

EES chapter 14 – Matters of National Environmental Significance

Warburton Mountain Bike Destination

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14.0 Matters of National Environmental Significance

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

The *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* (EPBC Act) ensures that nationally significant animals, plants, habitats and places are identified, and any potential negative impacts on them are carefully considered before changes in land use or new developments are approved. Under the EPBC Act, if the Commonwealth Minister for the Environment decides that a project could potentially have a significant impact on MNES, the project becomes a controlled action that must be assessed and approved by the Minister before it can proceed. The matters which the project may have a significant impact on are known as the controlling provisions.

On 16 June 2020 the Commonwealth Department for Agriculture, Water and Environment (DAWE) issued a decision that the project is a controlled action under the EPBC Act and that the project will be assessed under the bilateral assessment agreement with the State of Victoria. The relevant controlling provision that has the potential to be significantly impacted is:

- Listed threatened species and communities (Section 18 and Section 18A of the EPBC Act).

The following evaluation objective from the EES scoping requirements is relevant to the assessment of MNES:

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

14.1 Overview

MNES protected under the EPBC Act include World Heritage properties, National Heritage places, Ramsar wetlands, listed threatened species and ecological communities and listed migratory species.

Of relevance to the project, multiple nationally threatened flora and fauna species are likely to occur in the study area. Threatened species listed under the EPBC Act include fauna and flora that are under threat, leading to population decline and extinction. No nationally threatened ecological communities were recorded in the study area.

Understanding how the project would impact MNES is important to develop effective mitigation measures. The project would require the removal of high-quality native vegetation and soil disturbance for construction of the mountain bike trails, which has the potential to impact the habitat of threatened species. Trail construction is generally undertaken in small teams of three to four people, with each team expected to complete between 60 and 100 metres of trail per day. The average disturbance width of trails would be between 1.2 and 3.3 metres, with a vegetation clearance height of 2.5 metres. Once the trails are established the temporarily disturbed construction areas along trail edges would be allowed to regenerate with native vegetation thus reinstating habitat elements. Overall, the trails are likely to end up with an average operational width of 0.6 to 1.2 metres (the ride line).

Operation of the trail network has the potential to disturb nationally significant fauna species in the area, however, use of the trails would be dispersed and transitory. In addition, the trails in Yarra Ranges National Park and in areas of high-quality forest habitat in Yarra State Forest would only operate during daylight hours (i.e. sunrise to sunset) to avoid noise and lighting impacts on nocturnal fauna species.

The key findings of the assessment are:

- The project is considered unlikely to result in a significant impact on nationally significant flora species. No populations of the readily detectable Round-leaf Pomaderris *Pomaderris vacciniifolia* (critically endangered) or Tall Astelia *Astelia australiana* (vulnerable) were recorded in suitable habitat where the species are most likely to occur.
- The project is considered unlikely to result in a significant impact on nationally significant fauna species. This conclusion has been reached based on:
 - Species that may forage or nest in the canopy would unlikely be affected by the project, as large trees or canopy trees would not be removed.

- Habitat critical to the survival of Leadbeater's Possum *Gymnobelideus leadbeateri* (critically endangered) including montane thickets, hollow-bearing trees, nest boxes and areas of high sub-canopy stem densities has been avoided by realignment of the trails. Specific mitigation measures would be applied to minimise potential impacts on the species, including supervision and guidance by a suitably qualified ecologist during the construction phase to assist with micro-siting.
- Ground-dwelling species that rely on understorey vegetation for habitat would unlikely be affected by understorey vegetation removal as the trail network would not create large or hostile barriers to the movement and dispersal of species and large areas of suitable forest habitat would remain available.
- Aquatic species would unlikely be affected by the project, as aquatic habitats would not be significantly altered, no barriers to fish movement would be introduced and sources of indirect impact (such as waterway sedimentation) would be managed through effective and proven sediment/erosion control measures for mountain bike trail construction and operation.
- The project is considered unlikely to result in a significant impact on nationally threatened ecological communities. No ecological vegetation classes associated with the Alpine *Sphagnum* Bogs and Associated Fens community were found during field surveys.
- Key mitigation measures to avoid and minimise significant impacts on threatened species include micro-siting prior to construction, consulting with land managers and arboricultural specialists if treatment of hazardous large or hollow-bearing trees is required, supporting existing ongoing pest control programs conducted by land managers and weed control.

In response to the decision that the project is a controlled action, impacts on MNES have been assessed and mitigation measures have been identified to avoid and minimise significant impacts on threatened terrestrial and aquatic flora and fauna species.

14.2 Method

The biodiversity impact assessment (refer to **Technical Report A: Biodiversity and Habitats** for further details) assessed the potential significant impacts on MNES associated with the project and informed the preparation of the EES required for the project. This was achieved by undertaking the following:

- Establishing a study area and an assessment of existing environmental conditions including desktop review of relevant datasets and review of literature, policies and legislation.
- Field surveys of the entire trail network, including undertaking targeted surveys for the following nationally significant species:
 - Broad-toothed Rat *Mastacomys fuscus mordicus* (vulnerable)
 - Leadbeater's Possum.
- A review of the project design and proposed activities in the context of existing environmental conditions to understand temporal and spatial distribution of project components and activities in relation to MNES.
- Use of a risk assessment as described in **Chapter 6: EES assessment framework** as a prioritisation tool to inform the impact assessment and development of mitigation measures.
- Assessment of potential direct and indirect significant impacts on MNES during the construction and operation phases of the project. A conservative approach to the assessment was undertaken, assuming the presence of threatened fauna within the study area. This included an analysis of the spatial and temporal extent, magnitude and nature of the potential impacts, and gave consideration to the sensitivity and significance of affected receptors. The sensitivity and significance ascribed to flora and fauna was informed by their legislative status under the *Flora and Fauna Guarantee Act 1988 (Vic)* (FFG Act) and EPBC Act, taking into account input and feedback from consultation and regulators.
- Assessment of the alternative to Trail 1 shown in Figure 14-1 (the combination of Trail 45, Trail 46 and Trail 47) including describing existing conditions, assessment of impacts and a comparative analysis against Trail 1.
- Development of mitigation measures for the construction and operation of the project, based around the implementation of the mitigation hierarchy.

- Evaluation of the residual environmental impacts, which describe whether an action would have a significant impact once mitigation has been implemented.
- Based on the findings, an environmental management framework as described in **Chapter 16: Environmental management framework** has been established to monitor and evaluate environmental management and contingency measures in relation to the residual environmental effects.

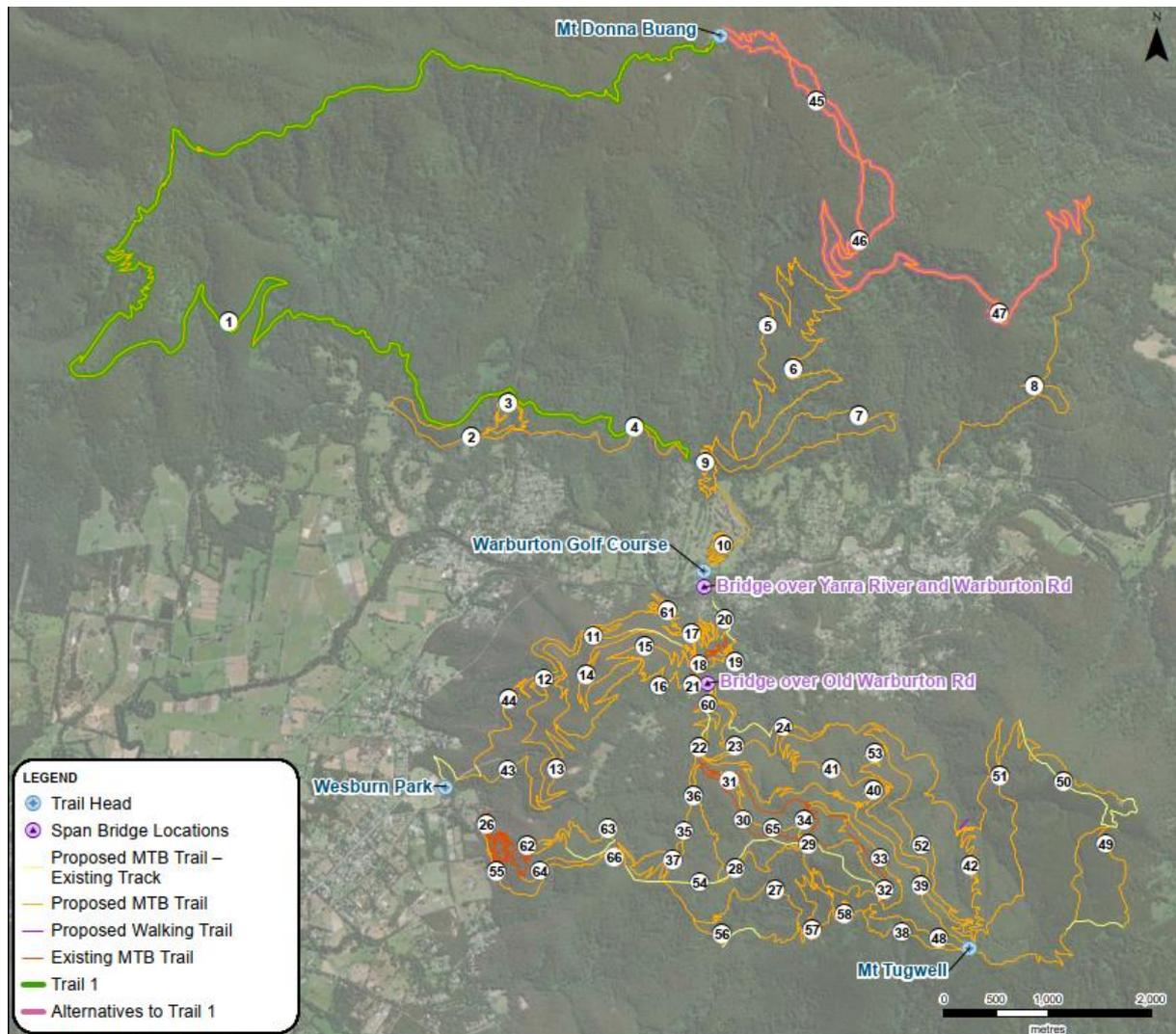


Figure 14-1 Study area

14.2.1 Significant impact criteria under the EPBC Act

To determine whether the project is likely to have a significant impact depends upon the sensitivity, value and quality of the environment, which is impacted, and upon the intensity, duration, magnitude and geographic extent of the impacts. If environmental impacts resulting from the project are unavoidable, proposed mitigation and offset strategies are required to reduce these impacts.

The significant impact criteria as defined in the *Matters of National Environmental Significance: Significant impact guidelines 1.1* (Australian Government, 2013) is used to assess whether the project would have significant impacts on MNES. The criteria consider whether threatened species are listed as critically endangered or endangered, or whether the species is listed as vulnerable, to determine whether an action will have, or is likely to have a significant impact on a species.

14.3 Avoidance and minimisation through design

It is recognised that there are opportunities to avoid and minimise environmental impacts during the many stages of project development and this has culminated in the project description which is presented in **Chapter 3: Project description** of this EES. During project inception and early design

development stages of the project, decisions on the location of the project, its design and construction techniques have enabled impacts to be avoided and minimised. These investigations as part of project development are summarised in **Chapter 4: Project development and alternatives** and demonstrate application of the mitigation hierarchy described in **Chapter 6: EES assessment framework**.

