access, to persist in permanently wet environments, or to persist during times of extended low rainfall.

A number of high potential aquatic GDEs, primarily associated with the Yarra River, Little Yarra River and associated tributaries were identified in previous assessments. Three low to moderate potential terrestrial GDEs occur in the north-west of the project area with several high potential GDEs occurring outside of the project area to the west. Montane thickets embedded within wet forest and rainforest vegetation communities dominated by Lemon Bottlebrush *Callistemon pallidus* and / or Mountain Tea-tree *Leptospermum grandifolium* were observed within the assessment corridor between Mount Donna Buang, Mount Victoria and Ben Cairn. Given this thicket vegetation thrives in damp soil conditions and is away from surface water sources, it is likely this vegetation is dependent on shallow aquifer groundwater sources. This vegetation may also be sustained by the high rainfall conditions and high soil moisture content in the project area during winter and spring months. Aquatic habitat for the larval stage of Mount Donna Buang Wingless Stonefly's lifecycle is associated with, or is fed by, a combination of surface water runoff and water from seasonal springs and soaks between Mount Donna Buang, Mount Victoria and Ben Cairn. On this basis at least some habitat for this species could be considered a GDE.

### 8.6.7 Potentially threatening processes

Potentially threatening processes that are either already occurring or are likely to be present within the project area as defined in the FFG Processes List are summarised below:

- Alteration to the natural flow regimes of rivers and streams.
- Collection of native orchids.
- Degradation of native riparian vegetation along Victorian rivers and streams.
- Habitat fragmentation as a threatening process for fauna in Victoria.
- High frequency fire resulting in disruption of life cycle processes in plants and animals and loss of vegetation structure and composition.
- Human activity which results in artificially elevated or epidemic levels of Myrtle Wilt within *Nothofagus*-dominated Cool Temperate Rainforest.
- Inappropriate fire regimes causing disruption to sustainable ecosystem processes and resultant loss of biodiversity.
- Increase in sediment input into Victorian rivers and streams due to human activities.
- Infection of amphibians with Chytrid Fungus, resulting in chytridiomycosis.
- Invasion of native vegetation by Blackberry *Rubus fruticosus* L. agg.
- Invasion of native vegetation by 'environmental weeds'.
- Loss of coarse woody debris from Victorian native forests and woodlands.
- Loss of hollow-bearing trees from Victorian native forests.
- Predation of native wildlife by the cat, *Felis catus*.
- Predation of native wildlife by the introduced Red Fox *Vulpes vulpes*.
- Prevention of passage of aquatic biota as a result of the presence of instream structures.
- Reduction in biodiversity of native vegetation by Sambar *Cervus unicolor*.
- Spread of *Pittosporum undulatum* in areas outside its natural distribution.
- The spread of *Phytophthora cinnamomi* from infected sites into parks and reserves, including roadsides, under the control of a state or local government authority.

#### Understanding threatening processes

Potentially threatening processes that are either already occurring or are likely to occur have been identified in order to understand how project construction and operation might exacerbate the processes and to inform the necessary mitigation measures to avoid this.

Key threatening processes listed under the EPBC Act that are either already present or likely to be present within the project area are:

- Infection of amphibians with chytrid fungus resulting in chytridiomycosis
- Loss and degradation of native plant and animal habitat by invasion of escaped garden plants, including aquatic plants.
- Predation by feral cats.
- Predation by European red fox.
- Dieback caused by the root-rot fungus *Phytophthora cinnamomi*.
- Land clearance.

For a number of the key threatening processes listed above, understanding the existing conditions of the environment are critical to understanding the potential impacts of the project. Therefore, habitat fragmentation as a threatening process for fauna, introduced fauna species, noxious and high threat weeds and pathogens (such as *Phytophthora cinnamoni*) are described in the following sections.



### 8.6.7.1 Habitat fragmentation as a threatening process for fauna in Victoria.

Habitat fragmentation is the division of a single area of habitat into two or more smaller areas, separated by a largely inhospitable matrix. The ability of animals to continue utilising fragmented habitats depends on a number of factors including patch size, distance between patches, the ability of species to traverse otherwise inhospitable areas, and their tolerance to disturbance. Habitat fragmentation can occur at a variety of scales and, in forest environments, a different strata. For example, clearing of ground-cover and understorey vegetation but retention of sub-canopy and canopy trees would result in minor fragmentation of habitat for ground-dwelling fauna, such as small terrestrial mammals and reptiles. Habitat fragmentation removes nesting and foraging resources for fauna and can place animals at greater risk of predation. Individuals can also be negatively impacted by the increased energetic cost required for foraging, dispersal and predator evasion in a fragmented home range.

Habitat fragmentation also often has an impact on habitat condition, as it has the potential to alter the quality of remaining habitat by introducing or increasing disturbance effects. Edges of habitat fragments are particularly susceptible to disturbance effects.

The regional distribution of species, as well as species richness in communities, is greatly influenced by the amount and quality of habitat. Habitat loss is usually accompanied by fragmentation of remaining areas of habitat. The process of fragmentation may impact on species within the newly created fragments due to barrier effects, genetic isolation and edge effects.

#### **Barrier effects**

Barrier effects occur where particular species are either unable or unwilling to move between suitable areas of fragmented habitat. This could result in either a complete halt to movement or a reduced level of movement between fragments.

#### **Genetic isolation**

Genetic isolation occurs where individuals from a population within one fragment are unable to interbreed with individuals from populations in adjoining fragments. This can result in reduced overall genetic fitness and resilience to environmental change due to reduced gene flow between populations.

#### **Edge effects**

A zone of changed environmental conditions (i.e. altered light levels, wind speed, temperature) occurs along the edge of habitat fragments. These new environmental conditions along the edges can promote the growth of different vegetation types (including weeds) and allow invasion by

Given the narrow permeable nature of the trails in a heavily forested landscape it is considered unlikely their construction or operation would result in significant barrier effects or reduced gene flow between populations. A range of linear disturbance already occurs throughout the project area and it is estimated that 45% of the designed trail network is within 100 metres of an existing road, track or trail. On this basis edge effects are already operating in the forest landscape and additional trails could contribute to these barrier and edge effects at a local level. Trail construction would result in localised edge effects within the trail construction corridor and would be addressed through allowing temporarily disturbed areas not required for trail operation to regenerate and revert back to native understorey vegetation.

A summary of threatened fauna sensitivity to fragmentation is provided in Section 9.9.1, **Technical Report A: Biodiversity and Habitats**.

### 8.6.7.2 Introduced fauna species

Introduced fauna species are likely to be widespread across the project area and the impacts of these species through competition and predation are already operating in forested and aquatic habitats. The Yarra Ranges National Park management plan acknowledged back in 2002 that deer were already a significant problem in the park and were impacting water quality and vegetation condition. The 2002 management plan also acknowledges that pest animal trapping had indicated introduced predators, particularly foxes, cats and dogs, were present in the park in large numbers. During field assessments feral cats have been observed in the Mount Donna Buang area and deer scats and signs were

recorded across the project area. The project area already contains many movement and invasion corridors for introduced animals.

There are database records of 32 introduced fauna species within the project search area, including nine mammals, nine fishes and 14 birds. The most common and widespread introduced bird in the project area is likely to be Common Blackbird *Turdus merula*, which is one of the few introduced bird species that will occur throughout large and intact tracts of forested vegetation, while the majority of remaining introduced birds are more likely to occur within developed and cleared areas, such as Warburton township and surrounds. Of the introduced mammals recorded from the project search area, cats, deer and foxes present the biggest threat in terms of predation, habitat disturbance and modification. Rabbits are also likely to cause significant damage in more open areas. Introduced fish such as Brown Trout *Salmo trutta* and Redfin *Perca fluviatilis* predate on native frogs and fish and present a significant threat to a number of species in the catchment.

### 8.6.7.3 Noxious and high threat weeds

Noxious weeds are introduced plants which are listed under the CaLP Act and classified by region in accordance with the level of action required to control or prevent their spread. There are four categories of noxious weed; state prohibited, regionally prohibited, regionally controlled and restricted. Land owners have legal responsibilities to take action on noxious weeds, depending on their classification in the region.

A total of seven noxious weeds were identified within the project area, which is part of the Port Phillip and Western Port catchment management area as described in Table 8-8. Noxious weeds were notably sparse throughout the majority of the assessment corridor. The main noxious weeds identified were small areas of Common Blackberry *Rubus anglocandicans* and patches of Ragwort *Jacobaea vulgaris*. These weeds were observed in areas of sparser canopy where there was enough light to penetrate the forest floor

**Table 8-8 Noxious weeds recorded within the project area during field assessments**

Classification	Species	Legal responsibility (CaLP Act)
State Prohibited	None	Agriculture Victoria is responsible for these species on all land in Victoria.
Regionally Prohibited	None	Landowners, including public authorities responsible for crown land management, must take all reasonable steps to eradicate regionally prohibited weeds on their land.
Regionally Controlled	<ul style="list-style-type: none"> <li>• Spear Thistle <i>Cirsium vulgare</i></li> <li>• Common Blackberry <i>Rubus anglocandicans</i></li> <li>• Cut-leaf Bramble <i>Rubus laciniatus</i></li> <li>• Ragwort <i>Senecio jacobaea</i></li> <li>• Hemlock Conium <i>maculatum</i></li> <li>• Tutsan <i>Hypericum androsaemum</i></li> </ul>	Landowners have a responsibility to take all reasonable steps to prevent the growth and spread of these weeds on their land.
Restricted	<ul style="list-style-type: none"> <li>• Asparagus Fern <i>Asparagus scandens</i></li> </ul>	Trade in these weeds and their propagules, either as plants, seeds or contaminants in other materials is prohibited.

Most of the weeds recorded occur at existing disturbed sites within the project area and intact forest areas are relatively weed free. Areas with the highest weed cover and potential source locations for weed invasion include Mount Donna Buang Summit, along Donna Buang Road, Warburton Golf Course, Wesburn Park, O'Shannassy Aqueduct Trail, the lower slopes of Yarra Ranges National Park, Scotchmans Creek Reserve and along forest tracks in the Yarra State Forest. Detailed weed mapping was not undertaken at these sites, as the intent is to manage potential weed spread associated with the project through appropriate construction and operation protocols as outlined in Section 8.11.

A detailed weed invasion pathways assessment is described in Section 7.3.7 of **Technical Report A: Biodiversity and Habitats**.

#### **8.6.7.4 Pathogens**

Myrtle Wilt *Chalara australis*, Cinnamon Fungus *Phytophthora cinnamomi* and Chytrid Fungus *Batrachochytrium dendrobatidis* are three plant or animal pathogen that occur, or have potential to occur or infect, sensitive species within the project area.

The Yarra Ranges National Park Management Plan states that Myrtle Wilt is present in the Park but does not specify where infected Myrtle Beech *Nothofagus cunninghamii* trees occur. Specific monitoring data relating to Myrtle Wilt monitoring or management actions within the Yarra Ranges National Park was unable to be obtained. No signs of Myrtle Wilt were recorded along proposed trails during field investigations between 2017 and 2021.

Chytrid Fungus is likely to be already present in the project area given nearby observations of this amphibian disease in the northern part of Yarra Ranges National Park near Lake Mountain, and the widespread nature of this fungal pathogen in Australian frog populations, especially in disturbed landscapes. No susceptible threatened frog populations have been recorded from the project area.

Cinnamon Fungus has not been officially recorded in the Yarra Ranges National Park based on a review of available data sources, however multiple species of *Phytophthora* have been recorded between Sugarloaf Dam and Glenburn, to the north of the project area. Based on available information, 6 per cent of the plant species present in the Yarra Ranges National Park are likely to be susceptible to this plant disease, and 31 per cent of the park is in the high risk class for predicted distribution, 24 per cent is in the medium risk class and 45 per cent is in the low risk class.

## 8.7 Construction impact assessment

This section presents a discussion of the potential impacts of the project on biodiversity values as a result of construction activities and identifies mitigation measures that are intended to minimise residual impact as far as reasonably practicable.

The trail construction footprint width will vary depending on terrain (slope class) and construction method (hand or machine construction). The construction disturbance width of trails will be 1.2 metres to 3.3 metres with wider areas of disturbance for berms and similar trail features, or in steeper terrain. On average, construction disturbance will be 2.7 metres. Once the trails are established the temporarily disturbed construction areas along trail edges will be allowed to regenerate with native vegetation thus reinstating habitat elements.

The key biodiversity and habitat values identified that are detailed in the proceeding discussion include:

- Significant flora
- Native vegetation and habitat removal.
- Cool Temperate Rainforest (CTR) / Cool Temperate Mixed Forest (CTMF)
- Significant fauna
- Mount Donna Buang Wingless Stonefly
- Leadbeater's Possum

The residual impact to groundwater dependent ecosystems are anticipated to be minimal in magnitude, highly localised and short in duration. The residual impact on migratory species is also considered to be low. Therefore, a detailed discussion of these ecological values are not included within this chapter. A summary is provided in Table 8-9. Further information on the assessment of these impacts can be found in **Technical Report A: Biodiversity and Habitats**.

**Table 8-9 Construction potential impacts and findings**

Potential Impacts	Findings
Impacts to groundwater dependent ecosystems as a result of construction activities	Potential impacts to GDEs are considered in terms of native vegetation removal within GDEs as well as impacts to existing groundwater flow pathways. It is intended to avoid impacts on montane thickets as this vegetation type is also critical for Leadbeater's Possum. Impacts would be minimised through micro-siting to avoid areas of wet or boggy ground and areas of vegetation which are conducive to GDE conditions. Construction teams would be trained to identify indicators of GDEs and all waterway crossings are to be elevated. Residual impacts would be minimal, highly localised and short in duration.
Impacts to migratory species as a result of construction activities (also discussed in <b>Chapter 14: Matters of National Environmental Significance</b> ).	The project area is not considered to provide important habitat for an ecologically significant proportion of any EPBC Act listed migratory species. The assessments indicates that the removal of small areas of wet forest vegetation is unlikely to result in significant impacts to the four migratory species that have the potential to occur. Residual impacts from the project area are considered to be low.

## 8.7.1 Significant Flora

### 8.7.1.1 EPBC Act listed flora species

Two EPBC Act listed threatened species Round-leaf Pomaderris *Pomaderris vacciniifolia* and Tall Astelia *Astelia Australiana* were identified as having a medium or higher likelihood of occurrence within the project area and assessment corridor. These two species are also listed on the FFG Act.

The project is considered unlikely to result in significant impact on the nationally significant Round-leaf Pomaderris due to no populations of this readily detectable species being recorded in lower slopes forest habitat, where the species is most likely to occur. Furthermore, the known local population of this species at East Warburton is outside of the project area and would not be impacted by the project. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts would occur) the implementation of pre-construction micro-siting within small areas of lower slopes forest habitat would ensure unanticipated significant residual impacts do not occur on this species.

The project is considered unlikely to result in a significant impact on the nationally significant Tall Astelia on the basis that no populations of this large and obvious species were detected in rainforest habitat that would be impacted by the project. In the unlikely event of undetected populations occurring in the trail assessment corridor (i.e. locations where project impacts would occur) the implementation of pre-construction micro-siting by an ecologist, within rainforest habitats, would ensure unanticipated significant residual impacts do not occur on important populations of this species.

