



**Biodiversity Impact Assessment  
Proposed Warburton Mountain Bike Trail**

**December 2019**

## Biodiversity Impact Assessment – Proposed Warburton Mountain Bike Trail, December 2019

### PRACTICAL ECOLOGY Pty Ltd

ACN: 082 911 377 ABN: 88 082 911 377

PO Box 228 Preston VIC 3072

(2B Stott Street Preston Vic 3072)

P: 9484 1555F: 9484 9133

[www.practicalecology.com.au](http://www.practicalecology.com.au)

**Authors:** Greg James, Lincoln Kern, Andrew Hamer, Alice Ewing

### Acknowledgments:

Prepared for: Yarra Ranges Council  
Contact: Tarryn Elverd  
Project Officer  
Recreation and Active Living  
03 9294 6837 | 0417 011 056  
t.elverd@yarraranges.vic.gov.au

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## 1. INTRODUCTION

Yarra Ranges Council proposes to construct an extensive network of mountain bike trails near the Warburton Township. Appendix 1, 0and 0 provides an overview of the entire project area.

The trail network is in two main regions, Region 1 is 61.5 km to the north of the Warburton township within the Yarra Ranges National Park. Region 1 includes 4 trails that lead off from Mt Donna Buang Road. The main trail runs from the Mount Donna Buang Summit in a westerly direction until it reaches the Ben Cairn section of the National Park and then heads south from Donna Buang Road and gradually descends through to the O'Shannassy Aqueduct Trail approximately 1km north of the Warburton Township. The other 3 trails descend from Donna Buang Road further east of the summit road with each of these heading towards the township in the vicinity of the Warburton Golf Course.

Region 2 is to the south of the Warburton Highway and Rail Trail within the Yarra State Forest. This area includes Mount Little Joe and Mount Tugwell. A network of trails in the vicinity of Mt Little Joe Track link to the west with the existing Crusher Track towards Wesburn and to the east towards Mt Tugwell in the Cemetery Fireline and Mt Bride Road region.

The total trail length of the project is approximately 180km.

The mountain bike trails are generally constructed with an initial bench width of 1.2m, but this reduces over time to a ride line of 0.3–0.6m wide. Tree branches are lopped to 2.5 metres high. Appendix 2 provides a series of maps to illustrate the trail alignment and the biodiversity values within or near to the trail corridor.

Appendix 3 provides a map series that highlights some of the more ecologically sensitive areas of the trail alignment.

Appendix 4 provides a 'Risk Assessment Matrix' to provide guidance on various design and construction approaches based on risk categories and established protocols for various sections of the trail.

### 1.1 Project Scope

The trail alignment traverses National and State Forest through vegetation that is generally high quality. The purpose of this study is to investigate the trail alignment and identify impacts to native vegetation and fauna habitats and how the planning and design of the alignment may minimise impacts to the most significant biodiversity values.

Environmental Protocols to guide the alignment of the trail network were developed with DELWP, Parks Victoria, Melbourne Water and ecological specialists. The current draft of the protocols, dated October 2019 has been incorporated into the Risk Assessment Matrix. A copy of the protocols is attached as Appendix 10.

Key deliverables included:

1. Establishment of agreed ecological assessment methodologies that can be applied to the Warburton Trail network
2. A comprehensive ecological assessment of the trail network including:
  - EVCs and conservation significance
  - Identification of any EPBC or FFG listed vegetation communities
  - Habitat Hectare Assessments
  - Locations of habitat importance for threatened flora and fauna species
  - Locations of threatened flora or fauna observed during the assessment
  - Compilation of a comprehensive flora list for the potential impact zone
  - Locations of noxious and high threat environmental weeds
  - Significant features including stream buffers, Leadbeater's Possum (LPB) buffer areas and special protection zones
  - Detailed mapping illustrating the trail alignment and biodiversity information.
3. Development implications under State and Commonwealth biodiversity legislation including:
  - The Flora and Fauna Guarantee Act (FFG Act) 1988
  - The Environment Protection and Biodiversity Conservation Act (EPBC Act) 1988
  - The Catchment and Land Protection Act (CaLP Act) 1994
4. All necessary biodiversity information relevant to the Yarra Ranges Council Planning Scheme including:
  - Information relevant to clause 52.17 Native Vegetation Protection
  - Information pertaining to relevant environmental overlays (e.g. ESO and SLO)
  - Information in relation to the Yarra Ranges local vegetation policy clause (c22.05)
  - An assessment of biodiversity impact in accordance with the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a) (recently replacing the *Permitted Clearing Biodiversity Assessment Guidelines*) (DEPI 2013a)
  - Implications of the Environmental Effects Act
  - Implications of the Planning and Environment Act 1987
  - Discussion of how the proposal has avoided and minimised biodiversity loss



- Assessment of whether the proposal has a significant impact on Victoria’s biodiversity
  - A discussion of biodiversity offset requirements associated with proposed clearing
5. Strategies for minimising impact to important habitat for threatened species including though not limited to the Mount Donna Buang Wingless Stonefly, Leadbeater’s Possum, Powerful Owl, Barking Owl and Sooty Owl.

## 1.2 Clarifications and Definitions

Key definitions that apply to the assessment and construction components of the proposed trail include:

**The Ride Line (Tread Width)** – The ‘tread’ is the firm, compacted section of the trail on the inside of the bench, where riders generally ride. On most trails, the tread is generally around 300–600mm wide, although it may be wider on corners and on some specific types of trails such as shared-use trails, high traffic trails and jump trails. It is also referred to as the ‘ride line’.

**The Trail Corridor (Construction Corridor)** – The construction corridor is defined as the horizontal corridor from the top of the upslope batter to the toe of the downslope batter and the vertical corridor to about 2m high (sufficient to allow passage of the excavator).

**Impact Zone** – This zone refers to the impact on native vegetation. Throughout most of the trail, the impact is expected to be limited to the 1.2-metre wide trail corridor, however, the more difficult areas or the end of switchbacks may require a disturbance footprint up to 2 metres for construction purposes:

**Indicative Trail Alignment** – This represents the general alignment of the trail following ground truthing. It does not represent the exact alignment once constructed. Prior to construction starting, all trail alignments will be subject to a Pre-Start Trail Review (PSTR), during which the land manager, project manager and construction team will walk the trail alignment, determining any final location of structures, no-go zones etc. In areas of high environmental significance and/or sensitive species, a qualified Ecologist will be required to attend the PSTR to assist in ‘micro-siting’ the exact position of the trail in order to minimise potential impacts to native vegetation and fauna habitats.

**Assessment Corridor** – a 20-metre wide transect (10 metres either side of the indicative trail alignment). The assessment corridor provides options for re-aligning the trail during the detailed design and construction phase. The average construction impact is anticipated to be no more than 2 metres.

**Broader Assessment Area** – The broader assessment of biodiversity values (native vegetation and fauna habitats) to inform the indicative alignment of the trail and a more refined Assessment Corridor. Broader Assessment Areas helped to inform the general alignment of the trail including avoiding significant biodiversity values such as Cool Temperate Rainforest.

Section 2 of this document explains the ecological definitions and methods applied to this assessment.

### 1.3 Overview of the Assessment Area

The assessment corridor is 10 metres either side of the indicative centreline of the trail (though the actual trail construction zone will be 1.2m). This 20m wide corridor allows for some flexibility to realign the trail within the corridor to avoid and minimise impacts to significant biodiversity values.

For the purpose of describing and illustrating the landscape, vegetation and habitat types, the assessment area is divided into several sections (as illustrated in Appendix 1 and Appendix 2– Maps 1 to 25):

- The Summit to Donna Buang Road ( Map 1)
- Donna Buang Road Central (Map 3)
- Ben Cairn Region (Map 5)
- APM Access Track (Map 7)
- Donna Buang Road to Aqueduct Link (Map 9)
- Yuonga Track South (Map 11)
- Mount Little Joe– Hooks Road Region (Map 13)
- Wesburn Climb (Map 15)
- Mount Little Joe Central (Map 17)
- Crusher Track Link (Map 19)
- Cemetery Fireline East (Map 21)
- Cumming Spur Track West (Map 23)
- Mount Bride Road South East (Map 25)
- Donna Buang Road East (Map 2)
- Donna Buang Road West (Map 4)
- South of Ben Cairn / Donna Buang Road (Map 6)
- O’Shannassy Aqueduct (Map 8)
- Yuonga Track North (Map 10)
- Golf Course Trail (Map 12)
- Mount Little Joe– Backstairs Track (Map 14)
- Mount Little Joe West (Map 16)
- Mount Little Joe East (Map 18)
- Mount Tugwell Cemetery Fireline (Map 20)
- La La Falls Region (Map 22)
- Cumming Spur Track East (Map 24)
- 

### 1.4 Landscape Context

The entire assessment area supports various foothill and montane forest types in a relatively high rainfall region. The assessment area traverses’ elevations between 160–1200 metres above sea level. The Mount Donna Buang Summit represents the highest elevation within the assessment area while the lowest elevation is in the vicinity of the rail trail south of the Warburton Highway (Appendix 1).

The trail alignment traverses several Crown land tenures including:

- The Yarra Ranges National Park managed by Parks Victoria (the majority of the Drop A K route)
- The Dee River Corridor north of Warburton (managed by DELWP and Melbourne Water)

- Warburton Bushland Reserve managed by DELWP (incorporating ‘The Elevator’ in the vicinity of Hooks Road) and,
- The Yarra State Forest managed by DELWP (accounting for the majority of the network within the Mount Tugwell Area)

Tall Eucalypt forest of various age classes persist across the majority of the assessment area, however areas north of Mount Donna Buang Road supports Cool Temperate Rainforest where Eucalypt cover subsides in favour of canopy species such as Southern Sassafras *Atherosperma moschatum* and Myrtle Beech *Nothofagus cunninghamii*.

The study area falls within 2 bioregions. Most of the assessment area in proximity to Donna Buang Road is within the Victorian Alps Bioregion while the most southerly section of Donna Buang Road transitions into the Highland Southern Falls Bioregion for the remainder of the trail network.

The entire assessment area is within the Port Phillip and Westernport Catchment (DEPI 2013a).

## 2. ASSESSMENT METHODOLOGY

A preliminary trail alignment was identified through a desktop exercise applying the primary objectives and protocols established for this project. Various GIS biodiversity layers provided by DELWP and the State of Victoria assisted with the preliminary planning of the trail alignment. Following this, the next step in the process was to ground truth the trail alignment and consider opportunities and constraints that aims to avoid significant ecological values.

Out of approximately 180 km of trail there were about 150km of the trail alignment that received site assessment. The most recent additions to the proposed trail have only undergone a desktop assessment of the potential ecological values as at the time of writing this report.

### 2.1 Site assessment

#### Assessment Process

The potential trail alignment is 10 metres either side of the indicative trail centreline (though the actual trail construction zone will be 1.2m). However, the Assessment Area was not limited to a 10-metre corridor. The assessment was undertaken in four steps as outlined below:

- a) **The Desktop Alignment** – This is the starting point for all ground truthing assessments. Using various GIS layers including contours/elevations and biodiversity data (including but not limited to Wingless Stonefly Locations, LPB habitat and nest boxes and modelled cool temperate rainforest), COX architecture and World Trail Pty Ltd plotted an indicative alignment that aimed to avoid significant biodiversity values while maintaining a reasonable gradient suitable for a Mountain Bike Trail. This provided a valuable starting point for the purpose of:
  - Identifying access points for undertaking ground truthing
  - Planning for ground truthing in remote areas
  - Providing a reference point with flexibility to vary the alignment in any direction up to 60m based on environmental constraints
  - Comparing mapped biodiversity data to conditions on the ground
- b) **Ground Truthing to determine the Revised Alignment** – The alignment was revised based on identifying significant environmental features on the ground such as Habitat Trees, Threatened Ecological Communities (i.e. Cool Temperate Rainforest) and constraints imposed by the terrain while also considering known mapped habitat values such as Leadbeater’s Possum (LBP) nest boxes, Mount Donna Buang (MDB) Stone Fly Buffer Zones and Monitoring Sites of the Australian National University (ANU). While there were often significant limitations in avoiding biodiversity values, the ground truthing approach provided flexibility in the direction of the alignment. As the revised alignment was being ground-truthed, it was still considered indicative within a 20-metre assessment corridor i.e. 10 metres either side of the centre line of the alignment.

c) **The Assessment Corridor** – Once determination of an indicative alignment was in progress, a 20-metre wide Assessment Corridor was defined to:

- provide an adequate width for undertaking Habitat Hectare Assessments as a measure of vegetation quality across a representative area (including mapping of significant trees and assessments of understorey, recruitment, logs etc).
- investigate potential siting alternatives if there were substantial constraints within the 20m corridor i.e. if areas beyond the corridor presented a better opportunity to minimise impacts, then the alignment would be rerouted.

**The Broader Assessment Area** – Ecological Values beyond the 20m corridor were also considered including:

a) Although habitat hectare assessments were applied within a 20 metre transect, assessments were not limited to this width. Visual and ‘on foot’ observations across the broader area were made both before and after determining the current alignment. Examples of these broader assessments included:

- Long-range assessments across the landscape, particularly when viewed from designated vehicle tracks on elevated sites. These assessments allowed the opportunity to determine a start point and a direction of travel from the main track where there appeared to be less constraints in terms of terrain, significant trees and drainage lines
- Boarder assessments were also undertaken on the first few days of preliminary site assessments within the Ben Cairn Area and locations to the north of Donna Buang Road and west of the Summit Road. These preliminary assessments were subject to broad investigations (60–100 metres in width) where large areas of Cool Temperate Rainforest to the north of Donna Buang Road were identified (refer to Map 4 – Series 1). The alignment was ultimately taken close to the road to avoid most areas of Cool Temperate Rainforest. Despite these efforts, not all sections of Cool Temperate Rainforest could be avoided as large areas of this vegetation type dominated sections to the north of the road. Melbourne Water requirements to minimise incursions into the mapped boundaries of Maroondah Water Catchment, while strictly avoiding incursions into the actual catchment, further limited opportunities to avoid sections of rainforest.

In addition to the four-step process outlined above, the chosen trail alignment is also based on additional factors including:

- a) Available access points from existing roads and tracks
- b) The target average and maximum trail gradient, based on the intended difficulty rating of the proposed mountain bike trail, as stipulated in the Trail Difficulty Rating System published in the Australian Mountain Bike Trail Guidelines (Mountain Bike Australia, 2019). Any constraints identified in the agreed protocols and identified during ground truthing e.g. Cool

Temperate Rainforest, nesting sites for Leadbeater's Possum, Buffer Zones for the Mount Donna Buang Stonefly and significant habitat trees.

- c) Any other constraints such as creek lines, gullies and steep inclines.

Preliminary ground truthing and project planning was undertaken by staff from Cox Architecture, World Trail Pty Ltd (the trail survey team) and Practical Ecology staff who initially worked with the survey team to identify environmental constraints. Practical Ecology then worked independently to undertake more detailed assessments based on the indicative alignment determined by the trail survey team. Prior to undertaking detailed assessments, the trail survey team provided spatial files (KML and ESRI Shapefiles) to Practical Ecology to enable a desktop assessment of biodiversity values. Practical Ecology staff then walked the alignment with the aid with a GPS enabled tablet using GIS software for recording field data in addition to known biodiversity values (e.g. mapped LBP nest boxes, Previous records of significant flora and fauna, MDB Stonefly Habitat).

## 2.2 Tree Habitat Assessment

A core component of the ground truthing was to identify potential Leadbeater's' Possum habitat trees particularly at higher elevations in locations where they are either known to occur or there is a high probability (>65%) of occurrence. Identification of suitable habitat for forest owls and other hollow dependant mammals was also considered simultaneously. Trees within lower elevation forests (in the vicinity of the O'Shannassy Aqueduct or within Mount Little Joe and Mount Tugwell) were equally considered and although age classes vary, mature stands of forest tended to exhibit a greater range of hollows visible at ground level.

Mapping of significant trees in close proximity to the alignment served two purposes:

- Firstly, it identifies trees that should be afforded maximum protection including avoiding construction within the Structural Root Zone and for the purpose of maintaining a hazard buffer for the uses of the trail and,
- Mapping trees within sample plots (including diameter, tree health and size class) also served the purpose of scoring as per the Habitat Hectare Assessment method (refer to section 2.3).

### Significant Trees

Tree assessments and mapping were undertaken where significant habitat trees were observed within range of the trail alignment. Four classes of trees were mapped as described below:

- a) **Pre-1900 living trees** (estimated to be greater than 120cm diameter) of which all are considered to be suitable habitat for LBP and potentially forest owls where large hollows are present.
- b) **Smaller habitat trees** defined as trees less than 120cm diameter with visible hollows that may provide nesting habitat for a range of fauna species including (where relevant):

- Trees with visible hollows suitable for LPB and other hollow dependent fauna within areas of high probability LPB habitat. These include trees that meet the Large Old Tree Benchmark (equal to or greater than 90cm diameter) although numerous smaller trees with hollows were also identified as suitable habitat
  - Dead trees greater than 50cm within high probability LBP habitat as the species has a tendency to inhabit dead trees, providing they are a suitable height (>10 metres)
- c) Other hollow bearing trees of various size classes in lower probability LBP habitat that exhibit hollows suitable for a range of owl species and other hollow dependent fauna
- d) Sample areas of **Large Trees** were mapped for the purpose of:
- a. Assisting with Large Tree counts per hectare (based on the Large Tree benchmark) as a part of habitat hectare assessments<sup>1</sup>
  - b. Identifying significant trees close to the indicative alignment so to allow for the alignment to be adjusted during the detailed design and construction phase

**Large Trees** are defined as those defined by the large tree benchmarks, which vary according to the Ecological Vegetation Class.

**Note:** Due to time constraints and the sometimes–extreme difficulty in accessing trees due to the rugged terrain, not all large trees in the assessment corridor were mapped. However, all large trees were mapped where the indicative alignment was within the assumed Structural Root Zone (SRZ). The SRZ varies depending on trunk size, for example an old growth tree of 250cm diameter (when measured from the buttress of the tree) requires a protection zone of 4.9 metres and a younger tree of 100cm diameter requires a protection zone of 1.5 metres. Sections where not all of the above categories of trees were mapped included:

- Areas with a sparse cover of Large Trees (less than 10 per hectare) and no visible hollows (Category D) where not at risk from impacts to the alignment.
- Where no other significant trees (Category A, B and C) were identified.

### Sub–canopy Trees

While sub–canopy trees were not mapped for this project, observations of sub–canopy trees were a key component of assessments within High Probability LBP Habitat. For the purpose of this project, a sub–canopy tree is defined as any species of tree between 10–25 metres high that sits below the

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<sup>1</sup> Sample areas of Large Trees was undertaken in accordance with standard methodology outlined in section D – page 45 of the *Assessor’s Handbook* (DELWP 2018)

mature Eucalypt canopy. This sub-canopy provides critical connectivity between canopy trees for the movement of LBP and other arboreal mammals.

## 2.3 Trail alignment – Desktop only

The newest proposed trail alignments (approximately 30km of trail) as shown in Appendix 1 underwent desktop assessment of ecological values.

The potential trail alignment is 10 metres either side of the indicative trail centreline (though the actual trail construction zone will be 1.2m). However, the Assessment Area was not limited to a 20-metre corridor. The assessment was undertaken in the steps as outlined below:

- EVCs and conservation significance (using modelled EVC datasets)
- Identification of any EPBC or FFG listed communities
- Vegetation Condition using modelled quality scores
- Locations of habitat importance for threatened flora and fauna species

Detailed mapping illustrating the trail alignment and desktop biodiversity information.

## 2.4 Vegetation Categorisation, Classification and Quality

Vegetation was assessed in terms of type (as defined by Ecological Vegetation Class) and its quality, by undertaking a Habitat Hectare assessment. Where the trail alignment only received a desktop assessment modelled Vegetation Quality scores were applied in place of a Habitat Hectare assessment.

### 2.4.1 Vegetation Categories

Vegetation in the study area was surveyed for categorisation as per the definitions within *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017):

#### Native Vegetation

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

#### Native Vegetation Patch

A *patch* of native vegetation is either:

- an area of vegetation where at least 25 per cent of the total perennial understory plant cover is native



- any area with three or more native canopy trees where the drip line of each tree touches the drip line of at least one other tree, forming a continuous canopy, or
- any mapped wetland included in the current wetlands layer available in NVIM and other DELWP systems.

### Scattered tree:

A scattered tree is a native canopy tree that does not form part of a patch.

Scattered trees have two sizes, small and large:

- a small scattered tree is less than the large tree benchmark for the species in the relevant EVC
- a large tree is equal to or greater than the large tree benchmark for the species in the relevant EVC

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

## 2.4.2 Ecological Vegetation Classes

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

DELWP EVC mapping was accessed to assess the EVCs likely to occur within the assessment areas. EVCs were then identified in the field according to observable attributes including dominant and characteristic species consistent with the benchmark descriptions (DEPI 2014b).

## 2.4.3 FFG Listed Threatened Communities

In addition to the standard Ecological vegetation Classes, FFG listed vegetation communities considered for this assessment includes *Cool Temperate Mixed Forest Community* and *Cool Temperate Rainforest Community*. Both these FFG listed communities fall within the broader EVC description for Cool Temperate Rainforest.

### Cool Temperate Rainforest Community

Rainforest is defined ecologically as forest vegetation with a more-or-less continuous rainforest tree canopy of variable height, and a characteristic diversity of other plant species and life forms.

Cool Temperate Rainforest is dominated by combinations of Myrtle Beech, Southern Sassafras, Black Olive-berry *Elaeocarpus holopetalus* and Blackwood *Acacia melanoxylon* 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 *Olearia argophylla*, Austral Mulberry *Hedycarya angustifolia* 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.

Cool Temperate Rainforest occurs in the Otway and Strzelecki ranges, Central Highlands and East Gippsland. It often occurs along the margins of streams or forms more extensive stands where it has been undisturbed and protected from fire.

### Cool Temperate Mixed Forest Community

This ecological community is described as ‘a structurally complex forest that has an upper canopy of eucalypts above an understorey layer of smaller trees of species that characterise Cool Temperate Rainforest communities. Its main tree species alter from east to west across Victoria. In the east the rainforest species include Black Oliveberry and Southern Sassafras. To the west their composition changes: Black Oliveberry is found in East Gippsland only, Southern Sassafras extends from East Gippsland to the Central Highlands and Myrtle Beech from the Central Highlands to the Otway Ranges’. Given sufficient time, and if bushfires do not intervene, the eucalypts of the overstorey gradually senesce and die and the community as a whole develops into Cool Temperate Rainforest. Cool Temperate Mixed Forest can therefore be regarded as a seral or successional stage of Cool Temperate Rainforest that typically develops after rainforest experiences severe fire damage and persists until the community reaches a climax phase.

Cool Temperate Mixed Rainforest is recognised as meeting the EVC description for Cool Temperate Rainforest. Vegetation consistent with either of these two FFG listed communities’ definitions are mapped and assessed as Cool Temperate Rainforest EVC as this is the only EVC approved by DELWP that an EVC benchmark is provided for to enable the habitat scoring process.

### 2.4.4 Vegetation Quality Assessment

Habitat hectare assessments were applied to the entire 20 metre corridor to determine the condition and significance of the vegetation. This methodology is outlined in *Vegetation Quality Assessment Manual-Guidelines for Applying the Habitat Hectares Scoring Method* (DSE 2004a). The habitat hectare method involves making visual and quantitative assessments on various characteristics of native vegetation according to established criteria that are set against an optimum benchmark.

This process begins with the identification of the EVC. Each EVC has a benchmark of optimal values relating to the vegetation conditions. In addition, the ecological landscape context is scored based on patch size, connectivity and distance to core habitats. If an assessment area meets all benchmark criteria it will receive a total score of 100%.

### Large Tree

When undertaking a habitat hectare assessment, a **Large Tree (LT)** is a tree with a diameter measured at breast height (DBH) equal to or greater than the large tree diameter as specified in the relevant EVC benchmark.

## 2.5 DELWP biodiversity impacts and offset requirements

GIS data of the 2 metre impact zone from the proposed alignment was tested to provide an indication of impact and offset requirements under *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a) including:

- Site condition scores of impacted native vegetation (highest modelled condition scores were applied to each habitat zone in the desktop only sections)
- strategic biodiversity value
- habitat importance maps for rare or threatened species and application of the specific-general offset test
- the offset requirements, specified in General Habitat Units and Species Habitat Units (as appropriate), and the required offset attributes

## 2.6 Flora

### 2.6.1 Plant taxonomy

Plant taxonomy used in this report are generally in accordance with Walsh and Stajsic (2008) and/or Flora Information System (Viridans Biological Databases 2012).

### 2.6.2 Existing information

Existing flora available through the Victorian Biodiversity Atlas (VBA) (2019 update) database was queried within a five-kilometre radius around the assessment areas to provide an indication of the potential occurrence of Victorian Rare and Threatened species.

### 2.6.3 Flora survey

During the assessment, the study area was inspected on foot. Flora surveys were undertaken over several stages based on the alignment and project brief spanning from October 2017 until November 2019. A species list (or defined area list) for indigenous or naturalised flora (i.e. not including planted species) over the entire study site was compiled.

The flora survey including mapping of rare flora and high threat weeds observed during site assessments.

## 2.6.4 Plant identification

Species that could not be identified in the field were recorded to the nearest possible family or genera. These were then collected as per the protocols associated with Practical Ecology's Flora and Fauna Guarantee (FFG) Act 1988 permit (No. 10004805) for the collection of plant material. In order to assist in the identification of some flora, major features of the specimens were collected where possible, including leaves, parts of branches, fruit and/or flowers.

## 2.6.5 Limitations of flora survey

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

- it was undertaken over a range of seasons but mostly in late spring which is an optimal time for identification of many but not all plant species
- however, each site was only assessed once so optimal timing of for plant species at all sites was not possible
- it is expected that some other species, particularly orchids, lilies and other herbaceous species that can only be observed for a limited period of time may not have been recorded during the present assessment
- within each section of trail, flora surveys were undertaken over a short period of time and were undertaken during the course of habitat hectare assessments.

## 2.7 Fauna

### 2.7.1 Fauna taxonomy

Animal taxonomy is consistent with naming conventions listed in the Victorian Biodiversity Atlas (VBA).