The key avoidance and minimisation measures that have been incorporated into the design including those to avoid and minimise impacts to MNES are:

- Placement of the proposed Visitor's Hub and other major trail head infrastructure in areas absent of native vegetation or areas subject to previous disturbance to avoid the need to remove significant amounts of native vegetation, i.e. in cleared areas at Wesburn Park and the Warburton Golf Course, and previously logged areas at Mount Tugwell along Mount Bride Road.
- Siting several new trails on existing formal and informal tracks and benches where possible, especially in State Forest areas with a recent history of logging operations and recreational access.
- Incorporating existing informal mountain bike trails in the Mount Tugwell area of Yarra State Forest.
- Where possible, designing trails to be within proximity to existing roads, walking trails or mountain bike trails. This has resulted in 45% of the proposed trail network being within 100 metres of an existing track or trail (i.e. existing linear disturbance footprints).
- Choice of shuttle bus routes that avoid the need for road widening in forested environments.
- The new bridge over the Yarra River to fully span the river and not require works in the waterway. Riparian vegetation at this location is poor quality.
- Ensuring trail styles and construction methods only require the removal of understorey vegetation so the forest canopy and sub-canopy will remain intact.
- Designing trails to follow land contours and take advantage of flat spurs and ridges, where possible, minimising the need for major soil excavation.
- Using trail designs and styles to achieve a balance of cut and fill soil material in trail construction, meaning that surplus spoil will not require disposal and fill would not be imported into the project area.
- Using the design principle of elevating all waterway crossings to minimise disturbance of aquatic habitats and to reduce ongoing point sources for sedimentation of local waterways.
- Committing to the principle of pre-construction micro-siting to achieve avoidance of key habitat features for threatened fauna, avoid significant flora species populations, minimise disturbance of wildlife habitat, minimise indirect impacts on significant trees and minimise impacts on waterways, other watercourses, springs and soaks.
- Engaging a professional arborist at the design stage to review existing conditions for trees in the project area to provide sensitive construction techniques that can be applied to ensure encroachment into tree protection zones and structural root zones does not lead to the long-term decline of forest trees.
- Applying trail operation and maintenance standards to minimise ongoing residual impacts. These include prohibiting night riding in the Yarra Ranges National Park and high-quality forest habitats in the Yarra State Forest to minimise nocturnal fauna disturbance, and applying seasonal closures of high elevation trails to maintain trail integrity and to minimise sedimentation during the winter months.
- Siting of trails to avoid areas of high ecological value, including:
 - Avoiding siting trails in dense montane thicket vegetation that provides high quality habitat and translocation recipient sites for Leadbeater's Possum between Mount Donna Buang, Mount Victoria and Ben Cairn.
 - Avoiding any direct removal of hollow bearing trees and avoiding the removal of any tree stems greater than 10 centimetres diameter at breast height (DBH) in Yarra Ranges National Park and tree stems greater than 20 centimetres DBH in Yarra State Forest.
- Siting and construction of trails to minimise impacts to the extent possible on areas of high ecological value, including:

- Minimising impacts on headwater springs and soaks between Mount Donna Buang, Mount Victoria and Ben Cairn that provide habitat for Mount Donna Buang Wingless Stonefly. It is proposed to elevate any trails that intersect these habitat types. The intention of using low impact elevated structures is to minimise soil disturbance and reduce sources of sedimentation.
- Minimising impacts on Cool Temperate Rainforest and Cool Temperate Mixed Forest threatened communities through reducing trail alignments that intersect these communities and committing to hand build any trails within areas that have Myrtle Beech canopy cover. Hand-built trails have a significantly smaller impact footprint than machine-built trails and also reduce the risk of wounding and damage to rainforest vegetation and Myrtle Beech trees.
- Minimising the removal of understorey or sub-canopy vegetation that provides structural connectivity in forest habitats, this will be achieved in part through having a maximum overhead height clearance of 2.5 metres from ground level.
- Committing to hand build a range of trails within Yarra Ranges National Park and Yarra State Forest to minimise overall understorey vegetation removal and project offset requirements.
- Minimising impacts on watercourses and headwater areas that provide Mount Donna Buang Wingless Stonefly habitat.
- Adoption of specific measures to avoid and minimise ecological values for the project scenario that involves development of Trail 1:
 - Realigning this trail in July 2021 after consultation with species experts to avoid direct impacts on high quality Leadbeater's Possum habitat and translocation recipient sites (suitable intact habitat locations where Leadbeater's Possum have been moved to support population recovery) along the headwaters of Walker Creek, parallel to the summit section of the Donna Buang Road. This alignment has now been shifted upslope into open forest to the north-west out of this gully system that supports dense thickets. This has pushed the Trail 1 alignment into the Melbourne Water catchment but has avoided impacts on high quality Leadbeater's Possum habitat.
 - Realigning this trail in July 2021 to use the Donna Buang Road surface near Ben Cairn to avoid disturbing a second high-quality Leadbeater's Possum habitat, translocation recipient site and research sites.
 - Committing to hand build Trail 1 from Mount Donna Buang summit to beyond Ben Cairn. The remaining section below Ben Cairn (except for rainforest vegetation) will be machine-built.
 - Assessing an alternative alignment to Trail 1 to achieve further avoidance and minimisation of biodiversity impacts.
- Use of small construction teams and small plant and equipment for construction of trails.
- Restriction of construction works to normal working hours.
- Micro-siting of trails to minimise vegetation loss and avoid mature trees.

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

14.4 Threatened flora

Two nationally significant flora species listed as threatened on the EPBC Act are considered to have a medium or higher likelihood of occurrence within the study area:

- Round-leaf Pomaderris *Pomaderris vacciniifolia* (critically endangered)
- Tall Astelia *Astelia australiana* (vulnerable).

The project is considered unlikely to result in a significant impact on the nationally significant Round-leaf Pomaderris or Tall Astelia, as discussed in the following sections.

14.4.1 Round-leaf Pomaderris (critically endangered)

Endemic to Victoria, Round-leaf Pomaderris is a slender shrub with distinctive foliage that is largely confined to moist forests and scrubs in the middle and upper catchments of the Yarra, Plenty and Yea Rivers.

The study area supports some suitable lower slopes forest habitat for this species and a population of several plants occurs in East Warburton 2.5 kilometres east of the closest trail (Trail 8). This local population was visited during site surveys to ascertain local habitat conditions and familiarise ecologists with identification of the species. On the basis of a local population being present the species was considered to have some likelihood of occurrence in the study area and along the trail assessment corridor, particularly in lower slopes forests adjacent to the Yarra River floodplain. However, most of the trail network is in higher elevation montane or foothill landscape settings and these areas are generally considered unsuitable habitat for this species.

Although no direct targeted searches were undertaken for this species, suitable lower slopes habitats were inspected during field surveys between 2019 and 2021 and the species was not detected. This large and distinctive shrub species is likely to have been readily detected if it were present.

The project is considered unlikely to result in a significant impact on the nationally significant Round-leaf Pomaderris based on an assessment against the EPBC significant impact criteria for this critically endangered species (refer to Table 14-1). This conclusion has been reached on the basis that no populations of this readily detectable species were recorded in lower slopes forest habitat where the species is most likely to occur. Habitat for the known local population at East Warburton is outside of the project area and will not be impacted by the project.

Table 14-1 Significant impact assessment for Round-leaf Pomaderris

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of a population	<u>Unlikely</u> No Round-leaf Pomaderris populations were detected in lower slopes vegetation communities during field assessments and all occurrences of this habitat type were inspected. Therefore, the project is considered unlikely to lead to the long-term decrease in the size of a population of Round-leaf Pomaderris as no populations were detected.
Reduce the area of occupancy of the species	<u>Unlikely</u> The project is considered unlikely to reduce the area of occupancy of this species as no populations were detected in the suitable lower slopes habitat of the study area.
Fragment an existing population into two or more populations	<u>Unlikely</u> The local population of this species in East Warburton is outside of the project area. Therefore, the project is considered unlikely to fragment an existing population into two or more populations as no populations were detected in the suitable lower slopes habitat of the study area and the known local population in East Warburton will remain undisturbed by the project.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> Small areas of suitable lower slopes forest habitat occur for this species in the study area and trail assessment corridor. These forest communities would be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable habitat and therefore the impacts from the project are considered unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	<u>Unlikely</u> The project is considered unlikely to disrupt the breeding cycle of the species as no populations were detected in the suitable lower slopes habitat of the study area, and the known local population in East Warburton is outside of the project area.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> No populations of Round-leaf Pomaderris were detected in suitable habitat for this species and therefore the impacts from the project are considered unlikely to modify, destroy or remove occupied habitat or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically	<u>Unlikely</u>

Significant impact criteria	Likelihood of significant impact
endangered or endangered species becoming established in the endangered or critically endangered species' habitat	No populations of this species were detected in this suitable habitat and therefore the impacts from the project are considered unlikely to result in invasive species that are harmful to this critically endangered species becoming established in habitat where populations of this species occur. Habitat for the local population at East Warburton is outside of the project area and will not be impacted by the project.
Introduce disease that may cause the species to decline	<u>Unlikely</u> Some Pomaderris species are known to be susceptible to <i>Phytophthora</i> although the EPBC Listing and Conservation Advices for this species do not identify <i>Phytophthora</i> as a known threat. There is little information about the presence of <i>Phytophthora</i> in the study area, but this soil pathogen has been documented in forests between Sugarloaf Reservoir and Glenburn to the north of the study area. Suitable habitat for Round-leaf Pomaderris would be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in this suitable habitat and therefore the impacts from the project are considered unlikely to result in disease being introduced to known habitat for this critically endangered species. Habitat for the local population at East Warburton is outside of the project area and will not be impacted by the project and risk of disease spread to this area is considered negligible as a result of the project.
Interfere with the recovery of a species	<u>Unlikely</u> There is no national Recovery Plan for this species and one is not required as the approved conservation advice for the species provides sufficient direction to implement priority actions and mitigate against key threats. The EPBC Conservation Advice identifies the main threats as inappropriate fire regimes, weed invasion by woody weeds and damage by Sambar Deer. Other threats include browsing by wallabies and grazing by livestock, road maintenance and associated fire management and suppression activities including construction and regular slashing of fire breaks. No populations of this species were detected in suitable habitat in the study area and therefore the impacts from the project are considered unlikely to contribute to the main threats to populations of this species. Habitat for the local population at East Warburton is outside of the project area so threats to this population will not be exacerbated as a result of the project.

14.4.2 Tall Astelia (vulnerable)

Tall Astelia is a tall native lily endemic to Victoria, that typically forms dense groves. The study area has suitable rainforest habitat for this species and populations occur 10 kilometres to the south of Warburton in the Powelltown-Beenak area of the Central Highlands.

On the basis of suitable rainforest habitat being present in the study area and the presence of nearby populations, the species was considered to have some likelihood of occurring in the study area. However, no Tall Astelia populations were detected in Cool Temperate Rainforest or Cool Temperate Mixed Forest vegetation communities during field assessments and all occurrences of this habitat type were inspected. This naturally restricted, large and highly distinctive species would have been easily detected if it were present.