### 8.7.1.2 FFG Act listed flora species

The construction impact on FFG Act listed flora threatened species that have a medium or higher likelihood of occurrence within the project area and assessment corridor are described in the following sections. Species have been grouped by the following flora types:

- Large trees
- Understorey (sub-canopy) trees and large shrubs
- Medium and small shrubs
- Herbs and graminoids, including orchids
- Ferns
- Cryptogams (except ferns)

Round-leaf Pomaderris (medium and small shrubs) and Tall Astelia (herbs and graminoids, including orchids) have been discussed above as they are both EPBC Act listed species.

#### Large trees

Three state significant large tree species as described in Section 8.6.3, Table 8-4 were considered to have a medium or high likelihood of occurrence in the project area. Residual impacts on these large and obvious tree species are considered to be negligible if they do occur in the assessment corridor and have remained undetected during field surveys. This conclusion has been reached on the basis that no tree removal is required for trail construction and if present these species are likely to be restricted to lower slopes forested areas and can be readily detected and avoided during pre-construction trail micro-siting.

Arboricultural investigations of potential impacts on tree health, as a result of TPZ and SRZ encroachment, have concluded that long term tree decline is unlikely to occur as a result of trail construction provided sensitive construction techniques are implemented. This supports the conclusion that large trees can be retained and are unlikely to experience decline in health or function over time as a result of trail construction.

#### Understorey (sub-canopy) trees and large shrubs

Three state significant understorey tree species as described in Section 8.6.3, Table 8-4 are considered to have a medium or high likelihood of occurrence in the project area and potentially in the assessment corridor.

One of these species, Tree Geebung, has been recorded and mapped in the assessment corridor between Mount Donna Buang, Mount Victoria and Ben Cairn in the Yarra Ranges National Park and near Mount Bride in the Yarra State Forest. A total of 18 Tree Geebung were recorded along the

assessment corridor associated with Trails 1, 45, 46, 47 and 49. Dwarf Silver-wattle and Hybrid Pittosporum were not recorded during ecological surveys between 2017 and 2021.

Direct residual impacts on Tree Geebung can be readily avoided through trail micro-siting in the locations where this species is known to occur and has been mapped in the assessment corridor. For the remaining two species residual impacts are considered to be negligible if they do occur in the assessment corridor and have remained undetected. These conclusions have been reached on the basis that no understorey tree removal is required for trail construction. Furthermore, arboricultural investigations of potential impacts on tree health including sub-canopy species, as a result of TPZ and SRZ encroachment, have concluded that long term tree decline is unlikely to occur as a result of trail construction provided sensitive construction techniques are implemented.

### Medium and small shrubs

One nationally significant and 13 state significant understorey small or medium shrub species as described in Section 8.6.3, Table 8-4 are considered to have a medium or high likelihood of occurrence in the project area and potentially in the assessment corridor:

Four state significant shrub species have been recorded during field surveys conducted between 2017 and 2021.

- Forest Phebalium was recorded in one location along Trail 42
- Victorian Flat-pea is widespread and abundant in Yarra State Forest
- Long Pink-bells was recorded along Trails 27, 32, 33 and 35
- Toothed Leionema is widespread in Wet Forest vegetation near Mount Bride where logging has occurred in the past 30 to 50 years.

It is likely direct impacts to Forest Phebalium and Long Pink-bells can be avoided through trail micro-siting given the discrete locations where these species have been recorded. However, Victorian Flat-pea is very widespread and a dominant understorey shrub in frequently burnt areas of the Yarra State Forest and is associated with EVC45 Shrubby Foothill Forest on drier slopes. Approximately 12 hectares of Shrubby Foothill Forest understorey would be disturbed by the project, but not all of this area is dominated by Victorian Flat-pea. The scale of impact on Shrubby Foothill Forest is a reasonable indication of the upper limit of residual impacts on Victorian Flat-pea. This species has not triggered species offsets indicating habitat removal is unlikely to be significant at a state-level. Toothed Leionema is also widespread in Wet Forest near Mount Bride and some pruning and removal of this species would be required along Trails 49 and 50 in this area. This species has triggered species offsets indicating habitat removal is significant at state-level.

For the remaining eight state significant species, residual impacts are considered to be negligible if the species do occur in the assessment corridor and have remained undetected. These conclusions have been reached on the basis that these species are readily identifiable shrubs and would have been detected if reasonable populations were present in the assessment corridor. To ensure residual impacts are avoided for these remaining eight species they would be included in trail construction micro-siting protocols to be implemented under the guidance of a project ecologist. Trail construction crews would also be educated by a project ecologist on the potential presence of these species and step to avoid and minimise impacts.

### Herbs and graminoids, including orchids

One nationally significant and 11 state significant understorey plants including graminoids, herbs and orchids as described in Section 8.6.3, Table 8-4 are considered to have a medium or high likelihood of occurrence in the project area and potentially in the assessment corridor.

Mountain Bird-orchid was recorded during field surveys near Mount Victoria between Trails 45 and 46 in one location and in two locations along Trail 51 below Burns Road in Yarra State Forest. The species may be more widespread in Damp Forest, Wet Forest and Shrubby Foothill Forest and it is likely direct impacts to Mountain Bird-orchid can be avoided through trail micro-siting given the discrete locations where this species has been recorded.

For the remaining nine state significant species, residual impacts remain a risk as most of these species are small, cryptic or transient in nature. There is some probability these species occur in the assessment corridor and were not detected during field surveys. To manage the potential for residual

impacts trail micro-siting by a suitably qualified and experienced botanist would be used and impacts in key habitats (such as wet gullies for Fairy Lanterns) would be minimised during trail construction.

## Ferns

Seven state significant ferns as described in Section 8.6.3, Table 8-4 are considered to have a medium or high likelihood of occurrence in the project area and potentially in the assessment corridor.

Oval Fork-fern was recorded during field surveys in Wet Forest along Trail 55 in a tributary of Edwardstown Creek in Yarra State Forest. It is likely direct impacts to this occurrence of Oval Fork-fern can be avoided through trail micro-siting given the discrete location where these species has been recorded. The same principle of trail micro-siting can be applied to other potential populations of Oval Fork-fern in Wet Forest habitats.

Of the remaining six state significant fern species not recorded but with some potential to occur, Slender Tree-fern, Lacy Wedge-fern and Tasman Fan-fern are large and obvious species. Residual impacts on these three obvious species are considered to be low to negligible if they do occur in the assessment corridor and have remained undetected. This conclusion has been reached on the basis that these three species are readily identifiable ferns and would have been detected if reasonable populations were present. To ensure residual impacts are avoided for these three obvious fern species they would be included in trail construction micro-siting protocols to be implemented under the guidance of a project ecologist. Trail construction crews would be educated by a project ecologist to avoid removal of tree ferns and in the potential presence of significant fern species and steps to avoid and minimise impacts on ground ferns.

Three other fern species with potential to occur are small epiphytic species. Jungle Bristle-fern, Beech Finger-fern and Small Fork-fern generally grow on the trunks of tree ferns and on rocks in rainforest or wet forest vegetation communities. There is the potential for residual impact as these three small epiphytic ferns may occur in the assessment corridor and were not detected during field surveys. To manage the potential residual construction impacts, protocols that avoid tree fern removal and impacts (i.e. host plants) and trail micro-siting would be used in key fern habitats (such as rainforest) under the guidance of a project ecologist.

## Cryptogams (except ferns)

Nine state significant cryptogams (mosses, liverworts, fungi or lichens) as described in Section 8.6.3, Table 8-4 are considered to have a medium or high likelihood of occurrence in the project area and potentially in the assessment corridor.

No targeted surveys were conducted for these cryptogams species and it is the intention of the project to minimise impacts on habitat for these species by retaining, or where retaining is not possible, sensitively relocating supporting habitat features and host substrates such as rock and logs in key rainforest and wet forest habitats. This approach is considered sufficient for all species (except Claspings Hypocreopsis, a fungus that grows on dead or living tree and shrub stems) to address potential residual impacts on significant cryptogams in rainforest and deep wet forest habitats. Claspings Hypocreopsis is known to be associated with *Leptospermum* spp., *Melalueca* spp., *Kunzea* spp. and *Banksia* spp. live and dead stems. As it is the intention of the project to avoid dense wet thickets that may support these host tree/shrub plants, impacts to this fungus are likely to be minimal.

To address impacts to cryptogams, trail construction crews would be educated by a project ecologist in the careful relocation of cryptogam habitat substrates such as logs and rocks. A trail micro-siting procedure has been included in the project CEMP that outlines the process for identifying and prioritising high risks areas for pre-construction trail micro-siting and substrate relocation.

## 8.7.2 Native vegetation and habitat impacts and offsetting

### 8.7.2.1 FFG Act listed threatened ecological communities

#### Cool Temperate Rainforest (CTR) / Cool Temperate Mixed Forest (CTMF)

Impacts to CTR and CTMF FFG Act listed threatened communities is largely confined to an area between Mount Donna Buang summit, Mount Victoria and Ben Cairn. There is a small area of CTMF likely to be impacted by Trail 50, in the Yarra State Forest in the headwaters of Calder Creek.

The project has committed to hand build all trails that intersect CTR and CTMF to minimise the construction footprint, as hand built trails have been demonstrated to require less disturbance than machine built trails, and allow for much more sensitive excavation works to be undertaken near tree roots. This design response would reduce soil disturbance, reduce understorey vegetation removal

and minimise the risk of Myrtle Beech stem and root wounding that could result in Myrtle Wilt infection and spread. The residual impacts for Trail 1 and Trails 45, 46 and 47 are described in Table 8-10.

For a trail network with Trail 1, the proportional bioregional impact on the remaining mapped areas of EVC 31 would be 0.001% in the Highlands Southern Fall bioregion and 0.02% in the Victorian Alps. For a trail network with the alternative (Trails 45, 46 and 47), the proportional bioregional impact on the remaining mapped areas of EVC 31 would be 0.003% in the Highlands Southern Fall bioregion and 0.007% in the Victorian Alps. The small area of CTMF community likely to be impacted in the Yarra State Forest would equate to approximately 0.008 hectares.

**Table 8-10 Residual impacts on CTR and CTMF**

Trail #	Residual impacts on CTR and CTMF
Trail 1 network	<ul style="list-style-type: none"> <li>• 1.870 km of trail intersecting pure Cool Temperate Rainforest.</li> <li>• 4.572 km of trail intersecting Cool Temperate Mixed Forest in the Yarra Ranges National Park.</li> <li>• 40 m of trail intersecting Cool Temperate Mixed Forest in Yarra State Forest (Trail 50).</li> <li>• 0.059 ha of understorey vegetation removal in HSF EVC 31 Pure CTR.</li> <li>• 0.023 ha of understorey vegetation removal in HSF EVC 31 CTMF.</li> <li>• 0.291 ha of understorey vegetation removal in VicAlps EVC 31 Pure CTR.</li> <li>• 0.683 ha of understorey vegetation removal in VicAlps EVC 31 Pure CTMF.</li> </ul>
Trails 45, 46 and 47 network	<ul style="list-style-type: none"> <li>• 0.616 km of trail intersecting pure Cool Temperate Rainforest.</li> <li>• 2.435 km of trail intersecting Cool Temperate Mixed Forest in the Yarra Ranges National Park.</li> <li>• 40 m of trail intersecting Cool Temperate Mixed Forest in Yarra State Forest (Trail 50).</li> <li>• No removal of vegetation in HSF EVC 31 Pure CTR.</li> <li>• 0.052 ha of understorey vegetation removal in HSF EVC 31 CTMF.</li> <li>• 0.131 ha of understorey vegetation removal in VicAlps EVC 31 Pure CTR.</li> <li>• 0.321 ha of understorey vegetation removal in VicAlps EVC 31 Pure CTMF.</li> </ul>

### 8.7.2.2 Native vegetation removal

Removal of understorey native vegetation is planned to occur in a staged manner for trail construction and is therefore assessed as having a very high residual impact. Additional mitigation measures have included committing to hand build trails in sensitive vegetation communities and in areas of modelled habitat for rare and threatened species to reduce on-ground impacts and to reduce the species habitat units offset requirements. However, the residual impacts on native vegetation would equate to up to 37 hectares of understorey vegetation removal depending on the preferred trail network chosen.

EnSym Native Vegetation Removal Reports (NVRs) have been produced for the two trail network options for the project (i.e. Trail 1 or the alternative). Both options impact understorey vegetation in a range of forest types across the project area according to the variable width trail construction footprint set out in Section 9.1 of **Technical Report A: Biodiversity and habitats**.

In summary, a trail network with Trail 1 would impact up to 37.047 hectares of understorey vegetation. The trail network with the alternative trail alignments 45, 46 and 47 would impact 35.75 hectares of understorey vegetation. Based on advice and recommendations from the project arborist no large trees have been included in patch vegetation removal as sensitive construction measures are considered unlikely to cause tree decline where TPZ and SRZ encroachment occurs. Native vegetation removal would be limited to understorey impacts in the variable trail construction footprint. In general, the steeper the underlying slope the wider the trail construction impact footprint would be as a result of additional cut and fill works required to create the trail benches on steep terrain. Some areas of the trail network would not have native vegetation impacts where existing informal mountain bike trails are being incorporated into the project and where the proposed trail alignments utilised existing forest roads, tracks or cleared areas (e.g. Warburton Golf Course).



Approximately 9.51 hectares of native vegetation removal would be required in the National Park for a trail network with Trail 1, or 9.15 hectares for a trail network including the alternative. .

Table 8-11 provides a summary of proposed native vegetation removal for the two options including a breakdown of EVC impacts.

Post-construction assessments by an arborist and/or ecologist may be required to confirm if TPZ encroachment or hazardous tree treatment has changed the offset requirements for the project estimated here. These offset requirements can then be reconciled in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*.

**Table 8-11 Summary of native vegetation impacts (understorey)**

Bioregion	EVC	Bioregional conservation status	Trail network (including trail 1) impacts (ha)	Trail network (including alternative) impacts (ha)
Highland Southern Falls	EVC 16 Lowland Forest	Least Concern	0.69	0.69
	EVC 18 Riparian Forest	Least Concern	0.005	0.005
	EVC 23 Herb-rich Foothill Forest	Least Concern	0.41	0.41
	EVC 29 Damp Forest	Least Concern	10.651	9.98
	EVC 30 Wet Forest	Least Concern	10.99	9.97
	EVC 31 Cool Temperate Rainforest ( <b>pure CTR</b> )	Endangered	0.059	0
	EVC 31 Cool Temperate Rainforest ( <b>CTMF</b> )	Endangered	0.023	0.052
	EVC 39 Montane Wet Forest	Least Concern	0.270	0
	EVC 45 Shrubby Foothill Forest	Least Concern	12.319	12.319
	EVC 127 Heathy Valley Forest	Vulnerable	0.117	0.117
Vic Alps	EVC 30 Wet Forest	Least Concern	0	0.773
	EVC 31 Cool Temperate Rainforest ( <b>pure CTR</b> )	Endangered	0.291	0.131
	EVC 31 Cool Temperate Rainforest ( <b>CTMF</b> )	Endangered	0.683	0.321
	EVC 39 Montane Wet Forest	Least Concern	0.539	1.039
Total			37.047	35.754

The majority of native vegetation to be impacted, is from EVCs that have a bioregional conservation status of Least Concern. The vast majority (around 90%) of native vegetation impacts would occur in three Least Concern EVCs; Damp Forest, Wet Forest and Shrubby Foothill Forest. The Least Concern status indicates these EVCs have greater than 50% of their pre-European extent intact across Victoria and have been subject to little to no degradation over a majority of the bioregion(s). Large areas of these three EVCs occur within parks and reserves within the Highlands Southern Falls and Victorian Alps Bioregions (including National Parks).