### 2.7.2 Habitat Assessment

Only a brief incidental fauna survey was undertaken for this study. As it was undertaken in association with other tasks it is likely some species onsite were not observed. The main focus in regard to fauna was to undertake a habitat assessment. The habitat assessment relies upon making judgements on the suitability of habitat present within the study site for any significant species recorded on existing databases. Potential habitat values considered include:

- old hollow-bearing trees
- intact EVCs including the understorey strata

- connectivity to existing reserves and other patches of remnant vegetation
- water bodies, drainage lines, wetlands or wet depressions
- large fallen logs, especially hollow or concave-shaped logs
- rocks and rock outcrops
- leaf litter and grassy understorey vegetation
- vegetation that provides fruiting/feeding resources for birds and other fauna
- dense vegetation particularly in the midstorey and understorey strata
- burrows

## 2.8 Potentially occurring rare or threatened species

Existing information of Victorian Biodiversity Atlas (VBA) (2019 update) for fauna records within a five-kilometre radius around trail alignment were obtained to provide an indication of potentially occurring significant species.

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

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

A description of the justification for the likelihood of occurrence is presented below.

**Table 1.** Criteria for potential occurrence of significant species

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

Appendix 5 provides the results of the Likelihood of Occurrence for rare or threatened flora and Appendix 6 provides the results of the Likelihood of Occurrence for threatened fauna. Likelihood of impact to EPBC listed fauna is included in Appendix 7.

## 2.9 Mapping

Geographical positioning data collection in the field for the purposes of map display was carried out using QGIS 2.16 and a GPS enabled tablet. Map production post-field was undertaken in QGIS format using a combination of GPS data, GPX tracks, spatial layers provided by DELWP and VicMap with geo-referenced aerial photography (Google Satellite imagery available through AusMap).

Due to limitations of satellite reception in heavily forested environments, it is rare that a GPS points are recorded within 1m accuracy. GPS points taken in the field were generally between 2–5 metre accuracy. The same limitation applies to the trail alignment itself. These limitations emphasize the importance of determining re-alignments with mitigation solutions on the ground when it comes to construction.

Prior to construction starting, all trail alignments will be subject to a Pre-Start Trail Review (PSTR), during which the land manager, project manager and construction team will walk the trail alignment, determining any final location of structures, no-go zones etc. In areas of high environmental significance and sensitivity, a qualified Ecologist will be required to attend the PSTR to assist in ‘micro-siting’ the exact position of the trail in order to minimise potential impacts to native vegetation and fauna habitats.

### 3. RESULTS

#### 3.1 Vegetation Categorisation, Classification and Quality

The Department of Environment, Land, Water and Planning (DELWP) has broadly mapped vegetation types (referred to as Ecological Vegetation Classes) within and surrounding the assessment corridor. Although the extent of Ecological Vegetation Classes (EVC's) as identified in the field vary markedly compared to modelled mapping units, all EVCs mapped within the vicinity were found at various locations within the assessment corridor including:

- Montane Damp Forest (EVC 38) (EVC
- Wet Forest (EVC 30)
- Damp Forest (EVC 29)
- Herb-rich Foothill Forest (EVC 23)
- Cool Temperate Rainforest (EVC 31)
- Lowland Forest (EVC 16)
- Shrubby Foothill Forest (EVC 45)
- Riparian Forest (EVC 18)

Overview Maps A and B (Appendix 1) illustrate the location of 25 sections of the assessment areas. Habitat Zones and Ecological Vegetation Classes are discussed in the context of these sections. Maps 1–25 in Appendix 2 illustrate the extent of habitat zones and EVCs within the assessment corridor.

The vegetation within the referral area is located across two Bioregions of Victoria, Highland Southern Fall and Victorian Alps. The most prominent Ecological Vegetation Classes are Wet Forest, Damp Forest and Shrubby Foothill forest which combined equate to about 90% of the vegetation within the disturbance footprint (Table 2). These EVC's have a Bioregional Conservation Status of Least Concern. Another 6% of this area is made up of Lowland Forest, Riparian Forest, Herb-rich Foothill Forest and Montane Damp Forest which are also listed as Least Concern.

Cool Temperate Rainforest EVC has a Bioregional Conservation Status of Endangered and is a listed ecological community under the *Victorian Flora and Fauna Guarantee Act 1988*. The project is only likely to impact upon 1.06 hectares of this vegetation type with specific design and construction mitigations strategies to further minimise the long-term impact.

**Table 2.** Area (Hectares) of EVC's within the proposed disturbance footprint of the mountain bike trail.

Bioregion	EVC	EVC Name	Bioregional Conservation Significance	Hectares Desktop	Hectares Ground-truthed	TOTAL
HSF	EVC 16	Lowland Forest	Least Concern	0.11	0.28	0.39
HSF	EVC 18	Riparian Forest	Least Concern	0.16		0.16
HSF	EVC 23	Herb-rich Foothill Forest	Least Concern		0.30	0.30



Bioregion	EVC	EVC Name	Bioregional Conservation Significance	Hectares Desktop	Hectares Ground-truthed	TOTAL
HSF	EVC 29	Damp Forest	Least Concern	2.05	4.43	6.47
HSF	EVC30	Wet Forest	Least Concern	1.51	7.40	8.91
HSF	EVC 31	Cool Temperate Rainforest	Endangered		0.15	0.15
HSF	EVC 45	Shrubby Foothill Forest	Least Concern	0.49	7.22	7.71
Alp	EVC 30	Wet Forest	Least Concern		0.49	0.49
Alp	EVC 31	Cool Temperate Rainforest	Endangered		0.91	0.91
Alp	EVC 38	Montane Damp Forest	Least Concern		0.10	0.10
<b>TOTAL</b>				4.31	21.28	<b>25.59</b>

General vegetation type and quality descriptions are provided below.

### Mount Donna Buang East (Map 1, Map 2 and Map 3)

This section is within the Victorian Alps Bioregion and comprises 2 EVCs; Montane Wet Forest (EVC 38) and Cool Temperate Rainforest (EVC 31). While these areas do not represent classified ‘Old Growth Forest’ they represent mature vegetation communities that have not been subject to logging over the past 50 years and have not been impacted by fire since 1939.

Vegetation from the Mount Donna Buang summit moves through Montane Wet Forest dominated by Alpine Ash *Eucalyptus delegatensis subsp. delegatensis*. While most of this area supports a continuous Eucalypt canopy, some areas transition into Cool Temperate ‘Mixed’ Forest while other areas are definitively Cool Temperate Rainforest with less than 5% Eucalypt canopy and dominated by a Myrtle Beech *Nothofagus cunninghami* and Southern Sassafras *Atherosperma moschatum* canopy which is the key determinant of this EVC.

Habitat Zones 4, 6 and 8 are consistent with the Cool Temperate Rainforest Benchmark. These areas account for 2.24 kilometres of trail length. Some other sections of Cool Temperate Rainforest have Myrtle Beech sub-canopy with an overstorey of Eucalypts (Zone 1, Zone 3 and Zone 5). All of the aforementioned habitat zones require particular care in design and construction of the alignment due to the abundance of Myrtle Beech and its vulnerability to Myrtle Wilt that can be facilitated by disturbance.

While the vegetation quality varies marginally across the 2 designated zones that represent Montane Wet Forest (zone 2 and 7), each zone supports a near benchmark cover and diversity of understorey species and organic litter and logs meet the optimal benchmark but natural recruitment is often patchy. Large old trees through Montane Wet Forests are reasonably abundant and vary from 50–100% of the large Tree benchmark per hectare.

As the vegetation moves further west towards McKenzie Creek, elements of Blackthorn Scrub (EVC 27) appear in association with drainage lines although a Eucalypt cover is still present among a suite of understorey species associated with Montane Wet Forest.

Other than some minor occurrences of grassy or herbaceous weeds on the road verges, there is virtually no weed cover within the Donna Buang East Region.

### Mount Donna Buang West to Ben Cairn (Map 4 and Map 5)

Large areas of Cool Temperate Rainforest persist to the north of Donna Buang Road where the proposed trail is located. The trail then crosses the road and heads south where the vegetation suddenly transitions into a relatively open Wet Forest (EVC 30) (Habitat Zone 9). Despite the relatively open canopy, Large Trees are at least 70% of the per hectare benchmark.

The middle section of Habitat Zone 9 features large rocky outcrops in the western margins of the assessment corridor.

As the trail moves further south, the vegetation transitions into a very sparse canopy immediately west of Donna Buang Road (habitat zone 10). While still present, large trees are less abundant throughout this zone (less than 50% per hectare benchmark).

The alignment then continues south of Donna Buang Road where the assessment corridor traverses steeper downslopes and moves from the Victorian Alps Bioregion into the Highlands Southern-fall Bioregion.

### South of Donna Buang Road towards the APM Access Track (Map 6 and Map 7)

Canopy cover and forest age class varies as the trail descends further south. With Habitat Zones 11, 13 and 15 exhibiting a partially mature forest cover with a Large Old Tree per hectare varying between from of 40–60% of benchmark cover. In contrast, Habitat Zones 10, 12, 14 and 16 generally lack a mature canopy with only sparse occurrences of Large Old Trees. However, most of the above zones support a near benchmark understorey cover and lifeform diversity. Mountain Ash *Eucalyptus regnans* is the dominant canopy species across these zones although scattered occurrences of Messmate *Eucalyptus obliqua* occur within the most south–westerly portions.

Mountain Ash *Eucalyptus regnans* dominated Wet Forest continues as the trail heads further east of Kennedy Creek although the forest age and quality are variable all the way through to Dee River. Within this section, the trail alignment often interacts with the APM Access Track which includes some trafficable areas and other former abandoned tracks which support young regrowth (~20–30 years old). Past logging activity is evident in patches within this landscape including more recently logged forested approximately 30–40 years old (e.g. Habitat Zones 16 and 17) and mature forests apparently undisturbed since 1939 (e.g. Habitat Zones 15 and 18).

A small area of Riparian Forest vegetation occurs in association with the Dee River that supports Swamp Gum and Manna Gum in addition to a suite of riparian species not observed throughout most areas in the vicinity of the APM Access Track.

Most of the zones between Kennedy Creek and Dee River support a suite of understorey lifeforms with most understorey components present. Like most of the assessment areas, the ground layer supports ample organic litter and logs of various sizes. Although most areas from south of Donna Buang Road to Dee Road have minimal overall weed cover, small patches of Blackberry \**Rubus fruticosus*, Ragwort \**Jacobaea vulgaris* and Spear Thistle \**Cirsium vulgare* were identified and mapped at various locations where the canopy cover is sparse and/or where previous disturbance is evident along track edges.

### O'Shannassy Aqueduct and Donna Buang Road to Aqueduct Link (Map 8 and Map 9)

A similar pattern of Wet Forest vegetation persists throughout Habitat Zone 18 where vegetation is mostly consistent with Wet Forest with varying age classes based on historical disturbance (both natural and anthropogenic). Lower elevations between Harrison and Walkers Creek support elements of Damp Forest EVC 29 due to the sparse occurrence of wetter elements such as ground ferns and shade dependent herbs and the transition from a Mountain Ash dominated canopy to increasing cover of Mountain Grey-gum and Messmate Stringybark.

As the trail moves further east (Habitat Zones 19–20), there are some stands of pines which are a legacy of pine plantations established in various patches to the north of the Aqueduct Trail, although native vegetation in the understorey and canopy is still dominant. However, further to the east, mature pines and newer recruits dominate the canopy and upper storey (within and surrounding habitat zone 21). Native understorey vegetation has recolonised these areas, however, there is only a sparse occurrence of mature Eucalypts with minimal Large Old Trees and no recruitment cohorts observed. Trails further to the east (Habitat Zones 25 and 26) return to largely intact Wet Forest with a mature Eucalypt canopy.

Two trails descend from Donna Buang Road to meet the trails in the vicinity of the O'Shannassy Aqueduct; these include Habitat Zones 22–24. The easterly trail (HZ22) is on a sheltered southerly slope and is attributable to Wet Forest. The trail to the west (id 5A) occurs on slightly more exposed slopes where Damp Forest (HZ23) and Shrubby Foothill Forest (HZ24) are the prevailing vegetation types. These sections support highly intact native vegetation with no weed cover although some sections have only sparse occurrences of Large Old Trees.

There is an existing walking track that links Donna Buang Road to the Aqueduct Trail where a number of paths converge at the southern end of the route. There are some notable weed populations in these areas, particularly large populations of Arum Lily \**Zantedeschia aethiopicum*.

### Yuonga Track to O'Shannassy Aqueduct (Map 10 and Map 11)

This section starts from the intersection of Donna Buang Road and Yuonga Track and then departs the track as it winds its way down to Yuonga Road. The trail section that traverses Yuonga Track is not trafficable as native vegetation has fully colonised this area. The entire section supports mature Wet Forest, however, Habitat Zone 27 has a generally low occurrence of Large Old Trees although there are some notable habitat trees (>150 cm in diameter). Once the trail departs the track there is a mix of mature forest with greater density of Large Trees, however, there are also sections containing large Pines further towards the aqueduct.

### Warburton Golf Course (Map 12)

This section starts from O'Shannassy Aqueduct and heading south through the Warburton Golf Course. This section of trail has only received a desktop assessment. There is mapped Wet Forest vegetation located in the northern end of the Golf Course property that is not actively used as part of the golf course. As the trail moves through the Golf Course the vegetation appears to be highly modified with overstorey trees on the edge of fairways.

### Mount Little Joe – Backstairs Track (Map 13 and Map 14)

This section supports generally drier vegetation types compared to the alignment to the north of Warburton Highway. The northern portion of this landscape is on a steep exposed aspect and mostly supports Shrubby Foothill Forest (EVC 45) and in some cases, Herb-rich Foothill Forest (EVC 23). Much of this landscape has experienced numerous fire events since 1939 including wildfires from 1983 (Ash Wednesday) and 1991. Several fuel reduction burns have also been undertaken over the past 10 years between the ridgeline and the Warburton Highway. Many of these areas support immature forests with a low occurrence of Large Trees although the understorey is highly intact.

Gully lines and sheltered aspects at lower elevations support Damp Forest EVC including Habitat Zones 29–31 and 35. These areas are associated with drainage lines and occur on the interface of the township. Consequently, these areas have a notable cover of high threat weeds including Sweet Pittosporum #*Pittosporum undulatum*, Wild Tobacco Tree \**Solanum mauritianum*, Arum Lily \**Zantedeschia aethiopica* and Red Cestrum \**Cestrum elegans*. Other than these areas, the vegetation is virtually weed free.

### Wesburn (Map 15)

This trail section has alignments of trail that generally head west and linking other trail sections. This section of trail has only received a desktop assessment. The mapped vegetation in the area includes Lowland Forest and Shrubby Foothill Forest on the drier ridges and mid-slopes and Riparian Forest and Damp Forest in the wetter gullies. There is a record of Greater Glider within close proximity of the proposed trail.

### Old Warburton Road Region (Map 16 and Map 19)

Most of this region supports highly intact Shrubby Foothill Forest and smaller sections of Damp Forest in sheltered easterly and southerly aspects. Forest age classes vary, and all areas have experienced various degrees of fire intensity and frequency. Although there are notable gaps, most of the determined Habitat Zones support an abundance of Large old trees and smaller habitat trees (i.e. 70% to >100% of the per hectare benchmark for large trees). There are minimal weeds throughout the entire landscape.

### Mount Bride Road and Cumming Spur Track Region (Map 17, Map 20, Map 21, Map 23 and Map 24)

This area supports a mix of Damp Forest and Shrubby Foothill Forest with Wet Forest being confined to sheltered easterly aspects at higher elevations (ASL +750m). State databases indicate that most of

the landscape to the west of Mount Bride Road was logged in the 1980s and while Large Trees are underrepresented across much of this area, native vegetation at all stratas is high in diversity with virtually no weeds present.

There are some significant old habitat trees (>150cm DBH) to the west of Mount Bride Road within areas of Damp Forest. Notably, most of these are Mountain Grey Gum among a relatively sparse canopy with few large old trees. It appears that Mountain Ash may have been the target species during past logging activities while many 100+ year old Mountain Grey Gums have been left.

### Cumming Spur Track East Region (Map 17, Map 18, Map 21, Map 22, Map 24 and Map 25)

This section of trail has only received a desktop assessment. The mapped vegetation in the area includes Shrubby Foothill Forest on the drier ridges and mid-slopes and Damp Forest and Wet Forest in the wetter gullies. The majority of this region occurs within high probability habitat for Leadbeater's Possum.

Two species of Burrowing Crayfish; Curve-tail Burrowing Cray *Engaeus curvisuturus* and Tubercle Burrowing Crayfish *Engaeus tuberculatus* are likely to be found within this section based on records within the broad assessment area and the habitat conditions they favour. It will be important to record any burrow activity along the alignment when this section goes through the detailed assessment.

## 3.2 Habitat hectare assessment

Sixty-nine vegetation quality zones (Habitat Zones) were assessed across the approximately 150 km of the project alignment. Using the Vegetation Quality Assessment (Habitat scoring methodology). The original March 2017 report included over 100 habitat zones assessed in accordance with the *Permitted Clearing Biodiversity Assessment Guidelines* (DEPI 2013). The revised assessment consolidates many of the previously assessed zones and new zones based on the current native vegetation policy and the *Assessor's Handbook* (October 2018). Page 17 of the *Assessor's Handbook* provides the following approach to Vegetation Quality (Habitat Hectare) Assessments (VQA):

'Changes in habitat condition should generally not influence how a habitat zone is defined. In general, a habitat zone should only be split based on the presence of a different EVC, not based on a change in the vegetation condition. However, a Habitat Zone must be split when it cannot be reasonably represented by a single VQA because:

- The condition score (out of 75) varies by at least 15 points
- the extent of the continuous patch of vegetation to be removed is greater than 1 hectare.

Table 3, Table 4, Table 5 and Table 6 on the following pages presents the results of the Habitat hectare assessment.

The newest alignment sections (approximately 30km) that have, to date, only received a desktop assessment were assigned Habitat Zones based on modelled EVCs and vegetation quality scores. This information is what is currently used in Section 4 to assess the potential native vegetation loss and offset requirements. Details of each of the Habitat Zones in the desktop only sections can be found in the Scenario Test Native Vegetation Report Zones 70– 113 in Appendix 11.

**Table 3.** Habitat hectare assessment – Mount Donna Buang East and West

Habitat Zone		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
Bioregion		VALP	VALP	VALP	VALP	VALP	VALP	VALP	HSF	VALP	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
Criteria	Max Score	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC		
		CTR	MWF	CTR	MWF	CTR	CTR	MWF	CTR	WF	WF	WF	WF	WF	WF	WF	WF	WF		
Site Condition	Large Trees	10	5	9	6	10	10	4	5	4	7	5	5	2	3	2	3	5	5	
	Canopy	5	4	4	4	4	4	4	4	5	4	2	4	2	5	3	4	2	4	
	Lack of Weeds	15	13	15	13	13	15	13	13	13	15	13	13	13	13	13	13	13	13	
	Understorey	25	20	20	20	20	15	20	20	20	25	20	20	25	25	20	20	20	20	
	Recruitment	10	3	6	3	3	6	6	6	6	6	10	6	6	3	3	6	6	6	
	Organic Litter	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Sub-total		55	64	56	60	60	57	58	58	67	60	53	58	59	52	55	56	58	
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	7	7	6	7	7	7	7	7	7	7	7	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
	Sub-total		19	19	19	19	19	19	19	19	18	19	19	19	19	19	19	19	19	
Total Habitat Score			74	83	75	79	79	76	77	77	85	84	72	77	79	70	74	75	77	
Habitat Hectare Score /100			0.74	0.83	0.79	0.79	0.78	0.76	0.77	0.77	0.85	0.84	0.72	0.77	0.79	0.70	0.74	0.75	0.77	
Area (Hectares)			2.51	1.73	0.91	1.57	2.46	1.6	1.01	1.48	3.09	4.38	2.31	2.51	2.44	0.64	3.68	1.5	2	

**Table 4.** Habitat hectare assessment – Drop A K South

Habitat Zone		18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
Criteria	Max Score	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC		
		WF	WF	WF	WF	WF	WF	DF	SFF	WF	WF	WF	WF	SFF	DF	DF	DF	SFF	DF	
Site Condition	Large Trees	10	3	2	0	0	5	2	8	7	2	3	7	5	3	3	5	0	4	
	Canopy	5	3	2	2	0	4	4	4	4	2	2	2	2	2	2	4	2	2	
	Lack of Weeds	15	13	7	7	0	15	15	15	15	7	13	7	11	13	13	13	13	13	
	Understorey	25	15	20	20	15	20	15	15	25	15	20	20	15	20	20	25	15	20	
	Recruitment	10	3	6	6	5	6	10	5	6	6	6	6	3	6	6	6	3	10	
	Organic Litter	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	3	3	2	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Sub-total		47	45	43	27	60	56	57	67	42	54	52	46	54	54	63	43	59	
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	7	7	7	7	7	6	6	6	6	6	6	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
	Sub-total		19	19	19	19	19	19	19	19	19	19	19	18	18	18	18	18	18	
Total Habitat Score			66	64	62	45	79	75	76	86	61	73	71	64	72	72	81	61	77	
Habitat Hectare Score /100			0.66	0.64	0.62	0.45	0.79	0.75	0.76	0.86	0.61	0.73	0.71	0.64	0.72	0.72	0.81	0.61	0.77	
Area (Hectares)			19	6.58	10.8	2.57	10.5	2.41	6.7	4.91	1.63	5.32	4.58	0.71	2.13	1.82	3.92	4.3	2.8	



**Table 5.** Habitat hectare assessment – Drop A K East

Habitat Zone		35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
Criteria	Max Score	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC		
		DF	HHRFF	SFF	SFF	SFF	DF	DF	LF	SFF	DF	SFF	SFF	DF	SFF	DF	DF	DF	SFF		
Site Condition	Large Trees	10	5	1	0	5	3	7	9	3	5	7	3	9	8	8	5	3	6	10	
	Canopy	5	4	3	4	4	4	4	5	2	2	4	4	4	5	5	2	4	5	5	
	Lack of Weeds	15	7	13	13	15	15		15	15	15	15	15	15	15	13	15	15	15	15	
	Understorey	25	15	15	15	20	20	25	20	20	25	20	25	25	20	20	25	20	20	20	
	Recruitment	10	6	3	6	6	6	10	6	3	10	6	10	10	6	10	10	6	10	10	
	Organic Litter	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	5	5	5	5	5	5	4	4	5	5	5	5	5	5	5	5	5	5
	Sub-total		47	45	48	60	58	56	65	52	66	62	67	73	64	66	67	58	66	70	
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	6	6	6	6	6	6	6	6	6	6	7	7	7	7	7	7	7	7	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
	Sub-total		18	18	18	18	18	18	18	18	18	18	19	19	19	19	19	19	19	19	
Total Habitat Score			65	63	66	78	76	74	83	70	84	80	86	92	83	85	86	77	85	89	
Habitat Hectare Score /100			0.65	0.63	0.66	0.78	0.76	0.74	0.83	0.7	0.84	0.8	0.86	0.92	0.83	0.85	0.86	0.77	0.85	0.89	
Area (Hectares)			2.8	2.98	1.3	1.57	9.7	2.12	5.55	2.71	1.72	1.21	3.41	0.9	1.73	0.73	4.45	2.77	6.13	3.03	

**Table 6.** Habitat hectare assessment – Mount Tugwell North

Habitat Zone		53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69		
Bioregion		HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF	HSF		
Criteria	Max Score	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC	EVC		
		SFF	SFF	SFF	SFF	WF	SFF	DF	SFF	DF	DF	SFF	SFF	DF	SFF	SFF	SFF	SFF		
Site Condition	Large Trees	10	10	3	3	4	9	10	9	10	6	5	7	8	9	6	8	10	0	
	Canopy	5	5	5	5	5	5	5	5	5	5	4	4	5	4	5	5	5	5	
	Lack of Weeds	15	13	13	13	13	15	13	15	13	13	15	13	15	13	15	15	15	15	
	Understorey	25	20	20	15	20	15	20	15	20	15	20	20	20	20	20	20	20	20	
	Recruitment	10	10	10	6	10	6	10	1	10	1	1	10	10	3	10	10	10	10	
	Organic Litter	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Logs	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
	Sub-total		<b>68</b>	<b>61</b>	<b>52</b>	<b>62</b>	<b>60</b>	<b>68</b>	<b>55</b>	<b>68</b>	<b>50</b>	<b>55</b>	<b>64</b>	<b>68</b>	<b>59</b>	<b>66</b>	<b>68</b>	<b>70</b>	<b>60</b>	
Landscape	Patch Size	10	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	
	Neighbourhood	10	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
	Distance to Core	5	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	
	Sub-total		<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	<b>19</b>	
Total Habitat Score			<b>87</b>	<b>80</b>	<b>71</b>	<b>81</b>	<b>79</b>	<b>87</b>	<b>74</b>	<b>87</b>	<b>69</b>	<b>74</b>	<b>83</b>	<b>87</b>	<b>78</b>	<b>85</b>	<b>87</b>	<b>89</b>	<b>79</b>	
Habitat Hectare Score /100			0.87	0.8	0.71	0.81	0.79	0.87	0.74	0.87	0.69	0.74	0.83	0.87	0.78	0.85	0.87	0.89	0.79	
Area (Hectares)			0.62	11.4	0.92	1.72	0.98	1.24	0.75	0.9	0.62	0.32	2.71	6.02	1.2	3.16	5.56	1.63	0.36	

### 3.3 Flora

A total of 190 plant species were recorded in the study area during the survey including 171 that are indigenous and 19 are introduced or naturalised outside their natural range. Appendix 5 lists all flora recorded within the study site. Table 6 summarises plant taxa recorded during surveys within the assessment corridor.

**Table 7.** Summary of plant species recorded

Flora Status	Number of Taxa
Indigenous vascular species	171
Exotic species	18
Native species outside of natural range	1
<b>TOTAL</b>	<b>190</b>

#### 3.3.1 State or nationally significant flora

The presence of 2 rare Victorian threatened flora species was confirmed. Numerous occurrences of Tree Geebung *Persoonia arborea* were identified towards the summit, although no specimens were found to occur directly within the trail alignment or assessment corridor. A small population of Long Pink Bells *Tetralochea stenocarpa* was identified within habitat zone 45 and 52 (Map 20 and Map 21 of Appendix 2). The locations were flagged and mapped with a GPS and it is likely that direct impact to this species can be avoided.

It is also possible that numerous populations of Powelltown Correa *Correa reflexa* var. *lobata* persists within the Mount Tugwell area where sites have recently experienced wildfire and prescribed burns. These plants were mostly immature (regrowth from bushfire) and no flowering parts were found. Without flowering parts, Powelltown Correa is difficult to distinguish from its common counter-part *Correa reflexa* var. *reflexa*. While these species are rare to Victoria, they do not have any legislated protection under the FFG or EPBC Act, however they are considered under the Biodiversity Assessment Guidelines in the context of Habitat Importance Maps (Section 4.4).