The project is considered unlikely to result in a significant impact on the nationally significant Tall Astelia based on an assessment against the EPBC Act significant impact criteria for this vulnerable species (refer to Table 14-2). This conclusion has been reached on the basis that no populations of this large and obvious species were detected in rainforest habitat within the assessment corridor that would be impacted by the project.

Table 14-2 Significant impact assessment for Tall Astelia

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of an important population of a species	<u>Unlikely</u> No Tall Astelia populations were detected in Cool Temperate Rainforest or Cool Temperate Mixed Forest vegetation communities during field assessments and all occurrences of this habitat type were inspected. Therefore, the project is considered unlikely to lead to the long-term decrease in the size of an important population as no populations were detected.
Reduce the area of occupancy of an important population	<u>Unlikely</u> The project is considered unlikely to reduce the area of occupancy of an important population as no populations were detected in suitable rainforest habitat.
Fragment an existing important population into two or more populations	<u>Unlikely</u> The project is considered unlikely to fragment an existing important population into two or more populations as no populations were detected in suitable rainforest habitat.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> Suitable habitat for Tall Astelia in the form of Cool Temperate Rainforest and Cool Temperate Mixed Forest vegetation communities occurs in the project area and trail assessment corridor. These rainforest communities would be impacted by trail construction through soil disturbance and understorey vegetation removal. No populations of this species were detected in suitable rainforest habitat and therefore the impacts from the project are considered unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of an important population	<u>Unlikely</u> The project is considered unlikely to disrupt the breeding cycle of the species as no populations were detected.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> No populations of this species were detected in suitable rainforest habitat and therefore the impacts from the project are considered unlikely to modify, destroy or remove occupied habitat or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<u>Unlikely</u> No populations of this species were detected in suitable rainforest habitat and therefore the impacts from the project are considered unlikely to result in invasive species that are harmful to a vulnerable species becoming established in habitat where populations of this vulnerable species occur.
Introduce disease that may cause the species to decline	<u>Unlikely</u> No populations of this species were detected in suitable rainforest habitat and therefore the impacts from the project are considered unlikely to result in introduction of diseases into habitats where populations of this vulnerable species occur. More broadly, Myrtle Wilt is an indigenous plant disease known to impact rainforest habitat and this disease risk would be managed through minimising machinery impacts in rainforest communities by hand building trails and through treating and monitoring any wounding of Myrtle Beech trees.
Interfere substantially with the recovery of a species	<u>Unlikely</u> The national recovery plan identifies fire, weed invasion, forestry in State Forests, altered hydrology and disease (Myrtle Wilt) as key threats to the species. No populations of this species were detected in suitable rainforest habitat and therefore the impacts from the project are considered unlikely to interfere with general and site-specific recovery objectives outlined in the national recovery plan.

14.4.3 Proposed mitigation measures

The complete list of proposed mitigation measures relevant to threatened flora can be found in **Chapter 8: Biodiversity and habitats** and **Chapter 16: Environmental management framework**.

In the unlikely event of undetected populations of threatened flora species occurring in the trail assessment corridor (i.e. locations where project impacts would occur) the implementation of pre-construction micro-siting by an ecologist within suitable habitats (small areas of lower slopes forest habitat for Round-leaf Pomaderris and rainforest habitat for Tall Astelia) would ensure unanticipated significant impacts do not occur on populations of threatened flora species.

Additionally, impacts from introduced disease (Myrtle Wilt) to potential rainforest habitat for Tall Astelia would be minimised by hand building trails in rainforest communities, reducing machinery impacts. Staff would be trained to identify signs of plant pathogens and weeds to implement procedures to minimise the risk of spread and to treat and monitor any wounding of Myrtle Beech trees.

14.4.4 Residual impacts

On the basis that no populations of these readily detectable threatened flora species were recorded during field surveys in habitat where the species are most likely to occur, and the trails would undergo further inspection within suitable habitats prior to construction, residual significant impacts on populations of Round-leaf Pomaderris or Tall Astelia are unlikely to occur.

14.5 Threatened fauna

Twelve nationally significant fauna species listed as threatened under the EPBC Act are considered to have a medium or higher likelihood of occurrence within the study area:

- Swift Parrot *Lathamus discolor* (critically endangered)
- Leadbeater's Possum *Gymnobelideus leadbeateri* (critically endangered)
- Spot-tailed Quoll *Dasyurus maculatus maculatus* (endangered)
- Smoky Mouse *Pseudomys fumeus* (endangered)
- Southern Brown Bandicoot *Isodon obesulus obesulus* (endangered)
- Macquarie Perch *Macquaria australasica* (endangered)
- White-throated Needletail *Hirundapus caudacutus* (vulnerable)
- Southern Greater Glider *Petauroides volans* (vulnerable)
- Broad-toothed Rat *Mastacomys fuscus mordicus* (vulnerable)
- Grey-headed Flying-fox *Pteropus poliocephalus* (vulnerable)
- Australian Grayling *Prototroctes maraena* (vulnerable)
- Murray Cod *Maccullochella peelii* (vulnerable).

Of these, the likelihood of occurrence of the Broad-toothed Rat was revised to low following habitat surveys. The project is considered unlikely to result in a significant impact on these nationally significant fauna species, as discussed in the following sections.

14.5.1 Swift Parrot (critically endangered)

Swift Parrots, when seasonally present on mainland Australia, typically favour certain winter tree species for foraging including a number of box and ironbark species, Swamp Mahogany, Forest Red Gum, Blackbutt and Spotted Gum. None of these species naturally occur within the project area, however planted specimens are likely to be present in and around the township of Warburton. For this reason, and given the highly mobile nature of the species, individuals may occasionally utilise planted trees within the study area and fly over other sections of the study area.

The project is considered unlikely to result in a significant impact on Swift Parrot based on an assessment against the significant impact criteria for endangered and critically endangered species (refer to Table 14-3). This conclusion has been reached on the basis that the project area is within the secondary range of the species and that no foraging habitat would be impacted by the project (that is, large trees and canopy trees would be retained).

Table 14-3 Significant impact assessment for Swift Parrot

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of a population	<p><u>Unlikely</u></p> <p>The study area contains potential foraging habitat within the secondary range of the species, however no preferred foraging trees naturally occur within the study area, and the project is not within an area identified as priority habitat for conservation management of Swift Parrot. The eucalypt canopy which may be utilised by the Swift Parrot would not be removed for the project.</p> <p>The project area also does not contain breeding habitat, and the project would not result in the construction of any structures that could present a collision risk.</p> <p>The project therefore has no capacity to lead to a population decrease or reduce the area of occupancy for the species.</p>
Reduce the area of occupancy of the species	
Fragment an existing population into two or more populations	<p><u>Unlikely</u></p> <p>The Swift Parrot occurs as a single, migratory population and as such the project has no capacity to result in fragmentation of the population.</p>
Adversely affect habitat critical to the survival of the species	<p><u>Unlikely</u></p> <p>The project area does not occur within an area identified as priority habitat for conservation management of Swift Parrot. The project would avoid the removal of canopy trees and is therefore not expected to result in the removal of any potential foraging habitat.</p>
Disrupt the breeding cycle of a population	<p><u>Unlikely</u></p> <p>Swift Parrots only breed in eastern and south-eastern Tasmania and do not breed on mainland Australia. The project therefore has no capacity to disrupt the breeding cycle of Swift Parrots.</p>
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<p><u>Unlikely</u></p> <p>The eucalypt canopy within the project area would largely be unaffected by avoiding the removal of large trees and canopy trees during trail construction and maintenance. It is therefore considered highly unlikely that the project would result in any changes to availability or quality of potential foraging habitat that could result in species decline.</p>
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><u>Unlikely</u></p> <p>The project would not result in the establishment or introduction of an invasive species or disease that could cause the species to decline.</p>
Introduce disease that may cause the species to decline	
Interfere with the recovery of a species	<p><u>Unlikely</u></p> <p>The project does not conflict with the objectives or actions outlined in the recovery plan for the species. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia. Given the project will not contribute to habitat loss for this species the project is not considered to compound the impacts of recent bushfires on this species.</p>

14.5.2 Leadbeater's Possum (critically endangered)

The Leadbeater's Possum is a small, quick and elusive nocturnal marsupial endemic to Victoria. It has a patchy distribution throughout the Central Highlands in montane forest and sub-alpine woodland above 400 metres elevation and relies on large hollow-bearing trees for nesting and a structurally dense interlocking canopy and/or sub-canopy layer to facilitate movement.

The study area supports known colonies of Leadbeater's Possum in patchy habitat around Mount Donna Buang and Ben Cairn. (Figure 14-1). Key features within the study area for the species include hollow-bearing trees, artificial nest boxes and areas with high stem densities of mid-storey species, such as Mountain Tea-tree, Lemon Bottlebrush, Myrtle Beech and associated occurrences of emergent eucalypts.

Areas of high stem density favoured by Leadbeater's Possum typically occur over wet substrates in dense montane thickets in the Yarra Ranges National Park. Trail 1 has been realigned in consultation with species experts to avoid direct impacts to this key habitat, including:

- Realigning the trail from west of Road 2. This provides a 100 to 300 metre-buffer to the known dense thicket habitat and nest box sites adjacent to Donna Buang Summit Road and directly west of Mount Donna Buang Summit.
- Realigning the trail out of the thicket upslope of Donna Buang Road (gravel section) approximately 450 metres north of Ben Cairn and placed on the existing road shoulder. The trail is still in proximity to the thicket and nest boxes but will use the existing road shoulder that does not support habitat. This road is regularly used by vehicles between November and June each year, so noise and disturbance already exist in this area.

In the Yarra State Forest to the south, habitat is typically taller and more open, with the sub-canopy dominated by taller Silver Wattles in areas that have been logged as recently as between the 1970s and late 1980s. In these areas, trails can avoid removal of dense stands of sub-canopy stems and therefore avoid impacts to the species. The project would also avoid removal of hollow-bearing trees, artificial nest boxes and removal of dense stands of sub-canopy stems that provide movement opportunities for this species.

The project is considered unlikely to result in a significant impact on Leadbeater's Possum based on an assessment against the significant impact criteria for endangered and critically endangered species (refer to Table 14-4). This conclusion has been reached on the basis of avoidance and minimisation strategies and implementation of effective mitigation measures, including:

- High quality montane thicket habitats with high stem densities between Mount Donna Buang and Ben Cairn would not be fragmented by the proposed trails. Downslope (east) of Ben Cairn, Trail 1 has been designed to avoid the edges of montane thickets and only minor pruning of several small Lemon Bottlebrush stems may be required, which is not considered a significant source of habitat loss or fragmentation.
- An alternative to Trail 1 was investigated, which is further away from high quality habitat and translocation sites for Leadbeater's Possum. The alignment of alternative Trails 45 and 46 has been designed in the presence of the Department of Environment, Land, Water and Planning (DELWP) and Parks Victoria representatives to avoid direct impacts on scattered small patches of open montane thicket vegetation, and Open Montane Wet Forest and Wet Forest vegetation with a scattered sub-canopy of Silver Wattle between Mount Donna Buang and Mount Victoria. The trail has been designed to avoid the need to prune or remove stems of Lemon Bottlebrush and/or Mountain Tea-tree, and to avoid removal of large hollow-bearing trees and sub-canopy wattles.
- Trails 38 and 50 have been aligned outside of the Special Protection Zones (SPZ) for Leadbeater's Possum established by DELWP in Regrowth Wet Forest vegetation (logged in the late 1970s) between Mount Tugwell, Mount Bride and Groom Hill in Yarra State Forest. A 400-metre section of Trail 49 uses an existing forest track through the SPZ just west of Mount Bride to avoid direct impacts on forest vegetation. Furthermore, in these locations it is intended to avoid removal of sub-canopy vegetation which is composed of scattered Silver Wattle.
- All large trees, including hollow-bearing trees would be avoided by the project with no direct removal required to build the trails. If any treatment of large or hollow-bearing trees that are deemed hazardous is required, then this would be done in consultation with the land manager, an ecologist and arboriculture specialist.
- Impacts on areas of dense sub-canopy stems in non-thicket habitat (e.g. wet forest communities) can be minimised by micro-siting trails around these areas and avoiding fragmentation of sub-canopy connectivity.
- Translocation recipient sites and monitoring areas would not be directly impacted by the project as these areas are considered critical to the survival and recovery of the species and have been avoided through trail design.
- Operation of the trails in Yarra Ranges National Park and high-quality forest habitats would be restricted to daylight hours, therefore avoiding potential for disturbance from noise and lighting at night, when the species is active.

