



EES chapter 4 – Project development and alternatives

Warburton Mountain Bike Destination

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4.0 Project development and alternatives

This chapter describes the development of the Warburton Mountain Bike Destination (the project) and provides a rationale for the current form of the project selected for assessment in this environment effects statement (EES). The information in this chapter is a summary of **Attachment II: Alternatives Assessment Report**.

4.1 Introduction

The project was initiated in 2010 and has undergone significant design development since feasibility studies commenced in 2013. The design development process included significant stakeholder consultation and sought to create a premium tourism product whilst avoiding significant environmental impacts. Figure 4-1 summarises the timeframes of the key design outputs and activities during project development.



Figure 4-1 Key design outputs and activities during project development

Within the setting of the scoping requirements, the focus of the alternatives assessment is to:

- Undertake a rigorous assessment of alternative trail alignments to identify the project design that is assessed within the EES
- Give consideration to ecological, heritage and socio-economic factors in the determination of the network design to avoid and minimise the potential for significant environmental impacts without undermining the project objectives.

This chapter summarises how alternatives were considered in the project development work that was undertaken prior to the preparation of the EES, identifies the benefits of inclusion of trails within the Yarra Ranges National Park and summarises the trail screening that was undertaken to determine the trail sections for further investigation.

4.2 Relevant scoping requirements

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

The scoping requirements set out that the EES should document and explain the alternative(s) assessment and design development. In relation to consideration of alternatives, the scoping requirements state the following:

The EES needs to document the proponent's process that led to the preferred alternative(s) and design presented in the EES. The EES should also document and explain the proponent's assessment of feasible alternatives and their effects, including an explanation of how and why specific alternatives were selected for detailed evaluation within the EES. The EES needs to document the likely environmental effects of feasible alternatives, particularly where these offer a potential to minimise and/or avoid significant environmental effects whilst meeting the objectives of the project. The assessment of feasible alternatives and their effects is required to include:

- Description of alternatives considered in the project design process, including alternative track alignments and locations of track heads and site access roads;
- Identification of methods and environmental criteria for selection of preferred alternatives;
- Assessment and comparison of the technical feasibility and environmental implications of alternative options considered;

- *The basis for selecting the proposed project layout and design, particularly where trails and trailheads are located within areas of particularly high conservation value such as within the Yarra Ranges National Park;*
- *Comparison of project benefits and impacts associated with the inclusion/exclusion of trails or trailheads within areas of particularly high conservation value; and*
- *Description of how information arising during the EES process was used to refine the preferred track alignments and other project alternatives.*

Where appropriate, the assessment of environmental effects of design and layout alternatives is to address the matters set out in the subsequent sections of this document. The depth of investigation of alternatives should be proportionate to their potential to minimise potentially significant adverse effects as well as meet project objectives.

4.3 Method

4.3.1 Project development pre-EES

An iterative design development process was undertaken to establish a network design for the purpose of project referrals. The designs were informed by a range of specialists who have investigated and advised on important biodiversity, heritage and socio-economic constraints. Community feedback on the design and endorsement from relevant agencies was obtained at critical design stages. These activities have resulted in the avoidance or minimisation of potential impacts on sensitive values. The design outputs and associated activities are described in Section 4.4.

4.3.2 Benefits of trails within the Yarra Ranges National Park

In order to better understand the benefits of trails within the Yarra Ranges National Park the following investigations were undertaken:

- Literature review to document the reported benefits of mountain bike projects
- Case studies of mountain bike trails within national parks and natural areas
- Demand modelling for the project with and without trails in the Yarra Ranges National Park to understand the differences in predicted project benefits.

The demand modelling was undertaken for the 10-year period of operations from 2022 to 2031. The cases examined were:

- Case 1 Base Case: Full Trail Network – full development of the trail network
- Case 2: Reduced Trail Network – with no trails in the Yarra Ranges National Park.
- Case 3: Reduced Trail Network – removal of Trail 1 in the Yarra Ranges National Park

The detailed methodology and results of the study are contained in **Attachment II: Alternatives Assessment Report**.

4.3.3 Trail screening to identify priority trail sections

An important step in the alternatives assessment process involved screening of the 66 trails within the full proposed network design to identify trail sections that warrant further examination with respect to alternatives. The trail screening exercise was a strategic analysis based on information from existing studies, to identify trail sections that passed through locations of high sensitivity and where significant impacts on those areas may be unavoidable.

The trail screening method focused on biodiversity, heritage and socio-economic values because these are considered to be the critical aspects for which significant impacts may occur. A framework was developed to rate each trail according to the priority for further examination of alternatives. The trails could be given a rating of low, moderate, high or very high. The framework is detailed in **Attachment II: Alternatives Assessment Report**.