Habitat modelling produced by DELWP (DEPI 2013b) includes 21 additional significant flora species that potentially occur in the assessment corridor. Location records were obtained from the Victorian Biodiversity Atlas (VBA) for the relevant species within a 5-kilometre radius of the subject site. Appendix 5 details these species with regard to habitat requirements, local VBA records and likelihood of occurrence within the subject site.

Threatened flora species, that to date haven't been observed, but have a moderate to high likelihood of occurring (Appendix 6) include Round-leaf Pomaderris *Pomaderris vacciniifolia*, Slender Tree-fern *Cyathea cunninghamii*, Skirted tree-fern *Cyathea x marcescens* and Fairy Lanterns *Thismia rodwayi*.

Although only 2 threatened flora species were identified during assessments undertaken for this study, this does not mean other locations of threatened species do not occur within the indicative

trail alignment as identification of some species has seasonal limitations (e.g. Naked Beard-orchid *Calochilus imberbis* and Fairy Lanterns *Thysmia rodwayi*). At this stage with the survey work conducted, the assessment corridor does not support any nationally threatened flora species listed under the EPBC Act.

### 3.3.2 Observations of High Threat Weeds

High threat weeds were notably sparse throughout the majority of the assessment corridor. During ground truthing assessments, locations of high threat weeds were mapped. In locations where weed cover was minimal (i.e. less than 5% cover), the main weeds identified were small areas of Blackberry *\*Rubus fruticosus spp. agg.* patches of Ragwort *\*Jacobaea vulgaris* and Foxglove *\*Digitalis purpurea*. These were observed in areas of sparser canopy where there was enough light to penetrate the forest floor.

Scattered woody weeds were observed in the vicinity of high use areas (existing public trails or adjacent to open spaces). Species observed included Sweet Pittosporum *#Pittosporum undulatum*, English Holly *\*Ilex aquifolium*, Wild Tobacco Tree *\*Solanum mauritianum*, Japanese Honeysuckle *\*Lonicera japonica*, Arum Lily *\*Zantedeschia aethiopica* and Red Cestrum *Cestrum elegans*.

### 3.3.3 Habitat Trees

A total of 1503 trees were mapped that are potential habitat trees for Leadbeater's Possum, Greater Glider or for forest owls (such as the Sooty Owl and Powerful Owl) and other dependent fauna. The range of trees recorded include:

- **Pre-1900 living trees** (estimated to be greater than 120cm diameter) of which all are considered to be suitable habitat for LBP.
- **Smaller habitat trees** defined as trees less than 120cm diameter with visible hollows
- **Other hollow bearing trees** of various size classes in lower probability Leadbeater's Possum habitat that exhibit hollows suitable for a range of owl species and other hollow dependent fauna
- **Other Large Trees**; while no hollows were visible, these may provide suitable habitat hollows in the present or near future

The location, size category, condition (dead or alive) and species of each tree was recorded and is maintained within the project database. Hollows were noted for each tree where observed. Appendix 3 (Map Series 2) illustrates locations where there is a high density of significant trees. Protection of significant trees is further detailed in section 5 of this report.

### 3.4 Fauna

No detailed fauna surveys were undertaken during this study. The main focus of the fauna assessment was the consideration of the assessment area to potential to provide fauna habitat. The habitat observed within the assessment area included:

- 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
- large fallen logs that are hollow or concave

Vegetation throughout the assessment area provides high-quality fauna habitat for hollow dependent fauna due to the abundance of medium and large old trees and or dead stags including trees with a range of hollow sizes suitable for a diverse array of dependent fauna species. There is high habitat connectivity across the landscape for foraging.

The dense midstorey provides suitable nesting and foraging habitat for a range of small bird species. Most of the assessment area supports a consistent cover of leaf litter and large fallen logs, and in some area's grassy tussocks, that is ideal habitat for smaller fauna species such as small mammals, birds, reptiles, frogs and invertebrates.

#### State or nationally significant fauna

No fauna of state or national significance was recorded during the site inspections. However, the regionally significant Koala *Phascolarctos cinereus* was recorded at Mount Tugwell in the vicinity of 'Little Joe Climb'.

Habitat modelling produced by DELWP includes eleven significant fauna species that potentially occur in the assessment area. Appendix 7 detail these species with regard to habitat requirements, local VBA records (within 5 km of the subject site) and likelihood of occurrence. Appendix 8 includes assessment of significant impacts to nationally listed fauna for those species that have a moderate to high likelihood of occurring in the study area.

Of the eleven species included in DELWP habitat modelling, the following were considered to have a high likelihood of occurring in the study area:

- Leadbeater's Possum *Gymnobelideus leadbeateri*
- Lace Monitor *Varanus varius*
- Eastern Horseshoe Bat *Rhinolophus megaphyllus*
- Powerful Owl *Ninox strenua megaphyllus*

- Grey Goshawk *Accipiter novaehollandiae*
- Masked Owl *Tyto novaehollandiae*
- Square-tailed Kite *Lophoictinia isura*
- Sooty Owl *Tyto tenebricosa tenebricosa*

The local area supports numerous habitat trees suitable as nesting or roosting habitat for Leadbeater's Possum, owls and raptors, and microbats. The forested area present in the study area provides extensive foraging habitat for all these species.

Two of the remaining species (Australian Grayling *Prototroctes maraena* and Chestnut-rumped Heathwren *Calamanthus pyrrhopygius*) are considered to have a low likelihood of occurrence within or near to the assessment area based on a combination of factors including lack of suitable habitat and lack of local records. Suitable habitat is present for the Smoky Mouse *Pseudomys fumeus* and has a moderate likelihood of occurrence, although the species has a patchy distribution in Victoria and there are no local records.

An additional 29 species state or national significance (Scheduled in DSE 2013) were assessed as to their likelihood of occurrence (Appendix 8) because of sightings made within 5 km of the subject site, or EPBC-listed species that were predicted to occur based on the results of the Protected Matters Search Tool. The EPBC-listed Grey-headed Flying Fox *Pteropus poliocephalus* and Swift Parrot *Lathamus discolor* have a medium likelihood of occurrence, although both species are likely to only be transient individuals foraging through the area during long-distance dispersal. There is a high likelihood of the EPBC listed Southern Brown Bandicoot *Isodon obesulus obesulus* occurring on the subject site. Other FFG-listed species with a high likelihood of occurrence including Common Bent-wing Bat *Miniopterus schreibersii*, Brush-tailed Phascogale *Phascogale tapoatafa* and Barking Owl *Ninox connivens connivens*.

The Curve-tail Burrowing Cray *Engaeus curvisutus* and Tubercle Burrowing Crayfish *Engaeus tuberculatus* are both likely to occur within the trail alignment areas that have only currently had a desktop assessment (Map 17, Map 18, Map 21, Map 22, Map 24 and Map 25)

### 3.4.1 General Fauna Observations

The majority of the proposed trail (and sections of existing trail), traverses' intact remnant native vegetation. The presence of many older trees with small to large hollows indicates high likelihood to support tree hollow-dependent fauna, potentially including threatened fauna such as Leadbeater's Possum, Brush-tailed Phascogale, Spot-tailed Quoll *Dasyurus maculata*, Sooty Owl *Tyto tenebricosa*, Barking Owl, Powerful Owl, and Lace Monitor. In more swampy areas supporting plants such as Sword-sedges and Tea-tree, there is a potential for Swamp Skink *Lissolepis coventryi* to be present.

Where the vegetation is highly diverse in species composition and complexity, the habitat is likely to support greater variety of fauna, particularly where there is a dense undergrowth, presence large logs and/or rocks/boulders. Although there are some more open areas, which resemble more of

a woodland type (e.g. as a result of past logging or past Pine plantations), these areas are important for more woodland specialist fauna (including Barking Owl, and a range of woodland birds).

A large number of bird species were observed during trail habitat assessments. Common Wombat *Vombatus ursinus* dens and droppings were encountered frequently, as were freshwater burrowing cray 'chimneys' near watercourses and Lyrebird *Menura novaehollandiae* display mounds. Swamp Wallaby *Wallabia bicolor* and Eastern Grey Kangaroo *Macropus giganteus* droppings were occasionally observed. Several bird nests were detected within the understorey and canopy, as were Common Ringtail Possum *Pseudocheirus peregrinus* dreys. Skinks were observed in many areas of good organic litter cover within proximity of logs and/or rocks.

In regard to exotic/pest fauna species, there were definite signs of the presence of foxes and rabbits in particular through incidental observations of scats, tracks, remains of bird kill and tree-rubs.

Scats from Sambar Deer *Rusa unicolor* were identified and were sighted on several occasions within the Yarra State Forest. Deer and foxes are a particular issue, as they tend to move through the landscape on formed tracks and would likely use a mountain bike trail for their ease of use. Increasing accessibility of deer could impact the adjacent habitat by increasing spread of weeds and grazing pressure which in turn will reduce recruitment of indigenous vegetation, trampling/pugging of watercourses impacting water quality, and damaging trees through heavy browsing and/or rubbing of basal trunk bark. Increasing accessibility of foxes will likely impact small to medium fauna which are likely to be preyed upon.

## 4. IMPLICATIONS FOR NATIVE VEGETATION REMOVAL UNDER CLAUSE 52.17

This section addresses the proposed native vegetation impacts associated with this permit application. A permit is required to remove native vegetation as outlined in the Native Vegetation Clause 52.17 of the planning scheme and detailed in the *Guidelines for the removal, destruction and lopping of native vegetation* (DELWP 2017a).

The purpose of clause 52.17 and ‘the Guidelines’ is to ensure a no net loss to biodiversity as a result of removal or loss of native vegetation. This is achieved in three steps:

1. Avoid the removal, destruction or lopping of native vegetation
2. Minimise impacts from the removal where native vegetation cannot be avoided and,
3. Provide an offset to compensate for the biodiversity impact if a permit is granted

### 4.1 Assessment Category

An application to remove, destroy or lop native vegetation must be classified as one of the following assessment categories:

- basic
- intermediate
- detailed

The application requirements and decision guidelines in Clause 52.17 must be applied in accordance with the relevant assessment category.

To determine the assessment category, two factors are considered in relation to the native vegetation proposed to be removed:

- the location categories (shown in the location maps a location 1, 2 or 3)
- the extent of proposed native vegetation removal

**Table 8.** Determining the location category

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



Source: Table 3, *Guidelines for the removal, destruction or lopping of native vegetation* (DELWP 2017a)

### 4.1.1 Location category

The location category has been determined for all of Victoria. Native vegetation will be in either location 1, 2 or 3 as outlined below

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

The vegetation to be removed includes location 3. If more than one location risks apply to vegetation proposed for removal the higher number is to be applied to the application. Therefore, the application is in the ‘Detailed’ category.

The DELWP mapped wetland layer does not intersect with any areas of the alignment.

### 4.1.2 Extent of impact from proposed development

As outlined in ‘The Guidelines’, an application must consider:

- the proposal and all buildings and works that could impact on existing native vegetation, including mapped wetlands.
- Consider any ancillary uses, utilities, access and earthworks associated with the use or development and any defensible space requirements.
- The full extent of native vegetation removal must be considered.
- Assumed losses account for indirect loss of native vegetation for example, encroachment into tree protection zones, loss from changed water flows and shading.

The following sections provide preliminary discussion in relation to these requirements.

## 4.2 Biodiversity loss from the proposed development

At this stage, biodiversity loss associated with this proposal is based on the following:

- The construction width of the mountain bike trail is 1.2 metres. Areas of impact beyond the trafficable width would vary across the alignment based on the various treatments required (e.g. switchbacks, bench cuts, gully crossings, barriers, anchoring points and construction access requirements. It is estimated that (on average) a 2m wide transect accounts for the impact.
- A 50% loss of vegetation assessed in habitat hectares due to:

- No impact or removal of canopy or sub-canopy trees
- Partial impact to understory (throughout the majority of the alignment, no shrubs or understory tree would require removal)
- No loss to habitat connectivity that would affect ‘patch size’ neighbourhood’ or ‘distance to core’ scoring

The estimated impacts are based on the following assumptions and principles:

- There may be minimal or no construction impact beyond the 1.2 metre trafficable width in locations where the natural grade is relatively even (between 0° and 5°) and no significant earthworks are required.
- There may be greater construction impact where the trail traverses’ steeper areas where excavation would be required to create a level grade. This includes steeper slopes (10° to 30°) where switchbacks are required (e.g. south of Donna Buang Road and the north face of Mount Little Joe) or where a crosscut may be required across the steepest locations (e.g. the areas west of Hooks Road).
- While there are a range of engineering solutions available to minimise construction impacts, any areas that cross gully lines and ephemeral drainage lines are expected to have an impact greater than the standard trafficable width, unless an elevated platform is installed. Low-level boardwalks will be installed at all defined water courses, in compliance with Melbourne Water requirements.

With the above principles in mind, it is important to distinguish between direct impacts (within the works footprint) and indirect impacts from development projects. For example, while the width of the trail is unlikely to significantly encroach on a Tree Protection Zone of a large tree, the alignment would need to ensure that damage to the structural root zone of significant trees are avoided. For example, a large to very large old tree (between 100–150cm DBH) would need a setback of 2–3 metres from construction works to avoid potential damage to structural root zones unless there is a demonstrated construction solution.

### 4.3 Avoiding and Minimising impacts to biodiversity

This type of proposal aims to bring the experience of mountain biking into a significant landscape to enhance the user experience and provide recreational opportunities that will promote tourism and economic growth to the region. In this context, the loss of vegetation cannot be avoided and considerations to minimise impacts within this landscape is limited to re-alignments of the trail to reduce impacts to the highest biodiversity values (e.g. direct impacts to threatened species or reduced impacts to endangered vegetation types) or to reduce impacts through detailed design and construction mitigation. A Risk Assessment Matrix is provided in Appendix 4 to address various siting, design and construction measures to minimise environmental impacts. This matrix is based on the current *Environmental Protocols* (Appendix 10) developed by the project working group.

Prior to the development of the Environmental Protocols, there have been a range of considerations that have sought to minimise biodiversity impact during the planning stages thus far including:

- Establishment of a range of assessment procedures and discussion of design and construction solutions as negotiated with Yarra Ranges Council, DELWP and Parks Victoria. This process has sought to avoid impacts to significant biodiversity values such as Leadbeater’s Possum habitat and Cool Temperate Rainforest.
- Identification of significant trees and threatened species during ground truthing and identifying opportunities to avoid or reduce impacts within the 20-metre corridor.

It is also acknowledged that during ground truthing, significant realignments were made to avoid Cool Temperate Rainforest compared to the preliminary trail alignment. While Cool Temperate Rainforest cannot be completely avoided to the north of Donna Buang Road, the alignment attempts to locate the trail close to road upon descent from the Summit, except for steeper gullies within rainforest areas that would otherwise necessitate more earthworks.

Extensive areas of Cool Temperate Rainforest occur between Donna Buang Road and the Ben Cairn Area (refer to Map 1–4). Inspections of these locations to the north of the current trail alignment confirmed the presence of Cool Temperate Rainforest even though it is not represented in the EVC modelled data sets. The original trail alignment (as circulated in September 2017) traversed this highly sensitive landscape. From Habitat Zone 1–8 (where Cool Temperate Rainforest could not be avoided), the revised trail route opted for an alignment close to the road all the way through to its departure from the road as the trail heads south. This alternative substantially avoids Cool Temperate Rainforest compared to the original alignment.

The planning process is to include a *Construction and Environmental Management Plan* (CEMP). As a minimum, items to be addressed in the CEMP are to include:

- mitigation measures to be implemented during operation phase – e.g. minimising spread of pathogens (Myrtle Wilt), litter, weeds etc.
- Specific mitigation measures developed for listed species or communities.
- Risks, impacts and mitigation measures considered should be for both the construction and operation phase of the project.

## 4.4 Biodiversity impacts and offset requirements

In order to assess the biodiversity impact and offset requirements information from both the ground-truthed alignments (approximately 150km) and the desktop only assessed alignments (approximately 30 km) were combined.

A Native Vegetation Report (NVR) ‘test scenario’ utilising Ensym software (the approved method provided by DELWP) was undertaken for the 180km of assessed trail. It is important to note that a new Scenario Test based on the actual impacts relating to the desktop only sections would be required once these areas receive the detailed ecological assessment.

This preliminary NVR report (Appendix 11) indicates the following offset requirements:

Offset Type	Species Offsets
Offset Amount	17.173 SHU's Brickmaker' Sedge <i>Gahnia grandis</i>
	17.588 SHU's Long Pink Bells <i>Tetradthea stenocarpa</i>
	11.347 SHU's Fairy Lanterns <i>Thismia Rodwayi</i>
	7.267 SHU's Mountain Bird Orchid <i>Chiloglottis jeanesii</i>
	17.421 SHU's Powelltown Correa <i>Correa reflexa var. lobata</i>
	9.223 SHU's White Star-bush <i>Asterolasia asteriscophora subsp. albiflora</i>

### Offset Implications

Offsets for threatened species are based on *Habitat Important Maps*, which are managed by DELWP. These maps indicate the importance of locations as habitat for a particular rare or threatened species based on modelled data. Where a proposal determines that native vegetation removal will have an impact on equal or greater than 0.005% of the mapped range for a rare or threatened species, an equivalent offset is required for that species within the same habitat type. Based on the current 'test scenario', there are six threatened species that require *Species Offsets* shown below:

- Fairy Lanterns *Thismia rodwayi*
- Long Pink-bells *Tetradthea stenocarpa*
- Powelltown Correa *Correa reflexa var. lobata*
- Brickmaker's Sedge *Gahnia grandis*
- Mountain Bird-orchid *Chiloglottis jeanesii*
- White Star-bush *Asterolasia asteriscophora subsp. albiflora*

During the original assessment in early 2017, it was predicted that the project would trigger an offset requirement for the Mount Donna Buang (MDB) Wingless Stonefly *Riekoperla darlingtonia*. Habitat importance mapping and the native vegetation policy has since been revised by DELWP and it appears unlikely that specific offsets would be required for (MDB) Wingless Stonefly or other threatened fauna species.

## Offsetting Strategy

Attainment of a biodiversity offsets can be either:

- First party – located on land owned by the landholder who is proposing to remove the native vegetation
- Third party – located on land owned by a third party (through the native vegetation credit register)

A report on available Species Habitat Units on the Native Vegetation Credit Register as of the 11/12/2019 demonstrates that all SHU requirements are available for purchase (Appendix 12). This means that it is feasible for Third Party Offsetting to achieve the potential offset requirements for this project. It is important to note that field assessed data for the desktop assessed only trails may change the requirements. However, it is unlikely to be a significant change.

The project team is also investigating suitable first party offset sites on either Crown Land or private land in the Warburton area and often close to the proposed trail alignment in order to consider a local offset if possible.

### 4.4.1 Offset Arrangements on Crown Land

The *Procedure for the removal, destruction or lopping of native vegetation on crown land* (DELWP 2018) outlines the following steps for ‘New Removal of Native Vegetation’

- **Step 1:** Consider if native vegetation removal impacts on important biodiversity values
- **Step 2:** Avoid and minimise impacts on native vegetation
- **Step 3:** Record and report native vegetation; DELWP and Parks Victoria will record the amount of new native vegetation removal. This information will be collated at a statewide level, and annually reported to the Secretary to DELWP.

### Offset options on Crown Land

The loss of biodiversity value through new removal of native vegetation on Crown land is counterbalanced with corresponding improvements to native vegetation and biodiversity resulting from actions undertaken by DELWP or Parks Victoria. Table 8 outlines options for this approach.

**Table 9.** Improvements to native vegetation from counterbalancing activities

<b>Increase in condition</b>	Works that improve condition of native vegetation or biodiversity. For example, managing for weeds or discontinuing allowed fire wood collection improves the condition of native vegetation, or managing for pest animals provides an improved outcome for a threatened species, and therefore biodiversity.
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<b>Increase in extent</b>	Increase in the extent of native vegetation relates to increases in the area of Crown land that is covered by native vegetation. For example, acquiring freehold land that includes native vegetation and managing it for conservation, or revegetating an area of existing Crown land.
<b>Increase in security</b>	An increase in security is achieved by changing the land status or land use to one that manages the native vegetation to a higher conservation standard. For example, changing the reserve status of a State forest to one where native vegetation is managed for conservation, or removing a licence from an area of land that currently allows a degrading land use, such as grazing. Increasing security can provide benefits for biodiversity beyond native vegetation by providing increased protection for all kinds of habitats.

## 4.5 Offset site eligibility

Whether offsets are achieved on the same land parcels as the impact site or provided as a ‘Third Party’, there are particular criteria that a site must comply with to be eligible as an offset (DEPI 2013b). A site that is not eligible cannot be used as an offset. The eligibility criteria are detailed and assessed in Table 9.

**Table 10.** Site eligibility criteria

Eligibility criteria	Details
<b>Current land use and future land use</b>	<p>Current and future land use(s) must be compatible with managing the native vegetation for conservation. Incompatible current and future land use may include:</p> <ul style="list-style-type: none"> <li>- fuel reduction activities requiring removal of logs or trimming/clearing of understorey plants or trees</li> <li>- horse-riding, cycling or motorised vehicle use of established tracks</li> <li>- infrastructure easements</li> <li>- areas identified for other uses that are incompatible with managing native vegetation for conservation. This includes those with a public acquisition overlay for creation of a road or with approval to undertake activities that will damage native vegetation</li> <li>- other ongoing land uses that are likely to degrade vegetation condition or restrict improvement in vegetation condition.</li> </ul>

Eligibility criteria	Details
<b>Existing offsets or existing agreements</b>	<p>An area of native vegetation is eligible to be an offset if the native vegetation to be protected is:</p> <ul style="list-style-type: none"> <li>- not already being used to offset other clearance of native vegetation or species habitat required under Victorian or federal legislation</li> <li>- not subject to a current agreement or initiative to generate carbon credits</li> <li>- not subject to a current agreement under a biodiversity or native vegetation related incentive or grant program to undertake actions which are equivalent to the commitments specified in Section 4.</li> <li>- An area of land is eligible if it was formerly subject to an agreement and the agreement period has expired.</li> </ul>
<b>Threats to native vegetation condition</b>	<p>An area of native vegetation is eligible to be an offset if the landowner can control significant threats to the condition of the native vegetation. Such threats include those associated with:</p> <ul style="list-style-type: none"> <li>- high levels of continued nutrient run off</li> <li>- secondary salinity with a high likelihood of the effect increasing</li> <li>- continuing significant erosion which is uncontrollable without affecting native vegetation</li> <li>- significant invasion from pest animals such as rabbits, deer, goats and pigs</li> <li>- extensive die-back or other plant diseases</li> <li>- planned disturbance regimes incompatible with native vegetation objectives such as fuel reduction burning or flooding.</li> <li>- lack of, or inappropriate flooding regime</li> <li>- highly invasive weeds that are difficult to control at a site level.</li> </ul>
<b>Security (Freehold Land)</b>	<p>Entering into a security agreement with a relevant statutory body that:</p> <ul style="list-style-type: none"> <li>- contains a legally enforceable provision</li> <li>- has no termination date</li> <li>- is recorded on the land title</li> <li>- contains a site management plan.</li> </ul> <p>Agreements that can comply with these requirements include:</p> <ul style="list-style-type: none"> <li>- an agreement with DELWP under section 69 of the <i>Conservation Forest and Lands Act 1987</i></li> <li>- an agreement with a responsible authority under section 173 of the <i>Planning and Environment Act 1987</i> (not available for third party offsets)</li> <li>- an agreement with Trust for Nature as an offset covenant under Section 3A of the <i>Victorian Conservation Trust Act 1972</i>.</li> </ul>
<b>Minimum management requirements</b>	<p>For an area of native vegetation to be eligible, the landowner must agree to the inclusion of minimum, ongoing commitments as detailed in a 10-year management plan.</p>

Eligibility criteria	Details
<b>Managing bushfire risk of offset sites</b>	<p>Managing an offset site for conservation objectives may be in conflict with managing native vegetation to reduce the risk to life and property from bushfire. To eliminate this conflict all offset sites must meet the following eligibility requirements in relation to managing bushfire risk. An offset cannot be established within:</p> <ul style="list-style-type: none"> <li>- 150 metres of a dwelling<sup>5</sup> or any area (building envelope) to be used as a dwelling in the future if the dwelling or area is within a Bushfire Management Overlay (BMO)</li> <li>- 50 metres of a dwelling or any area (building envelope) that will or may be used as a dwelling in the future, when the dwelling or area is not within a BMO.</li> <li>- The distance can be reduced if the landowner or manager of the offset site has written approval from the Country Fire Authority, or relevant fire authority as defined by the planning schemes, that this distance can be safely reduced.</li> </ul>
<b>Revegetation</b>	<p>Revegetation must be done in accordance with the DELWP minimum planting. Revegetation of native vegetation must meet the following eligibility requirements to be an offset:</p> <ul style="list-style-type: none"> <li>- revegetation must be for a woody vegetation type</li> <li>- revegetation offset sites must meet the following size requirements: <ul style="list-style-type: none"> <li>- for revegetation not abutting a patch of native vegetation the area of revegetation must have an area to perimeter ratio of at least 20</li> <li>- for revegetation abutting a patch of native vegetation the combined area of revegetation plus adjacent patch of native vegetation must have an area to perimeter ratio of at least 20.</li> </ul> </li> <li>- The area to perimeter ratio is calculated by dividing the area (metres squared) by the perimeter (metres).</li> </ul>



## 5. ENVIRONMENTAL RISK AND IMPACT MITIGATION

This section provides an overview of the development proposal and discussion of mitigation methods during design and construction. Although there are limitations at this stage of the project, it is important to realise that the current proposed trail alignment is indicative only and just the starting point. Once a general alignment is approved, the project team will work towards a more detailed design and construction process with the objective of further avoiding and minimising significant ecological values.