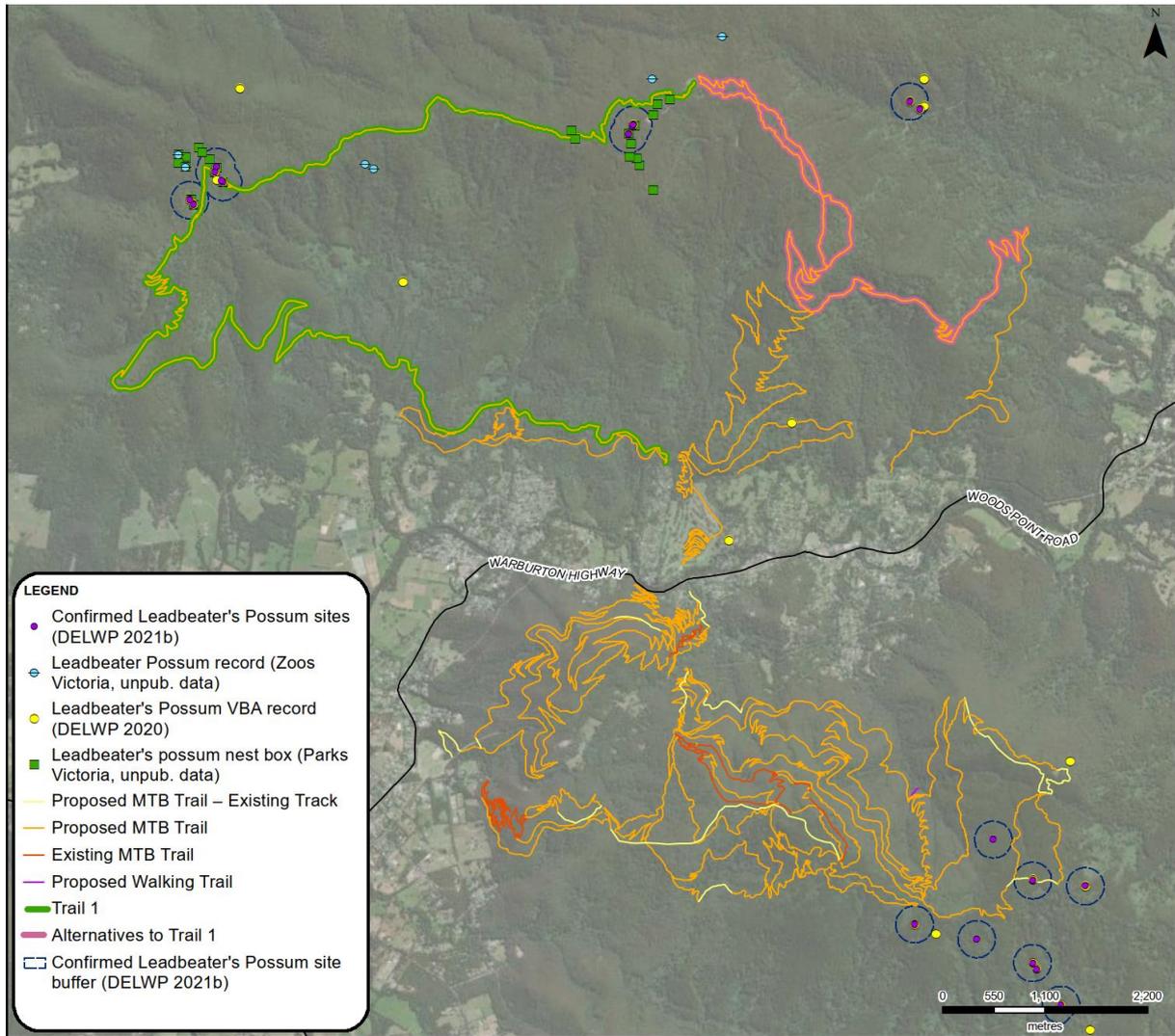


Figure 14-1 Leadbeater's Possum sites, records and nest boxes

Table 14-4 Significant impact assessment for Leadbeater's Possum

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of a population	<u>Unlikely</u> The project would avoid key habitat features utilised by the species in the broader local area. If any treatment of large or hollow-bearing trees that are deemed hazardous is required then this would be done in consultation with the land manager, an ecologist and arboriculture specialist. With these important avoidance and impact minimisation measures applied to trail design and appropriate mitigation, the project is considered unlikely to result in the long-term decrease in size of the Leadbeater's Possum population.
Reduce the area of occupancy of the species	<u>Unlikely</u> Key areas where trails could not be constructed without impacts to key features (e.g. thickets with high stem densities) have been avoided. The overall area of occupancy of the species would therefore remain unchanged during construction and operation, as the habitat in which the trails are situated would remain suitable for this species (i.e. retention of undisturbed thickets, retention of hollow-bearing trees and maintenance of sub-canopy connectivity).
Fragment an existing population into two or more populations	<u>Unlikely</u> Key areas where structural fragmentation of dense montane thickets and the sub-canopy layer in wet forests and rainforests may occur have been avoided through realignments in the Mount Donna Buang and Ben Cairn areas of the Yarra Ranges National Park. While such fragmentation would not have resulted in a population becoming isolated and fragmented into two populations, structural fragmentation was considered important to avoid due to impacts associated with disturbance, increased predation and

Significant impact criteria	Likelihood of significant impact
	energetic costs to animals in the area. The project would therefore not result in fragmentation of a population, nor would it result in structural fragmentation of important habitat facilitating movement of the species. It is also important to note that habitat for the species is already fragmented by roads and tracks throughout the study area and by areas of naturally unsuitable forest types or previously logged or burned forests that may now lack suitable habitat elements.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> Direct impacts on habitat elements and features critical to the survival of the species in the broader study area including montane thickets, hollow-bearing trees, nest boxes and areas of high sub-canopy stem densities would be avoided. The project is therefore unlikely to adversely affect habitat critical to the survival of the species.
Disrupt the breeding cycle of a population	<u>Unlikely</u> Trail construction and operation are unlikely to affect breeding or dispersal as key habitat and connectivity for these activities would still be available and the trails would not act as a barrier that would interrupt gene flow between individuals or populations. Sources of construction noise would not be in any one area for a prolonged time, and the top section of Trail 1 between Mount Donna Buang summit and Ben Cairn is proposed to be hand built so the construction noise profile would be much lower in this area compared to machine built trails. Noise from normal day to day trail use during operation is likely to be insignificant as patrons will be spread around the network and not concentrated. Hollow-dependent species that are high in the canopy (e.g. 30 to 60 metres high) are less likely to be susceptible to noise than those using tree hollows closer to ground level or occupying low roosting sites. Leadbeater's Possum are unlikely to be disturbed by the daytime construction or operation noise given they currently occupy nest boxes in close proximity to Donna Buang Road near the Mount Donna Buang summit and towards Ben Cairn where vehicle traffic regularly occurs.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> Key habitat features within the broader study area (hollow-bearing trees, nest boxes and dense thickets with high density of sub-canopy stems) would be avoided and the structural connectivity of sub-canopy and canopy habitat would not be fragmented by the proposed trails. The habitat in the project area would therefore not be modified or destroyed to the point that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<u>Unlikely</u> Invasive fauna species are already present within the study area (e.g. cats). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species the project would support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Ongoing monitoring would be undertaken during project construction and operation to control the introduction and spread of weed species and pathogens. With these measures in place, it is unlikely that an invasive species harmful to Leadbeater's Possum would become established within the project area.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Leadbeater's Possum.
Interfere with the recovery of a species	<u>Unlikely</u> The first national recovery plan for the Leadbeater's Possum was approved in 1998, and a revision is currently being drafted. An Action Statement has also been prepared. Key threats identified in these published documents include wildfire, timber harvesting, habitat fragmentation and declines in habitat quality and extent. The project would avoid impacts to key habitat features and would not result in fragmentation and declines in the extent and quality of habitat. An existing recovery action for the species that is relevant to the study area is the translocation of individuals to recipient sites in and around Mount Donna Buang and Ben Cairn, including locations that were previously within or immediately adjacent to the proposed Trail 1 alignment below Mount Donna Buang and on the Donna Buang Road near Ben Cairn. Trail 1 has now, however, been realigned after consultation with species experts

Significant impact criteria	Likelihood of significant impact
	to avoid direct impacts on these recipient sites and the associated high-quality habitat present at these locations. Suitable buffers have also been applied to research sites off the Donna Buang Road near Ben Cairn. This species was not recognised as having a significant percentage of its habitat burned in the 2019-20 bushfires in south-eastern Australia. As such, the project is considered unlikely to interfere with the recovery actions and objectives for Leadbeater's Possum.

14.5.3 Spot-tailed Quoll (endangered)

The Spot-tailed Quoll is the largest carnivorous marsupial on mainland Australia and is known to occur within a range of forest habitats characterised by high rainfall, which is consistent with habitat present throughout the study area. Den sites comprise of rock crevices, caves, hollow logs and hollows within trees.

The project is considered unlikely to result in a significant impact on Spot-tailed Quoll based on an assessment against the significant impact criteria for endangered and critically endangered species (refer to Table 14-5). This conclusion has been reached on the basis that:

- Large areas of suitable forest habitat would remain within, and adjacent to, the project area.
- The trail network only impacts understorey vegetation and would not create large or hostile barriers to the movement and dispersal of this species.
- Effective mitigation measures would be implemented, including supporting existing pest animal programs targeting foxes, cats and deer conducted by land managers for the entire life of the project. These measures will assist in addressing potential changes to local movements of pest animals and their potential impacts on this species.