Under the framework, any trail assigned a very high or high priority would be subject to further consideration of alternatives. The options for further examination of these trails included comparative analysis with other trails that could similarly meet the project objectives, or if no feasible alternative was able to be identified which met the project objectives for a trail section, this trail section would be included in the network design for impact assessment (including a focus on mitigating the risks associated with any trails given a high or very high priority rating) as part of the EES process.

Trails assigned moderate or low priority ratings would be subject to impact assessment (and potentially further mitigation) within the EES. The alternatives assessment process has been informed by a wide range of studies involving both desktop reviews and detailed site inspections. This provided an appropriate level of information to identify potential sensitivities that cannot be avoided, and therefore to identify priority trails for further examination of alternatives.

4.4 Project development pre-EES

The project has undergone significant design development since feasibility studies commenced in 2013. Table 4-1 describes the design development of the project that led to the production of a network design that was used for the purpose of project referrals.

Table 4-1 Project development

Design outputs and associated activities	Description	Key outcomes
Feasibility Study (2013)	<p>In 2013, World Trail was engaged to lead the delivery of a feasibility study for the development of mountain bike trails around the Warburton area. The feasibility study included a desktop flora and fauna report that identified environmental considerations in planning the proposed network of trails.</p>	<p>The feasibility study supported the development of a world class mountain bike destination in the hills surrounding Warburton and identified significant visitor economy stimulus opportunities. The feasibility study recommended the establishment of approximately 140 kilometres of trails in three zones surrounding Warburton township.</p>
Preliminary Master Plan (2016)	<p>Yarra Ranges Council established the Warburton Mountain Bike Destination master plan project. In recognition of the land tenure and complexity of the project a Project Reference Group (PRG) and formal project governance structure was established to oversee the design process. Membership of the PRG included representatives from Yarra Ranges Council, Department of Environment, Land, Water and Planning, Parks Victoria, Melbourne Water, Wurundjeri Council and Upper Yarra Community Enterprise.</p> <p>A concept design was presented as part of the Preliminary Master Plan. The concept design was based on the following principles:</p> <ul style="list-style-type: none"> ● Providing a world class mountain bike destination that delivers economic, social and health benefits to the community ● Desktop GIS assessment of all known environmental and heritage values to enable the siting of trails away from important areas ● Consultation with land managers, key stakeholders and community to understand sensitive areas to avoid and opportunities to use existing features 	<p>The Preliminary Master Plan identified opportunities for trails across Mount Little Joe, Mount Tugwell, Mount Bride and Mount Donna Buang. In particular it identified a descending trail from the Mount Donna Buang summit to Warburton township (Drop-a-K trail) as a key opportunity to develop an experience unlike anything available in Australia.</p> <p>The design for the Mount Donna Buang descending trail in the Preliminary Master Plan sought to avoid important biodiversity values including cool temperate rainforest and habitat for Leadbeater's Possum and the Mount Donna Buang Wingless Stonefly. The desktop design provided for a 36-kilometre-long trail from the summit of Mount Donna Buang to the township of Warburton.</p>
Ground truthing of trail alignments (2016)	<p>An extensive ground-truthing process was undertaken in 2016 to ensure that the trails could be built in accordance with the project objectives. Ground-truthing is a process that involves on-ground assessment of the proposed trail with teams of trail designers, ecologists, heritage consultants, land</p>	<p>The ground-truthing process resulted in changes to alignment, including for Drop-a-K.</p> <p>Ground-truthing for the Drop-a-K trail identified a greater extent of cool temperate rainforest than had been previously mapped. Additionally, known nest sites and high probability for Leadbeater's Possum, known</p>