### 5.1 Environmental Mitigation

Environmental protocols (Appendix 10) were developed by Yarra Ranges Council, DELWP, Parks Victoria, project consultants and regional experts. The aims and principles of the current protocols are summarised below:

1. Special Protection Zones (SPZs), including Leadbeater's Possum (LBP) habitat, Cool Temperate Rainforest, known locations of Mount Donna Buang Stonefly and historic and recreational sites should be avoided.
2. 200m radius timber harvesting exclusion zones (buffers) for LBP should be avoided.
3. Clusters of LBP records should be avoided as this indicates good habitat.
4. In areas of LBP habitat, as indicated by SPZs, timber harvesting exclusion zones, areas of >65% habitat mapping, clusters of records or observation of habitat, the canopy of the forests must not be opened and must remain contiguous. Mid-storey canopy must also be maintained and no overstorey trees can be removed.
5. If any of the above principles cannot be strictly applied, then it will be necessary to ensure that the trail alignment will have an appropriate setback from any hollow-bearing tree or known LBP nest tree. Potential LBP habitat or nesting trees will be generally considered as dead stags >40 DBH and pre-1900 living trees (greater than 120cm diameter).
6. Australian National University LBP monitoring plots should be avoided, and a 200-m buffer applied from the centre of the plot.
7. A 50-m buffer is required around identified roosting trees and nesting trees for large forest owls including Sooty Owl, Powerful Owl, Barking Owl, or as advised by a suitably qualified ecologist. Roosting trees with whitewash will be targeted during ground-truthing searches.
8. Threatened flora species records and ecological communities mapped along the proposed trail corridor should be avoided. This includes species and ecological communities listed under the Flora and Fauna Guarantee Act 1988 (FFG) (in particular, Cool Temperate Rainforest), Victorian Advisory List (VROT) and Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act).

9. During site assessments, occurrence or habitat suitability for threatened flora and fauna species included though not limited to:
- Round-leaf Pomaderris *Pomaderris vacciniifolia*
  - Powelltown Correa *Correa reflexa var. lobata*
  - Slender Tree-fern *Cyathea cunninghamii*
  - Toothed Leonema *Leonema bilobum subsp. serrulatum*
  - Tree Geebung *Persoonia arborea*
  - Forest Phebalium *Phebalium squamulosum subsp. squamulosum*
  - Forest Sedge *Carex alsophila*
  - Naked Beard-orchid *Calochilus imberbis*
  - Leadbeater's Possum *Gymnobelideus leadbeateri*
  - Southern Brown Bandicoot *Isodon obesulus obesulus*
  - Lace Monitor *Varanus varius*
  - Brush-tailed Phascogale *Phascogale tapoatafa tapoatafa*
  - Southern Myotis *Myotis macropus*
  - Greater Glider *Petauroides volans*

### 5.1.1 Considerations and Limitations of the Assessment Protocols

As outlined in Appendix 10, a range of protocols have been established by the project working group in an attempt to minimise environmental impact. This section provides responses to the objectives listed above and how this has informed the current environmental protocols.

#### Item 1 – Special Protection Zones

**Premise:** Special Protection Zones include Leadbeater's Possum (LBP) buffer habitats, Cool Temperate Rainforest, known locations of Mount Donna Buang Stonefly and historic and recreational sites.

#### Response

- a) Cool Temperate Rainforest cannot be completely avoided within the current context of the trail alignment. Although re-alignments to the trail have avoided some substantial areas of rainforest, ground truthing has determined that the extent of rainforest is much greater than the EVC modelled dataset suggests. Melbourne Water requirements to minimise incursions into the Maroondah Water Catchment (see map 1 to 4 – Appendix 1) further limited

opportunities to avoid sections of rainforest, however the current alignment is generally sited closer to the road (within an area of previous disturbance) compared to the original alignment and therefore preferable. In some cases, the current alignment is a result of the trail being deviated either closer or further from the road to avoid areas of Cool Temperate Rainforest where there was a practical opportunity.

- b) The alignment of the trail is not within known locations of Mount Donna Buang Stonefly and not within any designated buffer zones (refer to Map 1 – Appendix 1). However, there is still concern regarding the potential threats to these vulnerable populations based on direct or indirect impacts from construction of the trail. The project working group is continuing to work with Mount Donna Buang Stonefly experts to minimise potential impact to the species and their habitats
- c) Separate to this document, a heritage study is being prepared to inform of any significant heritage values in the context of the proposal.

### Item 2 – Timber harvesting exclusion zones for Leadbeater’s Possum

No timber harvesting exclusion zones occur within the proposed alignment.

### Item 3 – High Probability Leadbeater’s Possum Habitat

**Premise:** Where possible, avoid >65% habitat probability for LBP. If it cannot be avoided, detailed ground truthing with a suitably qualified ecologist (with LBP expertise) will be required to ensure the alignment does not impact on LBP habitat.

#### Response

The Overview Map (Appendix 1) shows that a substantial portion of the assessment area from the summit through to the Platts Creek area is included in the High Probability Habitat layer. The alignment does not avoid these areas, however, protocols detail how the alignment can minimise impacts on habitat components within this broad area.

### Item 4 – Locations of previous Leadbeater’s Possum records

**Premise:** Clusters of LBP records should be avoided as this indicates good habitat.

#### Response

The trail corridor is within some locations of Leadbeater’s Possum nest boxes and sightings as documented in the Victorian Biodiversity Atlas (VBA). Given the known populations in the vicinity of Mount Donna Buang Road, these records represent under sampling. The VBA records tend to be congregated near Mount Donna Buang Road as they provide convenient access for monitoring locations.

The project working group is continuing to work with DELWP and LBP experts to minimise potential disturbances to the species and their habitats.

### Item 5 – Retention of canopy and midstorey to maintain Leadbeater’s Possum habitat

**Premise:** The canopy of the forests must not be opened. Mid-storey canopy must also be maintained. All canopy vegetation must remain contiguous. Overstorey trees must not be removed.

**Response:**

It is a commitment of the project team that no sub-canopy, midstorey or canopy species would require removal to accommodate the trail throughout trails north of the Warburton Township. The sub-canopy is sparse enough throughout these areas and any trees in this stratum (e.g. Silver Wattles, Blackwood’s and immature Eucalypts) are easy to avoid.

However, some sites around Mount Little Joe exhibit a much greater density of midstorey which is in part due to the recent fire history, however this does not generally include sub-canopy, rather, it includes small trees and shrubs less than 10m height. It would appear that some small shrub/tree species (ranging from 10–20cm in diameter) will require removal in some selected locations given the density of vegetation although sub-canopy will be retained. Although these areas provide some habitat requirements for the Leadbeater’s Possum, this area is not considered high probability habitat and there are no confirmed populations in these locations.

### Item 6 – Leadbeater’s Possum Nest Trees

**Premise:** During the ground truthing, any potential LBP nest trees outside of the 200 m radius timber harvesting exclusion zones should be identified and avoided. This includes all hollow-bearing trees, both dead and alive. A 50m buffer should apply around any potential LBP hollow bearing nest tree.

**Response:**

During various meetings with Stakeholders and personnel from the ANU, Parks Victoria and DELWP, it was agreed that trees to be avoided (i.e. suitable nest trees for Leadbeater’s Possum) were to include:

- Any pre-1900 tree (e.g. Eucalypts that were spared during any subsequent logging operations). Trees in this category are assumed to be greater than 120cm DBH.
- Any dead tree that appears to provide suitable nesting hollows
- Any sub-canopy trees

Due to the abundance of pre-1900 trees and other large habitat trees within the assessment corridor, with most Eucalypt dominated Habitat Zones reaching at least 50% of the optimum benchmark, a 50m buffer from potential nest trees is impossible to avoid in many locations.

On the advice of DEWLP and other experts on the species, the importance of avoiding sub-canopy trees is the highest priority for protecting LBP Habitat. The Leadbeater’s Possum is not a gliding species; therefore, it is highly dependent on a continuous sub-canopy for its mobility between mature

Eucalypts. No canopy or sub-canopy trees will require removal to facilitate the construction of the trail.

While a 10-metre or greater setback from nest boxes or habitat trees is a primary aim of siting the final trail alignment, avoiding the general vicinity of nest boxes or habitat trees was not seen as the primary concern given that:

- The LBP are a nocturnal species and the activity of Mountain Bikers will occur during the day
- The LBP only rarely venture within 10 metres of ground level, therefore ground-based disturbance is not likely to significantly impact the species, providing that no standing trees are removed.

While many suitable nest trees occur within the alignment (and in most cases, would occur no matter where the alignment may be re-directed), the alignment does avoid the majority of LBP nest boxes that are established as a part of an ongoing monitoring program. Of the 23 nest box locations, only 2 occur within the trail alignment (within Habitat Zone 1 – see Map 1, Appendix 1). During the final alignment setting, the impacts to the two nest box sites could be mitigated.

Siting further north of the Donna Buang road would have led to greater impacts including:

- Significant encroachments into Cool Temperate Rainforest
- encroachments into small gullies and drainage lines
- Encroachment into areas of high-density habitat trees (dead trees and pre-1900 trees)
- Potential encroachment into the sub-canopy trees that provide critical bridging habitat for LBP.

### Protocol 7 – Australian National University LBP monitoring plots

The current alignment avoids all Australian National University LBP monitoring plots. A preliminary alignment was sited in the Ben Cairn area on the westside of Mount Donna Buang Road. This alignment was changed to the east side of the road to avoid any works in proximity to the monitoring plots.

### Protocol 8 – Buffers for Identified Roosting Trees

Premise: A 50m buffer is required around identified roosting trees and nesting trees for large forest owls including Sooty Owl, Powerful Owl, Barking Owl, or as advised by a suitably qualified ecologist.

#### Response:

Although no direct evidence was found of forest owls utilising habitat trees within the assessment areas, forest owls may utilise the numerous pre-1900 eucalypts identified during ground truthing. While the actual occupation of hollow trees by forest owls may be sparse across the landscape, a 50m buffer from potential nest trees cannot be achieved with any degree of certainty in the now or in the future without undertaking detailed fauna spotlighting surveys across broad areas beyond the vicinity of the assessment corridor. However, significant trees with large hollows have been mapped and are

kept in the project database with the most significant populations of habitat trees shown in Map Series 2 – Appendix 2. There are opportunities to re-align sections of the trail (within the 20-metre corridor) to provide maximum setback from significant habitat trees.

### Protocol 9 – Avoidance of Cool Temperate Rainforest and listed Flora

**Premise:** Avoid and ensure suitable buffer to Cool Temperate Rainforest (FFG listed community) and any rare or threatened flora. Any impact which would cause the FFG listed community to be opened up to disturbance must be avoided; therefore, tracks through rainforest would not be supported. Buffer to be based on location of track and level of works and be sufficient to mitigate any impacts on the Rainforest community.

#### **Response:**

At this stage, it appears that the trail alignment can avoid all rare and threatened listed flora.

Despite the significant re-alignments implemented during the ground-truthing process to reduce incursions into Cool Temperate Rainforest, impact to this vegetation cannot be avoided. In particular, the summit section of the trail and the top section of the trail (north of Donna Buang Road) were subject to broad assessments (60–100 metres in width) before settling on a final alignment. This task was undertaken in light of the broad distribution of Cool Temperate Rainforest and other marginal areas with significant quantities of Myrtle Beech which is an indicator species of transition into rainforest. Despite these efforts, not all sections of Cool Temperate Rainforest could be avoided as large areas of this vegetation type dominated sections to the north of the Donna Buang Road. Melbourne Water requirements to minimise incursions into the Maroondah Water Catchment (see map 1 to 4 – Appendix 1) further limited opportunities to avoid sections of rainforest.

Avoiding Cool Temperate Rainforest and Cool Temperate ‘Mixed’ Forest has been the highest priority in the alignment of the trail, however, Cool Temperate Rainforest incursions account for just 1 ha of the entire trail area (see maps 1–4 of Appendix 2). This includes 3 sections that are close to Donna Buang Road, where rainforests dominate the surrounding landscape. However, raised platforms are proposed to be implemented where the trail passes through these sections and a range of other design and construction treatments will also be implemented. The Risk Assessment Matrix and *Construction and Environmental Management Plan (CEMP)* will further details these approaches.

### Protocol 10 – Avoid impacts to threatened species

**Premise:** Avoid mapped threatened species records, including Flora and Fauna Guarantee Act 1988 (FFG) listed, Victorian Advisory list (VROT) and Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) listed species. The ground truthing should also include searching for listed threatened species and avoiding them.

#### **Response:**

Maps series 1 of Appendix 1 show that no VBA records of threatened species (including FFG, VROT and EPBC listed species) occur within the assessment corridor (20 metres either side of the indicative

trail). The assessment corridor includes only two Leadbeater's Possum VBA records for a threatened species.

## 5.2 Project Construction

Appendix 1 presents the maps to illustrate the trail alignment in the context of biodiversity values based on available data and new data collected during ground truthing.

The construction width of the mountain bike tread is 1.2m. Areas that require minimal or no excavation will be able to keep the impact within the 1.2m width of the trail for substantial portions of the trail alignment. For the more difficult areas, it is anticipated that the impact zone will be up to 2 metres and may involve:

- Excavations (i.e. bench cuts on steeper slopes) to facilitate the desired grade
- Any additional works beyond the trafficable zone (batters, retaining areas, anchoring materials and barriers)
- Areas that require switchbacks and gully crossings where more detailed design and construction techniques are required.
- Any minor drainage works that aim to redirect run-off

The exact dimensions of the construction footprint will be refined in negotiation with the appointed trail construction company (World Trail Pty Ltd) and the development of a Construction and Environmental Management Plan (CEMP). Generally, the construction will involve the cutting of a bench to allow the passage of the small excavator, but the finished ride line is only 0.3 – 0.6m.

The construction of the trail will require small purpose-built machinery (such as a mini-digger/traxcavator). The width of impact is considered minor although construction and operation of the trail will need to consider:

- Maintenance of a branch or debris free zone
- Any works near trees that may impact on tree protection zones or structural root zones
- Any requirements to cut and remove substantial logs and organic matter to enable construction and maintenance of the trail

Due to the above considerations and further design and construction detail required, impact mitigation outlined in this report is preliminary only.

## 5.3 High Risk Areas

In addition to standard Habitat Hectare Assessment and information provided in Map Series 1 (Appendix 1), Map Series 2 (Appendix 2 – Maps 1 to 16) illustrates the sensitive areas of the alignment. While it is expected that the entire construction program will need to follow a *Construction*

and *Environmental Management Plan* (CEMP), the sensitive areas will require more than just the standard construction mitigation measures. Various design treatments specified in the Environmental Protocols and in the *Trail Construction Plan* and revisions to the alignment based on the advice and supervision of ecologists, fauna specialists and tree specialists will be required in these sensitive areas.

Sensitive areas as illustrated in Maps 1–7 of Appendix 2 is where the indicative alignment occurs in proximity to:

- Leadbeater’s Possum nesting sites and high probability habitat
- MDB Wingless Stonefly buffer zones or modelled habitat
- Cool Temperate Rainforest
- Areas with a high density of Pre-1900 trees, Large Old Trees and or suitable habitat trees
- threatened flora identified during ground truthing or previously recorded in the VBA
- Locations of previous VBA records of Threatened Fauna

In most cases, more than one of the above values occur in the sensitive areas.

A risk assessment matrix (Appendix 3) has been developed by the Practical Ecology and the Project Team to assist with reducing ecological impacts of the trail.



## 6. RELEVANT POLICY AND LEGISLATION

The following section explores relevant environmental policy and legislation relevant to the proposed trail from the national level through to the local level.

### 6.1 Environment Protection and Biodiversity Conservation Act

The *EPBC Act 1999* applies to sites where proposed developments or projects may have a significant impact on matters of national environmental significance. There are currently seven matters of National Environmental Significance:

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

Under the *EPBC Act*, a proponent must refer proposed actions that may require approval to the Commonwealth Environment Minister (or delegate). The Minister then decides which assessment and reporting option is applied. The Minister may approve a ‘controlled action’ allowing the development to proceed provided conditions are applied to mitigate significant impacts protected by this act.

#### Implications of National Environmental Significance

Based on a database query utilising the EPBC Protected Matters Search Tool, there are potential occurrences of numerous threatened species and one ecological community. The protected matters report identifies *Alpine Sphagnum Bogs and Associated Fens* as a potentially occurring ecological community. However, no vegetation types within the assessment corridor meet the definition of this ecological community.

#### Implications for listed threatened species

Populations of one EPBC species listed as ‘endangered’ (Leadbeater’s Possum) are known to occur in several locations in the Yarra Ranges National Park in the vicinity of Donna Buang Road and the Summit Road, in fact almost the entire area from the Summit to the top of Kennedy Creek (approximately 15 km of the trail corridor) is considered high probability of habitat for the species.

Although the proposed trail traverses' significant areas of known habitat for Leadbeater's Possum, the type of works proposed may be considered minimal where the following objectives can be met:

- All large hollow bearing trees (dead and alive) are retained with no substantial works encroachment that would compromise the health and viability of such trees
- Minimal to no sub-canopy species are removed (such as Silver Wattle, Black Wattle and immature Eucalypts) to construct the trail as this vegetation layer provides a critical habitat component for the movement of the species.

Being an aerial species, the proposed works and its impact on habitat for the Leadbeater's Possum could be considered minimal if every effort was made to minimise loss of sub-canopy species and to avoid larger trees to the extent that any encroachment is minor. Having said this, the trail moves through significant areas of confirmed habitat for a Critically Endangered species.

While it appears there is enough flexibility with the trail alignment to avoid removal of all large and hollow bearing trees, there are numerous locations where the desired protocols in Appendix 2 cannot be met. For example, where clusters of Large Trees prevent the opportunity for a significant tree buffer from the location of the works (these limitations are further described in section 5.2).

Although the habitat within Mount Tugwell is potentially suitable for Leadbeater's Possum, there are no known populations within this location and habitat modelling suggests that probability of occurrence is less than 65%.

Mount Tugwell is more likely to support populations of Southern Brown Bandicoot given the species prefers a mosaic of vegetation age classes as a result of fire and shrubby/heath vegetation cover that persists throughout much of this area. A VBA record has been confirmed within 1km of the Mount Little Joe assessment area.

Other EPBC listed species considered for this project include Swift Parrot, Smoky Mouse, Grey-headed Flying-fox, Greater Glider Fork-tailed Swift, White-throated Needle-tail, Rainbow Bee-eater. The impacts to these species are considered to be low to negligible.

Appendix 8 provides summary tables for the EPBC *Significant Impact Criteria* for all fauna species considered in this assessment.

Round-leaf Pomaderris *Pomaderris vacciniifolia* is one notable EPBC listed flora species recorded in 1 location (10 individuals) within 5 km of the assessment areas. This species was not observed during surveys undertaken for this study.

## 6.2 The Environmental Effects Act 1975

The Environment Effects Act 1978 provides for assessment of proposed projects (works) that are capable of having a significant effect on the environment.

- there is a likelihood of regionally or State significant adverse effects on the environment

- there is a need for integrated assessment of potential environmental effects (including economic and social effects) of a project and relevant alternatives, and
- normal statutory processes would not provide a sufficiently comprehensive, integrated and transparent assessment.

### 6.2.1 Relevance to proposal

Given the scale of this project, a referral to the State Minister of Environment will be made for a determination on the requirement of an Environmental Effects Statement (EES), which will consider combined loss or impacts to biodiversity, water quality, geology, landscape values and Archaeological and Aboriginal Heritage.

It is likely that combined biodiversity impacts will be considered as a part of an EES referral, although the combined loss of native vegetation is likely to be well below 10 hectares, which is a key referral trigger. However, defined or potential impacts to significant species and ecological communities include the Wingless Stonefly, Leadbeater’s Possum and Cool Temperate Rainforest. As a part of preparation for the EES referral, experts have been engaged to assist in quantifying impacts to these habitats to determine the significance of the likely impacts.

Table 10 summarises biodiversity related referral triggers outlined in the *Ministerial guidelines for assessment* (DSE 2006).

**Table 11.** Summary of Potential Biodiversity Related Referral Triggers

<ul style="list-style-type: none"> <li>• Referral criteria: a combination of potential environmental effects A combination of two or more of the following types of potential effects on the environment that might be of regional or State significance, and therefore warrant referral of a project, are:</li> </ul>	<ul style="list-style-type: none"> <li>• Trigger</li> </ul>
<ol style="list-style-type: none"> <li>1. Potential clearing of 10 ha or more of native vegetation, unless authorised under an approved Forest Management Plan or Fire Protection Plan</li> <li>2. matters listed under the Flora and Fauna Guarantee Act 1988:             <ol style="list-style-type: none"> <li>a) potential loss of a significant area of a listed ecological community,</li> <li>b) potential loss of a genetically important population of an endangered or threatened species (listed or nominated for listing), including as a result of loss or fragmentation of habitats,</li> <li>c) potential loss of critical habitat,</li> <li>d) potential significant effects on habitat values of a wetland supporting migratory bird species</li> </ol> </li> </ol>	<ul style="list-style-type: none"> <li>• Trigger</li> <li>• Likely trigger</li> <li>• May be triggered</li> <li>• Unlikely to be triggered</li> </ul>

### 6.3 The National Parks Act 1975

The Conservation and Recreational Objectives of Australian National Parks is outlined in the National Parks Act 1975. The National Parks Act calls for protection of all flora and fauna, not just threatened species. For this project, the Act is relevant to the Summit and trail section along Mount Donna Buang Road and Ben Cairn which are part of the Yarra Ranges National Park. Some of the stated objectives of National Parks outlined in section 4 of the act include:

- a. the protection, preservation and evolution of the natural environment including indigenous flora and fauna and of features of ecological, geological, scenic, archaeological and other scientific significance;
- b. the use and enjoyment of those parks by the public for inspiration, solitude and appropriate self-reliant recreation; and
- c. to make provision in accordance with the foregoing for the use of parks by the public for the purposes of enjoyment, recreation or education and for the encouragement and control of that use.

Mountain biking fits broadly within nature-based recreation activity. However the various specific uses are not defined in the Act.

### 6.4 Flora and Fauna Guarantee Act 1988

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

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

## 6.4.1 Threatened Flora Species and Ecological Communities

### Listed Flora Species

There are 5 threatened flora species listed under the FFG Act 1988 that are included in the States Habitat Importance Mapping in the local area or have been recorded in the VBA within 5km of the study area. These include Slender Tree-fern *Cyathea cunninghamii*, Round-leaf Pomaderris *Pomaderris vacciniifolia*, Fairy Lanterns *Thismia rodwayi*, Purple Diuris *Diuris punctata* and Maroon Leek-orchid *Prasophyllum frenchii*. The latter two species have highly limited distributions throughout Victoria and are most unlikely to occur within or in the vicinity of the trail network. The assessment area provides suitable habitat for Slender Tree-fern, Fairy Lanterns and Round-leaf Pomaderris. Slender Tree-fern and Round-leaf Pomaderris are conspicuous species that would have been easily identified if present within the assessment corridor; neither of these species were observed during site assessments. However, Fairy Lanterns is a cryptic species that is rarely seen and its presence cannot be discounted.

### Listed Ecological Communities

The trail traverses through of Cool Temperate Rainforest as confirmed through ground truthing. Cool Temperate Rainforest is an FFG listed ecological community. The presence of Cool Temperate Rainforest throughout sections of the trail alignment to the north of Donna Buang Road and the Summit road were confirmed. Ground truthing established that the extent of this ecological community is greater than what EVC modelling suggests (refer to Maps 1–4). The FFG Act describes Cool Temperate Rainforest as:

‘Combinations of Myrtle Beech *Nothofagus cunninghamii*, Southern Sassafras *Atherosperma moschatum* = *A. moschatum* subsp. *moschatum*, Black Olive-berry *Elaeocarpus holopetalus* and Blackwood *Acacia melanoxylon* 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 *Olearia argophylla*, Austral Mulberry *Hedycarya angustifolia* 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.

Much of the vegetation north of Donna Buang Road meets the diagnostic criteria of the above description including some ‘transitional communities’ where Eucalypts are present.

Approximately 1 hectare of Cool Temperate Rainforest may be impacted along the trail alignment however specific mitigations relating to design and construction techniques are to be implemented to mitigate impacts.

## 6.4.2 Threatened Fauna Species

There are 16 threatened fauna species listed under the FFG Act 1988 that are included in the State's Habitat Importance Mapping in the local area or have been recorded in the VBA within 5km of the study area. Of these, the entire assessment area provides important habitat for Grey Goshawk, Sooty Owl, Powerful Owl, Leadbeater's Possum, Common Bent-wing Bat and possibly Barking Owl.

Known populations of the Mount Donna Buang Wingless Stonefly occur in the vicinity of the Donna Buang Summit Road (refer below). This is a highly localised species that is unlikely to occur at lower elevations associated with the trail alignment. The key threats to this species as identified in the Action Statement (DSE 2001) include reductions in water quality (siltation, turbidity and chemical pollution). Buffer zones from known records of the species were mapped (Appendix 2) to enable alignment setting of the trail to be located in a way so as to not risk habitat for the species.

Suitable habitat and one local record suggest that the Southern Brown Bandicoot may persist within Mount Tugwell. The majority of the assessment area also provides suitable habitat for Square-tailed Kite while Brush-tail Phascogale, Masked Owl and Eastern Horseshoe Bat may utilise habitats within Mount Tugwell although there are no recent records in the vicinity.

The remaining species including Chestnut-rumped Heathwren, Smoky Mouse, Brown Toadlet and Lewin's Rail are considered unlikely to occur in the vicinity of the study area based on their habitat requirements, no local records and their known distribution throughout Victoria.

### Mount Donna Buang Wingless Stonefly

Several populations of the Mount Donna Buang Wingless Stonefly occur in proximity to the trail alignment. However, the alignment does avoid the designated buffer zones (refer to Map 1).

## 6.4.3 Relevance to proposal

Since all of the proposed works are within Public Land, the FFG Act applies and under the act, an application to DELWP will be required on the basis of:

- Impact to one listed Ecological Community (Cool Temperate Rainforest)
- Impact to a range of common flora species listed under the Act
- Potential impact to habitat for a range of listed fauna species (particularly Mount Donna Buang Stonefly, Leadbeater's Possum and potentially Southern Brown Bandicoot)

## 6.5 Planning and Environment Act 1987

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



### 6.5.1 Zoning

The following table provides a summary of land zonings for each main section of the trail.

**Table 12.** Applicable Land Zonings

Section	Land Zonings
Mount Donna Buang Road	Public Park and Recreation Zone, Public Use Zone (PUZ1)
Drop A K South	Public Conservation and Recreation Zone
Drop A K East	Rural Conservation Zone RCZ3, Public Use Zone, Public Conservation and Recreation Zone
Mount Tugwell	Rural Conservation Zone RCZ3, Public Park and Recreation Zone

Given the entire trail alignment is within public land, most of the individual land parcels have an appropriate public land zoning under clause 36 of the planning scheme. The range of public land zonings vary in their purpose and applicable uses, the general objectives of each public land zone is outlined below:

#### Public Park and Recreation Zone

- To recognise areas for public recreation and open space.
- To protect and conserve areas of significance where appropriate.
- To provide for commercial uses where appropriate.