Table 14-5 Significant impact assessment for Spot-tailed Quoll

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of a population	<u>Unlikely</u> Depending on the trail design scenario, the project proposes to permanently remove/disturb up to 37 ha of understorey vegetation across a range of forest types. The habitat to be removed is within a large contiguous area of high-quality native forest within the broader area and region. The resultant understorey disturbance would be a permeable narrow track in discrete locations. This level of disturbance is unlikely to affect foraging, dispersal or gene flow of Spot-tailed Quoll, given this species' dispersal ability and large home ranges. Given the relatively small linear construction footprint in the context of available habitat in the broader area and region and as extensive habitat would still be available during and post construction, the proposed trails would not lead to a long term decline in the size of a population of this species.
Reduce the area of occupancy of the species	<u>Unlikely</u> While the project would result in the removal of native understorey vegetation that may constitute habitat for this species, the overall area of occupancy of the species would remain unchanged during and post construction, as the habitat in which the trails are situated would still be suitable for this species.
Fragment an existing population into two or more populations	<u>Unlikely</u> The habitat in the project area would not be fragmented by the proposed works and any resultant disturbance would consist of permeable narrow trails in discrete locations that would not affect physical or functional connectivity between populations or breeding individuals.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> The national recovery plan for Spot-tailed Quoll describes critical habitat as large patches of forest with adequate denning resources and relatively high densities of medium-sized mammalian prey. The understorey vegetation to be disturbed for construction and operation of the project includes high quality montane and foothill vegetation that under the definition above contains elements critical to this species survival. However, the extent of permanent vegetation removal/disturbance required for the trail development would not jeopardise the long-term survival of this species

Significant impact criteria	Likelihood of significant impact
	given the quantity of similar high-quality contiguous habitat remaining within, and immediately adjacent to, the project area.
Disrupt the breeding cycle of a population	<u>Unlikely</u> Given the large home range and dispersal ability of Spot-tailed Quoll, trail construction activities are unlikely to affect dispersal or gene flow and are unlikely to disrupt the breeding cycle of the species. Extensive habitat would still be available during and post construction for these species and the trails would not act as a barrier that would interrupt gene flow between individuals or populations.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> The habitat in the project area would not be modified or destroyed to the point that the species is likely to decline, given the extent and quality of adjacent habitats.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<u>Unlikely</u> Invasive fauna species are already present within the study area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project would support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Spot-tailed Quoll as the habitat becomes unsuitable for preferred prey species. Soil disturbance and subsequent weed invasion would be minimised through construction management and follow up weed control. Ongoing monitoring would be undertaken during project construction and operation to control the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Spot-tailed Quoll would become established within the project area.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Spot-tailed Quoll.
Interfere with the recovery of a species	<u>Unlikely</u> The national recovery plan for Spot-tailed Quoll describes a number of threats and management actions, and while the removal of understorey vegetation that provides foraging or dispersal resources is counter to those management actions, the extent and type of vegetation removal required for the trail development is unlikely to interfere with the national recovery of the species. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia. Given the project will only contribute to small areas of potential habitat loss and will not create significant barriers to movement or dispersal, the project is not considered to compound the impacts of recent bushfires on this species.

14.5.4 Smoky Mouse (endangered)

The Smoky Mouse has a disjunct Victorian distribution with populations in the Snowfields, Eastern Highlands, East Gippsland, Otway Range and the Grampians. The national recovery plan for Smoky Mouse describes any vegetation with a diversity of heath and bush-pea species, combined with potential shelter sites in the form of woody debris or rocks as being potential habitat within the species range. There is a medium likelihood of this species occurring in the study area and the nearest records for this cryptic species are 11 kilometres to the east of the study area.

The project is considered unlikely to result in a significant impact on Smoky Mouse based on an assessment against the significant impact criteria for endangered and critically endangered species (refer to Table 14-6). This conclusion has been reached on the basis that most forest types that would be impacted are too wet and unsuitable for this species. If the species is present in the project area in suitable bush pea dominated Shrubby Foothill Forest it is considered unlikely that construction of minor trails would fragment suitable habitat as this species has been demonstrated to cross large fire breaks in similar forested habitats in the Central Highlands of Victoria.

The project would support existing pest animal programs targeting foxes, cats and deer conducted by land managers. These measures would assist in addressing potential changes to local movements of pest animals and their potential impacts on this species.

Table 14-6 Significant impact assessment for Smoky Mouse

Significant impact criteria	Likelihood of significant impact
<p>Lead to a long-term decrease in the size of a population</p>	<p><u>Unlikely</u> Given these broad habitat requirements and the cryptic nature of this species, it could be reasonably assumed that if a population of the species was present within or adjacent to the trail alignment, the population would utilise the extensive areas of available habitat adjacent to the project (e.g. Shrubby Foothill Forest dominated by bush peas). Approximately 12 ha of Shrubby Foothill Forest understorey would be disturbed by the project and not all of this area is dominated by suitable heath and bush pea species that provides potential habitat for Smoky Mouse. Under this assumption the removal of suitable habitat from within a large, contiguous, patch would not lead to a direct decline in the size of a population as extensive habitat would still be available for critical activities to occur in. Predation from introduced carnivores is a key threatening process to the species. Cats and foxes are already present throughout the project area, and while the trails could increase opportunities for localised predation, the construction of new trails is unlikely to result in new invasion of unoccupied habitats that would lead to a long-term decrease in the population, given that the local area currently has a level of predator activity.</p>
<p>Reduce the area of occupancy of the species</p>	<p><u>Unlikely</u> The permanent removal of potentially suitable habitat would reduce the area of available habitat within the study area, however habitat surrounding and within the trail may still be utilised by Smoky Mouse, should they be present. As such the overall area of occupancy would remain unchanged post construction.</p>
<p>Fragment an existing population into two or more populations</p>	<p><u>Unlikely</u> The habitat in the project area would not be fragmented by the proposed works and any resultant disturbance would consist of permeable narrow trails in discrete locations that would not affect physical or functional connectivity between populations or breeding individuals. Previous studies on the impact of large fire breaks suggest the construction of narrow trails as proposed are unlikely to significantly impact the species or fragment its habitat.</p>
<p>Adversely affect habitat critical to the survival of the species</p>	<p><u>Unlikely</u> There is no declared critical habitat for the Smoky Mouse.</p>
<p>Disrupt the breeding cycle of a population</p>	<p><u>Unlikely</u> Impacts likely to disrupt the breeding cycle of Smoky Mouse include direct mortality, disturbance to breeding sites, loss of breeding and sheltering habitat, loss and fragmentation of foraging habitat and fragmentation of movement corridors. The project would directly remove some potentially suitable habitat on dry slopes where Shrubby Foothill Forest is dominated by bush peas. The habitat to be removed is within a large patch of vegetation within Yarra State Forest. It is likely that if the species uses the study area for foraging, breeding and sheltering then the local population would use the entire patch of habitat.</p>
<p>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p><u>Unlikely</u> The habitat in the project area would not be modified or destroyed to the point that the species is likely to decline, given the extent and quality of adjacent habitats.</p>
<p>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>	<p><u>Unlikely</u> Invasive fauna species are already present within the study area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project would support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Smoky Mouse persistence. Soil disturbance and subsequent weed invasion would be minimised through construction</p>

Significant impact criteria	Likelihood of significant impact
	management and follow up weed control. Ongoing monitoring would be undertaken during project construction and operation to control the introduction and spread of weed species. With the above effective mitigation measures in place, it is unlikely that an invasive species harmful to Smoky Mouse would become established within the project area.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Smoky Mouse.
Interfere with the recovery of a species	<u>Unlikely</u> The removal of suitable habitat is counter to the recovery of this species, however, the extent and nature of the vegetation removal in the context of available suitable habitat within the broader Yarra State Forest would not interfere with the recovery of this species.

14.5.5 Southern Brown Bandicoot (endangered)

The Southern Brown Bandicoot is a medium-sized ground dwelling marsupial that occurs in a range of dense vegetation types, including predominately introduced vegetation throughout south-eastern Australia, including south, central and east Gippsland, the southern and eastern outskirts of Melbourne and south-west Victoria. They occur in a range of habitats including tall open forest, woodland and heathland, but do not typically occur in closed wet forest types, such as those that make up the majority of the study area. There is a medium likelihood of this species occurring in drier forest types located in the southern sections of the study area, particularly around Wesburn (e.g. Lowland Forest and Valley Heathy Forest).

The project is considered unlikely to result in a significant impact on Southern Brown Bandicoot based on an assessment against the significant impact criteria for endangered and critically endangered species (refer to Table 14-7). This conclusion has been reached on the basis that most forest types that would be impacted are not suitable habitat for the species. If the species is present in the project area in suitable Lowland Forest or Valley Heathy Forest habitat it is considered unlikely that construction of minor trails and removal of 0.8 hectares of understorey vegetation in these forest types would significantly impact this species.

The project would support existing pest animal programs targeting foxes, cats and deer conducted by land managers. These measures would assist in addressing potential changes to local movements of pest animals and their potential impacts on this species.

Table 14-7 Significant impact assessment for Southern Brown Bandicoot

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of a population	<u>Unlikely</u> It can be reasonably assumed that if a population of the species was present within or adjacent to the trail alignment, the population would utilise the extensive areas of available habitat adjacent to the development. Under this assumption the removal of 0.81 ha of suitable understorey habitat in Lowland Forest and Valley Heathy Forest from within a large, contiguous patch would not lead to a direct decline in the size of a population as extensive habitat would still be available for critical activities to occur in. Predation from introduced carnivores is a key threatening process to Southern Brown Bandicoot. Cats and foxes are likely to be present throughout the study area, and while the trails could provide increased opportunities for localised predation, the construction of new trails is unlikely to result in new invasion of unoccupied habitats that would lead to a long-term decrease in the population, given that the local area currently has a level of predator activity and Lowland Forest and Valley Heathy Forest already have an extensive network of forest tracks and trails near Wesburn.
Reduce the area of occupancy of the species	<u>Unlikely</u> The permanent removal of potentially suitable habitat (0.81 ha of understorey vegetation) would reduce the area of available habitat within the study area, however habitat surrounding and within the trail corridors may still be utilised by Southern Brown Bandicoot, should they be present. As such the overall area of occupancy would remain unchanged post construction.

Significant impact criteria	Likelihood of significant impact
Fragment an existing population into two or more populations	<u>Unlikely</u> The habitat in the project area would not be extensively fragmented by the proposed works and any resultant disturbance would consist of permeable narrow trails in discrete locations that would not affect physical or functional connectivity between populations or breeding individuals.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> There is no declared critical habitat for Southern Brown Bandicoot.
Disrupt the breeding cycle of a population	<u>Unlikely</u> Impacts likely to disrupt the breeding cycle of Southern Brown Bandicoot include direct mortality, disturbance to breeding sites, loss of breeding and sheltering habitat, loss and fragmentation of foraging habitat and fragmentation of movement corridors. The project would directly remove some potentially suitable habitat within a large patch of vegetation. It is likely that if the species uses the study area for foraging, breeding and sheltering then the local population would use the entire patch of habitat and minor habitat removal is unlikely to disrupt the breeding cycle.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> The habitat in the project area would not be extensively fragmented by the proposed trails and any resultant disturbance would consist of permeable narrow trails in discrete locations that would not affect physical or functional connectivity between populations or breeding individuals. The habitat in the project area would not be modified or destroyed to the point that the species is likely to decline, given the extent and quality of adjacent habitats.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<u>Unlikely</u> Invasive fauna species are already present within the study area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project would support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Southern Brown Bandicoot persistence. Soil disturbance and subsequent weed invasion would be minimised through construction management and follow up weed control. Ongoing monitoring would be undertaken during project construction and operation to control the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Southern Brown Bandicoot would become established within the project area.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Southern Brown Bandicoot.
Interfere with the recovery of a species	<u>Unlikely</u> The removal of suitable habitat is counter to the recovery of this species, however, the extent and nature of the vegetation removal in the context of available suitable habitat within the broader local area would not interfere with the recovery of this species. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia. Given the project will only contribute to small areas of potential habitat loss and will not create significant barriers to movement or dispersal, the project is not considered to compound the impacts of recent bushfires on this species.