Based on hand built trails having an average construction impact of 1.7 metres wide across all slope classes, and only 0.6 metres to 1.2 metres being required for the operational trails, an area of 0.5 metres to 1.1 metres would typically revert to native understorey vegetation along hand built trails. For machine built trails the average construction impact would be 2.7 metres wide across all slope classes. Similar to hand built trails, 0.6 metres to 1.2 metres would be required for the operational trails leaving 1.5 metres to 2.1 metres to revert to back to native understorey vegetation along machine built trails. Unlike previous regulatory settings in Victoria, the current *Guidelines for the removal, destruction or lopping of native vegetation* do not have a mechanism that acknowledges 'temporary vegetation loss'. Therefore, despite the temporary nature of at least part of the construction

impacts, native understorey loss and offsets have been calculated using the full construction corridor. A typical trail construction and regeneration of temporary impact scenarios is depicted in Figure 8-10.



**Figure 8-10 Typical trail construction corridor scenario showing the trail bench and temporarily disturbed areas that have regenerated with native vegetation, Yarra State Forest Warburton.**

When viewed in wider geographic contexts, the reduction in understorey vegetation from nine EVCs across the project area is relatively minor at a bioregional scale. A bioregional scale is considered the most appropriate level of geographic context for this project given the project area occurs in a largely intact landscape (in terms of vegetation cover) and is contiguous with large tracts of forested public land in the Highlands Southern Fall and Victorian Alps bioregions. Impacts to EVCs in the project area equate to less than 0.03% of bioregional extant distribution of these vegetation types.

### 8.7.2.3 Impacts on modelled habitat for rare and threatened species

A test for the significance of a project's impacts on native vegetation and Victoria's biodiversity is available through the general-species offset under the *Guidelines for the removal, destruction or lopping of native vegetation* (see page 15 of the Guidelines). The general-species offset test is specifically referred to as a measure of 'significant impacts' on Victoria's rare and threatened species, or their habitats. It involves intersecting a native vegetation removal footprint with Habitat Importance Models for state significant species and is separate to the criteria-based qualitative assessment used for Commonwealth matters.

The test determines if proposed native vegetation removal has a proportional impact on any rare or threatened species modelled habitat above the specified threshold of 0.005% of habitat value affected. A NVRR has been produced for the two trail network options contemplated in this impact assessment and the results are summarised in Table 8-12. Thirteen species are above the specified threshold of 0.005% of habitat value affected by proposed clearing for both trail network options. All species above that threshold are similar for both trail network options, except trail network (including Trail 1) is above the threshold for Leadbeater's Possum and trail network (including alternative) is above the threshold for Wavy Fork-moss.

Table 8-12 Proportional impacts on modelled habitat for rare and threatened species

Common name	Species name	Cons. status (DELWP Adv. lists)	Trail network (including Trail 1) above threshold	% habitat value affected	Trail network (including alternative) above threshold	% habitat value affected
Leadbeater's Possum	<i>Gymnobelideus leadbeateri</i>	Endangered	Yes	0.0051	No	0.0049
Smoky Mouse	<i>Pseudomys fumeus</i>	Endangered	Yes	0.0058	Yes	0.0057
Tall Astelia	<i>Astelia australiana</i>	Vulnerable	Yes	0.0065	Yes	0.0060
Brickmaker's Sedge	<i>Gahnia grandis</i>	Vulnerable	Yes	0.0119	Yes	0.0113
Nunniong Everlasting	<i>Ozothamnus rogersianus</i>	Rare	Yes	0.0069	Yes	0.0067
Jungle Bristle-fern	<i>Cephalomanes caudatum</i>	Rare	Yes	0.0055	Yes	0.0050
Tree Geebung	<i>Persoonia arborea</i>	Vulnerable	Yes	0.0052	Yes	0.0050
Long Pink-bells	<i>Tetradlea stenocarpa</i>	Rare	Yes	0.0108	Yes	0.0103
Fairy Lanterns	<i>Thismia rodwayi</i>	Vulnerable	Yes	0.0135	Yes	0.0113
Mountain Bird-orchid	<i>Chiloglottis jeanesii</i>	Rare	Yes	0.0106	Yes	0.0097
Powelltown Correa	<i>Correa reflexa</i> var. <i>lobata</i>	Rare	Yes	0.0101	Yes	0.0096
Toothed Leionema	<i>Leionema bilobum</i> subsp. <i>serrulatum</i>	Rare	Yes	0.0055	Yes	0.0053
White Star-bush	<i>Asterolasia asteriscophora</i> subsp. <i>albiflora</i>	Endangered	Yes	0.0095	Yes	0.0088
Wavy Fork-moss	<i>Dicranoloma platycaulon</i>	Rare	No	0.0045	Yes	0.0050

#### 8.7.2.4 Biodiversity offset requirements

State offsets arise through the removal of native vegetation, which sometimes corresponds with modelled habitat for rare or threatened flora and fauna under the DELWP advisory lists. Offsets are calculated in accordance with the Guidelines for the removal, destruction or lopping of native vegetation, which is an incorporated document within the Victoria Planning Provisions under Clause 52.17 (Native Vegetation).

For a detailed assessment pathway project, the species-general offset test will determine if a general offset, species offset or combination of both is required.

Native Vegetation Removal Reports were obtained for two separate trail network options. The base case includes Trail 1 and the alternative includes Trails 45, 46 and 47. The project is also proposed to be constructed across two stages and a stage offset scenario has also been calculated for the two different trail network options. The results of the species-general offset test indicate that species offsets would be required for both trail network options. No general offsets or large tree offsets have been triggered. State offset requirements are summarised in Table 8-13.

The project is unlikely to result in a significant impact on EPBC Act listed threatened species, as discussed in detail in Section 14.4 and 14.6 of **Chapter 14: Matters of National Environmental Significance**. Therefore, Commonwealth offsets are not considered necessary for the project.

#### What are offsets?

In order to ensure a gain to Victoria's biodiversity that is equivalent to the loss resulting from the proposed removal of native vegetation, compensatory offsets are required. Losses and gains are measured in general or species habitat scores or units. The offset must also include at least one large tree for every large tree removed.

An offset strategy for the project has been developed and is detailed in **Attachment IV Biodiversity Offset Strategy and Plan**. This strategy has been developed in consultation with public land managers and project stakeholders and demonstrates how biodiversity offsets for the project are available and can be secured to achieve a no net loss for the project. An offset management plan would be required for all offset sites prior to commencement of any vegetation clearance for the project. The Offset Management Plan would be developed after primary approvals.

**Table 8-13 State offset requirements for native vegetation removal**

	Base case – with Trail 1		Alternative – with Trails 45, 46 and 47	
Attribute	Outcome	Notes	Outcome	Notes
Location category	Location 3	Areas where vegetation removal could significantly impact rare or threatened species or areas of mapped endangered EVCs	Location 3	Areas where vegetation removal could significantly impact rare or threatened species or areas of mapped endangered EVCs
Native vegetation removal extent	37.047 ha	Partial removal of understorey vegetation only	35.754 ha	Partial removal of understorey vegetation only
Assessment pathway	Detailed assessment pathway	Highest risk pathway for vegetation removal in Victoria	Detailed assessment pathway	Highest risk pathway for vegetation removal in Victoria
Strategic Biodiversity Value Score	0.480 to 0.970	Medium to high score	0.480 to 0.960	Medium to high score
Modelled habitat for rare or threatened species	Yes	Modelled habitat for 68 species	Yes	Modelled habitat for 67 species
Offset type	Species offsets	263.637 species habitat units for 13 species: <ul style="list-style-type: none"> <li>• 21.107 Leadbeater's Possum</li> <li>• 20.684 Smoky Mouse</li> <li>• 19.073 Tall Astelia</li> <li>• 25.214 Brickmaker's Sedge</li> <li>• 26.076 Nunniong Everlasting</li> <li>• 20.620 Jungle Bristle-fern</li> <li>• 19.885 Tree Geebung</li> <li>• 26.023 Long Pink-bells</li> <li>• 15.210 Fairy Lanterns</li> <li>• 9.342 Mountain Bird-orchid</li> <li>• 25.858 Powelltown Correa</li> <li>• 23.128 Toothed Leionema</li> <li>• 11.417 White Star-bush</li> </ul>	Species offsets	240.087 species habitat units for 13 species: <ul style="list-style-type: none"> <li>• 19.410 Smoky Mouse</li> <li>• 18.027 Tall Astelia</li> <li>• 24.584 Brickmaker's Sedge</li> <li>• 25.342 Nunniong Everlasting</li> <li>• 19.387 Jungle Bristle-fern</li> <li>• 19.182 Tree Geebung</li> <li>• 25.345 Long Pink-bells</li> <li>• 13.528 Fairy Lanterns</li> <li>• 8.830 Mountain Bird-orchid</li> <li>• 25.125 Powelltown Correa</li> <li>• 22.394 Toothed Leionema</li> <li>• 10.430 White Star-bush</li> <li>• 8.503 Wavy Fork-moss240</li> </ul>

### 8.7.3 Significant Fauna

The project noise technical report (**Appendix E – Noise Technical Report of Technical Report C: Land use and planning**) identifies that most of the current noise in the project area is daytime noise and that the project could generate additional noise through use of equipment such as mini-

excavators, power carriers and chainsaws. The assessment also indicates that the sources of construction noise would not be in any one area for a prolonged time as trail construction crews move along the construction corridor. One-off significant short term noise sources such as the use of a helicopter for lifting bridges into inaccessible areas may also occur. The assessment concludes that vibration from the project is also likely to be insignificant.

For nocturnal fauna species that are denning in tree hollows or have daytime roost sites in the construction corridor there is potential that construction noise could lead to disturbance. Hollow-dependent species that are high in the canopy (e.g. 30 to 60 metres high) are less likely to be susceptible to construction noise than those using tree hollows closer to ground level or occupying low roosting sites. The key strategies to minimise disturbance to nocturnal fauna during the construction phase would be limiting all works to daylight hours only to avoid disturbance to the nocturnal activities of these species, and avoiding running multiple pieces of equipment at the same time to minimise excessive noise. The controls are documented in the project CEMP.

For daytime active (diurnal) species the presence of people and equipment along the construction corridor is most likely to result in wildlife temporarily moving away from the works area. The use of trail construction micro-siting would allow important habitat features or signs of fauna occupancy (e.g. roost sites, owl whitewash on trees and the ground, burrows, active Lyrebird mounds) to be recognised, mapped and avoided through making adjustments to the trail alignments within the assessment corridor. A summary of threatened species sensitivity to disturbance during breeding is provided in **Technical Report A: Biodiversity and habitats**.

### 8.7.3.1 EPBC Act listed species

Eight nationally significant terrestrial fauna species and three aquatic species are considered to have a medium or high likelihood of occurrence in the project area and potentially in the assessment corridor.

- Leadbeater's Possum
- Southern Greater Glider
- Grey-headed Flying-fox
- Swift Parrot
- White-throated Needletail
- Spot-tailed Quoll
- Smoky Mouse
- Southern Brown Bandicoot
- Australian Grayling
- Murray Cod
- Macquarie Perch

#### Leadbeater's Possum

The project area supports known colonies of Leadbeater's Possum in patchy habitat around Mount Donna Buang and Ben Cairn. Sub-canopy connectivity is a critical habitat feature in these locations, which is typically provided by high stem density of mid-storey species including *Acacia* spp., *Callistemon* spp. and Mountain Tea-tree. The species has also been previously recorded in the Yarra State Forest in and around the Mount Bride area as recently as 2015, and from Groom Hill in 1976.

Based on current knowledge of this species in the project area, key areas of habitat and steps to avoid this habitat include:

- Dense montane thickets, rainforest vegetation and nest boxes adjacent to Donna Buang Summit Road and directly west of Mount Donna Buang summit. In this location Trail 1 has been realigned from west of Road 2 to avoid direct impacts on these key habitats and to provide a 100 metre to 300 metre buffer to the known dense thicket habitat and nest box sites.
- Dense montane thicket habitat and nest boxes upslope of Donna Buang Road (gravel section) approximately 450 metres north of Ben Cairn. In this location Trail 1 has been realigned out of the thicket and placed on the existing road shoulder to avoid direct impacts on key habitat. The trail is still in proximity to the thicket and nest boxes but will use the existing road shoulder that does not

support habitat. Additionally, this road is regularly used by vehicles between November and June each year so noise and disturbance already exists in this area.

Other potential habitat where impacts have been avoided and/or minimised include:

- The edges of montane thickets downslope (east) of Ben Cairn where Trail 1 has been designed to avoid these thickets with only minor pruning of several small Lemon Bottlebrush stems required.
- Scattered small patches of open montane thicket vegetation between Mount Donna Buang and Mount Victoria. The alignment of alternative Trails 45 and 46 has been designed and micro-sited in the presence of DELWP and Parks Victoria representatives to avoid direct impacts on these open thickets and to avoid the need to prune or remove stems of Lemon Bottlebrush and/or Mountain Tea-tree.
- Open Montane Wet Forest and Wet Forest vegetation with a scattered sub-canopy of Silver Wattle between Mount Donna Buang and Mount Victoria where the species may occupy tall canopy and sub-canopy habitat. The alignment of alternative Trails 45 and 46 has been designed and micro-sited in the presence of DELWP and Parks Victoria representatives to avoid direct impacts on large hollow-bearing trees and sub-canopy wattles.
- Regrowth Wet Forest vegetation (logged in the late 1970s) between Mount Tugwell, Mount Bride and Groom Hill in Yarra State Forest where SPZs for Leadbeater's Possum have been established by DELWP. In this location Trails 38 and 50 have been aligned outside of the SPZs. A 400 metre section of Trail 49 uses an existing forest track through the SPZ just west of Mount Bride to avoid any direct impacts on forest vegetation. Furthermore, in these locations it is intended to avoid any removal of sub-canopy vegetation which is composed of scattered Silver Wattle.

Key habitat features within the project area for the species include hollow-bearing trees, artificial nest boxes and areas with high stem densities of mid-storey species, such as Mountain Tea-tree, Lemon Bottlebrush, Myrtle Beech and associated occurrences of emergent eucalypts. These areas of high stem density typically occur over wet substrates in dense montane thickets in the Yarra Ranges National Park, and trails have been realigned in consultation with species experts to avoid impacts to these thicket areas around Mount Donna Buang and Ben Cairn. Structural fragmentation of dense montane thickets and the sub-canopy layer in wet forests and rainforests has been avoided through these realignments. Avoiding structural habitat fragmentation and maintaining key habitat connectivity was considered particularly important due to potential impacts associated with disturbance, increased predation and energetic costs to animals in the area. In the Yarra State Forest to the south, habitat is typically taller and more open, with the sub-canopy dominated by taller Silver Wattles in areas that have been logged between the 1970s and late 1980s. In these areas, it is intended that trails can avoid removal of dense stands of sub-canopy stems and therefore avoid impacts to the species. The project would also avoid removal of hollow-bearing trees, artificial nest boxes and removal of dense stands of sub-canopy stems that provide movement opportunities for this species.

If any treatment of large or hollow-bearing trees that are deemed hazardous is required during construction, this would be done in consultation with the land manager, an ecologist and arboricultural specialist.