#### Public Conservation and Resource Zone

- To protect and conserve the natural environment and natural processes for their historic, scientific, landscape, habitat or cultural values.
- To provide facilities which assist in public education and interpretation of the natural environment with minimal degradation of the natural environment or natural processes.
- To provide for appropriate resource-based uses.

#### Public Use Zone

- To recognise public land use for public utility and community services and facilities.
- To provide for associated uses that are consistent with the intent of the public land reservation or purpose



### Rural Conservation Zone RCZ3

Some parcels within Drop AK East and Mount Tugwell are within the Rural Conservation Zone (RCZ3) which is more often associated with private land in rural areas even though the parcels in question are in public land tenures. The purpose of the Rural Conservation Zone is to:

- To conserve the values specified in a schedule to this zone.
- To protect and enhance the natural environment and natural processes for their historic, archaeological and scientific interest, landscape, faunal habitat and cultural values.
- To protect and enhance natural resources and the biodiversity of the area.
- To encourage development and use of land which is consistent with sustainable land management and land capability practices, and which takes into account the conservation values and environmental sensitivity of the locality.
- To provide for agricultural use consistent with the conservation of environmental and landscape values of the area.
- To conserve and enhance the cultural significance and character of open rural and scenic non-urban landscapes

### 6.5.2 Overlays

Various overlays relevant to this proposal include:

- The Environmental Significance Overlay (ESO1) applies throughout the majority of trail alignment
- Schedule 3 to the Significant Landscape Overlay (SLO3) applies to the entire 'Drop A K' section north of the Warburton Township
- The Bushfire Management Overlay (BMO) applies throughout the majority of the trail
- Erosion Management Overlay (EMO) applies to a small area of Mount Tugwell south of the summit.
- A heritage Overlay (H140) from the Mount Donna Buang summit to the general vicinity of Road 26.

### Environmental Significance Overlay

Subsets of this overlay that apply to the proposal include:

#### Botanical Significance

- B44 Myrtle Gully Scenic Reserve (north of Donna Buang Road in the vicinity of habitat zone 9 and 10)
- B45 Myrtle Creek (Don River) Public Purpose Reserve (the western section of Mount Donna Buang Road)
- B46 The Acheron Way and the Ben Cairn Road (the eastern section of Donna Buang Road)
- B47 O'Shannassy Aqueduct (the majority of Drop AK South and East)

#### Zoological Significance

- Z18 Mt Toolebewong – Don River (the central section north of Donna Buang Road)
- Z19 Black Sands Creek and Yarra State Forest (the entire areas of Mount Tugwell)

As the proposal will be subject to decision guidelines and detailed application requirements under clause 52.17 of the Yarra Ranges Planning Scheme, the FFG Act and possibly the EPBC Act, it is considered that the ecological considerations pertaining to the various ESOs will be adequately considered through these 3 levels of regulation (Local, State and National).

### Bushfire Management Overlay

The entire project area is under the Bushfire Management Overlay (clause 44.06). Among other matters, permit requirements under this overlay includes any works associated with leisure and recreation as specified in clause 44.06–2. Under the direction of Councils Statutory Planning Department, it is likely that this proposal will be referred to the CFA for comment. Matters for the CFA to consider may include:

- Emergency assembly areas
- Emergency procedures
- Parking areas and access for emergency vehicles
- Potential closure of the trail during days of high or extreme fire danger

A Bushfire Emergency Plan for review by fire authorities may be required to support this application.

### Erosion Management Overlay

The Erosion Management Overlay occupies a small area within Habitat Zones 48 and 50. It does appear that the types of works proposed do not require a permit under the EMO (apart from vegetation removal). However, particular design and construction requirements may need consideration within this area (subject to a soil and landslip analysis).

### Significant Landscape Overlay (SLO 3)

The SLO3 applies to the entire 'Drop A K' section. Decision guidelines and potential information requirements of the SLO3 include:

- The statement of the nature and key elements of the landscape and the landscape character objective contained in a schedule to this overlay.
- The conservation and enhancement of the landscape values of the area.
- The impact of the proposed buildings and works on the landscape due to height, bulk, colour, general appearance or the need to remove vegetation.
- The extent to which the buildings and works are designed to enhance or promote the landscape character objectives of the area.
- The impact of buildings and works on significant views

### 6.5.3 Clause 52.17

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

Application requirements and decision guidelines are listed within the Clause. Applications may fall into a basic, intermediate or detailed pathway depending on the location and extent of vegetation removed. The application requirements and decisions depend on the relevant assessment pathway. Referral to DELWP under Clause 66.02 may be required for an application to remove native vegetation; e.g. if clearing is greater than 0.5 ha or the application follows the detailed pathway. This report, and in particular, Section 4 responds to this Clause.

## 6.6 Catchment and Land Protection Act 1994

Three declared noxious weeds listed under the *Catchment and Land Protection (CaLP) Act 1994* was identified within the trail alignment. Plants occurring on this list are known to or have the potential to result in detrimental environmental or economic impact.

Under the CaLP Act declared noxious weeds are categorised into four groups depending on their known and potential impact and specific circumstances for each region. These categories are:

- State Prohibited Weeds (S) is either currently absent in Victoria or are restricted enough to be eradicated. The Victorian Government is responsible for their control.
- Regionally Prohibited Weeds (P) in the Port Phillip Catchment Management Authority (CMA) area; these weeds are not necessarily widespread but have the potential to become widespread. It is expected that weeds that meet these criteria can be eradicated from the region. For weeds considered to be Regionally Prohibited it is the responsibility of the land owner to control these weeds on their land but not on adjacent roadside reserves.
- Regionally Controlled Weeds (C) are usually widespread but it is important to prevent further spread. It is the responsibility of the landowner to control these weeds on their property and on adjacent roadside reserves.
- Restricted Weeds (R) include plants that pose unacceptable risk of spreading in the State or other Australian states and are considered to be a serious threat to primary production, Crown land, the environment and/or community health if they were traded in Victoria. Trade in these weeds and their propagules, either as plants, seeds or contaminants in other material is prohibited.

Table 9 lists the noxious weeds identified during the ground truthing. Although minor in their current extent, these weed species typically thrive in disturbed environments and the proposed earthworks may encourage these small populations to rapidly spread.

**Table 13.** Declared Noxious weeds occurring within the Subject Site

Scientific Name	Common Name	Control Category
<i>*Cirsium vulgare</i>	Spear Thistle	C
<i>*Rubus fruticosus spp. agg.</i>	Blackberry	C
<i>*Jacobaea vulgaris</i>	Ragwort	C

CaLP listed weeds and other high impact weeds have been mapped during site assessments where identified within the assessment corridor, any infestations should be controlled at the earliest opportunity during and following construction of the trail during an ongoing monitoring program.

## 7. CONCLUSION AND RECOMMENDATIONS

The project team has undertaken extensive ground truthing and liaison with land management authorities to arrive at the current indicative alignment of the trail. This assessment was undertaken in four steps:

- A Desktop Alignment
- Undertaking broad area assessments to determine locations that are suitable for the alignment
- Ground Truthing to determine a revised alignment based on a 20-metre wide assessment corridor
- Development of Environmental Protocols to address risks and constraints of the alignment

Through development of assessment protocols and re-alignments of the trail, significant biodiversity values, have or can be avoided or minimised but in many instances cannot be completely avoided given the nature of the proposal.

### 7.1 Protection of Threatened Species and Ecological Communities

#### Leadbeater's Possum

Protection of Leadbeater's Possum habitat is one of the primary goals of this project,

To date, total of 1503 Trees were mapped that are potential habitat trees for the species OR OTHER dependant species such as Greater Glider, the Sooty Owl and Powerful Owl including:

- **Pre-1900 living trees** (estimated to be greater than 120cm diameter) of which all are considered to be suitable habitat for LBP.
- **Smaller habitat trees** defined as trees less than 120cm diameter with visible hollows
- **Other hollow bearing trees** of various size classes in lower probability Leadbeater's Possum habitat that exhibit hollows suitable for a range of owl species and other hollow dependent fauna
- **Other Large Trees**; while no hollows were visible, these may provide suitable habitat hollows in the present or near future

Documentation of these trees will assist with the detailed design and construction of the trail alignment with the objective of siting the works as far as possible from these trees. Locations of Leadbeater Possum nest boxes were also documented including several in the assessment corridor. A similar approach will be taken to site the trail away from these nest boxes.

No sub-canopy species will be removed in areas of high probability habitat for Leadbeater's Possum as the sub-canopy layer provides critical habitat for the species.

### Mount Donna Buang Wingless Stonefly

The assessment corridor is unlikely to support populations of Mount Donna Buang Wingless Stonefly. Nevertheless, particular care is to be taken during the design and construction process to minimise potential impacts including:

- Measures to prevent the spread of myrtle wilt which may impact the species
- Measures to minimise soil contamination or changes to hydrology through raised platforms rather than excavation

Myrtle Wilt control will be a primary objective of construction and maintenance of the trail including:

- Vehicle hygiene procedures for construction equipment
- Mandatory wash down facilities for mountain bikes to be provided at the Summit Car Park and/or other appropriate locations

### Cool Temperate Rainforest

The trail traverses through approximately 1 ha of Cool Temperate Rainforest as confirmed through ground truthing. At this stage, Cool temperate rainforest accounts for 4% of the entire area of vegetation to be impacted and this is considered unavoidable if the trail to the north of Donna Buang Road is to proceed. Impacts to this ecological community will be minimised as follows:

- Raised platforms rather than excavation as the standard approach to construction of the trail alignment. This approach will minimise soil disturbance and maintain the integrity of the forest floor
- Measures to prevent the spread of myrtle wilt and other pathogens is also a primary goal within this ecosystem and areas of Montane Eucalypt Forest. Strict hygiene standards must during and following construction.
- Avoiding any earthworks within the root zones of Myrtle Beech to prevent proliferation of Myrtle Wilt

## 7.2 Further Steps

In addition to the Threatened Species and Ecological Communities listed above, the majority of the alignment traverse's native vegetation of high diversity and ecological condition which supports significant habitat for common and rarer fauna species. Although the presence of threatened flora species appears to be limited within the assessment corridor, this may be due to the seasonal limitations of the assessment.

Field assessment of the ecological values of the new trail sections (that only received a desktop assessment of values) should occur prior to construction.

The design and construction process must be planned and implemented to the highest standards to ensure that impacts to native vegetation and fauna habitat is minimised. The risk assessment matrix and *Trail Construction Plan* is the starting point to identifying environmental risks, design solutions and construction mitigation methods.

Management of environmental risks must be ongoing throughout the planning, construction and maintenance phase of this project and should include:

- A fully developed Construction and Environmental Management Plan (CEMP) that expands on and implements the recommendations outlined in this document and the *Trail Construction Plan*
- A final trail alignment negotiated with land managers and input from ecologists onsite, particularly within high –risk areas.
- A comprehensive weed management program following the trail construction, particularly in locations where high threat weeds were identified and mapped as a part of this project.
- A comprehensive pest animal program, particularly targeting Foxes and Deer.
- Ecological enhancement programs supported by Yarra Ranges Council, Melbourne Water and Park Victoria that involve the local community to compensate for vegetation and habitat impacts associated with the trail.
- Vegetation loss is formally offset in a manner consistent with the Guidelines for the Removal, Destruction or Lopping of Native Vegetation (DELWP 2017) and/or the Procedure for the removal, destruction or lopping of native vegetation on Crown land (DELWP 2018).

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## Appendix 1. Overview Maps of the Trail Alignment

**Overview Map A – Mount Donna Buang Summit to Golf Course**

**Overview Map B – Mount Little Joe and Tugwell**

## Appendix 2. Map Series 1 – Ecological Assessment Proposed Warburton Mountain Bike Trail

**Map 1. Summit to Donna Buang Road**

**Map 2. Donna Buang Road East**

**Map 3. Donna Buang Central**



**Map 4. Donna Buang Road West**

**Map 5. Ben Cairn Region**

**Map 6. South of Ben Cairn**

**Map 7. APM Access Track**

**Map 8. O'Shannassy Aqueduct**

**Map 9. Donna Buang Road to Aqueduct Link**

**Map 10. Yuonga Track North**

**Map 11. Yuonga Track South**



**Map 12. Golf Course Trail**

**Map 13. Mount Little Joe– Hooks Road Region**

**Map 14. Mount Little Joe– Backstairs Track**

**Map 15. Wesburn Climb**

**Map 16. Mount Little Joe West**

**Map 17. Mount Little Joe Central**

**Map 18. Mount Little Joe East**

**Map 19. Crusher Track Link**



**Map 20. Mount Tugwell Cemetery Fireline**

**Map 21. Cemetery Fireline East**

**Map 22. La La Falls Region**

**Map 23. Cumming Spur Track West**

**Map 24. Cumming Spur Track East**

**Map 25. Mount Bride Road South East**

## Appendix 3. Map Series 2– High Risk Areas

**Map 1. Mount Donna Buang Summit Region**





**Map 2. Donna Buang Road Central Region**

**Map 3. Donna Buang Western Region**













**Map 4. Ben Cairn Region**





**Map 5. Donna Buang Road to Aqueduct Link**



**Map 6. Mount Bride Road North**



**Map 7. Mount Bride Road South**



## Appendix 4. Risk Assessment Matrix

The methodology of the Risk Assessment Matrix is outlined below:

1. The risk assessment starts with defining an alignment in the field that is indicative only within a 20-meter corridor to allow flexibility for realignments. The indicative alignment has sought to minimise environmental impacts as much as possible, however, further minimisation can only be achieved through analysis and detailed design and construction methods outlined in the following steps.
2. The indicative alignment is then subject to a four-tiered risk analysis based on ecological sensitivities as outlined below:

Very High	High	Moderate	Low
Sites in this category have one or more issues as listed below (predominantly unavoidable breaches or near breaches of protocols)	Sites in this category have one or more issues as listed below although no impacts on critical habitats such as Cool Temperate Rainforest, MDB Stonefly or LBP	Sites in this category have few issues in terms of breaching protocols or impacting on critical habitats, however the trail still traverses through moderate to high quality forest vegetation	Sites in this category are minimal risk as they traverse through existing cleared areas or substantial trails or vehicle tracks

The above risk categories are the starting point to identify the risks in the various sections of the trail. The risk category for each section is on the assumption that no particular design or construction mitigation measures are implemented. There are a range of risks associated with design and construction including:

- Impacts to Leadbeater’s Possum including nesting sites and its foraging habitat
- Impacts to MDB Wingless Stonefly or its habitat
- Impacts to Cool Temperate Rainforest
- Impacts to habitat trees suitable for a range of hollow dependent species
- Impacts rare or threatened flora is identified
- Erosion and siltation impacts to drainage lines and waterways
- Impacts to tree root zones where minor earthworks are required to achieve a suitable trail grade
- Impacts to small dead trees (mostly in post-fire areas) that may require removal for safety reasons
- Impacts to high quality understorey vegetation

Each of these risks evaluated and then each trail section has a risk category based on the combination of risk present in these locations.

**A moderate risk only applies where:**

- There are no particular issues pertaining to threatened species and ecological communities and,
- Only if there are one or two other risks within the defined section of trail
- within areas of non-native vegetation

**A low risk only applies where:**

- the trail utilises existing walking tracks, vehicle tracks or bike tracks that can accommodate all requirements to facilitate the mountain bike trail construction or
- Where no-native understorey or significant trees are present.

3. The identified risks are then subject to 4-step assessment process outlined below:

- The severity of the risk in defined locations
- The potential environmental impacts associated with each risk
- A Risk Mitigation Design and Construction Response to each of these risks or potential impacts
- A revised risk category and justification following the prescribed risk mitigation methods

It is important to realise that the current proposed trail alignment is just the start point that allows a more detailed design and construction process so that avoidance and minimisation of impacts can be achieved. It is also important to note that the location of mapped ecological values as represented in Appendix 1, 2 and 3 (including significant trees, nest boxes, rare flora and fauna records) are indicative only. Due to limitations of satellite reception in heavily forested environments, it is rare that a GPS points are recorded within 1 m accuracy. GPS points taken in the field were generally between 2–5 metre accuracy. The same limitation applies to the trail alignment itself. These limitations emphasize the importance of determining re-alignments with mitigation solutions on the ground when it comes to construction. Depending on the section of trail being built, construction contractors will need to be supervised by expert personnel including ecologists, flora and fauna specialists, arborists and design engineers to ensure that the objectives of risk minimisation is achieved.

**Table 14. Risk Assessment by Protocol**

Risk of Impact without mitigation	Ecological Value	Risk to Value:	Protocols	Can the protocol be achieved?	Where can't the protocol be achieved?	Mitigation Measures where protocol cannot be achieved	Risk of Impact Following Protocols and Mitigation Measures
<b>Very High</b>	Cool Temperate Rainforest or Cool Temperate 'Mixed' Forest	The reduction in overall area of Cool Temperate Rainforest and Cool Temperate Mixed Forest given their current limited distribution and listing under FFG.	CTR P1 – Prior to finalising the trail alignment, field surveys are required to identify the extent of Cool Temperate Mixed Forest within the area.	Yes	na	na	<b>Moderate</b>
			CTR P2 – Avoid areas of Cool Temperate Rainforest and Cool Temperate Mixed Forest.	In Part	Habitat Zone (HZ) 1, 4, 6 and 8	CTR M1 – Minimise the length of the alignment through Cool Temperate Rainforest and Cool Temperate Mixed Forest.	
			CTR P3 – No rest stops or viewing areas are to be located within Cool Temperate Rainforest or Cool Temperate Mixed Forest.	Yes	na	na	
		The introduction and spread of Myrtle Wilt caused by damage to trees, including disturbance to the root zone will lead to the death of Myrtle Beech species.	CTR P4 – Avoid areas showing signs of Myrtle Wilt.	TBD	TBD	CTR M2 – Prior to finalising the trail alignment, undertake detailed mapping to clearly identify areas showing signs of Myrtle Wilt (Attach check list of Myrtle Wilt from DELWP as appendix).	
			CTR P5 – Avoid the drip line of Myrtle Beech within Cool Temperate Rainforest and Cool Temperate Mixed Forest.	In Part	Habitat Zone 1, 4 and 6 and some areas within Habitat zone 2, 3, 5 and 7	CTR M3 – Where areas containing Myrtle Beech cannot be avoided, minimise disturbance within the drip line of all Myrtle Beech trees using a design/engineered solution.  CTR M4 – In the event of any disturbance within the root zone or to any part of Myrtle Beech trees occurs, fungicide must be immediately applied to prevent the spread of Myrtle Wilt.  CTR M5 – Trail construction is to be undertaken using hand tools only within Cool Temperate Rainforest and Cool Temperate Mixed Forest.	
		The introduction of imported fill material will introduce pathogens and damage the integrity of Cool Temperate Rainforest and Cool Temperate Mixed Forest.	CTR P7 – No imported fill material (including gravel, rock and soil) is to be used within Cool Temperate Rainforest or Cool Temperate Mixed Forest.	Yes	na	CTR M6 – Where soils are damp and boggy, trail must be elevated using boardwalk or another appropriate engineered/design solution.	

Risk of Impact without mitigation	Ecological Value	Risk to Value:	Protocols	Can the protocol be achieved?	Where can't the protocol be achieved?	Mitigation Measures where protocol cannot be achieved	Risk of Impact Following Protocols and Mitigation Measures	
High / Moderate	Leadbeater's Possum (LBP)	<p>There are 3 essential components to Leadbeater's habitat which are, an appropriate food source, access to nesting hollows and dense connected vegetation to allow movement. Any impact to one of these factors will have a negative impact on the population and future viability of Leadbeater's in these areas.</p> <p>Creation of the trail in close proximity to Leadbeater's habitat will facilitate movement by predatory species such as foxes and cats which will increase predation and reduce population size.</p> <p>Removal of dense stands of mid-story vegetation, specifically Callistemon and Tea Tree species will negatively impact the movement and therefore health of Leadbeater's populations.</p>	LBP P1 – Avoid areas of known and potential LBP habitat.	No	All areas in the vicinity of Donna Buang Road (HZ 1-13, 22-24) and Mount Tugwell (HZ 50-62)	LBP M1 – No removal of dense stands of Callistemon or Tea Tree species within potential or suitable habitat for Leadbeater's possums.	Low	
			LBP P2 – Apply a 50m buffer zone around known or potential Leadbeater's colonies.	No	HZ 1-3, 9-10	LBP M2 – Where removal of vegetation cannot be avoided, the alignment must utilise existing cleared areas.		
			LBP P3 – No removal of vegetation (as applied to midstorey and canopy) within potential or suitable Leadbeater's habitat. LBP M3 – No trees, including mid-storey trees of more than 10cm DBH are to be removed.	In Most Cases	Selected Areas within the north facing sections of the Yarra State Park	LBP M3 – In State Forest where there is a stand of single age Eucalyptus sp. and midstorey (i.e. regrowth following bushfire), trees of up to 20 cm DBH may be removed. However, no midstorey is to be removed in LBP high quality habitat (within the National Park)		
			Disturbance to existing Australia National University monitoring plots will impact long term monitoring results of Leadbeater's Possum.	LBP P4 – Apply a 200m exclusion zone from the centre of all ANU monitoring plots.	Yes	na		LBP M6 – The alignment of the trail cannot result in increased visibility to existing nest boxes or occupied tree hollows.
			The construction and ongoing use of the trail may create disturbance to Leadbeater's and increase the likelihood of human interaction and interference.	LBP P5 – No rest stops or viewing areas within 200m of LBP nest boxes or known or potential colonies.	Yes	na		
High	Mount Donna Buang Wingless Stonefly (SF)	<p>Any disturbance to known and potential habitat of Mt Donna Buang Wingless Stonefly will result in a reduction in the current population and future viability of the species.</p> <p>Ground disturbance in close proximity to surface water flowing into Wingless Stonefly habitat will negatively impact available habitat through sedimentation, water pollution, obstructions in waterways and shading of waterways.</p> <p>Construction during the critical life cycle stages of Wingless Stonefly will negatively impact the species.</p>	SF P1 – Avoid areas of known and potential habitat for Mt Donna Buang Wingless Stonefly.	No	Habitat Zones 1-9	SF M1 – Align trail as close as possible to the verge of Mt Donna Buang Road or use existing tracks.	Moderate	
			SF P2 – No loss of connectivity or change in hydrology patterns in know or potential habitat.	TBD	TBD	SF M2 – Any work within the potential range of the species must minimise habitat disturbance and sedimentation by elevating the trail to cross waterways, bogs, damp areas or seasonal drainage lines within the mapped suitable habitat zone.		
			SF P3 – No increase in sediment transport in identified areas of known or potential habitat.			SF M3 – Any elevated trail must be constructed to minimise ground disturbance and maintain natural light levels.		
			SP P4 – No change in solar radiation (i.e. natural light) in identified areas of known or potential habitat.					
			SF P5 – No ground disturbance or soil compaction within 30m of known or potential habitat.					
			SF P6 – Construction of the trail is to be undertaken between December and February.					

Risk of Impact without mitigation	Ecological Value	Risk to Value:	Protocols	Can the protocol be achieved?	Where can't the protocol be achieved?	Mitigation Measures where protocol cannot be achieved	Risk of Impact Following Protocols and Mitigation Measures
High	Native Vegetation	A break in the canopy will increase light to the forest floor which will create changes in microclimate and have a negative impact on the ecological system.	NV P1 – Any native vegetation removal requires avoidance, minimisation and offsetting in accordance with the 'Guidelines for The Removal, Destruction or Lopping of Native Vegetation (DELWP 2017)'	Avoid (No) Minimise (Yes)	The Avoid Principle cannot be achieved without undermining the purpose of the project	NV M1 – The trail alignment is to be determined based on minimising the removal of vegetation, including mid-story and ground cover.	Moderate
			NV P2 – No trees, including mid-storey trees of more than 10cm DBH are to be removed.	All areas of National Park and at least 90% of the State Park	Selected Areas within the north facing sections of the Yarra State Park	NV M3 – In State Forest where there is a stand of single age Eucalyptus sp (i.e. regrowth following bushfire), trees of up to 20 cm DBH may be removed.	
			NV P3 – No vegetation is to be removed to accommodate rest stops or viewing areas in National Park.	Yes	na	NV M2 – Rest stops and viewing areas along the trail are to use existing cleared areas and breaks in vegetation to minimise vegetation removal.	
		Damage to tree roots during construction and use of the trail will negatively impact the long-term health of tree species.	NV P5 – Avoid aligning the trail within the structural root zones of all trees.	In Part	Cannot be achieved in all cases where there is greater than 20 trees per hectare	NV M3 – Where the structural root zones (defined by AS) of trees cannot be avoided, then a design solution will need to be implemented to reduce impact on tree root zones.  NV M4 – Align the trail on the higher elevation side of large trees, especially on steeper side slopes as tree roots are likely to be closer to the surface on the lower side.	
		A break in vegetation connectivity at any strata layer will negatively impact movement corridors of native fauna that rely on heavy vegetation cover to move through the landscape protected from predators.	NV P6 – Avoid existing stands of dense vegetation, particularly mid-storey vegetation between 1–5m in height.	In Most Cases	Selected Areas within the north facing sections of the Yarra State Park	NV M5 – Avoid removal of mid-storey vegetation within 10m of known or probable nesting sites of native fauna within National Park.	
		A break in vegetation connectivity will create movement corridors for predatory and pest animals.		Yes	na	NV M6 – Avoid removal of mid-storey vegetation within 10m of known nesting sites of listed (within VBA) fauna species within State Forest.	
		Disturbance to the ground cover and removal of vegetation will allow introduction and spread of weed species and pathogens. This includes the spread of Myrtle Wilt and Phytophthora.	NV P8 – Avoid disturbance to the ground surface in areas known to contain invasive weeds and pathogens including Myrtle Wilt and Phytophthora.	Yes	na	NV M7 – Undertake weed and pathogen control along the trail corridor during construction in accordance with an approved CEMP.	