14.5.6 Macquarie Perch (endangered)

Macquarie Perch naturally reside in cool, rocky, slow-flowing rivers with deep holes; predominantly in the upper reaches of forested catchments with intact riparian vegetation. This aquatic species has been recorded within the Yarra River Basin after being translocated to this part of southern Victoria from its natural range within the Murray Darling Basin. The species is considered to have some likelihood of occurrence in small numbers within the study area.

The project is considered unlikely to result in a significant impact on Macquarie Perch based on an assessment against the significant impact criteria for endangered and critically endangered species

(refer to Table 14-8). This conclusion has been reached on the basis that no aquatic habitats would be significantly altered, no barriers to fish movement would be introduced and that sources of indirect impact (e.g. waterway sedimentation) would be managed through effective and proven sediment/erosion control measures for mountain bike trail construction and operation.

Table 14-8 Significant impact assessment for Macquarie Perch

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of a population	<u>Unlikely</u> The development of trails is not expected to lead to a long-term decrease in the size of the population of Macquarie Perch. This is considering the small area of potential impact associated with the Yarra River and the small extent of available habitat and level of impact along Yarra River tributaries within the study area.
Reduce the area of occupancy of the species	<u>Unlikely</u> The proposed works would result in a narrow trail in discrete locations and would not reduce the area of occupancy for the species in the unlikely event they are found to be present within the project area. Measures to avoid indirect impacts to water quality (such as through appropriate waterway crossing solutions and erosion controls) would be implemented in the project Construction Environmental Management Plan (CEMP) to avoid impacts to the Yarra River and associated tributaries.
Fragment an existing population into two or more populations	<u>Unlikely</u> The proposed works would result in a narrow trail in discrete locations and would not present a major barrier for the movement of the species, retaining population scale connectivity. All bridges across waterways would be single span and would not cause barriers to fish movement.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> The current area of occupancy of the species in the Yarra River is noted in the Recovery Plan as critical habitat. The proposed works would result in a narrow trail in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Sedimentation controls would be employed during construction to prevent erosion and sediments entering waterways. Habitat would not be adversely affected.
Disrupt the breeding cycle of a population	<u>Unlikely</u> The proposed works would result in a narrow trail in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Breeding cycles would not be adversely affected.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> The proposed works would result in a narrow trail in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. The availability and/or quality of habitat would not be affected.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	<u>Unlikely</u> The type and scale of potential impacts associated with the project construction and operation are not anticipated to favour the establishment of invasive species. Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds and pathogens would be included in the project CEMP/Operations Environmental Management Plan (OEMP).
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Macquarie Perch.
Interfere with the recovery of a species	<u>Unlikely</u> The National Recovery Plan for the Macquarie Perch lists threats to the species as: habitat degradation, introduced fish species, barriers to fish movement, altered flow and thermal regimes, disease and parasites, illegal/incidental capture, chemical water pollution and climate change. The project is not considered likely to substantially interfere with the recovery of the species due to the localised area of potential impacts and extent of available adjacent habitat. This species was recognised as having 30% to 50% of its habitat (catchments) burned in the 2019-20 bushfires in south-eastern Australia. Given the project impacts to waterways are minimal and indirect impacts such as sedimentation can be readily managed, the project is not considered to compound the impacts of recent bushfires on this species.

14.5.7 White-throated Needle-tail (vulnerable)

The White-throated Needle-tail is a migratory bird species that occurs over most habitats in Australia. White-throated Needle-tails breed in a number of locations throughout Asia and spend the non-breeding portion of the year in Australia and occasionally Papua New Guinea and New Zealand. The species is present in Australia between roughly October and March, during which time it is likely to be almost exclusively aerial, however the species may forage and utilise forest habitat within the study area for roosting in the canopy foliage or within hollows of tall trees.

The project is considered unlikely to result in a significant impact on White-throated Needle-tail based on an assessment against the significant impact criteria for this vulnerable species (refer to Table 14-9). This conclusion has been reached on the basis of the predominantly aerial nature of this species and that potential roosting trees in forested areas would not be removed by the project.

Table 14-9 Significant impact assessment for White-throated Needle-tail

Significant impact criteria	Likelihood of significant impact
<p>Lead to a long-term decrease in the size of an important population of a species</p> <p>Reduce the area of occupancy of an important population</p>	<p><u>Unlikely</u> White-throated Needle-tails are considered to function as one single migratory population when present in Australia, therefore the entire population is considered to be an important population for the purpose of this assessment.</p> <p>Some White-throated Needle-tails have been recorded roosting in hollows and canopy foliage of tall trees in forest and woodland. The species may therefore occasionally utilise tall trees in the project area for roosting. The use of roosting habitat in Australia is not well understood. Despite this, the project would not remove canopy trees and therefore the project is highly unlikely to result in a decrease in size of the population, nor reduce the area of occupancy for the species.</p>
<p>Fragment an existing important population into two or more populations</p>	<p><u>Unlikely</u> The White-throated Needle-tail occurs as a single, migratory non-breeding population when present in Australia, and as such the project has no capacity to result in fragmentation of the population.</p>
<p>Adversely affect habitat critical to the survival of the species</p>	<p><u>Unlikely</u> White-throated Needle-tails are almost exclusively aerial when present in Australia, however they may utilise tall trees within the project area for roosting on occasions. The project would not result in the removal of any canopy trees and therefore would not result in impacts that could affect habitat critical to the survival of the species.</p>
<p>Disrupt the breeding cycle of an important population</p>	<p><u>Unlikely</u> White-throated Needle-tails do not breed in Australia, and the project would not result in impacts (e.g. via impacts to migration or mortality of adults) that could affect breeding success elsewhere. The project therefore has no capacity to disrupt the breeding cycle of White-throated Needle-tails.</p>
<p>Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</p>	<p><u>Unlikely</u> White-throated Needle-tails may utilise tall trees within the project area for roosting on occasions, however the project would avoid removal of all canopy trees. It is therefore considered highly unlikely that the project would result in any changes to availability or quality of habitat that could result in species decline.</p>
<p>Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</p> <p>Introduce disease that may cause the species to decline</p>	<p><u>Unlikely</u> The project would not result in the establishment or introduction of an invasive species or disease that could cause the species to decline.</p>
<p>Interfere substantially with the recovery of a species</p>	<p><u>Unlikely</u> The project does not conflict with information regarding key threats to the species. The species is described as having few threats in Australia or elsewhere. Collisions with tall structures such as overhead wires, buildings and wind farms are the only listed threats in Australia and are not applicable to this project.</p> <p>This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia. Given the project will not contribute to habitat loss for this species the project is not considered to compound the impacts of recent bushfires on this species.</p>

14.5.8 Southern Greater Glider (vulnerable)

The nocturnal Southern Greater Glider is Australia's largest gliding mammal and occurs in forest environments in eastern Australia, particularly tall, moist montane forest. Hollow-bearing trees provide an important resource for shelter and breeding. The species is known to occur throughout forest habitat in the local area and is therefore considered to have a high likelihood of occurrence within the study area.

The project is considered unlikely to result in a significant impact on Southern Greater Glider based on an assessment against the significant impact criteria for vulnerable species (refer to Table 14-10). This conclusion has been reached on the basis that vegetation removal in forested areas would be restricted to understorey species and all hollow-bearing trees would be avoided. If any treatment of large or hollow-bearing trees that are deemed hazardous is required, then this would be done in consultation with the land manager, an ecologist and arboriculture specialist.

Table 14-10 Significant impact assessment for Southern Greater Glider

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of an important population of a species	<u>Unlikely</u> Southern Greater Glider are known to occur within the study area and broader local area. In the absence of specific information on what constitutes an important population of Southern Greater Glider, it is assumed that important populations are present within the project area and adjacent contiguous habitat. Impacts associated with the project are to be restricted to understorey vegetation, therefore it is unlikely that this impact would lead to a broader decline in the population. Furthermore, all hollow-bearing trees would be avoided and as such breeding habitat would not be directly impacted.
Reduce the area of occupancy of an important population	<u>Unlikely</u> The area of occupancy for Southern Greater Glider would remain unchanged as the trail alignments would be a discrete narrow disturbance and the canopy would remain effectively contiguous in the context of this species dispersal and movement patterns.
Fragment an existing important population into two or more populations	<u>Unlikely</u> The disturbance associated with trail construction would be a discrete narrow disturbance that would not act as a barrier for dispersal for this species as the canopy would remain effectively contiguous in the context of this species dispersal and movement patterns.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> Impacts associated with the project would be restricted to understorey vegetation, therefore it is unlikely that this impact would lead to impacts that would adversely affect the survival of the species. Furthermore, all hollow-bearing trees would be avoided and as such critical breeding habitat would not be impacted.
Disrupt the breeding cycle of an important population	<u>Unlikely</u> The project would remove understorey vegetation only and would avoid direct impacts to breeding sites by avoiding removal of hollow-bearing trees during construction. Operation of the trails in Yarra Ranges National Park and high-quality forest habitats near Mount Bride in Yarra State Forest would be restricted to daylight hours, therefore avoiding potential for disturbance from noise and lighting at night, when the species is active. It is therefore unlikely that impacts of the trail construction and operation would disrupt the breeding cycle of Southern Greater Gliders.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> The project would remove understorey vegetation only and would avoid direct impacts to breeding sites by avoiding removal of hollow-bearing trees during construction. This level of disturbance in the context of available habitat would not lead to a broader species decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<u>Unlikely</u> Invasive fauna species are already present within the study area (e.g. cats and foxes). To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project would support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Ongoing monitoring would be undertaken during project construction and operation to control the introduction and spread of weed

Significant impact criteria	Likelihood of significant impact
	species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Southern Greater Glider would become established within the project area.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to the Greater Glider.
Interfere substantially with the recovery of a species	<u>Unlikely</u> There is no accepted or adopted recovery plan associated with Greater Glider. The conservation advice gives priority to the following conservation actions: <ol style="list-style-type: none"> 1. Reduce the frequency and intensity of prescribed burns. 2. Identify appropriate levels of patch retention, habitat tree retention, and logging rotation in hardwood production. 3. Protect and retain hollow-bearing trees, suitable habitat and habitat connectivity. Considering the above factors, the project would not interfere with the recovery of Southern Greater Glider. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia. Given the project will not contribute to direct habitat loss for this species (i.e. hollow-bearing trees and forest canopy to be retained) the project is not considered to compound the impacts of recent bushfires on this species.

14.5.9 Broad-toothed Rat (vulnerable)

Broad-toothed Rat is a mostly nocturnal rodent that occupies structurally dense vegetation communities in high rainfall areas in south-eastern Australia and has a highly fragmented and patchy distribution. Surveys for suitable habitat in the study area were undertaken in early 2021 to inform a revised assessment of the likelihood of Broad-toothed Rat occurring within the study area. No Broad-toothed Rats or suitable sedge/grass-dominated drainage line habitat were identified during these field studies.