Native vegetation removal would be concentrated on understorey impacts only in the variable trail construction impact footprint. In general, the steeper the underlying slope the wider the trail construction impact footprint would be as a result of additional cut and fill works required to create the trail benches on steep terrain. Some areas of the trail network would not have native vegetation impacts where existing informal mountain bike trails are being incorporated into the project and where the proposed trail alignments utilised existing forest roads, tracks or cleared areas (e.g. Warburton Golf Course).

Once the trails are established the temporarily disturbed construction areas along trail edges would be allowed to regenerate with native vegetation thus reinstating habitat elements. This regeneration process would be encouraged through using vegetation sods and organic matter cut from the trail tread to cover disturbed areas during construction. The trail construction and any resultant disturbance is therefore considered to be a permeable narrow barrier in discrete locations that is unlikely to affect physical or functional connectivity between populations of Leadbeater's Possum in the extensively forested landscape. Arboricultural investigations of potential impacts on tree health, as a result of TPZ and SRZ encroachment, have concluded that long term tree decline is unlikely to occur as a result of

trail construction provided sensitive construction techniques are implemented. This supports the conclusion that large trees and important sub-canopy tree species can be retained and are unlikely to experience decline in health or function over time as a result of trail construction.

Invasive fauna species are already present within the project area (e.g. cats and fox). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project would support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). The project CEMP would also specifically deal with controlling the introduction and spread of weed species and pathogens.

An existing recovery action for the species that is relevant to the project area is the translocation of individuals to recipient sites in and around Mount Donna Buang and Ben Cairn, including locations that were previously within or immediately adjacent to the proposed Trail 1 alignment below Mount Donna Buang and on the Donna Buang Road near Ben Cairn. Trail 1 has now been realigned after consultation with species experts to avoid direct impacts on these recipient sites and the associated high quality habitat present at these locations. For example, the previous alignment of Trail 1, along the headwaters of Walker Creek, parallel to the Donna Buang Road Summit Road, has now been shifted upslope into open forest to the north-west out of this gully system that supports dense thickets. This has pushed the Trail 1 alignment into the Melbourne Water catchment but has avoided impacts on high quality Leadbeater's Possum habitat. Trail 1 has also been realigned to use the Donna Buang Road at an area of high quality thicket habitat and a translocation recipient site near Ben Cairn. Suitable buffers, as noted above, have also been applied to research sites off the Donna Buang Road near Ben Cairn. After detailed desktop and field investigations, and consultation with species experts, a trail alignment that avoids Leadbeater's Possum habitat, remains outside of the Melbourne Water catchment and meets project objectives could not be found. Therefore, avoiding Leadbeater's Possum habitat was given priority and the new Trail 1 alignment now enters the catchment for approximately 458 metres to the north-west of Donna Buang Road (summit section).

Construction phase noise has the potential to disturb Leadbeater's Possums during their daytime denning in nest boxes and natural tree hollows. Tree hollows high in the canopy (e.g. 30 to 60 metres high) are less likely to be susceptible to construction noise than those closer to ground level.

**Appendix E – Noise Technical Report of Technical Report C: Land use and planning** identifies that most of the current noise in the project area is daytime noise and that the project could generate additional noise through use of equipment such as mini-excavators, power carriers and chainsaws. The noise technical report also indicates that the sources of construction noise would not be in any one area for a prolonged time as trail construction crews move along the construction corridor. One-off significant short term noise sources such as the use of a helicopter for lifting bridges into inaccessible areas may also occur. The noise technical report concludes that vibration from the project is also likely to be insignificant. Leadbeater's Possum currently occupies nest boxes in close proximity to Donna Buang Road near the Mount Donna Buang summit and towards Ben Cairn where vehicle traffic regularly occurs.

The key strategies to minimise disturbance to Leadbeater's Possum during the construction phase would be limiting all works to daylight hours only, to avoid disturbance to the species' nocturnal activities and avoiding running multiple pieces of equipment at the same time to minimise excessive noise. It should also be noted that the top section of Trail 1 between Mount Donna Buang summit and Ben Cairn is proposed to be hand built so the construction noise profile would be much lower in this area compared to machine built trails. With these important avoidance and impact minimisation measures applied to trail design and appropriate mitigation, the project is unlikely to result in significant impacts or effects to the Leadbeater's Possum population.

### **Southern Greater Glider, Grey-headed Flying-fox, Swift Parrot and White-throated Needletail**

The eucalypt canopy within the project area would largely be unaffected by avoiding the removal of large trees and canopy trees during trail construction and maintenance. This would avoid direct impacts for arboreal and canopy dwelling species such as Southern Greater Glider, Grey-headed Flying-fox and Swift Parrot. Impacts to White-throated Needletail would similarly be avoided, however they are far less likely to be present in the canopy.

### **Spot-tailed Quoll**

Depending on the trail design network option, the project proposes to permanently remove / disturb up to 37 hectares of understorey vegetation across a range of forest types. The habitat to be removed is

within a large contiguous area of high quality native forest within the broader area and region. The resultant understorey disturbance would be a permeable narrow track network in discrete locations. This level of disturbance is unlikely to affect foraging, dispersal or gene flow of Spot-tailed Quoll, given this species' dispersal ability and large home ranges and as extensive habitat would still be available during and post construction for these activities to occur in. Given the relatively small linear construction footprint in the context of available habitat in the broader area and region, the proposed trails would not lead to a long term decline in the size of a population of this species and significant impacts on this species are considered unlikely.

### **Smoky Mouse**

Given the broad habitat requirements and the cryptic nature of Smoky Mouse, it could be reasonably assumed that if a population of the species was present within or adjacent to the trail alignment, the population would utilise the extensive areas of available habitat adjacent to the development (e.g. Shrubby Foothill Forest dominated by bush peas). Approximately 12 hectares of Shrubby Foothill Forest understorey would be disturbed by the project in the Yarra State Forest and not all of this area is dominated by suitable heath and bush pea species that provides potential habitat for Smoky Mouse. Other forest EVCs that dominate the Yarra State Forest and would be impacted by the project, including Damp Forest and Wet Forest, naturally lack bush-pea and heath-dominated understorey and are not considered likely to support this species. Under this assumption the removal of suitable habitat from within a large, contiguous, patch would not lead to a significant impact as extensive habitat would still be available for critical activities to occur in. Predation from introduced carnivores is a key threatening process for Smoky Mouse. Cats and foxes are already present throughout the project area, and the construction of new trails, is unlikely to increase the current predation threat from introduced carnivores, given that the local area currently has a level of predator activity.

### **Southern Brown Bandicoot**

Within the project area, Southern Brown Bandicoot is considered to have some potential to occur in drier forest types located in the southern sections of the project area, particularly around Wesburn (e.g. Lowland Forest and Valley Heathy Forest). The species is not likely to be present in other parts of the project area. It can be reasonably assumed that if a population of the species was present within or adjacent to the trail alignment, the population would utilise the extensive areas of available habitat adjacent to the development. Under this assumption the removal of 0.81 hectares of suitable understorey habitat in Lowland Forest and Valley Heathy Forest from within a large, contiguous patch would not lead to a direct decline in the size of a population as extensive habitat would still be available for critical activities to occur in. Predation from introduced carnivores is a key threatening process to Southern Brown Bandicoot. Cats and foxes are likely to be present throughout the project area and the construction of new trails is unlikely to increase the current predation threat from introduced carnivores, given that the local area currently has a level of predator activity, and Lowland Forest and Valley Heathy Forest already have an extensive network of forest tracks and trails near Wesburn. It is considered highly unlikely that the project would result in any changes to availability or quality of habitat for this species and it would not be significantly impacted by the project. .

### **Aquatic species (Australian Grayling, Murray Cod and Macquarie Perch)**

Australian Grayling has been recorded within the Yarra River Basin the Yarra River is known as supporting an important population. The development the project is not expected to lead to a significant impact to Australian Grayling. This is considering no works are required within the bed of the Yarra River for bridge construction and the small extent of available habitat and level of impact along Yarra River tributaries within the project area.

Murray Cod has been recorded within the Yarra River Basin (translocated population); however, the Yarra population is not noted as an important population. The development of the project is not expected to lead to a significant impact to Murray Cod. This is considering no works are required within the bed of the Yarra River for bridge construction and the small extent of available habitat and level of impact along Yarra River tributaries within the project area.

Macquarie Perch has been recorded within the Yarra River Basin and has been translocated to this part of southern Victoria. The development of the project is not expected to lead to significant impacts to Macquarie Perch. This is considering no works are required within the bed of the Yarra River for bridge construction and the small extent of available habitat and level of impact along Yarra River tributaries within the project area.



Residual construction impacts to these species are considered low to negligible and can be readily managed through proven and effective soil erosion and sedimentation control measures in the catchment of the Yarra River and its tributaries.

### 8.7.3.2 FFG Act listed species

Twelve state significant terrestrial and three state significant aquatic fauna species as described in Section 8.6.3, Table 8-4 are considered to have a medium or high likelihood of occurrence in the project area and potentially in the assessment corridor.

- Little Egret
- Great Egret
- Grey Goshawk
- Barking Owl
- Powerful Owl
- Masked Owl
- Sooty Owl
- Brush-tailed Phascogale
- Platypus
- Eastern Horseshoe Bat
- Common Bent-wing Bat (eastern ssp.)
- Lace Monitor
- Mount Donna Buang Wingless Stonefly
- Curve-tail Burrowing Crayfish
- Tubercle Burrowing Crayfish

#### Egret (Little Egret and Great Egret)

For these FFG Act listed species, Little Egret and Great Egret are likely to utilise wetlands and flooded areas in and around the township of Warburton, on the Yarra River floodplain. There is unlikely to be any level of residual impact to these habitats at these locations from the proposed trail development.

#### Owls

Grey Goshawk is likely to forage in forested environments and while it may do so occasionally it is unlikely to be impacted by the project. The large forest owls Barking Owl, Powerful Owl, Masked Owl and Sooty Owl may all occur within the project area. Habitat elements such as large old trees with hollows for roosting and breeding, and hollows/canopy/adjacent cleared area that support their prey are important for these species. By avoiding impacts to large old trees and minimising impacts on understorey habitats, significant residual impacts on these species are unlikely. Grey Goshawk and these owl species are also likely to forage and range across large areas and the amount of ground disturbance from the project is unlikely to impact them or their prey adversely.

#### Brush-tailed Phascogale

Brush-tailed Phascogale *Phascogale tapoatafa* is only likely to be present in lower elevation drier woodland in the project area. The avoidance of large hollow bearing trees and project support for predator control measures would avoid and minimise any significant residual effect to this species.

#### Platypus

Platypus *Ornithorhynchus anatinus* is known to occur in and around Warburton, associated with permanent waterbodies, creeks and rivers according to VBA records. The northern trails cross a number of permanent or semi-permanent creeklines on the lower slopes of Yarra Ranges National Park in the vicinity of the O'Shannassy Aqueduct where habitat impacts could occur to burrow sites (e.g. along Frenchmans Creek, Kennedy Creek, McKenzie Creek, Dee River, Walker Creek, Stockdales Creek, Dirty Gully Creek, Ythan Creek and Rocky Creek). Habitat impacts from proposed trails to the south of Warburton in the Yarra State Forest are likely to be limited to negligible as there

are few permanent waterbodies, creeks and rivers that would be crossed by trails. There is also one clear-span bridge crossing proposed over the Yarra River in a highly disturbed riparian zone where impacts would be limited to areas well above the immediate river edge. Overall, impacts to habitat for this species would be avoided by minimising disturbance to stream banks where burrow sites could occur and by installing bridge crossings and structures rather than undertaking any significant excavation along sensitive waterway banks and beds. Micro-siting these waterway crossings would be undertaken to firstly identify potential burrowing habitat for Platypus (not actual burrows) based on stream conditions and water permanency, and then applying appropriate mitigation measures at higher order stream crossings that avoid sedimentation and sediment mobilisation. The identification of potential Platypus habitat would be undertaken by a qualified zoologist and contingency measures to protect this species during works near potential habitat would be undertaken in accordance with Australian Platypus Conservancy – Platypus Contingency Plans for Capital Works Programs.

### Eastern Horseshoe Bat and Common Bent-wing Bat

Eastern Horseshoe Bat *Rhinolophus megaphyllus megaphyllus* and Common Bent-wing Bat (eastern ssp.) *Miniopterus orianae oceanensis* are both cave roosting species, however the assessment corridor and trail construction footprint is not considered likely to support any caves or mineshafts that would provide breeding habitat. Only one capped mineshaft is known to be present along an existing 4WD track on Mineshaft Hill Track near Trails 62 and 63. The minimisation of impacts to forest habitats and abundant local habitat would avoid impacts to these species.

**Lace Monitor** *Varanus varius* is considered most likely to occur in drier vegetation located in the lower north and west facing foothills and ridges of the southern section of the project area, such as around Wesburn. The species is considered less likely to occur in wetter forests at higher elevations. The minimisation of impacts to forest and woodland habitats and abundant local habitat would avoid impacts to this species.

### Aquatic species

#### Mount Donna Buang Wingless Stonefly

Targeted investigations of Mount Donna Buang Wingless Stonefly habitat indicate this species is present in the headwaters of several streams that are issued from the ridges and slopes between Mount Donna Buang, Mount Victoria and Ben Cairn.

Specific areas of potential impacts on this species' habitat or sources of indirect impacts to habitat through soil compaction and sedimentation include.

- Sections of Trail 1 between Mount Donna Buang and Ben Cairn, particularly the trail alignment in the catchment of drainage lines and soaks above the gravel sections of the Donna Buang Road.
- Sections of alternative Trail 45 in the catchment of the upper reaches of Ythan Creek, including headwaters that flow south off the ridge between Mount Donna Buang and Mount Victoria.
- Sections of alternative Trail 46 in the catchment of the upper reaches of Cement Creek, including headwaters that flow north off the ridge between Mount Donna Buang and Mount Victoria.

Trail alignments do not cross any well-defined headwater streams between Mount Donna Buang and Ben Cairn for Trail 1 as the alignment is in the upper part of the catchment or along ridgelines and flat saddles. Similarly, the alignments for alternative Trails 45 and 46 do not cross any well-defined headwater streams as they follow the ridgeline and upper slopes between Mount Donna Buang and Mount Victoria. Despite not crossing well-defined headwater streams, there is a risk that minor hydrological change in the upper catchment and soil disturbance caused by trail construction could generate sediment into soaks and trickles that provide stonefly habitat immediately downstream.

The most appropriate design responses and mitigation measures to reduce residual impacts on this species include:

- Where soil disturbance in the upper catchment cannot be avoided then ground disturbance and compaction should be absolutely minimised through use of elevated structures in headwater areas (i.e. near springs, soaks and trickles).
- Ensuring no off-trail use occurs that could lead to sedimentation and compaction in proximity to stonefly habitat.
- Eliminating any pollution sources that could be soaked into the soil during trail construction, maintenance or operation (e.g. fuels, chemicals, herbicides or fungicides).

- Eliminating coarse and fine sediment carried into permanent or ephemeral (occasionally flowing) waterways and watercourses
- Avoiding interruption of the flow rate of the groundwater.
- Avoiding increases in sediment from the gravel section of the Donna Buang Road flowing into the adjacent springs downstream of the road.