Risk of Impact without mitigation	Ecological Value	Risk to Value:	Protocols	Can the protocol be achieved?	Where can't the protocol be achieved?	Mitigation Measures where protocol cannot be achieved	Risk of Impact Following Protocols and Mitigation Measures
		The introduction of fill material may introduce weeds and pathogens and potentially alter pH levels of the soil which will have a negative impact on the health of the system.	NV P10 – Minimise the introduction of fill material for the construction and ongoing management of the trail. NV P11 – Any fill material introduced to the site must be certified clean and be weed and pathogen free and be of a similar pH to natural soils.	Yes	na		
		The construction and use of the trail may have negative impacts on significant native flora, including listed species.	NV P12 – Prior to the trail alignment being finalised, detailed field surveys are required to identify the likely presence of significant species or communities identified in Appendix 1.	Yes (providing there is follow up surveys during construction)	na	NV M9 – Apply an appropriate buffer to significant native flora species and communities identified in appendix 1, in consultation with the relevant public land manager.	
			NV P13 – Avoid areas known or are likely to contain significant species or communities, as identified in appendix 1, including species listed under FFG and EPBC and advisory listed.				
		Large fallen debris (>30cm DBH) is part of the natural cycle of the area and provides important habitat for local fauna and assists in soil stabilisation.	NV P5 – Avoid any removal or disturbance to large fallen timber	In Part	In all habitat zones where large logs are present (where the log score is 5)	NV M10 – Any removal of fallen timber must be to the minimum extent necessary and any material removed must be retained on site.	
High	Native Fauna	Construction and ongoing use of the trail (including night-time use) will interfere with the existing movement corridors of native fauna, including significant and listed species, which may cause displacement, impact available food sources and reduce available habitat areas.	NF P1 – Avoid all areas which are known or likely to contain significant native fauna as identified in appendix 2.	Yes	Yes	NF M1 – Apply an appropriate buffer to identified nesting sites of significant native fauna identified in appendix 2, including applying a 5m buffer to rocky outcrops with cracks and crevices. NF M2 – Apply a 50m buffer to owl nesting sites. NF M3 – Apply an appropriate buffer/visual buffer to all tree hollows. NF M4 – Apply a 20m buffer to lyrebird display mounds.	Low/Moderate
			NF P2 – Existing habitat trees (>40cm DBH, or hollow bearing trees) are to be avoided.	Yes	Yes		
			NF P3 – Avoid known or probable nesting sites of VBA listed species by at least 10m.	Yes	Yes		

**Part 2 – Risk Category per type**

Key to Table

<b>Very High</b>	Sites in this category have one or more issues as listed below (predominantly unavoidable breaches or near breaches of protocols)	<b>Moderate</b>	Sites in this category have few issues in terms of breaching protocols or impacting on critical habitats, however the trail still traverses through moderate to high quality forest vegetation
<b>High</b>	Sites in this category have one or more issues as listed below although no impacts on critical habitats such as Cool Temperate Rainforest, MDB Stonefly or LBP	<b>Low</b>	Sites in this category are minimal risk as they traverse through existing cleared areas or substantial trails or vehicle tracks

Risk Category per Item	Associated risks	Risk Mitigation/Design Response	Revised Code <sup>2</sup>	Reason for Revised risk
<b>Area of high-density sub-canopy (trees between 10–25m) where trees may require removal</b>	Impacts to the movement of LPB between canopy trees via bridging habitat provided by sub-canopy e.g. Silver Wattle, Blackwood, Pomaderris	There is limited sub-canopy within the assessment areas and the trail corridor has been sited to avoid significant areas of sub canopy. No sub-canopy trees will be removed in the construction of the trail. Supervision and guidance by an ecologist within LBP habitats will be provided during the construction phase.	Low	This is avoidable in all cases in Habitat Areas for LBP. Therefore, impacts for this risk type is eliminated
<b>Within assumed habitat for MDB Wingless Stonefly</b>	Impact to the MDB Wingless Stonefly avoids buffer of known locations refer to Map 1 of Map Series 1	Manage the construction process to avoid erosion and run-off into drainage lines (refer to Appendix 1)	Low	Management of Myrtle Wilt is key to preservation of the MDB Stonefly
<b>Within Cool Temperate Rainforest</b>	Impact to rainforest species and the potential spread of Myrtle Wilt	Best practise Myrtle Wilt Control during construction and once the trail is opened (i.e. hygiene processes / wash down facilities) as identified in Appendix 1. Boardwalks or elevated platforms to be used within rainforest sections as indicated in section 4.4 of the Trail Construction Plan (Cox Architecture). Myrtle Beech trees to be identified with sufficient construction setback	Low	Myrtle Wilt is an uncommon occurrence in the region and will be controlled providing construction protocols are adhered to. Boardwalks or elevated platforms will minimise impacts to rainforest flora and further minimise soil disturbance that potentially leads to the spread of Myrtle Wilt. This approach ensures that any construction activity will not increase the likelihood of Myrtle Wilt spread

<sup>2</sup> Revised code is upon implementation of the recommended Design and Construction Response

Risk Category per Item	Associated risks	Risk Mitigation/Design Response	Revised Code <sup>2</sup>	Reason for Revised risk
Within areas containing a high number of large habitat trees for suitable for a range of hollow dependent species	Impacts to Tree Protection Zones where excavation or compaction is required to form the trail. Potential disturbance to hollow dependent arboreal species	In consultation with a Fauna and Tree specialist, define the exact alignment of the trail with the greatest setback distance possible from the trunks of significant trees. This includes avoiding the Structural Root Zone if excavation is greater than 600m. (Refer to trail construction document) No excavations deeper than 1m will occur within the Tree Protection Zone of large canopy trees. Where tree roots are unavoidable, the trail will be constructed up and over tree roots	Low to Moderate	Given the construction width is predicted to be 1.2 to 2m and excavation will typically be less than 600m depth, there is likely to be negligible impacts to Structural Root Zones and Tree Protection Zones once significant trees are identified and the trail is appropriately setback from tree trunks. However, these mitigation measures cannot guarantee no disturbance to nesting animals within trees in proximity to the trail
Within 50m of a significant habitat tree within high probability LBP Habitat – dead or pre-1900	Disturbance to LBP nesting sites, Forest Owls and Bats	In consultation with a Fauna specialist, define the exact alignment of the trail with the greatest setback distance possible. Ensure no removal of dead or live habitat trees and no removal of sub-canopy that provides Structural movement for the LPB	Low to Moderate	This approach will undoubtedly reduce the risk of habitat disturbance in the broad sense but is difficult to quantify in the absence of targeted surveys
Within 50m of an LBP nest box		In consultation with a Fauna specialist, define the exact alignment of the trail with the greatest setback distance possible. Ensure no removal of dead or live habitat trees and no removal of sub-canopy that provides Structural movement for the species	Low to Moderate	As the species is an arboreal species, rarely active during the day and rarely venturing near ground level, the avoidance of impact to the sub-canopy layer is paramount. This can be easily achieved given the open canopy structure within the trail alignment
Within areas where rare or threatened flora is identified	Impact to local populations of rare or threatened flora	Addressed by avoiding direct loss through conscientious siting of the final trail in consultation with a flor specialist onsite during a seasonally appropriate period	Low to Moderate	Threatened flora populations are sparse and can largely be avoided, however given the dense groundcover present and seasonally inconspicuous nature of some species, complete avoidance cannot be guaranteed
Within gully sections, drainage lines and waterway crossovers	Erosion, siltation, soil disturbance	Any stream crossings will need to be strictly designed with rock armouring on intermittent trails or small bridges on raised pedestals either side of the stream. These structures will ensure that any water and sediments are absorbed along the trail edge and not draining into the streams. Refer to design treatments outlined in section 4.4 Trail Construction Plan (Cox Architecture).	Low	Design treatments and construction mitigation is predicted to minimise environmental risks
Within steep sections where excavation is required, or 'switchbacks' are required to minimise the grade <sup>3</sup>	Erosion, siltation, soil disturbance	Manage the construction process to avoid erosion and run-off into drainage lines (refer to Appendix 1) and apply design treatments and construction principles outlined in the Trail Construction Plan (Cox Architecture)	Low	A mountain bike trail is ideally a series of dips and rises, often with only 5–8 m in between rises and this makes it possible to contain any erosion or water flow into small limited basins where water is retained



Risk Category per Item	Associated risks	Risk Mitigation/Design Response	Revised Code <sup>2</sup>	Reason for Revised risk
Within areas containing small dead trees (mostly in post-fire areas) that may require removal for safety	Impact to some habitat (mostly invertebrates)	Any small dead trees <less than 200mm diameter within 2 metres of the trail may require removal if significant defects are identified. Fell unstable trees and keep them as habitat logs within the nearby forested areas	Low to Moderate	Recommended measures can minimise loss of dead trees but cannot avoid the loss of dead trees in all situations. However dead habitat trees suitable for LBP will be retained (non-negotiable)
Within areas of high-quality vegetation but no likely habitat for threatened species or endangered ecological communities	Impact to high quality vegetation beyond the trail width	Removal of vegetation will be to the minimum extent required, usually approximately 1.2m width, and will not exceed 2.0m width	Low to Moderate	Design treatments and a Construction Management Plan will reduce but not eliminate risks
Within areas of limited large old trees or habitat trees in areas of lower probability LPB Habitat	Although more options to avoid are available (compared to red and orange categories) Without due consideration, impacts to Tree Protection Zones where excavation or compaction is required to form the trail. Potential disturbance to hollow dependent arboreal species	In consultation with a Fauna and Tree specialist, define the exact alignment of the trail with the greatest setback distance possible from the trunks of significant trees. This includes avoiding the Structural Root Zone if excavation is greater than 600m. No excavations deeper than 1m will occur within the Tree Protection Zone of large canopy trees. Where tree roots are unavoidable, the trail will be constructed up and over tree roots	Low	Significant trees are sparse enough across the corridor that appropriate onsite consultation will lead to minimal risk
within areas of non-native vegetation	Minimal although standard construction measures apply including marking out the trail alignment and defining no-go zones	Risk to be managed in accordance with a Construction and Environmental Management Plan (CEMP) to address all levels of risk	Low	na
within areas of existing walking tracks or vehicle tracks that can accommodate all requirements to facilitate the mountain bike trail			Low	na

## Appendix 5. Flora recorded at study site

Flora species recorded in the study area during fieldwork.

X indicates general region where the species was observed

\* denotes exotic species

# denotes native species extended beyond natural range

r – rare in Victoria

Origin	Scientific Name	Common Name	Donna Buang East	Donna Buang West	Drop AK Sth/East	Mount Tugwell
	<i>Acacia dealbata</i>	Silver Wattle	x	x	x	x
	<i>Acacia genistifolia</i>	Spreading Wattle				x
	<i>Acacia melanoxylon</i>	Blackwood	x	x	x	x
	<i>Acacia mucronata subsp. longifolia</i>	Narrow-leaf Wattle				x
	<i>Acacia myrtifolia</i>	Myrtle Wattle				x
	<i>Acacia obliquinervia</i>	Mountain Hickory Wattle	x			
	<i>Acacia stricta</i>	Hop Wattle				x
	<i>Acacia verticillata</i>	Prickly Moses			x	x
	<i>Acaena echinata</i>	Sheep's Burr				x
	<i>Acaena novae-zelandiae</i>	Bidgee-widgee	x	x	x	x
	<i>Acrotriche prostrata</i>	Trailing Ground-berry			x	x
	<i>Acrotriche serrulata</i>	Honey-pots			x	x
	<i>Adiantum aethiopicum</i>	Common Maidenhair			x	x
	<i>Anogramma leptophylla</i>	Annual Fern		x		
*	<i>Anthoxanthum odoratum</i>	Sweet Vernal-grass				x
*	<i>Arctotheca calendula</i>	Cape weed				x
	<i>Arthropodium strictum</i>	Chocolate Lily				x
*	<i>Asparagus scandens</i>	Asparagus Fern				x
	<i>Asperula gunnii</i>	Mountain Woodruff	x	x	x	
	<i>Asplenium bulbiferum subsp. gracillimum</i>	Mother Spleenwort	x	x		x
	<i>Astrotricha sp</i>	Star-hair				x
	<i>Australina pusilla subsp. muelleri</i>	Shade Nettle	x	x	x	x
	<i>Austrocynoglossum latifolium</i>	Forest Hound's-tongue	x	x	x	
	<i>Bauera rubioides</i>	Wiry Bauera				x
	<i>Bedfordia arborescens</i>	Blanket Leaf	x	x	x	x
	<i>Billardiera mutabilis</i>	Common Apple-berry		x	x	x
	<i>Blechnum cartilagineum</i>	Gristle Fern	x	x		
	<i>Blechnum chambersii</i>	Lance Water-fern		x	x	
	<i>Blechnum fluviatile</i>	Ray Water-fern		x	x	
	<i>Blechnum nudum</i>	Fishbone Water-fern		x	x	

Origin	Scientific Name	Common Name	Donna Buang East	Donna Buang West	Drop AK Sth/East	Mount Tugwell
	<i>Blechnum wattsii</i>	Hard Water-fern	x	x	x	
	<i>Bossiaea prostrata</i>	Creeping Bossiaea				x
	<i>Burchardia umbellata</i>	Milkmaids				x
	<i>Bursaria spinosa subsp. spinosa</i>	Sweet Bursaria				x
	<i>Caladenia spp.</i>	Caladenia				x
	<i>Callistemon pallidus</i>	Lemon Bottlebrush	x	x		
	<i>Calochilus robertsonii</i>	Purple Beard-orchid				x
	<i>Carex appressa</i>	Tall Sedge			x	
	<i>Cassinia aculeata subsp. aculeata</i>	Common Cassinia		x	x	x
	<i>Cassinia longifolia</i>	Shiny Cassinia		x	x	x
	<i>Chiloglottis valida</i>	Common Bird-orchid			x	x
*	<i>Cirsium vulgare</i>	Spear Thistle			x	x
	<i>Clematis aristata</i>	Mountain Clematis	x	x	x	x
*	<i>Conium maculatum</i>	Hemlock				x
	<i>Coprosma hirtella</i>	Rough Coprosma		x	x	
	<i>Coprosma quadrifida</i>	Prickly Currant-bush	x	x	x	x
	<i>Coronidium scorpioides</i>	Button Everlasting				x
	<i>Correa lawrenceana</i>	Mountain Correa	x	x		
	<i>Correa reflexa var. reflexa</i>	Common Correa			x	x
	<i>Corybas spp.</i>	Helmet Orchid			x	
	<i>Cyathea australis</i>	Rough Tree-fern	x	x	x	x
	<i>Cynoglossum suaveolens</i>	Sweet Hound's-tongue			x	x
	<i>Dampiera stricta</i>	Blue Dampiera				x
	<i>Deyeuxia quadriseta</i>	Reed Bent-grass				x
	<i>Dianella revoluta</i>	Black-anther Flax-lily				x
	<i>Dianella tasmanica</i>	Tasman Flax-lily	x	x	x	x
	<i>Dichelachne crinita</i>	Long-hair Plume-grass			x	
	<i>Dichondra repens</i>	Kidney-weed			x	x
	<i>Dicksonia antarctica</i>	Soft Tree-fern	x	x	x	
*	<i>Digitalis purpurea</i>	Foxglove				x
	<i>Dillwynia cinerascens</i>	Grey Parrot-pea				x
	<i>Dillwynia sericea</i>	Showy Parrot-pea				x
	<i>Drosera peltata</i>	Pale Sundew			x	x
	<i>Dryopoa dives</i>	Giant Mountain Grass		x	x	
	<i>Epacris impressa</i>	Common Heath				x
	<i>Eucalyptus cephalocarpa</i>	Mealy Stringybark				x
	<i>Eucalyptus cypellocarpa</i>	Mountain Grey-gum		x	x	x
	<i>Eucalyptus delegatensis subsp. delegatensis</i>	Alpine Ash	x			

Origin	Scientific Name	Common Name	Donna Buang East	Donna Buang West	Drop AK Sth/East	Mount Tugwell
	<i>Eucalyptus goniocalyx</i>	Bundy				x
	<i>Eucalyptus nitens</i>	Shining Gum	x			
	<i>Eucalyptus obliqua</i>	Messmate Stringybark			x	x
	<i>Eucalyptus ovata</i>	Swamp Gum			x	
	<i>Eucalyptus radiata</i>	Narrow-leaf Peppermint	x	x	x	x
	<i>Eucalyptus regnans</i>	Mountain Ash	x	x	x	x
	<i>Eucalyptus sieberi</i>	Silvertop Ash		x	x	x
	<i>Eucalyptus viminalis</i>	Manna Gum		x	x	
	<i>Exocarpos cupressiformis</i>	Cherry Ballart				x
	<i>Gahnia radula</i>	Thatch Saw-sedge		x	x	x
	<i>Gahnia sieberiana</i>	Red-fruit Saw-sedge		x	x	
*	<i>Galium aparine</i>	Cleavers				x
	<i>Galium binifolium</i>	Reflexed Bedstraw		x	x	
	<i>Galium gaudichaudii</i>	Rough Bedstraw			x	x
	<i>Glossodia major</i>	Wax-lip Orchid				x
	<i>Glycine clandestina</i>	Twining Glycine			x	x
	<i>Gonocarpus humilis</i>	Shade Raspwort			x	x
	<i>Gonocarpus micranthus</i>	Creeping Raspwort				x
	<i>Gonocarpus tetragynus</i>	Common Raspwort				x
	<i>Goodenia lanata</i>	Trailing Goodenia			x	x
	<i>Goodenia ovata</i>	Hop Goodenia		x	x	x
	<i>Grammitis billardierei</i>	Common Finger-fern	x	x		
	<i>Gratiola peruviana</i>	Austral Brooklime		x		x
	<i>Hardenbergia violacea</i>	Purple Coral-pea				x
	<i>Histiopteris incisa</i>	Bat's Wing Fern	x	x	x	
	<i>Hovea heterophylla</i>	Common Hovea			x	x
	<i>Hydrocotyle geraniifolia</i>	Forest Pennywort		x	x	
	<i>Hydrocotyle hirta</i>	Hairy Pennywort	x	x	x	x
	<i>Hydrocotyle laxiflora</i>	Stinking Pennywort				x
	<i>Hypericum gramineum spp. agg.</i>	Small St John's Wort				x
	<i>Hypericum japonicum</i>	Matted St John's Wort			x	
*	<i>Hypochaeris glabra</i>	Smooth Cat's-ear		x	x	x
*	<i>Hypochaeris radicata</i>	Flatweed		x	x	x
*	<i>Ilex aquifolium</i>	English Holly				x
*	<i>Jacobaea vulgaris</i>	Ragwort		x	x	
	<i>Kunzea leptospermoides</i>	Yarra Burgan		x	x	x
	<i>Lagenophora gracilis</i>	Slender Bottle-daisy			x	x
	<i>Lagenophora stipitata</i>	Common Bottle- daisy				x
	<i>Lepidosperma elatius</i>	Tall Sword-sedge	x	x	x	

Origin	Scientific Name	Common Name	Donna Buang East	Donna Buang West	Drop AK Sth/East	Mount Tugwell
	<i>Lepidosperma gunnii</i>	Slender Sword-sedge				x
	<i>Lepidosperma laterale</i>	Variable Sword-sedge			x	x
	<i>Leptospermum continentale</i>	Prickly Tea-tree		x	x	x
	<i>Leptospermum lanigerum</i>	Woolly Tea-tree		x		
	<i>Leucopogon virgatus</i>	Common Beard-heath			x	x
	<i>Lobelia rhombifolia</i>	Branched or Tufted Lobelia				x
	<i>Lomandra filiformis subsp. coriacea</i>	Wattle Mat-rush			x	x
	<i>Lomandra filiformis subsp. filiformis</i>	Wattle Mat-rush			x	x
	<i>Lomatia ilicifolia</i>	Holly Lomatia				x
*	<i>Lonicera japonica</i>	Japanese Honeysuckle				x
	<i>Mentha laxiflora</i>	Forest Mint			x	x
	<i>Microlaena stipoides var. stipoides</i>	Weeping Grass	x	x	x	x
*	<i>Myosotis sylvatica</i>	Wood Forget-me-not				x
	<i>Notelaea ligustrina</i>	Privet Mock-olive		x	x	
	<i>Nothofagus cunninghamii</i>	Myrtle Beech	x	x		
	<i>Olearia argophylla</i>	Musk Daisy-bush	x	x	x	x
	<i>Olearia lirata</i>	Snowy Daisy-bush	x	x	x	x
	<i>Olearia phlogopappa</i>	Dusty Daisy-bush	x	x	x	
	<i>Olearia rugosa</i>	Wrinkled Daisy-bush		x	x	
	<i>Opercularia varia</i>	Variable Stinkweed		x		x
	<i>Oxalis exilis</i>	Shady Wood-sorrel		x	x	
	<i>Pandorea pandorana subsp. pandorana</i>	Wonga Vine		x	x	x
	<i>Pelargonium inodorum</i>	Kopata				x
	<i>Pellaea falcata</i>	Sickle Fern	x	x		
	<i>Phebalium squamulosum subsp. squamulosum (r)</i>	Forest Phebalium	x			
	<i>Pimelea axiflora</i>	Bootlace Bush	x	x	x	
	<i>Pimelea humilis</i>	Common Rice-flower				x
	<i>Pimelea ligustrina</i>	Tall Rice-flower			x	x
#	<i>Pittosporum undulatum</i>	Sweet Pittosporum				x
*	<i>Plantago coronopus</i>	Buck's-horn Plantain				x
	<i>Plantago debilis</i>	Shade Plantain	x		x	
*	<i>Plantago lanceolata</i>	Ribwort				x
	<i>Plantago varia</i>	Variable Plantain				x
	<i>Platylobium formosum spp. agg.</i>	Handsome Flat-pea			x	x

Origin	Scientific Name	Common Name	Donna Buang East	Donna Buang West	Drop AK Sth/East	Mount Tugwell
	<i>Poa ensiformis</i>	Sword Tussock-grass	x		x	x
	<i>Poa labillardierei</i>	Common Tussock-grass			x	x
	<i>Poa tenera</i>	Slender Tussock-grass			x	x
	<i>Polyscias sambucifolia</i>	Elderberry Panax	x			x
	<i>Polyscias sambucifolia subsp. 1</i>	Broad-leaf Panax		x		
	<i>Polyscias sambucifolia subsp. 3</i>	Mountain Panax		x		
	<i>Polystichum proliferum</i>	Mother Shield-fern	x	x	x	x
	<i>Pomaderris aspera</i>	Hazel Pomaderris			x	
	<i>Pomaderris elliptica var. elliptica</i>	Smooth Pomaderris			x	
	<i>Poranthera microphylla</i>	Small Poranthera			x	x
	<i>Prostanthera lasianthos</i>	Victorian Christmas-bush			x	
	<i>Pteridium esculentum</i>	Austral Bracken	x	x	x	x
	<i>Pultenaea forsythiana</i>	Prickly Bush-pea				x
	<i>Pultenaea gunnii</i>	Golden Bush-pea			x	x
	<i>Pultenaea scabra</i>	Rough Bush-pea				x
	<i>Ranunculus lappaceus</i>	Australian Buttercup	x		x	x
	<i>Ranunculus spp.</i>	Buttercup			x	
	<i>Rubus parvifolius</i>	Small-leaf Bramble			x	x
	<i>Rytidosperma pallidum</i>	Silvertop Wallaby-grass			x	x
	<i>Rytidosperma racemosum var. racemosum</i>	Slender Wallaby-grass				x
	<i>Sambucus gaudichaudiana</i>	White Elderberry		x	x	
	<i>Senecio glomeratus</i>	Annual Fireweed		x	x	x
	<i>Senecio hispidulus</i>	Rough Fireweed	x			
	<i>Senecio linearifolius</i>	Fireweed Groundsel				x
	<i>Senecio minimus</i>	Shrubby Fireweed		x	x	x
	<i>Sigesbeckia orientalis subsp. orientalis</i>	Indian Weed		x	x	
*	<i>Solanum mauritianum</i>	Wild Tobacco Tree				x
	<i>Solanum prinophyllum</i>	Forest Nightshade		x	x	
	<i>Spyridium parvifolium</i>	Dusty Miller			x	x
	<i>Stackhousia monogyna</i>	Creamy Stackhousia				
	<i>Stellaria flaccida</i>	Forest Starwort	x	x		
	<i>Tasmannia lanceolata</i>	Mountain Pepper	x	x	x	
	<i>Tetrarrhena juncea</i>	Forest Wire-grass	x	x	x	x
	<i>Tetradlea ciliata</i>	Pink-bells				x
	<i>Tetradlea stenocarpa (r)</i>	Long Pink-bells				x
	<i>Themeda triandra</i>	Kangaroo Grass				x

Origin	Scientific Name	Common Name	Donna Buang East	Donna Buang West	Drop AK Sth/East	Mount Tugwell
	<i>Todea barbara</i>	Austral King-fern	x	x		
*	<i>Trifolium spp.</i>	Clover				x
	<i>Urtica incisa</i>	Scrub Nettle	x	x	x	x
	<i>Veronica calycina</i>	Hairy Speedwell			x	
	<i>Veronica derwentiana</i>	Derwent Speedwell		x		
	<i>Veronica notabilis</i>	Forest Speedwell	x	x		
	<i>Veronica plebeia</i>	Trailing Speedwell				x
	<i>Viola hederacea</i>	Ivy-leaf Violet	x			
	<i>Wahlenbergia spp.</i>	Bluebell				x
	<i>Xanthosia dissecta</i>	Cut-leaf Xanthosia			x	x
*	<i>Zantedeschia aethiopica</i>	White Arum-lily				x
	<i>Zieria arborescens subsp. arborescens</i>	Stinkwood	x	x		

## Appendix 6. Potentially occurring significant flora species

**Table 15.** Potentially occurring State and Nationally Significant fauna species

\*Refers to latest VBA record within 5km of the study site    ^Refers to number of VBA records within 5km of the study site

### Status Code

**Victorian Rare or Threatened Species (VROTS)** (DEPI 2013)

CR: Critically Endangered, EN: Endangered, VU: Vulnerable

**FFG Act 1988 status** L: Listed

**EPBC Act 1999 conservation status**

EX: Extinct, CR: Critically endangered, EN: Endangered, VU:

Vulnerable and CD: Conservation dependant.

EPBC	FFG	VROT	Scientific name	Common name	Last record*	No. records^	Occurrence Likelihood	Likelihood Reasoning	Likelihood of Impact	Habitat notes
		r	<i>Correa reflexa</i> <i>var. lobata</i>	Powelltown Correa	1977	1	Low	Low distribution across the local area	Low	Locally common in areas south-east of Melbourne. Moist, open forests, often heathy. Also heathy woodlands (Walsh and Entwisle 1999).
	L	v	<i>Cyathea cunninghamii</i>	Slender Tree-fern	2003	38	Moderate	None observed – partially suitable habitat is present	Low	Generally confined to deep gullies in wet forests (Walsh and Entwisle 1994, p. 69).
		v	<i>Cyathea X marcescens</i>	Skirted Tree-fern	2006	20	Moderate	None observed though suitable habitat is present	Low	Found in Otway Ranges, Eastern Highlands, Gippsland Highlands, East Gippsland and Tasmania including King Island. Thought to be a sterile hybrid between <i>C. australis</i> and <i>C. cunninghamii</i> and its distribution echoes that of the less common of those species, <i>C. cunninghamii</i> . (Walsh and Entwisle 1994).
		r	<i>Tetratheca stenocarpa</i>	Long Pink-bells	-	-	Low	None observed within no previous records in the local area	Low	Endemic in Victoria. Grows in open-forests and tall mountain forests with populations limited to the Healesville and Gembrook, the Pyrete Ranges and French Island (Walsh and Entwisle 1999, p. 127).
		r	<i>Pteris comans</i>	Netted brake	2000	11	Moderate	None observed; partially suitable habitat is present	Low	Locally abundant in shady forests of wetter regions in south-central Victoria, mainly growing on seepages, stream banks and damp flats (Walsh and Entwisle 1994, p. 54).
		r	<i>Acacia howittii</i>	Sticky Wattle	-	-	Low	Unlikely to occur unless from nearby cultivated populations	Low	Indigenous to the Tarra Valley and surrounds, central Gippsland, Victoria. It is also widely cultivated. Prefers moist forests and sheltered areas (Tame 1992, pp. 79–80).