The project is considered unlikely to result in a significant impact on Broad-toothed Rat based on an assessment against the significant impact criteria for vulnerable species (refer to Table 14-11). This conclusion has been reached based on the species being considered to have a low likelihood of occurrence in the study area due to a lack of suitable habitat.

If undetected habitat or populations do occur in the study area or along the assessment corridor, it is still considered that trail construction is unlikely to lead to a significant impact based on the species' ability to use modified vegetation, the narrow footprint of the impact and the environmental controls that will be implemented.

Table 14-11 Significant impact assessment for Broad-toothed Rat

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of an important population of a species	<u>Unlikely</u> No areas of suitable Broad-toothed Rat habitat have been identified within the project area based on habitat surveys undertaken in early 2021, and the species is considered to have a low likelihood of occurrence. The project is therefore considered unlikely to result in the decrease in size of a Broad-toothed Rat population.
Reduce the area of occupancy of an important population	<u>Unlikely</u> The proposed works would result in a network of narrow trails in discrete locations and would not reduce the area of occupancy for the species in the unlikely event they are found to be present within the project area.
Fragment an existing important population into two or more populations	<u>Unlikely</u> The proposed works would result in a network of narrow trails in discrete locations and would not present a major barrier for the movement of the species in the unlikely event they are found to be present within the project area. Studies demonstrate that Broad-toothed Rats in alpine environments freely disperse through and around significantly fragmented and disturbed landscapes and utilise drains, pipes and introduced vegetation to move through inhospitable landscapes. If a population were present in the project area, its habitat would not be fragmented by the trails and any resultant disturbance would be a permeable narrow barrier in a discrete

Significant impact criteria	Likelihood of significant impact
	location or elevated structures that would not affect physical or functional connectivity between populations or breeding individuals.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. It is therefore considered unlikely that the project would adversely affect habitat critical to the survival of Broad-toothed Rat.
Disrupt the breeding cycle of an important population	<u>Unlikely</u> The project is considered unlikely to disrupt the breeding cycle of a Broad-toothed Rat population. The proposed works would result in a network of narrow trails that would not affect the movement or dispersal of the species, in the unlikely event of a population being in proximity to the project area.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> No areas of suitable Broad-toothed Rat habitat have been identified within the project area, and the species is considered to have a low likelihood of occurrence. The project is therefore considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<u>Unlikely</u> Invasive fauna species are already present within the study area. Broad-toothed Rats are known to be particularly prone to selective predation by foxes, and their habitat is particularly sensitive to damage by deer. To address the potential risk of the project increasing opportunities for the movement and dispersal of introduced fauna species, the project would support existing pest animal programs targeting foxes, cats and deer conducted by public land managers (e.g. DELWP and Parks Victoria). Invasive weeds species can modify or simplify vegetation structure that may indirectly influence Broad-toothed Rat habitat through altered structure and/or hydrology. Soil disturbance and subsequent weed invasion would be minimised through construction management and follow up weed control. Ongoing monitoring would be undertaken during project construction and operation to control the introduction and spread of weed species. With the above effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Broad-toothed Rat would become established within the project area.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Broad-toothed Rat.
Interfere substantially with the recovery of a species	<u>Unlikely</u> The Conservation Advice for the species identifies the key threats to Broad-toothed Rat as predation, fire, climate change, habitat loss and fragmentation and the reduction in the extent and quality of habitat due to weeds, die-back and damage caused by livestock and feral herbivores. Key conservation actions are identified as controlling predators and maintaining and protecting habitat. The project is not identified as a threat, and the proposed works do not conflict with the primary conservation actions identified for the species. The project CEMP/OEMP would include requirements to contribute to management of feral predators and deer, which are listed as recovery actions in the Conservation Advice. The project would therefore not interfere with the recovery of the species. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia. Given the species has low potential to occur in the project area or be impacted by trail construction, the project is not considered to compound the impacts of recent bushfires on this species.

14.5.10 Grey-headed Flying-fox (vulnerable)

The Grey-headed Flying-fox occurs through-out much of Victoria and is a wide-ranging species with the ability to travel up to 50 kilometres from their roost to forage. There are no known roost sites or breeding colonies of this species in the study area with the closest camps of Grey-headed Flying-fox located in Yarra Bend Park approximately 55 kilometres south-east of the study area and in Doveton approximately 45 kilometres south-west of the study area. This species is considered likely to utilise food resources within the study area on occasion; however, these would not constitute an important

food resource for the species and the species is not expected to make significant use of the study area.

The project is considered unlikely to result in a significant impact on Grey-headed Flying-fox based on an assessment against the significant impact criteria for vulnerable species (refer to Table 14-12). This conclusion has been reached on the basis that this species is highly mobile and forages across large tracts of urban, rural and forest habitat. Vegetation removal in forested areas would be restricted to understorey species only and all potential canopy feed trees for this species would be avoided.

Table 14-12 Significant impact assessment for Grey-headed Flying-fox

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of an important population of a species	<u>Unlikely</u> Grey-headed Flying-fox have rarely been recorded utilising the local area. There are no known roost sites or breeding colonies of this species in the study area. It is not expected that the habitat present is a critical food source for the survival of the species.
Reduce the area of occupancy of an important population	No canopy tree removal is proposed for the project and therefore the project is unlikely to lead to a long-term decrease in the size of any population, reduce the area of occupancy or fragment any population.
Fragment an existing important population into two or more populations	There is a large expanse of suitable food trees for the species in the broader surrounding area and the regional population is not reliant on potential food sources located within the Warburton area.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> Whilst the species may visit the study area on occasion, suitable trees located within the study area are unlikely to provide habitat critical to the survival of the species given the large extent of other available food sources for the species in the broader region.
Disrupt the breeding cycle of an important population	<u>Unlikely</u> The closest known breeding colony is located at least 45 km from the project area in Doveton. No breeding population occurs within the project area, and the project would not result in the disruption of the species during their breeding period.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> The potential habitat located within the project area is not critical to the survival of the species and no removal of canopy trees would occur within the project area. Therefore, the project would not cause a decline in the species.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<u>Unlikely</u> The project would not result in the establishment or introduction of an invasive species or disease that could cause the species to decline.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not introduce disease that may cause any impact on the species.
Interfere substantially with the recovery of a species	<u>Unlikely</u> The removal of suitable habitat is counter to the recovery of this species, however, the extent and nature of the vegetation removal (i.e. understorey only) in the context of available suitable habitat within the broader region would not interfere with the recovery of this species. This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia. Given the project will not result in loss of canopy trees that provide potential foraging habitat, the project is not considered to compound the impacts of recent bushfires on this species.

14.5.11 Australian Grayling (vulnerable)

Australian Grayling is a fish species that lives in freshwater, preferring to inhabit streams with a moderate flow, but it is also known to inhabit turbid water. Whilst spending most of its life in freshwater, the species is diadromous, meaning adults respond to flow events in autumn (April-May) by undertaking downstream migrations to lower freshwater reaches of rivers to spawn. This species has been recorded within the Yarra River Basin.

The project is considered unlikely to result in a significant impact on Australian Grayling based on an assessment against the significant impact criteria for vulnerable species (refer to Table 14-13). This conclusion has been reached on the basis that no aquatic habitats would be significantly altered, no

barriers to fish movement would be introduced and that sources of indirect impact (e.g. waterway sedimentation) would be managed through effective and proven sediment/erosion control measures for trail construction and operation.

Table 14-13 Significant impact assessment for Australian Grayling

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of an important population of a species	<u>Unlikely</u> The development of trails is not expected to lead to a long-term decrease in the size of a population of Australian Grayling. This is considering the small area of potential impact associated with the Yarra River and the small extent of available habitat and level of impact along Yarra River tributaries within the study area.
Reduce the area of occupancy of an important population	<u>Unlikely</u> The National recovery plan for the Australian Grayling notes the Yarra River as supporting an important population. The species is considered to have some likelihood of occasional occurrence within the study area. The proposed works would result in a narrow trail network in discrete locations and would not reduce the area of occupancy for the species within the project area. Measures would be implemented in the project CEMP to avoid impacts to the Yarra River and associated tributaries (e.g. single span bridges, sustainable trail design and sediment controls).
Fragment an existing important population into two or more populations	<u>Unlikely</u> The proposed works would result in a narrow trail network in discrete locations and would not present a major barrier for the movement of the species, retaining population scale connectivity.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> Critical habitat is not defined to particular locations, although habitats for certain life stages, such as spawning, refuge and juvenile habitats, are critical. Habitat would not be adversely affected by trail construction in the project area as river and creek systems would not be altered and indirect impacts through sedimentation would be managed appropriately.
Disrupt the breeding cycle of an important population	<u>Unlikely</u> The proposed works would result in a narrow trail network in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Breeding cycles would not be adversely affected by the project.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> The availability and/or quality of habitat for Australian Grayling would not be affected.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<u>Unlikely</u> The type and scale of potential impacts associated with the project construction and operation are not anticipated to favour the establishment of invasive species. Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds and pathogens would be included in the project CEMP/OEMP.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Australian Grayling.
Interfere substantially with the recovery of a species	<u>Unlikely</u> The recovery plan lists the species threats as: barriers to movements, river regulation, poor water quality, siltation, impact of introduced fish, climate change, disease and fishing, angling and whitebaiting. The project is not considered likely to substantially interfere with the recovery of the species due to the localised area of potential impacts and extent of available adjacent habitat.

14.5.12 Murray Cod (vulnerable)

Murray Cod is the largest of Australia's native freshwater fishes that has been introduced into the Yarra River. It is considered a low likelihood for a significant number of individuals of this species to reside within the confines of the project area. This is predominantly attributed to the project area not being known as a spawning site for migrating adults, the general sedentary nature of the species, angler knowledge and the limited distribution of deep pools, undercutting banks or holes pertaining

Instream Woody Habitat which it requires for cover. Nevertheless, occupation of a rare number of individuals within the project area cannot be discounted.

The project is considered unlikely to result in a significant impact on Murray Cod based on an assessment against the significant impact criteria for vulnerable species (refer to Table 14-14). This conclusion has been reached on the basis that no aquatic habitats would be significantly altered, no barriers to fish movement would be introduced and that sources of indirect impact (e.g. waterway sedimentation) would be managed through effective and proven sediment/erosion control measures for trail construction and operation.