There is the potential for residual construction impacts to Mount Donna Buang Wingless Stonefly and its habitat due to the sensitivity of this species to soil and hydrological disturbance. Micro-siting trail works between Mount Donna Buang, Mount Victoria and Ben Cairn and installing elevated structures in headwater habitats would minimise but not eliminate the potential residual impacts to this species. Micro-siting and defining exact locations for elevated structures would involve engaging experts at the pre-construction stage to specifically indicate which springs, soaks and trickles should be elevated and how soils and hydrological conditions can be maintained. Targeted surveys for this project have located new populations of Mount Donna Buang Wingless Stonefly between Mount Donna Buang and Mount Victoria. There is potential that this species is more widespread in the vicinity of Mount Donna Buang and the project and/or land managers could support ongoing eDNA-based monitoring and detection of more new populations in the Yarra Ranges National Park and Melbourne Water catchment.

### Crayfish

Within the project area, potential habitat has been identified for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, both listed under the FFG Act. Advice received from DELWP is that burrowing crayfish, for the purposes of permit requirements under the FFG Act, are considered to be a terrestrial crustacean, not an aquatic crustacean. Therefore, these species do not fall within the definition of 'fish' in the *Fisheries Act 1995* (which is also the definition of 'fish' for the purposes of the FFG Act).

Based on the limited available information on the habitat requirements for these two species and the location of VBA records, it is likely that Curve-tail Burrowing Crayfish is associated with more permanent waterways and watercourses with access to the watertable on lower slopes of the project area. Tubercle Burrowing Crayfish is likely to be associated with wet forest habitats with suitable deep clay soils for burrowing (e.g. EVCs 30 and 31) in the assessment corridor.

Threats to burrowing Crayfish include habitat degradation and disturbance of crayfish and their burrows. Specific potential impacts and mitigation responses associated with the project include:

- Removal of vegetation that can damage burrows and increase local erosion or sedimentation. When clearing vegetation, root systems should be left intact to reduce erosion and damage to burrows.
- Use of herbicide can impact upon burrowing crayfish. Reduce chemical use when controlling weeds, use chemicals safe for waterways, even at high elevations as the crays can collect runoff in their burrows.
- Use of heavy machinery or vehicles within burrowing crayfish habitat can compact soil and collapse shallow burrow systems. Where possible, use light machinery, travel on well-established roads and tracks and avoid working near crayfish burrows.
- Burrowing crayfish feed on roots and decaying organic matter. Removal and disturbance of rotting logs and leaf litter should be minimised in crayfish habitat (e.g. Wet Forest habitats)
- Frequent or intense fire can have negative long term effects on soil quality and vegetation in crayfish habitat, increasing erosion and reducing sources of food. A fire management plan incorporating use of low intensity fuel reduction burns may be appropriate for crayfish habitat.
- Where destruction of a crayfish burrow is unavoidable, or if a crayfish is inadvertently excavated, trained fauna salvagers (with appropriate fauna handling permits) should excavate burrows, collect the crayfish, and relocate them to nearby suitable habitat. Construction teams would be trained by the project ecologist in the identification of potential crayfish habitat and burrows during the construction induction. It is not intended to provide species-specific training but to educate construction teams in the general identification of potential burrow sites and appropriate management of impacts (e.g., avoidance of deep excavation).

Residual impacts to burrowing crayfish would be managed through implementation of these construction phase measures. Confirmed locations detected would be mapped for future reference in operational management planning.

## 8.8 Operation impact assessment

This section discusses the potential effects and impacts of the project as a result of trail operation and the associated mitigation measures that aim to reduce impacts to as low a level as possible. During operation, the trails are likely to end up with an average operational width of between 0.6 metres and 1.2 metres (the ride line/trail bench) and an overhead height clearance of 2.5 metres from ground level. This would be the maximum understorey disturbance in the long term. Similar to the construction impact assessment, the key biodiversity and habitat values identified that are detailed in the proceeding discussion include:

- Significant flora
- Native vegetation and habitat removal.
- Cool Temperate Rainforest (CTR) / Cool Temperate Mixed Forest (CTMF)
- Significant fauna
- Leadbeater's Possum
- Mount Donna Buang Wingless Stonefly

The residual impact to groundwater dependent ecosystems and migratory species are anticipated to be minimal. Therefore, a detailed discussion of these ecological values are not included within this chapter. A summary is provided in Table 8-14. Further information on the assessment of these impacts can be found in **Technical Report A: Biodiversity and Habitats**.

Table 8-14 Operation potential impacts and findings

Potential Impacts	Findings
Impacts to groundwater dependent ecosystems as a result of operational activities	To manage springs that may naturally emerge during operation via mass wasting or after heavy rain and sedimentation that may occur <b>Chapter 8: Surface water, groundwater and geotechnical hazards</b> outline mitigation measure GWR07 which establishes a procedure for identifying springs and periodical inspection of trails to assess condition and need for maintenance or additional trail treatments. Mitigation selection may depend on the size of the affected area. Treatments include controlling sedimentation and erosion from the new spring. Maintenance staff would also be trained to identify indicators of GDEs to reduce the likelihood of exposing a new spring or expanding an existing spring through any maintenance activities. Therefore, operational residual impacts to groundwater dependent ecosystems are anticipated to be minimal.
Impacts to migratory species as a result of operational activities (also discussed in <b>Chapter 14: Matters of National Environmental Significance</b> ).	Aerial species such as Fork-tailed Swift and White-throated Needletail use the airspace above the forests and may roost in tall canopy trees and project operations would not impact these habitat types. Rufous Fantail and Satin Flycatcher use wet gullies and forest habitats in the project area and may experience minor disruption due to trail operations near these habitat types. Suitable resources for breeding, foraging and resting of Rufous Fantail and Satin Flycatcher would remain available in the broader project area during operation, and both species are described as being common and secure. Therefore, operational residual impacts on migratory species are expected to be low to negligible.

### 8.8.1 Significant flora

Impacts to significant flora during operation could occur as a result of increased bicycle and pedestrian traffic within habitat that supports significant flora, particularly in the instance where poor hygiene practices and off-trail activities occur. There is also the potential for leaks, spills, litter or waste from trail users or from maintenance activities to negatively impact ecosystem health. Trail use and maintenance in proximity to waterways could also result in sedimentation or disrupt natural flow paths. To address potential impacts the following operational measures would be implemented:

- Weeds and pathogens would be managed through appropriate trail maintenance and use of hygiene practices (e.g. bike and equipment wash downs) and through monitoring and management actions in the project's Operations Environmental Management Plan (OEMP).
- Sediment control measures and trail drainage would be appropriately deployed and managed to minimise smothering of adjacent forest vegetation.
- Trail use guidelines and appropriate signage would be installed to minimise off-trail trampling of vegetation and significant plant species. Any additional significant plant species detected during pre-construction trail micro-siting would be incorporated in the operational trail management plan spatial dataset.
- Trail maintenance would be limited to the trail operational corridor (typically 0.6 metres to 1.2 metres wide by 2.5 metres high) and ongoing vegetation management activities would be limited to this envelope and adjacent trail drainage features. There may be the occasional need to undertake one-off works such as hazardous tree treatment, outside of this operational corridor and these activities would be done in consultation with the relevant land manager.
- Trail maintenance activities would be sympathetic towards retaining habitat and growing substrates such as tree ferns, logs and rocks in and adjacent to the trail operational corridor, where safe to do so.
- The project would support pest and animal monitoring and control programs conducted by public land managers that target deer.

Residual impacts to significant flora following the implementation of measures would relate to maintenance activities that could require pruning of significant small and medium shrub species, sedimentation smothering significant plant species, off-trail use resulting in plant trampling and damage or collection, habitat modification and plant mortality through weed and pathogen invasion, removal or damage to growing substrates for epiphytic ferns and cryptogams (e.g. tree fern trunks, rocks and logs) and increased browsing by deer moving along trails.

### 8.8.2 Native vegetation removal and habitat impacts

The operational trail corridor would be maintained to support the trail bench, typically 0.6 metres to 1.2 metres wide and an overhead height clearance of 2.5 metres. The remaining areas disturbed during construction would be rehabilitated and allowed to regenerate with native vegetation during the trail operational phase. This is the typical approach to track and trail construction in forested landscapes. Where trails remain open and functional, the operational footprint would be permanent in nature (i.e. corridor of understorey vegetation removal that is 1.2 metres wide by 2.5 metres high).

To address potential impacts the following operational measures would be implemented:

- Weeds and pathogens would be managed through appropriate trail maintenance and use of hygiene practices (e.g. bike and equipment wash downs) and through monitoring and management actions in the projects OEMP.
- Sediment control measures and trail drainage would be appropriately deployed and managed to minimise smothering of adjacent forest vegetation.
- Trail use guidelines and appropriate signage would be installed to minimise off-trail trampling of vegetation.
- Trail maintenance would be limited to the trail operational corridor (typically 0.6 metres to 1.2 metres wide by 2.5 metres high) and ongoing vegetation management activities would be limited to this envelope and adjacent trail drainage features. There may be the occasional need to undertake one-off works such as hazardous tree treatment, outside of this operational corridor and these activities would be done in consultation with the relevant land manager.

- The project would support pest animal control programs conducted by public land managers that target deer.

Residual impacts to native vegetation following the implementation of mitigations measures would related to maintenance activities that require pruning of vegetation, sedimentation smothering significant adjacent vegetation, off-trail use resulting in vegetation trampling, damage or collection, habitat/vegetation modification through weed and pathogen invasion and increased browsing of native vegetation by deer moving along trails.

### Cool Temperate Rainforest (CTR) / Cool Temperate Mixed Forest (CTMF)

The operation of mountain bike trails within CTR and CTMF communities could result in the introduction of weeds and pathogens as a result of poor hygiene practices. Trail use or maintenance activities could also inadvertently result in damage to Myrtle Beech trees. To address and minimise potential residual impacts the following measures would be applied:

- Weeds and pathogens would be managed through appropriate trail maintenance and use hygiene practices (e.g. bike and equipment wash downs) and through monitoring and management actions in the projects OEMP.
- Trail maintenance would be undertaken by hand in all rainforest areas to limit the potential for wounding of Myrtle Beech trees and subsequent Myrtle Wilt infection. Where maintenance activities inadvertently result in Myrtle Beech wounding, appropriate application of a fungicide would be undertaken and the wounded tree would be monitored. Although it is not possible to document every wounding event that may result from trail use, ongoing surveillance of Myrtle Beech trees for signs of infection during the operational phase of the project would also be applied.
- Ongoing monitoring for the presence of Myrtle Wilt would be undertaken in stands of Myrtle Beech through regular visual inspections. Where infected trees are detected actions would be implemented to manage and reduce the impact of Myrtle Wilt.

Residual impacts to CTR and CTMF following the implantation of measures would be by rainforest modification through weed and pathogen invasion and accidental vegetation damage during trail maintenance.

#### 8.8.3 Significant fauna

Impacts to significant fauna during operation could be a result of increased bicycle and pedestrian traffic within habitat that supports significant fauna, particularly in the instance where poor hygiene practices and off-trail activities occur. Operation of the trails could also result in disruption or damage to vegetation, altering a landscape that provides protection from predators. Additionally, noise and changes to air quality (i.e. dust) could result in the disturbances to fauna or degradation of fauna habitat. Noise and vibration impacts associated with project operation are discussed below.

To address potential impacts the following operational measures would be implemented:

- Trails in Yarra Ranges National Park and in areas of high quality forest habitat in Yarra State Forest would only operate during daylight hours to avoid disturbance to nocturnal forest species (e.g. owls, gliders).
- The project would support predator control programs conducted by public land managers that target foxes and cats.
- Weeds and pathogens would be managed through appropriate trail maintenance and use of hygiene practices (e.g. bike and equipment wash downs) and through monitoring and management actions in the projects OEMP.
- Trail maintenance would be limited to the trail operational corridor (typically 1.2 metres wide by 2.5 metres high) and would take place during daylight hours only. There may be the occasional need to undertake one-off works such as hazardous tree treatment, outside of this operational corridor and these activities would be done in consultation with the relevant land manager.
- If any treatment of large or hollow-bearing trees that are deemed hazardous is required during trail operation, this would be done in consultation with the land manager, an ecologist and arboricultural specialist.

Notable residual impacts from trail operation and maintenance following the implementation of measures could include disturbance of canopy and ground-dwelling fauna, increased localised predation events, habitat modification through weed and pathogen invasion, accidental habitat damage during trail maintenance and ongoing management of hollow-bearing trees adjacent to the trail network.

### Leadbeater's Possum

The operation of mountain bike trails within the Yarra Ranges National Park and in areas of potential habitat of the Yarra State Forest could disturb Leadbeater's Possum habitat or research sites and introduce weeds and pathogens into the habitat as a result of poor hygiene practices.

**Appendix E – Noise Technical Report in Technical Report C: Land use and planning** identified that vibration from trail operation is considered very low. Noise is likely to be generated from fixed equipment (such as bike wash stations) but this would be limited to locations where there are existing human noise sources. The noise technical report investigated noise generated by local existing trail use and the noise measurements found that mountain bike activities typically consisted of a series of short, intermittent noises that are above the ambient sound level. Noise during trail ascent was generally limited to trail users talking. Noise on the descent was higher than the ascent, and was composed of freewheeling, tyre noise and occasional skidding and voices. The highest measured noise levels were due to impact noise when bikes landed after jumps. Large events associated with the project also have the potential to generate additional noise and disturbance but the project would require an event management plan that considers noise sources prior to any events. In summary, noise from normal day to day trail use is likely to be insignificant as patrons would be spread around the network and not concentrated.

To address and minimise potential impacts the following measures would be applied:

- Trails in Yarra Ranges National Park and in areas of potential habitat in Yarra State Forest would only operate during daylight hours to avoid disturbance to the nocturnal activities of this species.
- Trails have been designed outside of research sites and translocation recipient areas to avoid operational interference with ongoing research and species recovery actions in the Mount Donna Buang area.
- The project would support predator control programs conducted by public land managers that target foxes and cats.
- Weeds and pathogens would be managed through appropriate trail maintenance and use of hygiene practices (e.g. bike and equipment wash downs) and through monitoring and management actions in the projects OEMP.
- Trail maintenance would be limited to the trail operational corridor (typically 0.6 metres to 1.2 metres wide by 2.5 metres high) and would take place during daylight hours only. There may be the occasional need to undertake one-off works, such as hazardous tree treatment, outside of this operational corridor and these activities would be done in consultation with the relevant land manager.
- If any treatment of large or hollow-bearing trees that are deemed hazardous is required during trail operation, this would be done in consultation with the land manager, an ecologist and arboricultural specialist.

Residual impacts to Leadbeater's Possum, following the implementation of measures would relate to disturbance of animals, disruption to research and translocation programs/locations, increased localised predation events, habitat modification through weed and pathogen invasion, accidental habitat damage during trail maintenance and ongoing management of hollow-bearing trees adjacent to the trail network.

#### 8.8.3.1 Aquatic fauna

Operational activities such as the use of mountain bike trails in proximity to waterways could result in downstream sedimentation, particularly in the case where mountain bikers deviate off-trail. Increased sedimentation in waterways would impact the quality of aquatic ecosystems. There is also the potential for leaks, spills, litter or waste from trail users or from maintenance activities to negatively impact ecosystem health.