EPBC	FFG	VROT	Scientific name	Common name	Last record*	No. records^	Occurrence Likelihood	Likelihood Reasoning	Likelihood of Impact	Habitat notes
		r	<i>Banksia saxifolia</i>	#N/A	-	-	Low	No VBA records within 150 km of the study site.	Low	Natural Populations are limited to the Grampians Ranges and Wilsons Promontory. Has been cultivated and is adaptable to cooler climates.

## Appendix 7. Potentially occurring significant fauna species

**Table 16.** Potentially occurring State and Nationally Significant fauna species

Status Code

<p><b>Migratory/Marine (EPBC Act)</b>                  M1: Migratory Listed Species under the EPBC Act;                  M2: Marine Listed Species under the EPBC Act.  <b>EPBC Act 1999 conservation status</b>                  EX: Extinct, CR: Critically endangered, EN: Endangered, VU: Vulnerable and                  CD: Conservation dependant.</p>	<p><b>FFG Act 1988 status</b>                  L: Listed, N: Nominated, I: Invalid or ineligible and D: Delisted  <b>Victorian Rare or Threatened Species (VROTS) (DSE 2013)</b>                  EX: Extinct, RX: Regionally Extinct, WX: Extinct in the Wild,                  CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near                  Threatened, DD: Data Deficient</p>
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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
	L	vu	<i>Accipiter novaehollandiae novaehollandiae</i>	Grey Goshawk	2001	18	High	suitable habitat is present	The Grey Goshawk has a stronghold in Victoria; particularly the white form in the Otway Ranges, where wet forests and gullies containing Mountain Grey Gum adjoin partly cleared farmlands. They occur in lower densities in similar habitats in the Strzelecki Ranges, Gippsland Plains and Otway Plains. Elsewhere in the State they are occasionally seen in woodlands, dry forests, suburban parks and wooded farmlands {Marchant, 1993 #703}.
		nt	<i>Alcedo azurea</i>	Azure Kingfisher	2000	9	High	species may occasionally fly over but no nesting habitat is present	This species is usually found near well-vegetated wetlands. Uses root-festooned banks of fresh or tidal creeks, rivers, streams, lakes, swamps, estuaries or mangroves for perching. It forages by plunge-diving from perches to below surface of still or slow moving water, which may sometimes be only a few centimetres deep {Higgins, 1999 #5967}. Nesting occurs in small burrows in creek banks {Pizzey, 2007 #4773}.

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
CR	L	cr	<i>Anthochaera phrygia</i>	Regent Honeyeater	1985	2	Nil	Species is now known only from localities north of the Great Dividing Range in Victoria	Its range has contracted dramatically from its historical distribution as the species has suffered badly from broad-scale clearing and complete absence of old growth box-ironbark habitat so that now only around 100 individuals remain wild in Victoria. It is a rare vagrant to the country around Bendigo (where it was once common) and to Gippsland (where it was a regular visitor), and in most years only a handful of birds are seen in eastern Victoria — four-fifths of sightings are from just three locations: Chiltern, the Killawarra, and the Reef Hills. It is highly nomadic in its movements as determined by the need for a nectar rich diet from the flowering of eucalypts particularly Mugga Ironbark <i>Eucalyptus sideroxylon</i> , White Box <i>Eucalyptus albens</i> , Yellow Box <i>Eucalyptus melliodora</i> and Yellow Gum <i>Eucalyptus leucoxylon</i> {SWIFFT, 2017 #11947}.
			<i>Apus pacificus</i>	Fork-tailed Swift	2001	3	High	species is likely to forage over the study area	The Fork-tailed Swift is a migratory species occurring throughout Australia between October–April. This insectivorous species is almost entirely aerial. Occurs over inland plains, often over cliffs or beaches and also over settled areas. Feed aerially, and probably also roost aerially, although rarely seen to land {Higgins, 1999 #5967; Pizzey, 2007 #4773}.
	L	vu	<i>Calamanthus pyrrhopygius</i>	Chestnut-rumped Heathwren	#N/A	#N/A	low	habitat is forested and represents sub-optimal habitat. No local records	Found in heathy woodlands, scrublands and box/ironbark forests in coastal south east Australia {Pizzey, 2007 #4773}.
	R	nt	<i>Cercartetus nanus</i>	Eastern Pygmy-possum	1990	1	Medium	Suitable habitat is present	Sparse to locally common in wide range of vegetation on the Great Dividing Range, including western slopes and coastal plains. Found in wet and dry eucalypt forest, subalpine woodland, coastal banksia woodland and wet heath {Menkhorst, 2001 #1259}.
		nt	<i>Climacteris picumnus victoriae</i>	Brown Treecreeper (south-eastern ssp.)	2000	1	High	suitable nesting and foraging habitat is present	Occurs in eucalypt woodlands, particularly open woodland lacking a dense understorey {Higgins, 2001 #5966}. It is sedentary and nests in tree hollows within permanent territories, breeding in pairs or communally in small groups. Birds forage on tree trunks, on the ground amongst leaf litter

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
									and on fallen logs for ants, beetles and larvae {Higgins, 2001 #5966}.
E	L	en	<i>Dasyurus maculatus maculatus</i>	Spot-tailed Quoll	1994	1	Medium	Suitable habitat is present	The species is recorded in a range of treed habitats including tropical, subtropical and temperate rainforests, vine thickets, wet and dry sclerophyll forest, woodland and coastal scrub. In Tasmania it also occurs in heathland {Van Dyck, 2008 #5474}.
	L	en	<i>Engaeus curvisuturus</i>	Curve-tail Burrowing Cray	1983	4	High	Likely habitat exists for this species on or close to the Yarra River Floodplain. These cryptic species are rarely surveyed for so the lack of records can't discount the possibility that they exist.	This species is endemic to Victoria, Australia. Its range extends from the Mount Baw Baw region in the east, to Warburton in the west (Horwitz 1990). This is a burrowing species, with burrows found predominantly in the flood-plain, in grey clay and silty soils.
		en	<i>Engaeus tuberculatus</i>	Tubercle Burrowing Crayfish	1963	1	High	Likely habitat exists for this species within the Wet Forest EVC's within the study area. This species is often found upslope and relies on surface water runoff rather than accessing the groundwater with its burrows. These cryptic species are rarely surveyed for so the lack of records can't discount the possibility that they exist.	The species occurs in wet sclerophyll forest dominated by Eucalyptus regnans and with abundant ferns at ground level; microhabitats can be divided into flood bed and clay-dominated hill slopes. In western populations, it occurs in sympatry with <i>Engaeus urostrictus</i> and the two species divide the habitat finely, with <i>E. tuberculatus</i> occurring in type 3 burrows (independent of the water table) on the slopes above the creek bed. In easterly populations, this species is not found in sympatry with any other species of <i>Engaeus</i> , and it can be found in both these microhabitats. The largest male found was 33.7 mm carapace length. Mature females ranged from 14.9 to 34.6 mm carapace length. The largest non-reproductive female was 27.7 mm carapace length (Horwitz 1990).

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
CR	L	en	<i>Gymnobelideus leadbeateri</i>	Leadbeater's Possum	2001	21	High	Species has been recorded from the alignment Mt Donna Buang West	Found in montane wet sclerophyll forest NE. of Melbourne; outlying lowland population in swamp woodland at Yellingbo {Menkhorst, 2001 #1259}. They are most common in Mountain Ash ( <i>Eucalyptus regnans</i> ) and Shining Gum ( <i>E. nitens</i> ) forest but also inhabits some sites dominated by Alpine Ash ( <i>E. delegatensis</i> ), Snow Gum ( <i>E. pauciflora</i> ) and Mountain Swamp Gum ( <i>E. camphora</i> ). Sites at which the possum is found have three attributes in common: trees containing hollows, a predominance of smooth barked eucalypts and dense vegetation structure. {Van Dyck, 2008 #5474}.
	L	vu	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	2001	1	Medium	species may occasionally fly over but no suitable nesting sites	Occurs along the coast (especially the forested coasts of the East Gippsland Plains), on coastal islands, around coastal lakes and along some inland rivers and lakes. Catches prey on, or near the water's surface and also takes refuse from fishing boats. On land they feed from the ground on carrion or occasionally catch live prey. Builds stick-nests in tall eucalypts, particularly River Red Gum, Forest Red Gum and Southern Mahogany. Clearing of forests and woodlands along the coast, near coastal lakes, and along the Murray River, threatens this species. In the Gippsland Lakes region more than half of the known nest sites are on private lands {DSE, 2003 #4987}. Occurs across a range of forests and woodlands throughout Victoria {DSE, 2003 #4987}.
		vu	<i>Hirundapus caudacutus</i>	White-throated Needletail	2006	26	High	species is likely to forage over the study area	In Australia, the White-throated Needletail is almost exclusively aerial, from heights of less than 1 m up to more than 1000 m above the ground. Because they are aerial, it has been stated that conventional habitat descriptions are inapplicable. In Australia, White-throated Needletails almost always forage aerially, at heights up to 'cloud level', above a wide variety of habitats ranging from heavily treed forests to open habitats, such as farmland, heathland or mudflats {Higgins, 1999 #5967}.

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
E	L	nt	<i>Isoodon obesulus obesulus</i>	Southern Brown Bandicoot	1999	11	High	Suitable habitat is present and recent records	The Southern Brown Bandicoot is active during both the day and night. It is found in forest, heath and shrub communities. It shelters in a nest of vegetation beneath dense cover; it eats fungi, tubers and arthropods {Menkhorst, 2001 #1 259 ;Paull, 2008 #6009}.
E	L	en	<i>Lathamus discolor</i>	Swift Parrot	1978	3	Medium	species may fly through the study area while dispersing, but records are old	The Swift Parrot is a winter migrant to Victoria {Swift Parrot Recovery Team, 2001 #4502}. They arrive from their breeding areas in Tasmania, however small numbers of non-breeding birds may remain here during summer {Swift Parrot Recovery Team, 2001 #4502;Higgins, 1999 #5967}. They are nomadic, and follow the flowering of trees and psyllid infestations. In Victoria their distribution is centered on box-ironbark forests, but they are often seen in town parks and occur sporadically elsewhere in dry forests, dry woodlands and wooded farmlands. They are seldom seen in treeless areas, rainforests or wet forests {Higgins, 1999 #5967;Pizzey, 2007 #4773}. Feed mainly in winter-flowering plants, especially Red Ironbarks and ornamental trees and shrubs {Swift Parrot Recovery Team, 2001 #4502;Higgins, 1999 #5967}.
	L	vu	<i>Lewinia pectoralis pectoralis</i>	Lewin's Rail	1997	2	Low	Habitat unsuitable – no wetlands present along the alignment	Inhabits densely vegetated, fresh, brackish or saline wetlands, usually with areas of standing water. Use long tussocky grass, reeds, rushes, sedges or bracken and are occasionally found amongst tangled clumps of weeds such as Blackberries and Lantana {Marchant, 1993 #703}.
	L	vu	<i>Lissolepis coventryi</i>	Swamp Skink	1995	3	Low	May inhabit some low-lying areas along drainage lines, particularly where scrub (e.g. Kunzea sp.) occurs	Occupy cool temperate, low-lying wetlands including swamp margins, tea-tree thickets and even tidal salt-marshes. Secretive, often dwelling in dense low vegetation. Nocturnal to diurnal, shelters in burrows including those of crustaceans {Wilson, 2008 #5486}.
	L	vu	<i>Lophoictinia isura</i>	Square-tailed Kite	1979	1	High	suitable nesting and foraging habitat is present	Found in heathlands, woodlands, forests, tropical and sub tropical rainforest, timbered watercourses, hills and gorges. Nest are large and loose made of sticks 15–25m up in leafy tree. Range in coastal and sub-coastal south east Australia including Murray River region in SA. {Pizzey, 2007 #4773}

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
V	L	en	<i>Mastacomys fuscus mordicus</i>	Broad-toothed Rat	1977	1	Low	Habitat unsuitable – no flowing streams are present along the alignment	Habitat is characterised by high rainfall, a cool summer, cool to cold winter and moderate to dense groundcover of grasses, sedges and shrubs. Often found close to streams and steep banks where there is abundant grass and rope-rush, and where dense cover is provided by shrubs. Nests of shredded grass are built under logs and dense undergrowth {Van Dyck, 2008 #5474}.
			<i>Merops ornatus</i>	Rainbow Bee-eater	1979	1	Medium	species may occasionally forage but no nesting habitat	The species occurs in many types of habitat including woodland, shrubland, semi-cleared land and farmland, however it mainly occurs where eucalyptus species are dominant. It is almost entirely insectivorous and mostly occurs near to permanent water {Higgins, 1999 #5967}.
	L		<i>Miniopterus schreibersii</i> GROUP	Common Bent-wing Bat	2000	13	High	Foraging habitat is present although no potential roosting sites occur along the alignment	Includes two subspecies: <i>Miniopterus schreibersii bassanii</i> and <i>Miniopterus schreibersii oceanensis</i> . <i>Miniopterus schreibersii bassanii</i> occurs in rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, Melaleuca forest and open grasslands. They are cave dwellers but also use man-made constructions such as abandoned mines and road culverts {Churchill, 2008 #3973`, p. 182}. Known breeding sites in Victoria largely occur west of Heywood, Portland, Hamilton and Warrnambool. The easternmost breeding site is at Pomorneit, near Camperdown. Also found foraging within woodlands near large natural wetlands, river basins and agricultural areas {Churchill, 2008 #3973`, p. 182}. <i>Miniopterus schreibersii oceanensis</i> occurs along the east coast of Australia from Cape York, N. Qld to Castlemaine, Vic, predominantly east of Great Dividing Range. Habitat is rainforest, wet and dry sclerophyll forest, monsoon forest, open woodland, Melaleuca forests and open grasslands. {Churchill, 2008 #3973`}
		nt	<i>Myotis macropus</i>	Southern Myotis	2002	49	High	Foraging habitat is present although no potential roosting sites occur along the alignment	A range of open forests in coastal northern, eastern and south-eastern Australia, preferring low-altitude vegetated areas with a strong association with streams and permanent water bodies in flat/undulating country. The species has a requirement for caves (mineshfts) or tree hollows for roosting and breeding {Churchill, 2008 #3973}.

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
	L	en	<i>Ninox connivens connivens</i>	Barking Owl	2000	2	High	Suitable foraging and roosting habitat is present and recent records	Occurs in dry woodlands, wooded farmlands and dry forests in the 500–800mm annual rainfall zone and extend into semi-arid areas in River Red Gum forests along the Murray River. Hollow dependent species {Higgins, 1999 #5967; Pizzey, 2007 #4773}.
	L	vu	<i>Ninox strenua</i>	Powerful Owl	2006	27	High	Suitable foraging and roosting habitat is present and many recent records	Widespread in foothill and coastal forests where they especially favour gullies with Peppermint–Manna Gum forests. Occasionally seen in wetter mountain forests, drier box–ironbark forests and woodlands, and softwood plantations. Hunts at night by flying through the forest canopy catching prey from tree branches. They nest in large holes in trees {DSE, 2004 #4990}.
		nt	<i>Nycticorax caledonicus hillii</i>	Nankeen Night Heron	2000	26	High	Species recorded within 100m of the alignment Drop AK South	The Nankeen Night Heron has a widespread distribution in wetlands throughout Australia, particularly in the north, south, and southwest. This species inhabits shorelines of lakes, rivers, estuaries, terrestrial wetlands and grasslands, particularly those sheltered by tall ground vegetation and/or trees, with shallow, slow-moving water. Breeds in colonies, usually in the crown or canopy of trees, in forks or on horizontal boughs; also in reed beds or atop shrubs. In Victoria, most numerous in the Murray River region, and in smaller numbers in more coastal/near-coastal regions {Marchant, 1990 #5613; Pizzey, 2007 #4773}.
V		vu	<i>Petauroides volans</i>	Greater Glider	NA	NA	Low	No local records although predicted to occur (PMST)	Occurs in wet sclerophyll forest on the ranges and coastal plains from near Mossman, NE. QLD to Daylesford, VIC. Favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred food tree species. Requires large tree hollows for shelter, and found in most abundance where there is a high density of tree hollows. In southern Queensland require at least 2–4 den trees for every 2ha of habitat. They are significantly vulnerable to logging and have relatively small home ranges and poor dispersal ability. In Victoria, their numbers have declined sharply in recent years {TSSC, 2016 #11733}.



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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
	L	vu	<i>Phascogale tapoatafa</i>	Brush-tailed Phascogale	1972	1	High	suitable habitat is present	This species typically inhabits dry forest and woodland dominated by box, ironbark and stringybark eucalypts but may also occur in wetter forests {Menkhorst, 1996 #4963}. Prefers open forest with sparse groundcover, but uses habitats ranging from mallee to rainforest. The understorey and ground cover in these favoured habitats may be sparse, consisting of “scattered tussocks and forest litter” {Menkhorst, 1996 #4963}. Other characteristics of known habitat of this species include dead trees (favoured for foraging), availability of bark from the Red Stringybark (for nest material) {Menkhorst, 1996 #4963}, and a number of tree hollows with entrances as narrow as five centimetres or less (for nesting and shelter). Has disappeared from substantial areas of Victoria in recent times {Van Dyck, 2008 #5474}.
			<i>Phascolarctos cinereus</i>	Koala			High	Species recorded within 100m of the alignment Drop AK South. Suitable feed tree species present	#N/A
V	L	vu	<i>Prototroctes maraena</i>	Australian Grayling	2000	5	Low	Species is known from the Yarra River although no suitable habitat	This species only spends part of its life in freshwater streams, Australian Graylings migrate between freshwater streams and the ocean. Streams where this species occur tend to be clear with gravel bottoms and a variety of instream habitat such as pools and riffles. The upstream migration of this species has been effectively terminated in some rivers by dams {Allen, 2002 #5968}.
E	L	en	<i>Pseudomys fumeus</i>	Smoky Mouse	#N/A	#N/A	Medium	patchy distribution and no local records	Patchy, ephemeral populations in Victoria. Although recorded in subalpine to coastal dune areas, habitat is linked to dietary requirements. Epacrids that provide berries and flowers and legumes that provide seeds are typical of suitable habitat. Underground fungi (truffles) are important in winter while seeds and fruit are important in summer. Invertebrates are taken when available {Van Dyck, 2008 #5474}.

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
	L	en	<i>Pseudophryne bibronii</i>	Brown Toadlet	1962	1	Nil	Brown Toadlet now only known north of the Great Dividing Range in Victoria	Frequent dry forest, woodland, shrubland and grassland, sheltering under leaf-litter and other debris in moist soaks and depressions. Eggs are spawned in shallow burrows (or nets) under litter, in low areas, near water, that will later be flooded. Tadpoles are aquatic in ponds, flooded grassland and roadside ditches {Hero, 1991 #5583}.
		vu	<i>Pseudophryne semimarmorata</i>	Southern Toadlet	1972	1	High	Steeply incised gully lines provide high quality breeding habitat	The Southern Toadlet can be found in dry forest, woodland, shrubland, grassland and heaths. It shelters under leaf litter and other debris in moist soaks and depressions. Their eggs are spawned in shallow burrows under organic litter in low areas close to water {Hero, 1991 #5583}.
V	L	vu	<i>Pteropus poliocephalus</i>	Grey-headed Flying-fox	1982	2	Medium	Species may occasionally fly over but no known roosting camps are present	Eastern coastal Australia from Gladstone in Qld to South Gippsland and Melbourne in Vic, with rare influxes further west and south. Rarely more than 200km inland. In warmer months gathers in very large camps, usually in dense forest in gullies. Population is more dispersed in winter. Size of camps fluctuate in response to local food supplies. In south numbers fluctuate in regular pattern, being highest in late summer-autumn and lowest in winter {Menkhorst, 2001 #1259}.
	L	vu	<i>Rhinolophus megaphyllus megaphyllus</i>	Eastern Horseshoe Bat	1998	1	High	suitable habitat is present including potential roost sites	The Eastern Horseshoe Bat has a distribution mainly along coastal eastern Australia, to the east/south east of the Great Dividing Range, in a wide range of wet/dry/open/closed forest, woodland or grassland habitat, but favouring mature forest. This species largely roosts in caves or abandoned mines, but also in tree hollows, rock piles, buildings and rail tunnels, within tree roots/undercuts along waterways. Forages along tracks/waterways, avoiding large clearings. {Churchill, 2008 #3973}.
	L	nt	<i>Sminthopsis leucopus</i>	White-footed Dunnart	1978	2	Medium	marginal habitat is present and no recent records	Patchily distributed in lowland heathy woodland and forest, coastal scrub, coastal dune grassland. Constructs bark nest beneath fallen timber or dense litter {Menkhorst, 2001 #1259}.
		dd	<i>Spathula goubaultae</i>	Planarian	1993	1	High	Species recorded within the alignment Mt Donna Buang East	Flatworms occur on the undersides of rocks and wood, in a variety of water flow conditions (Gooderham & Tsyrlin 2002).

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
	L	nt	<i>Stagonopleura guttata</i>	Diamond Firetail	1980	1	Low	No grassland habitat is present. Most of the area is thickly forested.	Inhabit woodlands, open forests and other lightly timbered habitats, such as farmland with remnant trees, or grasslands with scattered trees. Often occurs in vegetation along watercourses and very occasionally near settlements. Habitat usually has open or sparse understorey of shrubs, small trees or regrowth, and grass ground cover {Higgins, 2006 #5585}.
	L	en	<i>Tyto novaehollandiae novaehollandiae</i>	Masked Owl	#N/A	#N/A	High	suitable foraging and roosting habitat is present but no local records	Inhabits forests, woodlands and caves. Active in middle storey {Simpson, 2000/2001 #981}. Inhabits diverse range of wooded habitats that provide tall or dense mature trees with hollows suitable for nesting and roosting, and nearby open areas for foraging {Higgins, 1999 #5967}.
	L	vu	<i>Tyto tenebricosa tenebricosa</i>	Sooty Owl	2006	33	High	Suitable foraging and roosting habitat is present and many recent records	Occurs in tall wet forests in sheltered east and south-east facing mountain gullies, with dense understorey layer. Nests on decayed debris, in hollow trunk of eucalypt, up to over 30m in height, or in high cavity in cave. Range is coastal east Australia mostly upon and east of divide from Mt. Disappointment range, north of Melbourne to Conondale Range.(Pizzey and Knight 2007)

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EPBC	FFG	VROTS	Scientific name	Common name	Last record	No. recs.	Likelihood occurrence	Likelihood Reasoning	Habitat/species notes
		en	<i>Varanus varius</i>	Lace Monitor	2006	11	High	Species has been recorded from Mt Donna Buang West. Foraging habitat is present but no termite nesting mounds observed within or near the alignment	Occurs in well-timbered areas, from dry woodlands to cool temperate southern forests. Species is arboreal, ascending large trees when disturbed; forages widely. Clutches of eggs are laid in arboreal or terrestrial termite mounds {Wilson, 2008 #5486}.

## Appendix 8. Significant Impact Assessment for EPBC Listed Fauna

Threatened fauna species listed under the EPBC Act with a medium or high likelihood of occurring in the study area were assessed against the EPBC Act criteria for significant impacts. One Critically Endangered fauna species (Leadbeater’s Possum), three Endangered species (Southern Brown Bandicoot, Swift Parrot, Smoky Mouse) and two Vulnerable species (Grey-headed Flying-fox, Greater Glider) listed under the EPBC Act have the potential to be impacted by the project and were assessed in accordance with the significant impact criteria. In the seven tables below, the general Matters of National Environmental Significance (MNES) significant impact guidelines and any specific significant impact criteria, have been utilised to determine if there will be significant impacts upon any of these six species from the proposed mountain bike trail. EPBC Listed Migratory birds are assessed as a group (Fork-tailed Swift, White-throated Needle-tail, Rainbow Bee-eater).