Table 14-14 Significant impact assessment for Murray Cod

Significant impact criteria	Likelihood of significant impact
Lead to a long-term decrease in the size of an important population of a species	<u>Unlikely</u> This species has been recorded within the Yarra River Basin (translocated population), however the Yarra population is not noted as an important population. The development of trails is not expected to lead to a long-term decrease in the size of a population of Murray Cod. This is considering the small area of potential impact associated with the Yarra River and the small extent of available habitat and level of impact along Yarra River tributaries within the project area.
Reduce the area of occupancy of an important population	<u>Unlikely</u> The Yarra population is not noted as an important population. The species is considered to have some likelihood of occurrence in small numbers within the project area within the Yarra River. The proposed works would result in a narrow trail network in discrete locations and would not reduce the area of occupancy for the species within the project area. Mitigation measures would be implemented in the project CEMP to avoid impacts to the Yarra River and associated tributaries (e.g. single span bridges, sustainable trail design and sediment controls).
Fragment an existing important population into two or more populations	<u>Unlikely</u> The Yarra population is not noted as an important population. The proposed works would result in a narrow trail network in discrete locations and would not present a major barrier for the movement of the species, retaining population scale connectivity.
Adversely affect habitat critical to the survival of the species	<u>Unlikely</u> Critical habitat is not defined for the species. The proposed works would result in a narrow trail network in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. Habitat would not be adversely affected by the project.
Disrupt the breeding cycle of an important population	<u>Unlikely</u> The Yarra population is not noted as an important population. Breeding cycles would not be adversely affected.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	<u>Unlikely</u> The proposed works would result in a narrow trail network in discrete locations, constructed in a manner in which stream and river connectivity remains undisturbed. The availability and/or quality of habitat would not be affected.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat	<u>Unlikely</u> The type and scale of potential impacts associated with the project construction and operation are not anticipated to favour the establishment of invasive species. Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds and pathogens would be included in the project CEMP/OEMP.
Introduce disease that may cause the species to decline	<u>Unlikely</u> The project would not result in the introduction of a disease that is harmful to Murray Cod.
Interfere substantially with the recovery of a species	<u>Unlikely</u> The recovery plan lists threats to the species as: flow regulation, habitat degradation, lowered water quality, barriers, alien species, commercial fishing, recreational fishing, illegal fishing, stocking and translocations, genetic issues, disease and climate change. The project is not considered likely to substantially interfere with the recovery of the species due to the localised area of potential impacts and extent of available adjacent habitat.

14.5.13 Proposed mitigation measures

To address potential impacts on nationally significant fauna during construction and operation of the project a range of mitigation measures would be implemented. These are set out in the sections below. The complete list of proposed mitigation measures relevant to threatened fauna can be found in **Chapter 8: Biodiversity and habitats** and **Chapter 16: Environmental management framework**.

14.5.13.1 Terrestrial species

Mitigation measures to avoid and minimise impacts on threatened terrestrial species include:

- No removal of existing habitat trees unless deemed hazardous in which case treatment of these trees would be discussed with the land manager, arborist and ecologist, such as pruning.
- Trail micro-siting to avoid existing stands of dense vegetation, particularly mid-storey vegetation between one and five metres in height, wherever possible.
- Training of construction and operation phase staff as part of the site induction to identify high quality habitat indicators, including distribution of fact sheets including notes and photos.
- Supporting existing pest animal management programs conducted by land managers, targeting foxes, cats and deer.
- Supporting existing weed control programs conducted by land managers. In addition, hygiene protocols to control the introduction and spread of weed species and pathogens would be included in the project CEMP/OEMP. Weed management would be conducted during regular trail inspections and maintenance during operation. This would include project inductions to train staff to identify signs of weeds and pathogens and procedures to minimise the risk of spread.
- Specific measures for Leadbeater's Possum include:
 - Micro-siting trails around areas of dense sub-canopy stems in non-thicket habitat (e.g. wet forest communities) and avoiding fragmentation of sub-canopy connectivity.
 - Removal of vegetation within suitable Leadbeater's Possum habitat would be subject to the following constraints:
 - In the National Park no removal of trees, including mid-storey trees, with greater than 10 centimetres DBH
 - In State Forest where there is a stand of single age *Eucalyptus* sp. and mid-storey (i.e. regrowth following bushfire), trees less than 20 centimetres DBH may be removed
 - No removal of dense stands of montane thickets (comprising Bottlebrush *Callistemon* spp. and/or Tea-tree *Leptospermum* spp.) anywhere in the project area. Minor pruning of these species may occur at the edges of these thickets.
 - Supervision and guidance by a suitably qualified ecologist would be provided during the construction phase within suitable habitat to identify any additional potential Leadbeater's Possum habitat and assist with micro-siting.

14.5.13.2 Aquatic species

Mitigation measures to avoid and minimise impacts on nationally significant aquatic species include:

- No instream works within Yarra River to avoid disturbance and alterations to existing conditions.
- Sources of indirect impact (e.g. waterway sedimentation) would be managed through effective and proven sediment/erosion control measures for mountain bike trail construction and operation, as discussed in **Chapter 9: Surface water, groundwater and geotechnical hazards**.
- Hygiene controls to reduce the risk of the spread or introduction of aquatic weeds and pathogens would be included in the project CEMP/OEMP.

14.5.14 Residual impacts

With the avoidance and minimisation strategies applied and effective implementation of mitigation measures outlined above, residual significant impacts on threatened fauna species would be unlikely.

The project would also include species monitoring programs as determined in consultation with land managers and where proposed as part of offset arrangements and installation of nesting boxes for significant fauna. This would enhance habitat values for nationally significant fauna.

14.6 Threatened ecological communities

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

- Alpine *Sphagnum* Bogs and Associated Fens (critically endangered).

Alpine *Sphagnum* Bogs and Associated Fens can be found in small pockets in alpine, subalpine and montane areas. No ecological vegetation classes associated with the community were mapped during field surveys and the community would therefore not be significantly impacted by the project.

14.7 Assessment of alternative to Trail 1

Trail 1 and the alternative to Trail 1 are shown in Figure 14-1. The assessment and comparison of Trail 1 and the alternative to Trail 1 is based on the assessment described in **Technical Report A: Biodiversity and Habitats** as shown in Table 14-15.

The comparison is based on the residual impact of these options assuming effective implementation of the proposed mitigation and contingency measures described in Sections 14.4 and 14.5.

Table 14-15 Assessment of alternative to Trail 1

Aspect	Trail 1	Alternative to Trail 1 – Trails 45, 46 and 47	Conclusion
Trail length within National Park	18.2 km	15.2 km	There is less trail in the National Park for the alternative than for Trail 1.
Vegetation condition	Trail 1 would require 4.855 ha of vegetation removal as per the following condition class break down: 0.164 ha with a Vegetation Quality Assessment (VQA) score of ≤ 0.6 2.663 ha with a VQA score of > 0.6 and ≤ 0.85 2.027 ha with a VQA score of > 0.85	The alternative would require 3.562 ha of vegetation removal as per the following condition class break down: Trail 45 = 0.578 ha of vegetation removal with a VQA score of > 0.6 and ≤ 0.85 & 0.341 ha of vegetation removal with a VQA score of > 0.85 Trail 46 = 0.781 ha of vegetation removal with a VQA score of > 0.6 and ≤ 0.85 & 0.431 ha of vegetation removal with a VQA score of > 0.85 Trail 47 = 0.566 ha of vegetation removal with a VQA score of > 0.6 and ≤ 0.85 & 0.864 ha of vegetation removal with a VQA score of > 0.85	Native vegetation removal would be an estimated 1.293 ha more for the Trail 1 compared to the alternative.
Threatened ecological communities	The distance of Trail 1 that intersects Cool Temperate Rainforest and the Cool Temperate Mixed Forest is estimated to be 6.4 km	The distance of the alternative that intersects Cool Temperate Rainforest and the Cool Temperate Mixed Forest is estimated to be 3.1 km	The distance of trail that intersects Cool Temperate Rainforest and the Cool Temperate Mixed Forest is estimated to be 3.3 km greater for Trail 1 than for the alternative.
Key threatened species	Dense montane thicket for the EPBC Act listed Leadbeater's Possum habitat and translocation sites intersected by pre-July 2021 alignment – new alignment of Trail 1 from July 2021 will avoid these sites between Donna Buang Summit and Ben Cairn (very minor pruning of thicket)	Dense montane thicket the EPBC Act listed Leadbeater's Possum habitat and translocation sites are avoided by the alternative trails, scattered areas of open thicket and associated thicket species occur near sections of Trails 45 and 46 (very minor pruning of thicket species may be required for the alternatives).	There is likely to be a comparable level of impact on threatened species habitat between Trail 1 and the alternative; however, Trail 1 would come in closer proximity to the EPBC Act listed Leadbeater's Possum translocation sites between Donna Buang Summit and Ben Cairn.

Aspect	Trail 1	Alternative to Trail 1 – Trails 45, 46 and 47	Conclusion
	<p>species below Ben Cairn would be required). In some locations, Trail 1 passes within several metres of known Leadbeater's Possum habitat.</p> <p>Mount Donna Buang Wingless Stonefly occurs in headwaters of tributaries that are issued from the ridges and slopes between Donna Buang summit and Ben Cairn.</p> <p>Tree Geebung occurs at montane elevations between Donna Buang Summit and Ben Cairn.</p> <p>Records of the EPBC Act listed Southern Greater Glider occur in proximity to Trail 1.</p>	<p>Mount Donna Buang Wingless Stonefly was confirmed in headwaters of tributaries that are issued from the ridges and slopes between Donna Buang summit and Mount Victoria (Yithan Creek and Cement Creek).</p> <p>Tree Geebung occurs at montane elevations between Donna Buang Summit and Mount Victoria.</p> <p>Records of the EPBC Act listed Southern Greater Glider occur in proximity to the alternative trail alignments.</p>	

Considering the comparison of impacts in this table, the alternative alignments would have less impact on the national park in terms of trail length and would require less native vegetation removal. Impacts on threatened species are likely to be comparable and are unlikely to be significant. Trail 1 is located in closer proximity to dense montane thicket habitat or translocation recipient sites for the EPBC Act listed Leadbeater's Possum than the alternative alignment trails. This may have higher risks for disturbance to the species in proximity to Trail 1 during project construction and operation than the alternatives. However, with the implementation of mitigation measures to avoid impacts to high quality habitat for the species to the extent possible, and given a road (with vehicles generating noise and disturbance) is already present in proximity to the Mount Donna Buang known sites, significant impacts from Trail 1 on Leadbeater's Possum are unlikely.

14.8 Conclusion

The impact assessments undertaken in relation to the EPBC listed threatened species have concluded that with the effective implementation of the proposed mitigation measures, the project is unlikely to result in a significant impact on this MNES.

No populations of nationally significant flora species or threatened ecological communities were recorded in the study area and they are unlikely to be significantly impacted by the project. Potential impacts of the project on the 12 threatened fauna species that have a moderate or high likelihood of occurrence in the study area were assessed, and it was concluded that no threatened fauna species would be significantly impacted.

Mountain bike trail construction would require the removal of understorey vegetation that may support habitat for threatened fauna. However, the trail network would not create large or hostile barriers to the movement and dispersal of species and large areas of suitable forest habitat and resources for these species would continue to be available within the broader area. All hollow-bearing trees and large trees would be avoided by the project with no direct removal required to build the trails.

Key habitat for Leadbeater's Possum has been avoided by realignment of the trails. Trail 1 is located in closer proximity to dense montane thicket habitat or translocation recipient sites for the EPBC Act listed Leadbeater's Possum than the alternative alignment trails. Specific mitigation measures would be applied to minimise potential impacts on this critically endangered species, including supervision and guidance by a suitably qualified ecologist during construction to assist with micro-siting.

Mitigation measures to avoid and minimise significant impacts on threatened species include micro-siting prior to construction, consulting with land managers and arboriculture specialists if treatment of hazardous large or hollow-bearing trees is required, supporting ongoing pest control programs and implementing weed control programs.

Noise, vibration and disturbance generated from trail construction and operation are considered manageable for terrestrial and aquatic fauna through standard construction environmental controls and due to the dispersed and transitory nature of trail construction and use. On the basis that there are no significant impacts on MNES, Commonwealth offsets are not considered necessary for the project.