To address impacts the following operational measures would be implemented:

- Elevated structures, bridges and rock armouring to be constructed across waterways, watercourses or in wet areas would be regularly maintained to ensure they continue to function and protect waterways and limit the risk of sedimentation downstream into aquatic habitats.
- No chemicals or pollutants would be used for trail maintenance in or near waterways and watercourses.
- Trail use guidelines and appropriate signage would be installed to minimise off-trail trampling in waterways, watercourses and disturbance to riparian habitats.
- Trails would be seasonally closed in wet and cold months in the Yarra Ranges National Park, and after extreme rainfall events, to minimise the risk of sedimentation events.
- Sediment control measures and trail drainage would be appropriately deployed and managed to minimise downstream sedimentation.

Residual impacts from trail operation and maintenance following the implementation of measures relate to sediment movement downslope into local waterways, contamination of waterways through use of chemical or pollutants, inadvertent disturbance to habitat for burrowing crayfish and trail user access to/disturbance of waterways and riparian vegetation.

### Mount Donna Buang Wingless Stonefly

Operational activities such as the use of mountain bike trails in proximity to waterways could result in downstream sedimentation, particularly in the case where mountain bikers deviate off-trail. Increased sedimentation in waterways/watercourses would impact the quality of the Mount Donna Buang Wingless Stonefly habitat. To address and minimise potential impacts the following measures would be applied:

- Elevated structures to be constructed in headwater habitats would be regularly maintained to ensure they continue to function and protect porous soils from compaction limiting the risk of sedimentation downstream into stonefly habitat.
- No chemicals or pollutants would be used for trail maintenance in areas of known stonefly habitat.
- Trail use guidelines and appropriate signage would be installed to minimise off-trail trampling, especially in stonefly habitat.
- Trails would be seasonally closed in wet and cold months in the Yarra Ranges National Park, and after extreme rainfall events, to minimise the risk of sedimentation events. These closures would generally align with other seasonal track and trail closures implemented by public land managers.
- Sediment control measures and trail drainage would be appropriately deployed and managed in the catchments of stonefly habitat to minimise downstream sedimentation.
- Where appropriate, support would be provided to ongoing monitoring and research for this species on the basis that new populations have been discovered between Mount Donna Buang and Mount Victoria as part of surveys undertaken for the project.

Residual impacts to Mount Donna Buang Wingless Stonefly following the implementation of measures could include sediment movement downslope into headwater soaks, springs and trickles, contamination of waterways through use of chemical or pollutants, inadvertent disturbance to habitat through off trail trampling and soil disturbance and increased traffic on the unsealed sections of Donna Buang Road leading to increased downstream sedimentation.



## 8.9 Cumulative impact assessment

The cumulative impacts resulting from the project can be considered at two scales. One scale relates to other planned major projects (as discussed in Section 8.9.1) and the other scale relates to activities that drive threatening processes which result in negative impacts on biodiversity values (as discussed in Section 8.9.2).

When defining the region and nearby projects or actions for the purpose of a biodiversity values cumulative impact assessment we have considered the following:

- Other large projects where significant areas of native vegetation removal would occur (e.g. greater than 10 hectares) or potentially significant impacts to threatened biota impacts would occur, and
- Projects that are subject to an approvals process and have impact assessment information available in the public domain, and
- Projects proposed in the Yarra Ranges National Park or Yarra State Forest or directly adjacent forested public land.

The scale of cumulative impact related to existing activities and threats is best described as 'consequential cumulative effect on the local landscape and biota' and is not a related project-based cumulative impact assessment in the traditional sense. There is no documented framework for consequential cumulative effect assessments with EES guidelines and therefore we have approached this assessment on the following basis:

- Identifying FFG Act and EPBC Act listed potentially threatening processes that operate in the local landscape. The reasons for using threatening processes as a basis for identifying cumulative effects is that these processes that may threaten the survival, abundance or evolutionary development of a native species or ecological community can usually be linked to land use activities operating in a particular area or local environmental conditions. These processes are also formally recognised and have been evaluated by Scientific Advisory Panels at various levels of government giving them some level of rigour.
- Reviewing the activities associated with the construction and operation of the project (e.g. risk pathways and likely modes of impact) and then summarising how these project activities would increase the effect of existing activities that drive threatening processes.
- Proposing avoid, minimise, mitigation and monitoring options to address construction and operation activities and hence address the risk of exacerbating existing threatening processes.

### 8.9.1 Other nearby projects

The potential for cumulative impacts is typically addressed through the impact assessment undertaken for each technical assessment where relevant. The Warburton Water World, which opened in 2020 has been identified as a project with the potential for cumulative impacts because it is an attractor of traffic to Warburton. Accordingly, the cumulative traffic impacts have been assessed and the findings are presented in **Technical Report F: Transport**. Cumulative biodiversity impacts from that project are considered negligible. No other major projects that fit the criteria used for biodiversity values have been identified where there is potential for impacts to overlap temporally and spatially with the Warburton Mountain Bike Destination. Accordingly, no other cumulative impacts with other projects are anticipated.

### 8.9.2 Cumulative biodiversity effects related to existing activities and threats

In assessing the local cumulative effects and how this project may contribute to or exacerbate existing threatening processes, the integrity and intactness of the local ecosystems, the types of historical and existing land uses that have contributed to the threatening processes and the likely effects of the project's construction and operation have been considered.

The project area is in a forested landscape that has been subject to various forestry, mining, recreation, altered fire regimes and agricultural land uses over the last 150 years. The landscape is

#### What are cumulative impacts?

Cumulative impacts refer to the situation where a project, in combination with one or more other proposed projects, or existing activities in an area, may have an overall significant effect on the same environmental asset. Where other major projects are occurring or proposed within the same geographical region and over a comparable time period, there is potential that the impacts of the project could be compounded.

also subject to existing pest plant and animal and pathogen invasion as a result of these land uses. The Yarra Ranges National Park and Melbourne Water catchment areas have not been subject to recent forestry, fire or mining activities but the influence of recreation land uses is ongoing in these areas including roads, walking tracks, snow play areas, pest animal proliferation (particularly Sambar Deer), resource extraction (spring water removal) and illegal firewood collection. The State Forest areas and small areas of private land have been subject to more recent and intensive forestry, regular planned burning, firewood removal, farming activities and un-regulated recreational activities such as four-wheel driving.

The project would involve creating an extensive narrow trail network through a mountainous forested landscape that would result in soil disturbance, waterway crossings and removal of native understorey vegetation. Locations for vehicle access and large congregations of trail users would be restricted to sites that are already highly disturbed and already experience significant visitation and human presence (e.g. Mount Donna Buang summit, Warburton Golf Course and Wesburn Park). There would also be discrete trail head and access areas where minor works and vegetation removal will be required (e.g. Mount Tugwell trail head and Yarra River bridge crossing). Existing access roads would be used for all access to the trail network by shuttle services or private vehicles. These include regularly used main roads and forest (unsealed) tracks such as Donna Buang Road, Dee Road, Mount Bride Road, Old Warburton Road and Edwardstown Road. In this context regular human presence and activities are already apparent across significant parts of the project area.

There is no baseline quantitative information available from Parks Victoria on the influence of historical land uses and current biodiversity-related impacts from visitation to the Yarra Ranges National Park. It can be inferred that areas between the Warburton Township and the summit of Mount Donna Buang received considerable summer and winter visitation and human presence, particularly vehicle traffic along sealed main roads, visitors to the summit precinct (including formal and informal tracks, huts and amenities), visitors and walkers at the Rainforest Gallery near Cement Creek, and walkers up and down the Mount Victoria trail. Areas to the west of Mount Donna Buang summit including the Melbourne Water catchment, the gravel section of the Donna Buang Road to Healesville and the Ben Cairn walking track are likely to experience lower visitation and human presence due to the unsealed road and more remote location from amenities.

For the Yarra State Forest section of the project area, there is also a lack of specific quantitative information available about the impacts of historical and current land uses on biodiversity values from DELWP as the primary land manager. It can be implied from reviewing land use mapping (e.g. fire and forestry history) and field observations that the State Forest areas have been subject to more intensive and recent disturbance and fragmentation, and are therefore less susceptible to the cumulative impacts of increased forest recreation activities and the attendant threatening processes. Examples of this include the large areas of post logging Mountain Ash regrowth near Mount Bride which has an extensive track and trail network and few hollow-bearing trees, the regularly burnt lower slopes of the Yarra State Forest along the Old Warburton Road where understorey vegetation is a mono-culture of fire-tolerant native shrubs, and the networks of poorly maintained and highly eroded 4WD and recreational trails, including Cemetery Track, south of Edwardstown Road within the Yarra State Forest. Cemetery track is currently extensively damaged by recreational vehicle use, causing significant environmental impact and making it impassable to DELWP management vehicles. The mountain bike trail construction on this section would address significant erosion issues and provide for land manager access.

Consequential cumulative effects of the project relate to increased disturbance and human presence in the Yarra Ranges National Park, adjacent Melbourne Water catchment and more remote sections of the Yarra State Forest during the construction and operational phase of the project. The trail network would cause disturbance to the forest soil and understorey vegetation but this is considered unlikely to pose a significant physical or functional barrier to important threatened forest fauna or to the lifecycle of understorey vegetation (e.g. pollination, seed dispersal, recruitment). The most notable potential cumulative effects are associated with introducing or facilitating the spread of pests and pathogens (weeds, deer and Myrtle Wilt), increased disturbance and mortality to wildlife (e.g. noise and vehicle collisions), localised changes to sedimentation of forest vegetation and waterways and increased waste and litter. A detailed assessment of existing land uses / activities that contribute to these threatening processes and the project related activities that could potentially exacerbate the threatening process are included in **Technical Report A: Biodiversity and habitats**. The cumulative effects of the 2019-20 bushfires across south-eastern Australia on key nationally threatened species has been considered in Appendix 7 of **Technical Report A: Biodiversity and habitats** and **Chapter**

**14: Matters of National Environmental Significance.** The project is not considered to compound the impacts of recent bushfires on key nationally threatened species.

## 8.10 Assessment of alternative to Trail 1

The assessment and comparison of Trail 1 and the alternative to Trail 1 (Trails 45, 46 and 47) is based on the existing conditions information provided in Section 8.6. The comparison is based on the residual impact of these options assuming effective implementation of the proposed mitigation and contingency measures outlined in Section 8.10. An overall comparative assessment of Trail 1 and the alternative covering all specialist topics is presented in **Chapter 15: Comparative evaluation of Trails 1 and Trails 45 to 47**.

The alternative alignments were investigated in the field in December 2020 with TRG representatives from DELWP, PV and species experts. These alignments were then subject to detailed ecological investigations in February 2021. The comparison of Trail 1 with alternatives is based on the residual impact of these options assuming effective implementation of the proposed mitigation and contingency measures outlined in Section 8.11.

Impacts outlined in the assessment of alternative alignments are based on key ecological values which are consistent across both alignments (i.e. there are no new key values associated with the alternative alignments). These include:

- Trail length within the Yarra Ranges National Park as a surrogate for the most sensitive land tenure in the project area.
- Magnitude and extent of native vegetation removal including consideration of VQA scores (i.e. vegetation quality).
- Effects on Cool Temperate Rainforest and/or Cool Temperate Mixed Forest FFG Act listed communities.
- Likelihood of a significant effect or significant impact on endangered or critically endangered species (e.g. Leadbeater's Possum, Mount Donna Buang Wingless Stonefly).

The assessment of Trail 1 and alternative alignments is summarised in Table 8-15. Considering the comparison of impacts in this table, the alternative alignments would have less impact on the national park in terms of trail length, they would require less native vegetation removal and would have substantially less impact on CTR and CTMF threatened communities. Impacts on threatened species are likely to be comparable, however the alternative alignments are not in proximity to dense montane thicket habitat or translocation recipient sites for Leadbeater's Possum.

**Table 8-15 Comparison of impacts between Trail 1 and alternatives to Trail 1**

Impact on value	Trail 1	Alternative to Trail 1 - Trails 45, 46 & 47	Conclusion
Trail length within Yarra Ranges National Park	18.215 km (the remaining 4.325 km of this trail is in State Forest or private land)	15.188 km (0.493 km is in the RDZ along Donna Buang Road with the National Park)	There is 2.327 km less trail in the National Park for the alternative.
Vegetation condition	Total vegetation removal is 4.855 ha as per the condition class break down below:  <u>0.164</u> ha of vegetation removal with a VQA score of $\leq 0.6$ .  <u>2.663</u> ha of vegetation removal with a VQA score of $>0.6$ and $\leq 0.85$ .  <u>2.027</u> ha of vegetation removal with a VQA score of $>0.85$ .	Total vegetation removal is 3.562 ha as per the condition class break down below:  Trail 45 = <u>0.578</u> ha of vegetation removal with a VQA score of $>0.6$ and $\leq 0.85$ & <u>0.341</u> ha of vegetation removal with a VQA score of $>0.85$  Trail 46 = <u>0.781</u> ha of vegetation removal with a VQA score of $>0.6$ and $\leq 0.85$ & <u>0.431</u> ha of	There is less requirement for native vegetation removal for the alternative.

		<p>vegetation removal with a VQA score of &gt;0.85</p> <p>Trail 47 = <u>0.566</u> ha of vegetation removal with a VQA score of &gt;0.6 and &lt;=0.85 &amp; <u>0.864</u> ha of vegetation removal with a VQA score of &gt;0.85</p>	
Threatened ecological communities	<p>1.870 km intersects pure Cool Temperate Rainforest</p> <p>4.572 km intersected Cool Temperate Mixed Forest</p>	<p>0.616 km intersects pure Cool Temperate Rainforest</p> <p>2.435 km intersected Cool Temperate Mixed Forest</p>	<p>The alternative alignment has less than half the impact of Trail 1 on Cool Temperate Rainforest</p> <p>The alternative alignment has approximately half the impact of Trail 1 on Cool Temperate Mixed Forest</p>
Key threatened species	<p>Dense montane thicket Leadbeater's Possum habitat and translocation sites intersected by the pre-July 2021 alignment – new alignment of Trail 1 from July 2021 would avoid these sites between Donna Buang Summit and Ben Cairn (very minor pruning of thicket species below Ben Cairn would be required).</p> <p>Mount Donna Buang Wingless Stonefly occurs in headwaters of tributaries that are issued from the ridges and slopes between Donna Buang summit and Ben Cairn.</p> <p>Tree Geebung occurs at montane elevations between Donna Buang Summit and Ben Cairn</p> <p>Records of Southern Greater Glider occur in proximity to Trail 1</p>	<p>Dense montane thicket Leadbeater's Possum habitat and translocation sites are avoided by the alternative trails, scattered areas of open thicket and associated thicket species occur near sections of Trails 45 and 46 (very minor pruning of thicket species may be required for the alternatives).</p> <p>Mount Donna Buang Wingless Stonefly was recently confirmed in headwaters of tributaries that are issued from the ridges and slopes between Donna Buang summit and Mount Victoria (Ythan Creek and Cement Creek).</p> <p>Tree Geebung occurs at montane elevations between Donna Buang Summit and Mount Victoria.</p> <p>Records of Southern Greater Glider occur in proximity to the alternative trail alignments.</p>	<p>There is likely to be a comparable level of impact on threatened species habitat between Trail 1 and the alternative alignments, however Trail 1 would come in closer proximity to Leadbeater's Possum translocation sites between Mount Donna Buang Summit and Ben Cairn.</p> <p>Construction phase noise has the potential to disturb Leadbeater's Possums during daytime denning in nest boxes and natural tree hollows. Where construction is occurring in proximity to Leadbeater's Possum translocation sites, it is proposed that trail would be hand built so that the construction noise profile would be lower. Trail building would occur during daylight hours to avoid disturbance to nocturnal activities.</p>

## 8.11 Summary of mitigation and contingency measures

Table 8-16 outlines the mitigation measures developed to avoid and minimise biodiversity and habitat impacts of the project. The focus of these mitigation measures is firstly avoiding impacts where possible, and secondly, developing, preparing and implementing project-specific measures to achieve acceptable biodiversity and habitat outcomes. Adopted mitigation measures are included in the project CEMP and OEMP. The plans are the primary mechanisms for environmental management during construction and operation and should be referred to for additional information regarding management (i.e. micro-siting procedures and environmental auditing and verification procedures).