**Table 17.** Significant Impact Guidelines for Leadbeater’s Possum

LEADBEATER’S POSSUM (Critically Endangered)					
Significant Impact Criteria	Risk to MNES Without Mitigation Measures	Likelihood of Significant Impact (No Mitigation Measures)	Specific Mitigation Measure(s)	Residual Risk to MNES With Mitigation Measures Applied	Likelihood of a Significant Impact (With Mitigation Measures Implemented)
<b>There are NO Significant Impacts Guidelines for Leadbeater’s Possum (LBP) – therefore the general guidelines for Critically Endangered/ Endangered species apply</b>					
<b>Matters of National Environmental Significance – Significant impact guidelines EPBC Act 1999 (General Guidelines for Endangered Species)</b>					
Lead to a long-term decrease in the size of a population	Potential nest/den trees are present in the study area in the form of large old trees or dead stags with hollows.  There are known populations in several locations in the vicinity of Mount Donna Buang Road and the Summit Road, in fact almost the	Medium	All large hollow bearing trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.  No canopy or sub-canopy species are proposed to be removed within High-probability habitat (e.g. Silver Wattle, Black Wattle and immature Eucalypts) to construct the trail as this vegetation layer provides a	Although the trail alignment traverses’ significant areas of confirmed habitat, application of buffers around significant trees will ensure minimal impacts.	Low

**LEADBEATER’S POSSUM (Critically Endangered)**

	<p>entire area from the Summit to the top of Kennedy Creek.</p> <p>Approximately 15 km of the trail corridor is considered habitat for the species.</p> <p>Removal of hollow-bearing trees, canopy and sub-canopy trees, may severely impact on the viability of LBP populations.</p>		<p>critical habitat component for the movement of the species.</p> <p>Any potential LBP nest trees will be identified and avoided. This includes all hollow-bearing trees, both dead and alive. A 50-m buffer will ideally apply around any potential LBP hollow bearing nest tree; however, a 10-m buffer will apply in instances where a 50-m buffer cannot be achieved.</p> <p>The alignment avoids the general vicinity of 21 of the 23 LBP nest boxes within the trail alignment.</p>		
Reduce the area of occupancy of the species	Removal of hollow-bearing trees may reduce the area occupied by the LBP in the study area.	Medium	Mitigation measures above are required to ensure the species can continue to utilise the habitat in the Study Area and surrounds after the trail is constructed and operational.	None – there is proposed to be no loss of nesting trees, or continuous sub-canopy movement habitat.	Low
Fragment an existing population into two or more populations	Removal of sub-canopy or canopy in LBP habitat may isolate nest trees and fragment populations.	Medium	Mitigation measures above are required to ensure the species can continue to move between nest trees through the sub-canopy layer. Broader movement for this species will be assured through retention of sub-canopy species.	None	Low
Adversely affect habitat critical to the survival of a species	The study area supports high-quality habitat and an abundance of nesting trees.	Medium	Mitigation measures above are required to ensure the species can continue to utilise the habitat in the Study Area and surrounds after the trail is constructed and operational. No nesting trees or nest boxes will be removed.	None	Low

**LEADBEATER’S POSSUM (Critically Endangered)**

Disrupt the breeding cycle of a population	There is an abundance of nest trees and 23 nest boxes in the vicinity of the trail alignment.	Medium	Mitigation measures above are required to ensure the species can continue to nest/breed in the Study Area and surrounds after the trail is constructed and operational.	None – there is proposed to be no loss of nesting trees or nest boxes. The trail will be within the general vicinity of 2 nest boxes; however, impacts on LBP are not anticipated from either construction or mountain biking.	Low
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The study area contains areas of high-quality LBP habitat, with an abundance of nest trees and canopy/ sub-canopy that provides connectivity. Construction of the trail will remove some understorey vegetation.	Medium	Mitigation measures above are required to ensure the species can continue to utilise the habitat in the Study Area and surrounds after the trail is constructed and operational. No trees or stags will be removed.	None – there is proposed to be no loss of nesting trees, or continuous sub-canopy movement habitat.	Low
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species’ habitat	Unlikely Feral cats are known to prey on LBP but their extent in the study area is not likely to increase as a result of the proposed trail. Sugar Gliders <i>Petaurus breviceps</i> compete with LBP for nest hollows. The proposed trail is unlikely to increase the occurrence of Sugar Gliders.	Low	No specific mitigation measures required to mitigate this risk. Continued monitoring of nest boxes will determine if Sugar Gliders are outcompeting LBP for nesting sites.	N/A	Low

LEADBEATER'S POSSUM (Critically Endangered)					
Introduce disease that may cause the species to decline	The proposed trail is unlikely to introduce a disease that may cause this species to decline.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Interfere with the recovery of the species.	There is a draft National Recovery Plan for the LBP. The Plan focusses on the main threat to the species – decline in the extent, quality and connectivity of suitable habitat. However, as there will be no loss of hollow-bearing trees resulting from construction of the trail, the recovery of the species is unlikely to be affected.	Low	Mitigation measures outlined above should ensure the recovery of the species is not impacted.	None	Low

**Table 18.** Significant Impact Guidelines for Southern Brown Bandicoot

SOUTHERN BROWN BANDICOOT (Endangered)					
Significant Impact Criteria	Risk to MNES Without Mitigation Measures	Likelihood of Significant Impact (No Mitigation Measures)	Specific Mitigation Measure(s)	Residual Risk to MNES With Mitigation Measures Applied	Likelihood of a Significant Impact (With Mitigation Measures)
<b>Under the draft referral guidelines (DSEWPaC 2011) there is high risk of a significant impact occurring to the Southern Brown Bandicoot if a proposed action will result in:</b>					
Loss or long-term modification of suitable habitat known or likely to support the	Unlikely; Habitat for the Southern Brown Bandicoot (SBB) was identified in the study area Mount Tugwell is likely to support populations given the species prefers	Medium	The proposed trail alignment has been refined to minimise impacts to native vegetation. However, there will inevitably be the loss of some understorey vegetation in habitat areas for the SBB.	Loss of breeding, foraging and dispersal habitat is unavoidable even with mitigation measures applied;	Low



**SOUTHERN BROWN BANDICOOT (Endangered)**

species of greater than 5% in patches greater than 100 ha	a mosaic of vegetation age classes as a result of fire and shrubby/heath vegetation cover that persists throughout much of this area. A VBA record has been confirmed within 1 km of the Mount Tugwell assessment area.  The loss of understorey vegetation representing potential SBB habitat in the vicinity of Mount Tugwell is approximately 4 ha. This includes habitat types (EVCs): Herb-rich Foothill Forest, Riparian Forest and Shrubby Foothill Forest.		Avoidance of vegetation loss in some sections of Mount Tugwell could be achieved using raised platform, especially at gully line crossings.	however, it is less than 5% of the habitat in the regional patch.	
Reduced connectivity or fragmentation of suitable habitat known to support the species that results in a distance of greater than 50 m.	Unlikely.  The proposed trail will remove understorey vegetation along a linear alignment with a disturbance footprint averaging 2 m wide. SBB are able to move across open areas adjacent to understorey habitat.	Low	Minimising the construction footprint of the proposed trail to 2m will have limited fragmentation of understorey habitat.	Construction of the trail will not create a gap of more than 50 m in the understorey vegetation within SBB habitat.	Low
<b>Matters of National Environmental Significance Significant impact guidelines EPBC Act 1999 (General Guidelines for Endangered Species)</b>					
Lead to a long-term decrease in the size of a population	Unlikely.  The size of the SBB population occupying habitats around Mount Tugwell is unknown. However, there are 11 VBA records with the most recent being from 1999.	Low	Only a small fraction of SBB habitat will be removed from a large, contiguous patch of habitat in the local region.	Potential impacts to individuals during construction.	Low

**SOUTHERN BROWN BANDICOOT (Endangered)**

Reduce the area of occupancy of the species	Unlikely. The removal of understorey vegetation along the proposed trail will not reduce the area likely to be occupied by the SBB in the vicinity of Mount Tugwell.	Low	As outlined above, the trail footprint has been refined to minimise impacts to vegetation.	Potential impacts to individuals during construction.	Low
Fragment an existing population into two or more populations	Unlikely. The proposed trail will remove understorey vegetation along a linear alignment with a disturbance footprint of no greater than 2 m wide. SBB are able to move across open areas adjacent to understorey habitat.	Low	As outlined above, minimising the construction footprint of the proposed trail to 2 m will ensure no fragmentation of understorey habitat.	Construction of the trail will not create a gap of more than 50 m in the understorey vegetation within SBB habitat.	Low
Adversely affect habitat critical to the survival of a species	Unlikely. The loss of a small amount of vegetation within the Study Area will not reduce breeding, foraging and dispersal habitat opportunities for the species.	Low	As outlined above, the trail footprint has been refined to minimise impacts to SBB habitat.	There will be some direct habitat losses during trail construction.	Low
Disrupt the breeding cycle of a population	Some potential for disruption. The species can breed all year round and give birth to up to four litters a year. Main breeding season is from July through to November, although this is linked to seasonal rainfall and it can vary accordingly.	Medium	Some minor habitat loss has potential to disrupt the breeding cycle of individuals; however, this is unlikely to impact the greater sub-regional population	Direct disruption to breeding will be linked with habitat loss. Timing of trail construction should avoid the breeding period	Low
Modify, destroy, remove, isolate or decrease the	Unlikely. The removal of understorey vegetation along the proposed trail is	Low	As outlined above, the trail footprint has been refined to minimise impacts to SBB habitat.	The availability and quality of SBB habitat will not be	Low

**SOUTHERN BROWN BANDICOOT (Endangered)**

availability or quality of habitat to the extent that the species is likely to decline	not likely to modify the quality of SBB habitat in the vicinity of the proposed trail.			compromised in the study area despite some minor habitat losses during trail construction.	
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	The species is highly vulnerable to predation by feral species especially foxes. The creation of a linear path may allow foxes to access areas of SBB habitat around Mount Tugwell previously uninhabited by foxes. However, it is unlikely that construction of the trail will lead to an increase in fox populations.	Medium	Establish a fox and cat control program baiting program prior to trail construction within the potential habitat for the species. Maintain this as an on-going program.	Potential predation on individuals may occur however population impacts should be mitigated	Low
Introduce disease that may cause the species to decline	Disease is not listed as a threat to this species. Construction of the trail is unlikely to introduce a disease that may cause this species to decline.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Interfere with the recovery of the species.	A Draft Recovery Plan has been prepared for the Southern Brown Bandicoot. Vegetation removal and habitat loss and alteration, in addition to predation by the Red Fox, have been recognised as threatening processes for the species.	Medium	As outlined previously, the trail footprint has been refined to minimise impacts to SBB habitat. However, there are no mitigation measures that can be undertaken to reduce the risk of increased fox incursion into SBB habitat.	Construction of the proposed trail is unlikely to interfere with the recovery of the species.	Low

**Table 19. Significant Impact Guidelines for Smoky Mouse**

SMOKY MOUSE (Endangered)					
Significant Impact Criteria	Risk to MNES Without Mitigation Measures	Likelihood of a Significant Impact (No Mitigation Measures)	Specific Mitigation Measure(s)	Residual Risk to MNES With Mitigation Measures Applied	Likelihood of a Significant Impact (With Mitigation Measures)
<b>There are NO Significant Impacts Guidelines for Smoky Mouse – therefore the general guidelines for Critically Endangered/ Endangered species apply</b>					
<b>Matters of National Environmental Significance Significant impact guidelines EPBC Act 1999 (General Guidelines for Endangered Species)</b>					
Lead to a long-term decrease in the size of a population	<p>Unlikely.</p> <p>There is no reliable data on which to base population estimates or to estimate trends in Smoky Mouse populations.</p> <p>The size of the Smoky Mouse population occupying habitats in the study area is unknown. There are no VBA records within 5 km of the alignment. However, the species and its habitat are predicted to occur in the study area according to the PMST. The species has a patchy distribution making it hard to predict the location of populations in the absence of targeted field surveys.</p>	Low	Only a small fraction of potential Smoky Mouse habitat will be removed from a large, contiguous patch of habitat in the local region.	Potential impacts to individuals during construction.	Low
Reduce the area of occupancy of the species	<p>Unlikely.</p> <p>The removal of understorey vegetation along the proposed trail will not reduce the area likely to be occupied by the Smoky Mouse in the study area.</p>	Low	As outlined above, the trail footprint has been refined to minimise impacts to vegetation.	Potential impacts to individuals during construction.	Low

SMOKY MOUSE (Endangered)					
Fragment an existing population into two or more populations	Unlikely. The proposed trail will remove understorey vegetation along a linear alignment with a disturbance footprint of no greater than 2 m wide. The Smoky Mouse is known to readily move across a 30-m wide fire break.	Low	As outlined above, minimising the construction footprint of the proposed trail to 2 m will ensure no fragmentation of understorey habitat.	Construction of the trail will create a gap distance known to be traversed by the Smoky Mouse.	Low
Adversely affect habitat critical to the survival of a species	Unlikely. The loss of a small amount of vegetation within the study area will not reduce breeding, foraging and dispersal habitat opportunities for the species.	Low	As outlined above, the trail footprint has been refined to avoid vegetation removal.	There will be some direct habitat losses during trail construction.	Low
Disrupt the breeding cycle of a population	Some potential for disruption. The species breeds from September to April, in small colonies where they occupy a relatively large and complex burrow system.	Medium	Some minor habitat loss has potential to disrupt the breeding cycle of individuals; however, this is unlikely to impact any sub-regional population (metapopulation). Proposed trail alignment should be inspected for Smoky Mouse burrows in areas of suitable habitat, prior to construction, and realign if burrows are detected.	Timing of trail construction should avoid the breeding period	Low
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely. Suitable habitat for the Smoky Mouse in the study area is represented by dry forest types along ridgetops, especially with a northerly aspect; e.g. Mount Tugwell. The removal of understorey vegetation along the proposed trail is not likely to reduce or modify the availability or	Low	As outlined above, the trail footprint has been refined to minimise impacts to understorey vegetation.	The availability and quality of Smoky Mouse habitat is not compromised in the study area despite some minor habitat	Low

SMOKY MOUSE (Endangered)					
	quality of habitat in the vicinity of the proposed trail.			losses during construction.	
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<p>The proposed trail may expose individuals to higher rates of predation when they cross areas unprotected by vegetation cover. Introduced predators include the Red Fox and Feral Cats.</p> <p>The creation of a linear path may allow foxes to access areas of Smoky Mouse habitat. However, it is unlikely that construction of the trail will lead to an increase in fox or cat populations.</p>	Medium	Establish a fox and cat control program baiting program prior to trail construction within the potential habitat for the species. Maintain this as an on-going program.	Potential predation on individuals may occur however population impacts should be mitigated	Low
Introduce disease that may cause the species to decline	<p>Disease is not listed as a threat to this species.</p> <p>Construction of the trail is unlikely to introduce a disease that may cause this species to decline.</p>	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Interfere with the recovery of the species.	<p>A Draft Recovery Plan has been prepared for the Smoky Mouse.</p> <p>Relevant threatening processes for this species in the study area include predation by introduced species and construction of roads and tracks in forests which threaten ridge-dependent species. Roads and tracks are likely to facilitate movement of the Fox and Cat.</p>	Medium	As outlined previously, the trail footprint has been refined to minimise impacts to ridgetop habitat. However, there are no mitigation measures that can be undertaken to reduce the risk of increased fox or cat incursion into SBB habitat.	Construction of the proposed trail is unlikely to interfere with the recovery of the species.	Low

**Table 20. Significant Impact Guidelines for Swift Parrot**

SWIFT PARROT (Endangered)					
Significant Impact Criteria	Risk to MNES Without Mitigation Measures	Likelihood of a Significant Impact (No Mitigation Measures)	Specific Mitigation Measure(s)	Residual Risk to MNES With Mitigation Measures Applied	Likelihood of a Significant Impact (With Mitigation Measures)
<b>There are NO Significant Impacts Guidelines for Swift Parrot – therefore the general guidelines for Critically Endangered/ Endangered species apply</b>					
<b>Matters of National Environmental Significance Significant impact guidelines EPBC Act 1999 (General Guidelines for Endangered Species)</b>					
Lead to a long-term decrease in the size of a population	Unlikely. Only marginal foraging habitat is present in the study area. No key tree species were recorded in the study area.	Low	No trees are proposed to be removed for construction of the proposed trail.	No loss of foraging habitat	Low
Reduce the area of occupancy of the species	Unlikely. The proposed trail will result only in the loss of scattered shrubs and groundstorey that are not foraging habitat for Swift Parrots.	Low	Minimise vegetation removal	N/A	Low
Fragment an existing population into two or more populations	Unlikely. The Swift Parrot is a mobile species that can easily disperse throughout the local region during its mainland migration.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Adversely affect habitat critical to the survival of a species	Unlikely Area provides potential foraging habitat only.	Low	No specific mitigation measures required to mitigate this risk.	None	Low

SWIFT PARROT (Endangered)					
Disrupt the breeding cycle of a population	Unlikely. The Swift Parrot breeds in Tasmania, so there is unlikely to be any disruption to breeding activities.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely. The study area only provides a very small area of potential foraging habitat. The loss of any of this vegetation will not result in the species' decline.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely The species is vulnerable to predation by Feral Cats. Construction of the proposed trail may facilitate ingress of Cats into previously uninhabited areas. However, it is unlikely that the proposed trail will lead to an increase in cat numbers in the study area.	Low	No specific mitigation measures required to mitigate this risk.	None	N/a- mitigation measures cannot be applied during the upgrade
Introduce disease that may cause the species to decline	Unlikely. The Swift Parrot is susceptible to Psittacine Beak and Feather Disease (Pbfd). Transmission of Pbfd to Swift Parrots is usually via contact with lorikeets.	Low	No specific mitigation measures required to mitigate this risk. There are no practical actions that can be identified to address this threat.	None	Low



SWIFT PARROT (Endangered)					
	Construction of the proposed trail is unlikely to increase any contact between Swift Parrots and lorikeets.				
Interfere with the recovery of the species.	The National Recovery Plan for the Swift Parrot lists clearing of native vegetation as a threat to the species. The construction of the proposed trail will result in the loss of understorey vegetation which is not foraging habitat for the Swift Parrot.	Low	Minimise vegetation removal	N/A	Low

**Table 21.** Significant Impact Guidelines for Grey-headed Flying-fox

GREY-HEADED FLYING-FOX (Vulnerable)					
Significant Impact Criteria	Risk to MNES Without Mitigation Measures	Likelihood of a Significant Impact (No Mitigation Measures)	Specific Mitigation Measure(s)	Residual Risk to MNES With Mitigation Measures Applied	Likelihood of Significant Impact (With Mitigation Measures)
<b>There are NO Significant Impacts Guidelines for the Grey-headed Flying-fox – therefore the general guidelines for vulnerable species apply</b>					
<b>Matters of National Environmental Significance Significant impact guidelines EPBC Act 1999 (General Guidelines for Vulnerable Species)</b>					
Lead to a long-term decrease in the size of an important population	Unlikely. Only foraging habitat is present in the study area.	Low	Minimise vegetation removal	N/A	Low

**GREY-HEADED FLYING-FOX (Vulnerable)**

GREY-HEADED FLYING-FOX (Vulnerable)					
Reduce the area of occupancy of an important population	Unlikely. Only potential habitat has been identified. There are no camps present in the study area.	Low	Minimise vegetation removal	N/A	Low
Fragment an existing population into two or more populations	Unlikely. The GHFF is a mobile species that can move freely to forage over the study area.	Low	Minimise vegetation removal	N/A	Low
Adversely affect habitat critical to the survival of a species	Unlikely. There will be some loss of understorey shrubs but this vegetation does not constitute critical habitat.	Low	Minimise vegetation removal	N/A	Low
Disrupt the breeding cycle of an important population	Unlikely. There are no camps present in the study area.	Low	No specific mitigation measures required to mitigate this risk.	N/A	Low
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely. There will be some loss of shrubs for construction of the proposed trail but this loss will not constitute critical habitat	Low	Minimise vegetation removal	N/A	Low
Result in invasive species that are harmful to a vulnerable species becoming established in the	Unlikely. The project will not result in the establishment of invasive species that are harmful to the GHFF.	Low	No specific mitigation measures required to mitigate this risk.	None	Low

**GREY-HEADED FLYING-FOX (Vulnerable)**

GREY-HEADED FLYING-FOX (Vulnerable)					
vulnerable species' habitat					
Introduce disease that may cause the species to decline	Unlikely. The proposed trail will not result in the introduction of disease that may threaten the GHFF.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Interfere with the recovery of the species.	Unlikely The project will not interfere with the recovery of the species.	Low	No specific mitigation measures required to mitigate this risk.	None	Low

**Table 22. Significant Impact Guidelines for Greater Glider**

GREATER GLIDER (Vulnerable)					
Significant Impact Criteria	Risk to MNES Without Mitigation Measures	Likelihood of a Significant Impact (No Mitigation Measures)	Specific Mitigation Measure(s)	Residual Risk to MNES With Mitigation Measures Applied	Likelihood of Significant Impact (Mitigation Measures)
<b>There are NO Significant Impacts Guidelines for the Greater Glider – therefore the general guidelines for vulnerable species apply</b>					
<b>Matters of National Environmental Significance Significant impact guidelines EPBC Act 1999 (General Guidelines for Vulnerable Species)</b>					
Lead to a long-term decrease in the size of an important population	Unlikely Potential nest/den trees are present in the study area represented by large old trees or dead stags with hollows. There are 46 VBA records of the Greater Glider within 5km of the study area, although the PMST predicts the species and its habitat to occur.	Medium	All large hollow bearing trees (dead and alive) are to be retained with no substantial works encroachment that would compromise the health and viability of such trees.	None – there is proposed to be no loss of nest/den trees	Low
Reduce the area of occupancy of an important population	Removal of hollow-bearing trees may reduce the area occupied by the Greater Glider in the study area.	Medium	Mitigation measures above are required to ensure the species can continue to utilise the habitat in the Study Area and surrounds after the trail is constructed and operational.	None – there is proposed to be no loss of nesting/den trees.	Low
Fragment an existing population into two or more populations	Unlikely. The Greater Glider is able to disperse across small gaps in the forest canopy or sub-canopy. The	Low	Minimise vegetation removal	N/A	Low

GREATER GLIDER (Vulnerable)					
	proposed trail is only likely to be 2 m wide.				
Adversely affect habitat critical to the survival of a species	The study area supports high-quality habitat and an abundance of nesting/den trees.	Medium	Mitigation measures above are required to ensure the species can continue to utilise the habitat in the Study Area and surrounds after the trail is constructed and operational. No nesting trees will be removed.	None	Low
Disrupt the breeding cycle of an important population	There is an abundance of nest trees in the vicinity of the trail alignment that runs through preferred habitat (e.g. Wet Forest).	Medium	Mitigation measures above are required to ensure the species can continue to nest/breed in the Study Area and surrounds after the trail is constructed and operational.	None – there is proposed to be no loss of nesting trees.	Low
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	The study area contains areas of high-quality habitat for the Greater Glider, with an abundance of nest trees.	Medium	Mitigation measures above are required to ensure the species can continue to utilise the habitat in the Study Area and surrounds after the trail is constructed and operational. No trees or stags will be removed.	None – there is proposed to be no loss of hollow-bearing trees.	Low
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	Unlikely There are no invasive species reported to be harmful to the Greater Glider. The construction of the trail is not likely to increase populations of native species that compete with Greater Gliders for hollows (e.g. cockatoos) or that predate gliders (e.g. large forest owls).	Low	No specific mitigation measures required to mitigate this risk.	N/A	Low

GREATER GLIDER (Vulnerable)					
Introduce disease that may cause the species to decline	Unlikely The proposed trail is unlikely to introduce a disease that may cause this species to decline.	Low	No specific mitigation measures required to mitigate this risk.	None	Low
Interfere with the recovery of the species.	There is currently no recovery plan for the Greater Glider. However, conservation advice published by the Commonwealth of Australia lists habitat loss, especially due to loss of senescent trees, as a threat to the species. However, as there will be no loss of hollow-bearing trees resulting from construction of the trail, the recovery of the species is unlikely to be affected.	Low	Mitigation measures outlined above should ensure the recovery of the species is not impacted.	None	Low

**Table 23.** Significant Impact Guidelines for Listed Migratory Species (Fork-tailed Swift, White-throated Needletail, Rainbow Bee-eater)

MIGRATORY BIRD SPECIES					
Significant Impact Criteria	Risk to MNES Without Mitigation Measures	Likelihood of Significant Impact (No Mitigation Measures)	Specific Mitigation Measure(s)	Residual Risk to MNES With Mitigation Measures Applied	Likelihood of a Significant Impact (With Mitigation Measures)

**MIGRATORY BIRD SPECIES**

**There are NO Significant Impacts Guidelines for Fork-tailed Swift, White-throated Needletail or Rainbow Bee-eater – therefore the general guidelines for listed migratory species apply**

**Matters of National Environmental Significance Significant impact guidelines EPBC Act 1999 (General Guidelines for Migratory Species)**

<p>Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species</p>	<p>Unlikely. Only foraging habitat is present in the study area, which is not considered to be ‘important habitat’ under the definition provided in the Guidelines. The White-throated Needletail and Fork-tailed Swift are almost exclusively aerial and so is not likely to forage over vegetation in the study area. There is not likely to be resident or breeding populations present.</p> <p>The proposed trail is unlikely to fragment habitat for migratory bird species; the hydrology of streams in the study area is not likely to be altered as a result of construction of the trail.</p>	<p>Low</p>	<p>Minimise vegetation removal</p>	<p>N/A</p>	<p>Low</p>
<p>Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species</p>	<p>Unlikely</p> <p>The project will not result in the establishment of invasive species that are harmful to migratory bird species.</p>	<p>Low</p>	<p>No specific mitigation measures required to mitigate this risk.</p>	<p>N/A</p>	<p>Low</p>
<p>Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species</p>	<p>Unlikely</p> <p>None of the migratory bird species are likely to breed in the study area. Roosting habitat (e.g. cliffs, walls, quarries) is not present. The White-throated Needletail and Fork-tailed Swift breed in Asia. There is no nesting habitat available for the Rainbow Bee-eater. Only foraging habitat for the Rainbow Bee-eater is present – of which</p>	<p>Low</p>	<p>No specific mitigation measures required to mitigate this risk.</p>	<p>N/A</p>	<p>Low</p>

**MIGRATORY BIRD SPECIES**

	only a fraction will be removed or disturbed as a result of the proposed trail.				
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## Appendix 9. Sample photos within the trail alignment



**Image 1.** Typical Montane Wet Forest understorey (Habitat Zone 6)



**Image 2.** Typical fern understorey in Cool Temperate Rainforest (Habitat Zone 9)



**Image 3.** Interface of Montane Wet Forest and Cool Temperate Rainforest dominated by Myrtle Beech (Habitat Zone 6 and 7)



**Image 4.** Mature Old Growth Forest west of Ben Cairn Car Park (Habitat Zone 15)



**Image 5.** Start of southern decent from Donna Buang Road (Habitat Zone 17)



**Image 6.** Mature Wet Forest (Habitat Zone 21)



**Image 7 and 8.** Varying forest age classes occur in the vicinity of the APM track such as young regenerating forest within Habitat Zone 26 (left of screen) and mature forest vegetation within Habitat Zone 27 (centre screen)



**Image 9.** One of few creek crossings that intersect the trail alignment (unnamed creek west of Dee River)



**Image 10.** Riparian Forest in association with Dee River (habitat zone 34)



**Image 11.** Fire affected vegetation near the ridge line above little joe track (near habitat zone 43)



**Image 12.** Exit point from existing track within Habitat Zone 45



**Image 13.** Long Pink Bells within Habitat Zone 45



**Image 14.** Post-fire understorey regeneration within habitat zone 51



**Image 15.** Gully crossing within Habitat Zone 52 will require some design and construction solutions to minimise earthworks



**Image 16.** Young forest with regenerating understorey along abandoned APM track (habitat zone 24)



**Image 17.** Wood fungus with host plant



**Image 18.** Common Bird Orchid

## Appendix 10. Warburton Mountain Bike Destination: Environmental Protocols

A copy of the latest version of the Environmental Protocols (subject to being finalised and approved by all parties) is provided on the following page

## Appendix 11. Scenario Test Native Vegetation Loss and Offset Requirements

## Appendix 12. Report of available native vegetation credits