**Table 8-16 Proposed mitigation measures**

Mitigation measure ID	Mitigation measure	Stage
<b>BM01</b>	CEMP / OEMP to include independent auditing of trail construction and operation against environmental objectives and approval conditions. Independent auditor should have power to stop work / use of trails should project be non-compliant. A suitably qualified ecologist/botanist to be present during micro-siting and construction activities in sensitive areas.	Construction & Operation
<b>BM02</b>	All trail alignments and all known site-specific environmental issues would be incorporated into the WorldTrail GIS platform which would be accessible by construction crew on-site at all times.	Construction & Operation
<b>BM03</b>	CEMP / OEMP would include procedures for flagging of the final trail alignment and demarcating environmental values to be avoided e.g. 'no-go zones' during works. Biodegradable tape would be preferentially used with any other non-biodegradable markers removed from site.	Construction & Operation
<b>BM04</b>	CEMP / OEMP would set out the key requirements and processes for the project with regards to the management of potential impacts to biodiversity values. The CEMP / OEMP would include monitoring, reporting, auditing and complaint management processes.	Construction & Operation
<b>BM05</b>	Minimise use / removal of natural materials such as rocks, woody debris, fallen timber, organic litter during construction, operation and maintenance of trail. Any material removed must be retained on-site nearby.	Construction & Operation
<b>BM06</b>	Implement standard CEMP / OEMP controls for chemicals (inc. fungicides), fuel and waste management including procedures for spill containment and clean-up as per SWM10	Construction & Operation
<b>BM07</b>	Compulsory in-person environmental induction and assessment for construction and operations phase workers. Induction to cover all biodiversity values present in the project area. Details to be provided in CEMP / OEMP. An environmental advisor with appropriate ecological qualifications would be appointed to assist with inductions and to provide ecological advice throughout the course of the project.	Construction & Operation
<b>BM08</b>	An Emergency Management Plan would be implemented as part of the CEMP / OEMP. The plan would include measures to manage fire risk from project activities including compliance with any requirements under the Forests Act (Fire Protection Regulations) 2014 for construction and operational activities in Fire Protected Areas.	Construction & Operation

Mitigation measure ID	Mitigation measure	Stage
BM09	<p>Adequately manage all construction and operation activities to maintain landform stability and avoid / minimise landslips and erosion and sedimentation. This includes:</p> <ul style="list-style-type: none"> <li>- Seasonal closure of selected trails,</li> <li>- Incorporate management measures outlined in <b>Technical Report B: Surface water, groundwater and geotechnical hazards</b> e.g. GTM01, GTM02 &amp; GMT03,</li> <li>- Rock armoured surfaces to be constructed on steep gradients to minimise erosion as per GTR03</li> <li>- Rock walls and / or retaining walls constructed from local rock from constructed areas where possible to stabilise steep slopes and batters (rock is not to be collected from surrounding areas),</li> <li>- If a retaining wall is required in a remote location, it would be brought in by helicopter where necessary to avoid surface impacts beyond the trail impact area,</li> <li>- Remediation of areas where landslips and / or erosion and sedimentation occur as a result of the trail.</li> </ul>	Construction & Operation
BM10	Full time maintenance workers would maintain the trails to ensure they remain in good condition. Trail maintenance would continue for the entire life of the project i.e. as long as the trails remain in use. Details of the maintenance program outlined in the OEMP.	Operation
BM11	Existing vehicle roads and tracks e.g. Cemetery Track to be incorporated into the trail network. Upgrades associated with incorporating these tracks would reduce existing erosion and sedimentation issues.	Construction & Operation
BM12	Existing mountain bike trails in the vicinity of Mount Tugwell would be incorporated into the trail network. Upgrades associated with incorporating these trails would reduce existing erosion and sedimentation issues.	Construction & Operation
BM13	Trail closure during periods of extreme weather as per SWM15 of <b>Technical Report B: Surface water, groundwater and geotechnical hazards</b> and in accordance with the Emergency Management Plan and any additional directions required under the Forests Act.	Construction & Operation
BM14	Pre-construction trail micro-siting in accordance with the existing contours, to make the most of the existing terrain and minimise the need for significant excavation or soil disturbance.	Construction
BM15	Regular trail inspections undertaken to identify any problems or changes to the trails that need to be repaired. This includes after extreme weather events. Details to be outlined in the OEMP.	Operation
BM16	<p>Develop and integrate a procedure to document and deal with finds into the CEMP / OEMP. Procedure would encompass:</p> <ol style="list-style-type: none"> <li>1) Significant flora observations,</li> <li>2) Significant fauna observations,</li> <li>3) Discovery of nests / burrows / roosts used by native fauna,</li> <li>4) Dealing with injured / killed / displaced / trapped fauna,</li> <li>5) Works that encounter GDEs, seeps / springs and associated vegetation communities / species.</li> </ol> <p>Observations of the above would be entered into the GIS platform and records of significant flora, significant fauna and threatened ecological communities would be periodically uploaded to the VBA. Where there is potential for harm of threatened species, works would be stopped until the risk of harm has been removed</p>	Construction & Operation
BM17	Native vegetation allowed / assisted to regenerate within construction footprint to a 30 to 60 centimetre wide tread width.	Construction & Operation
BM18	OEMP would include monitoring for any off-trail tracks and process for closing unauthorised trails and assisted regeneration.	Operation

Mitigation measure ID	Mitigation measure	Stage
BM19	Removal of vegetation would be to the minimum extent required, according to variable trail construction footprint which is a function of slope class. Accidental / excessive clearing would be remediated through assisted regeneration or additional offsets.	Construction & Operation
BM20	The project would work with relevant land managers to support existing pest animal programs. Support would be provided for the entire life of the project i.e. as long as the trails remain in use.	Construction & Operation
BM21	The project would conduct environmental enhancement works such as species monitoring programs and installation of nesting boxes for significant fauna.	Operation
BM22	A comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers and would continue for as long as the trails remain in use.	Construction & Operation
BM23	Construction and operation phase staff trained as part of site induction to identify high threat environmental weeds within the project area and to implement procedures to minimise risk of spread. Training would include distribution of fact sheets, Yarra Ranges Weed ID guide and CaLP Act obligations.	Construction & Operation
BM24	Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens (including Myrtle Wilt) wherever possible. In high risk areas a suitably qualified ecologist would accompany trail crew to identify weed species and key areas to avoid. High risk areas would be mapped prior to construction.	Construction & Operation
BM25	CEMP / OEMP to include appropriate hygiene procedures for weeds / pathogens throughout the trail alignment.	Construction & Operation
BM26	Construction and operation phase staff trained as part of site induction to identify signs of plant pathogens e.g. Myrtle Wilt, understand conditions that can cause spread and to implement procedures to minimise risk of spread.	Construction & Operation
BM27	OEMP to include commissioning & maintenance schedule and procedures for bike washing facilities as per SWM14. These facilities would be maintained for the entire life of the project i.e. as long as the trails remain in use.	Operation
BM28	Any fill material introduced to the National Park must be certified clean and be weed and pathogen free and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Any fill material introduced to the Yarra State Forest would be undertaken according to DELWP FFM procedures and exhibit similar properties to local natural soils e.g. pH, drainage, texture. Fill areas should be monitored for germination of weeds.	Construction & Operation
BM29	Minimise the introduction of fill material for the construction and ongoing management of the trail.	Construction & Operation
BM30	Construction and operation phase staff trained as part of site induction to identify pest animals and signs of their presence to inform pest management program e.g. locating traps near feral cat sightings. This data would be recorded in the GIS platform for the project.	Construction & Operation
BM31	All waterway crossings are to be elevated by installing small bridges on raised pedestals either side of the waterway. All other watercourse crossings would involve bridges, boardwalks or rock armouring where deemed appropriate as per <b>Technical Report B: Surface water, groundwater and geotechnical hazards</b> . These structures would ensure that any water and sediments are absorbed along the trail edge and not draining into the watercourse.	Construction
BM32	Trail micro-siting to identify narrowest practicable crossing location where watercourse crossing required as per SWM01.	Construction

Mitigation measure ID	Mitigation measure	Stage
BM33	Construction of all watercourse crossings, whether permanent waterways or intermittent, must follow Melbourne Water requirements for works on waterways & crossings and is to be supervised and certified by a suitably qualified person.	Construction
BM34	All watercourse crossings must be inspected and maintained by a suitably qualified person as per GTM05.	Operation
BM35	All watercourses are designated no-go zones during construction and operations unless works are required directly in / adjacent to watercourse.	Construction & Operation
BM36	No instream works within Yarra River to minimise disturbance and alterations to existing conditions.	Construction & Operation
BM37	Works in proximity to watercourses should not occur during wet months (e.g. June – September) unless conditions are such that land degradation and surface water management problems can be avoided or appropriate mitigation measures implemented. Where practicable, all watercourse crossings should be constructed during no or low flow conditions.	Construction & Operation
BM38	Micro-siting to avoid areas of wet or boggy ground, including areas where vegetation changes suggest such conditions may be present (i.e. thickets, sedges, rushes, mosses etc.)	Construction
BM39	Where wet or boggy ground is present and unavoidable, use suitable rock armouring to harden and reinforce the trail or elevate trail using boardwalk or another appropriate engineered/design solution.	Construction
BM40	Trail micro-siting in consultation with a suitably qualified ecologist to avoid where possible and minimise the final trail alignment through CTR / CTMF and avoid areas showing signs of Myrtle Wilt.	Construction
BM41	Micro-siting to avoid areas showing signs of Myrtle Wilt as per micro-siting protocol outlined in CEMP.	Construction
BM42	Where areas containing Myrtle Beech cannot be avoided, minimise disturbance within the drip line of all Myrtle Beech trees using a design/engineered solution.	Construction & Operation
BM43	Where pruning or wounding of Myrtle Beech trees and / or roots is likely to occur trail crews would be trained in pruning methods and application of anti-fungal agents to prevent the spread of Myrtle Wilt.	Construction & Operation
BM44	No imported fill material (including gravel, rock and soil) is to be used within CTR / CTMF.	Construction & Operation
BM45	Construction and operation phase staff trained as part of site induction to identify Myrtle Beech, CTR and CTMF.	Construction & Operation
BM46	No machinery excavation is to be undertaken within CTR / CTMF to minimise changes to existing ground surface gradients. Where soils are damp and boggy, trail must be elevated using boardwalk or another appropriate engineered/design solution.	Construction & Operation
BM47	Trail construction and maintenance is to be undertaken using hand tools only within CTR / CTMF.	Construction & Operation
BM48	Micro-site to avoid the drip line of Myrtle Beech including scattered individuals outside of mapped CTR / CTMF.	Construction
BM49	Implement measures outlined in GWM01 to manage potential impacts to GDEs / seeps / springs.	Construction & Operation
BM50	Construction and operation phase staff trained as part of site induction to identify GDEs, seeps / springs and associated vegetation communities / species.	Construction & Operation
BM51	Construction and operation phase staff trained as part of site induction to identify high quality LBP habitat indicators. Training would include distribution of fact sheets including notes and photos.	Construction & Operation



Mitigation measure ID	Mitigation measure	Stage
BM52	Removal of vegetation within suitable Leadbeater's Possum habitat would be subject to the following constraints: 1) In the National Park no removal of trees, including mid-storey trees, with > 10 cm DBH, 2) In State Forest where there is a stand of single age <i>Eucalyptus</i> sp. and mid-storey (i.e. regrowth following bushfire), trees < 20 cm DBH may be removed, 3) No removal of dense stands of montane thickets (comprising Bottlebrush <i>Callistemon</i> spp. and / or Tea-tree <i>Leptospermum</i> spp.) anywhere in the project area. Minor pruning of these species may occur at the edges of these thickets.	Construction & Operation
BM53	Supervision and guidance by a suitably qualified ecologist would be provided during the construction phase within LBP habitat to identify any additional potential LBP habitat and assist with micro-siting.	Construction
BM54	Micro-siting to align trail as close as possible to the verge of Mount Donna Buang Road as per SWM01 within potential range of Mount Donna Buang Wingless Stonefly.	Construction
BM55	Construction of the trails within potential range of Mount Donna Buang Wingless Stonefly is to be undertaken between December and February to avoid disruption to critical life cycle stages.	Construction
BM56	Any work within the potential range of the species must minimise habitat disturbance e.g. soil compaction and sedimentation by elevating the trail to cross waterways, bogs, damp areas or seasonal drainage lines within the mapped suitable habitat zone. Any elevated trail must be constructed to maintain natural light levels.	Construction & Operation
BM57	Construction and operation of the trails within potential range of Mount Donna Buang Wingless Stonefly would be managed to decrease sediment from Mount Donna-Buang Road or surrounds flowing into the adjacent springs downstream of the road as per SWM07.	Construction & Operation
BM58	Minimise sedimentation into permanent or ephemeral waterbodies within potential range of the species through appropriate procedures for erosion and sedimentation in CEMP / OEMP as per SWM02.	Construction & Operation
BM59	Within potential range of Mount Donna Buang Wingless Stonefly, minimise pollution from trail construction that can soak into soil, through implementing appropriate procedures for leaks / spills in CEMP / OEMP as per SWM02 & SWM10.	Construction & Operation
BM60	Ensure trail construction and or use does not interrupt flow rate of ground water within or upslope of potential range of the Mount Donna Buang Wingless Stonefly. .	Construction & Operation
BM61	Construction and operation phase staff trained as part of site induction to identify Mount Donna Buang Wingless Stonefly habitat indicators. Training would include distribution of fact sheets including notes and photos.	Construction & Operation
BM62	No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with land manager, arborist & ecologist e.g. habitat pruning of tree. Any hazardous tree considered for removal would be assumed to be a habitat tree unless deemed otherwise.	Construction & Operation
BM63	CEMP / OEMP to include procedures for minimal disturbance to suitable habitat for epiphytic / lithophytic species e.g. avoid use of boulders covered with bryophytes and / or ferns.	Construction & Operation
BM64	Construction and operation phase staff informed as part of site induction regarding potential presence of significant flora species (including epiphytic / lithophytic species) in order to minimise risk of damage to species or suitable habitat.	Construction & Operation

Mitigation measure ID	Mitigation measure	Stage
BM65	Construction and operation phase staff trained as part of site induction to identify any additional high risk habitats for rare or threatened flora e.g. wet gullies, rainforests, etc. Training would include distribution of fact sheets including notes and photos.	Construction & Operation
BM66	Micro-siting of the final trail alignment in high risk areas to avoid significant flora in consultation with a suitably qualified ecologist on-site during a seasonally appropriate period for the target species. High risk areas would be identified through mapping.	Construction
BM67	Native vegetation (trees including mid-storey species) removal is subject to the following constraints: 1) No trees (including mid-storey trees) with DBH > 10 centimetres are to be removed in the National Park (unless condition 3) applies). 2) Within State Forest trees < 20 centimetres DBH in single age stands of <i>Eucalyptus</i> spp. and mid-storey (i.e. regrowth following bushfire) may be removed. 3) Excluding areas of suitable habitat for Leadbeater's Possum, any small dead trees (< 20 centimetres DBH) within 2 metres of the trail may require removal if significant defects are identified. Such trees would be felled and kept nearby as habitat logs (coarse woody debris).	Construction & Operation
BM68	Construction and operation phase staff trained as part of site induction in tree protection methods, SRZ and root protection methods and identification of hazardous trees.	Construction & Operation
BM69	Minimise impacts to trees through micro-siting and adequate implementation of sympathetic mitigation measures.	Construction & Operation
BM70	CEMP / OEMP to include procedure to capture relevant data where direct tree impacts are possible, where tree root protection is required, or where hazardous tree removal or excessive pruning is required.	Construction & Operation
BM71	Trail micro-siting to avoid existing stands of dense vegetation, particularly mid-storey vegetation between 1 to 5 metres in height, wherever possible.	Construction
BM72	All large hollow-bearing canopy trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.	Construction & Operation
BM73	No construction activities at night. No use of trail infrastructure in the National Park at night. Night riding allowed for selected trails within the Yarra State Park.	Construction & Operation
BM74	Where appropriate and where high risk areas are identified, under the supervision of a qualified ecologist, microsite final trail alignment to avoid, minimise and appropriately buffer any burrows / nests / roosting sites for native fauna identified during construction activities. This includes, but is not limited to: 1) Lyrebird display mounds, 2) Forest owl nesting or roosting sites, 3) Platypus burrows, 4) Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish burrows, 5) Ground-dwelling native fauna burrows e.g. wombat, 6) Rocky outcrops with cracks and crevices, 7) Research sites e.g. LBP monitoring plots. Any burrows / nests / roosting sites for native fauna would be mapped to GIS platform as per finds procedure outlined in BM16.	Construction
BM75	Construction or maintenance activities, particularly in proximity to the Yarra River or sensitive areas within Yarra Ranges National Park, to use slow-start construction measures to enable both aquatic and terrestrial fauna time to disperse.	Construction & Operation

Mitigation measure ID	Mitigation measure	Stage
BM76	CEMP / OEMP to include procedure for fauna entrapment. Any structures that could trap fauna must be covered, checked and an egress point provided.	Construction & Operation
BM77	Management of potential impacts from noise, vibrations and air quality as outlined in NM01 to NM06 and AM01 to AM07. In addition to these measures, project activities should minimise amount of equipment / machinery in use at any one time to reduce intensity of noise, vibrations and / or reduced air quality.	Construction & Operation
BM78	Construction and operation phase staff trained as part of site induction to identify signs of native fauna habitation including, but not limited to: 1) Lyrebird display mounds, 2) Roosting or nesting sites for forest owls, 3) Platypus burrows, 4) Habitat indicators for Curve-tail Burrowing Crayfish and Tubercle Burrowing Crayfish, 5) Burrows used by ground-dwelling fauna e.g. wombats. Training would include distribution of fact sheets including notes and photos.	Construction & Operation

### 8.11.1 Monitoring and contingency measures

Adverse residual impacts on biodiversity values requiring further management would be assessed as they occur and responses tailored to address each issue. Assessment and management of any unexpected impacts would be conducted in accordance with relevant legislation, regulations, policies and guidelines. Details of the environmental objectives, approval conditions and auditing requirements would be established through the environmental management framework and approvals process. These processes would be conveyed through to the CEMP and OEMP.

The majority of the biodiversity mitigation measures are standard measures that have been used on other trail projects with reliable outcomes. Where there was sufficient uncertainty in the effectiveness of existing measures, additional measures were recommended to reduce this uncertainty. Some of the key areas of uncertainty include:

- **Loss / damage to vegetation outside impact area** - this is primarily addressed through BM03, BM05, BM19, BM67 and BM69 which cover flagging the final trail alignment and 'no-go zones', minimising disturbance to natural materials, minimising native vegetation removal, constraints on native tree removal and implementation of sympathetic mitigation measures outlined in Treelogic (2021) respectively. However to further reduce uncertainty the CEMP / OEMP would also include BM18 which specifies monitoring for any off-trail tracks and process for closing unauthorised trails and rehabilitation where appropriate.
- **Erosion and sedimentation** - a range of standard measures e.g. BM09, BM31, BM58, BM59 have been proposed to minimise erosion and sedimentation particularly within the potential range of Mount Donna Buang Wingless Stonefly. However BM10, BM15, BM34 and BM37 which focus on inspections and maintenance are also included as contingency measures predominantly to adequately manage the aftermath of high flow events.
- **Significant flora** - impacts to significant flora would primarily be avoided through BM63 - CEMP / OEMP to include procedures for minimal disturbance to suitable habitat for epiphytic / lithophytic species, and BM65 - Micro-siting of the final trail alignment in high risk areas to avoid significant flora in consultation with a suitably qualified ecologist on-site during a seasonally appropriate period for the target species. However, the mitigation and contingency measures also include BM64 and BM65 which focus on developing contractor awareness regarding high risk habitat for significant flora as a secondary mitigation layer plus BM16 which integrates a procedure to document finds into the CEMP / OEMP.

## 8.12 Conclusion

The biodiversity and habitat assessment has shown that construction and operation of the project could be managed such that the objective to avoid, or minimise where avoidance is not possible, adverse effects on biodiversity and habitat could be achieved. Biodiversity impacts to trail heads and other associated infrastructure are not anticipated to occur during construction or operation as detailed in **Attachment II: Alternatives Assessment Report**.

During the design process of the project, considerable effort was applied to avoiding and minimising the likely magnitude, extent and duration of trail network construction and operation impacts. A particular focus was placed on trail alignments and design responses that would avoid a significant impact on EPBC Act listed threatened species and to reduce potential significant effects on state significant biota. Principles that have been applied to minimise the impact on biodiversity and habitat values include the use of elevated structures, siting of trail to avoid the extent possible of high ecological value areas and realignment of trails accordingly (i.e. realignment of Trail 1 to avoid direct impacts to Leadbeater's Possum habitat).

An assessment and comparison of Trail 1 and the alternative to Trail 1 (Trails 45, 46 and 47) was undertaken. The alternative alignments would have less impact on the Yarra Ranges National Park in terms of trail length, they would require less native vegetation removal and would have substantially less impact on CTR and CTMF threatened communities. Impacts on threatened species are likely to be comparable, however the alternative alignments are not in proximity to dense montane thicket habitat or translocation recipient sites for Leadbeater's Possum.

The assessment considered potential impacts to biodiversity and habitat during both construction and operation of the project including impacts to Leadbeater's Possum, CTR and CTMF threatened communities, Mount Donna Buang Wingless Stonefly, significant flora and fauna, aquatic ecosystems, GDEs, native vegetation and migratory species. These key sensitivities are primarily contained within the Yarra Ranges National Park.

### Construction

During construction, native vegetation removal would be limited to understorey impacts within a variable trail width construction and operational footprint. The vast majority (around 90%) of native vegetation impacts would occur in three EVCs that have a bioregional conservation status of Least Concern; Damp Forest, Wet Forest and Shrubby Foothill Forest. The trail network with Trail 1 would require up to 37.047 hectares of understorey vegetation removal and the trail network including the alternative (Trails 45, 46 and 47) would require 35.754 hectares of understorey vegetation removal. Based on advice and recommendations from the project arborist no large trees have been included in patch vegetation removal as sensitive construction measures are considered unlikely to cause tree decline where TPZ and SRZ encroachment occurs. Impacts to EVCs in the project area equate to less than 0.03% of bioregional extant distribution of these vegetation types. In total 13 species (none of Commonwealth significance) would require offsets totalling 263.637 species habitat units for a trail network with Trail 1, and 240.087 species habitat units for a trail network with the alternative (Trails 45, 46 and 47). Approximately 9.51 hectares of understorey vegetation removal would be required in the National Park for a trail network with Trail 1, and 9.15 hectares for a trail network with the alternative.

Within the National Park, a trail network with Trail 1 would intersect approximately 6.442 kilometres of Cool Temperate Mixed Forest and Cool Temperate Rainforest (CTMF/CTR) compared to a trail network with the alternative (Trails 45, 46 and 47) which would intersect approximately 3.069 kilometres of CTMF/CTR community. For both trail networks, Trail 50 would intersect approximately 40 metres of CTR in the Yarra State Forest. A trail network with Trail 1 would require approximately 1.587 ha of understorey vegetation removal in EVC 31 (CTR/CTMF) and the trail network including the alternative would require 0.504 hectares of understorey vegetation removal in EVC 31 (CTR/CTMF). At a bioregion scale, the proportional bioregional impact on the remaining mapped rainforest area would be 0.001% in the Highlands Southern Fall bioregion and 0.02% in the Victorian Alps for a trail network with Trail 1, and 0.003% in the Highlands Southern Fall bioregion and 0.007% in the Victorian Alps for a trail network with the alternative. Impacts to Cool Temperate Mixed Forest and Cool Temperate Rainforest would be minimised by hand building of all trails that intersect these communities in order to reduce soil disturbance, reduce understorey vegetation removal and minimise the chance of pathogen infection and spread.

The project area supports known colonies of Leadbeater's Possum. Areas of dense montane thickets in the Yarra Ranges National Park have been avoided through trail realignment. The project would also avoid removal of hollow-bearing trees, artificial nest boxes and removal of dense stands of sub-

canopy stems that provide movement opportunities for this species and these considerations have guided trail alignments. Trail 1 has been realigned to avoid direct impacts on key habitat, and to provide a 100 to 300 metre buffer to known dense thicket habitat and nest box sites. Between Mount Donna Buang summit and Ben Cairn, where the trail intersects CTR/CTMF, the project is committed to hand building Trail 1 to reduce the construction footprint. Hand building would also reduce the noise profile during construction. With these important avoidance, impact minimisation and mitigation measures, noise, vibration and disturbance during construction is unlikely to result in significant impacts to the Leadbeater's Possum population in the project area.

There is potential for residual construction impacts to Mount Donna Buang Wingless Stonefly and its habitat due the sensitivity of this species to soil and hydrological disturbance. Micro-siting trail works between Mount Donna Buang, Mount Victoria and Ben Cairn and installing elevated structures in headwater habitats would minimise but not necessarily eliminate the potential residual impacts to this species.

The construction of the project is considered unlikely to result in a significant impact to any EPBC Act listed threatened species. However, similar to state significant flora and fauna species, impacts during construction could still occur as a result of removal of native vegetation, potential for sedimentation during construction, disturbance of flora and fauna, introduction of weeds and pathogens as a result of poor hygiene practices and pollution of waterways as a result of litter or any chemicals used during trail construction. It is considered that the majority of impacts can be avoided, minimised and mitigated through pre-construction trail micro-siting, sensitive construction techniques and monitoring. Mitigation measures and monitoring during construction are intended to reduce impact during construction as far as reasonably practicable.

Residual construction impacts on threatened fish species are considered low to negligible and can be readily managed through proven and effective soil erosion and sedimentation control measures in the catchment of the Yarra River and its tributaries. Similarly, impacts to GDEs are expected to be minimal in magnitude, highly localised and short in duration during construction.

## Operation

During operation, monitoring and maintenance would include regular trail inspections in accordance with the inspection program detailed in the OEMP. Whilst mountain bike trails would have been located, designed and built to avoid and minimise environmental impacts, monitoring through an effective inspection program enables unforeseen impacts to be detected and adaptive management to be adopted. Additionally, a comprehensive weed management program would be implemented along and in the immediate vicinity of trails. The program would be developed in consultation with land managers. The project would also work with relevant land managers to support existing pest animal management programs. Both the weed management program and support for the pest animal management program would be provided for the entire life of the project (i.e. as long as the trails remain in use).

The operational trail corridor would be maintained to support the trail bench, typically 0.6 metres to 1.2 metres wide and an overhead height clearance of 2.5 metres. The remaining areas disturbed during construction would be rehabilitated and allowed to regenerate with native vegetation during the trail operational phase. There may be the occasional need to undertake one-off works such as hazardous tree treatment and these activities would be done in consultation with the relevant land manager.

Noise, vibration and disturbance generated during trail operation is unlikely to result in significant impacts to the Leadbeater's Possum population in the project area, predominantly due to the dispersed nature of trail use. Night riding would not be permitted in the Yarra Ranges National Park to minimise impacts to nocturnal fauna disturbance. Residual impacts to Leadbeater's Possum, following the implementation of measures would relate to disturbance of animals, disruption to research and translocation programs/locations, increased localised predation events, habitat modification through weed and pathogen invasion, accidental habitat damage during trail maintenance and ongoing management of hollowing-bearing trees adjacent to the trail network.

There is potential for residual operational impacts to Mount Donna Buang Wingless Stonefly and its habitat due the sensitivity of this species to soil and hydrological disturbance. Targeted surveys for this project have located new populations of Mount Donna Buang Wingless Stonefly between Mount Donna Buang and Mount Victoria. There is potential that this species is more widespread in the vicinity of Mount Donna Buang and the project and/or land managers could support ongoing eDNA-based monitoring and detection of more new populations in the Yarra Ranges National Park and Melbourne Water catchment.

The operation of the project is considered unlikely to result in a significant impact to any EPBC Act listed threatened species. However, similar to state significant flora and fauna species, impacts during operation could still occur as a result of potential for sedimentation during trail use, disturbance of flora and fauna, introduction of weeds and pathogens as a result of poor hygiene practices, and pollution of waterways as a result of litter. Mitigation measures and monitoring during operation are intended to reduce impact during operation as far as reasonably practicable.

Residual operation impacts on threatened fish species are considered low to negligible and can be readily managed through proven and effective soil erosion and sedimentation control measures in the catchment of the Yarra River and its tributaries. Similarly, impacts to GDEs are expected to be minimal in magnitude, highly localised and short in duration during construction.

### Cumulative impacts

Cumulative impacts of the project relate to increased disturbance and human presence in the Yarra Ranges National Park, adjacent Melbourne Water catchment and more remote sections of the Yarra State Forest during the construction and operational phase of the project. The trail network would cause disturbance to the forest soil and understorey vegetation but this is considered unlikely to pose a significant physical or functional barrier to important threatened forest fauna or to the lifecycle of understorey vegetation (e.g. pollination, seed dispersal, recruitment). A comparison of how threatening processes currently operate, how the project may result in an increase in these processes and the mitigation options available has been undertaken. The most notable potential cumulative effects and exacerbation of threatening processes are associated with introducing or facilitating the spread of pests and pathogens (weeds, deer and Myrtle Wilt impacts on rainforest communities), increased disturbance and mortality to wildlife (e.g. noise and vehicle collisions), localised changes to sedimentation of forest vegetation and waterways/watercourses and increased waste and litter. The cumulative effects of the 2019-20 bushfires across south-eastern Australia on key nationally threatened species has been considered as part of significant impact assessments for these species.

In response to the EES evaluation objective described in the beginning of this chapter, impacts of the project on biodiversity and habitat have been assessed and mitigation measures have been identified to avoid and minimise adverse impacts. Impacts related to Matters of National Environmental Significance are further discussed in **Chapter 14: Matters of National Environmental Significance**.