Design outputs and associated activities	Description	Key outcomes
	<p>managers, council officers, Wurundjeri and species experts to confirm or validate data and to identify important values and plan for their protection.</p> <p>The ground-truthed corridor was 20 metres wide allowing for further refinement of the alignment at the time of construction to avoid impacts to important values, in consultation with appropriate specialists.</p>	<p>and potential habitat for the Mount Donna Buang Wingless Stonefly, along with issues involved in remaining clear of the Melbourne Water catchment boundary close to the summit made the Drop-a-K trail a technical challenge.</p> <p>Significant collaboration with relevant specialists and stakeholders was involved in finalising the alignments and developing risk mitigation strategies that provided protection to important values to minimise potential impacts.</p>
Draft Master Plan (2018)	<p>The Draft Master Plan included a network of trails in the Yarra State Forest, on Mount Little Joe and Mount Tugwell, and a network of trails on the north side of Warburton, including the Drop-a-K trail through Yarra Ranges National Park.</p>	<p>The Draft Master Plan was informed by the extensive ground-truthing that has been undertaken and collaboration with land managers, species experts and ecologists to design risk mitigation strategies for the Drop-a-K trail that provided appropriate protection for important values to minimise potential impacts.</p>
Community engagement and feedback (2018)	<p>Community consultation on the Draft Master Plan was undertaken between April and October 2018 and involved face-to-face meetings, online surveys, calls, emails and letters, mail outs and five public information sessions.</p>	<p>The following refinements were made to the trail alignments in response to community feedback:</p> <ul style="list-style-type: none"> ● Trails moved away from homes around central Warburton ● Old Warburton Cemetery avoided ● Trails through Old Warburton removed ● Old Warburton Road crossing modified ● More trails added to Mount Donna Buang ● Impact on Mount Donna Buang Wingless Stonefly and Leadbeater's Possum habitats minimised ● Use of old road cuttings and existing informal trails maximised ● Cool temperate rainforest protection increased.
Referred Network Design (2019)	<p>The referred network design formed the basis of project referrals and is under consideration in this assessment.</p> <p>World Trails were appointed to finalise the design of the trail networks. They carried out a design review which recommended changes that addressed a range of sensitivities in the project area including known biodiversity and heritage values. Following this review, ground-truthing of all new trails and existing informal trails was undertaken.</p>	<p>The following key changes were made between the Draft Master Plan and the referred network design:</p> <ul style="list-style-type: none"> ● Increase in size of the trail network from 110 kilometres to +160 kilometres ● Removal of trails in the vicinity of Merlino Avenue in response to community concern and proximity to local residences. ● Redesign of the trail network around the settlement of Old Warburton to reduce proximity to residences and moved the Old Warburton Road crossing point away from residences. ● Realignment of the Drop-a-K trail to: <ul style="list-style-type: none"> - Completely avoid the drinking water catchment at the summit of Mount Donna Buang (a section was later reintroduced as part of EES process) - Avoid Mount Donna Buang Wingless Stonefly habitat - Reduce intersection with cool temperate rainforest - Completely avoid an Australian National University Leadbeater's Possum monitoring site

Design outputs and associated activities	Description	Key outcomes
		<ul style="list-style-type: none"> - Use existing disturbed footprint (old road cuttings) as much as possible - Bring the trail as close as practicable to Mount Donna Buang Road to leverage the existing impact area - Decrease length from 36 kilometres to 28 kilometres. • Addition of two challenging trails and one beginner trail within the Yarra Ranges National Park. These trails were designed and ground-truthed on the basis that key values such as cool temperate rainforest, Mount Donna Buang Wingless Stonefly and Leadbeater's Possum were not within the identified trail corridors and that important values could be adequately protected. • Realignment of numerous sections of trail to avoid the need for waterway crossings. • Identification of existing informal trails and tracks that can be used for additional trails to minimise impact by using already disturbed areas. • Identification of opportunities for rehabilitation of existing informal trails not planned to be incorporated into the network.

4.5 Benefits of trails within Yarra Ranges National Park

To inform an understanding of how the Warburton Mountain Bike Destination could deliver benefits to the Yarra Ranges region and to Victoria as a whole, a literature review, case study documentation and economic analysis were undertaken.

The literature review and assembled case studies demonstrate many benefits of mountain bike projects including:

- Community and social benefits: Providing opportunities for families and friends to enjoy time together and enhancing quality of life
- Economic benefits: Increased tourism revenues, greater business investment and enhanced property values
- Educational benefits: Providing an outdoor classroom for physical activity, sport, nature, culture and history
- Environmental benefits: Understanding of our natural heritage and stewardship of the environment
- Health and fitness benefits: Improved health and physical well-being for both individuals and communities, reduced health care costs and enhanced productivity
- Health and cultural benefits: Recognition and respect for Aboriginal culture and historical values.

The potential economic benefits from the development and operation of the trail network was also considered by undertaking an economic analysis to compare the relative benefits of the Warburton Mountain Bike Destination with and without trails in the Yarra Ranges National Park. The analysis predicted that exclusion of trails from within the National Park would reduce total visitor numbers in 2031 from 221,454 for Case 1 to 140,014 for Case 2 and 153,769 for Case 3. Annual spend in 2031 within the Yarra Ranges municipality is predicted to be \$48M for the full trail network, \$28M for the trail network without the trails in the National Park and \$31M for the scenario with no Trail 1. Jobs generated during the project operations phase are predicted to reduce from 228 to 133 if the trails in the National Park are excluded and 148 in a no Trail 1 scenario. The detailed methodology and results of the study are contained in **Attachment II: Alternatives Assessment Report**.

Overall, the economic benefits of the project and the project's ability to meet the project objectives are significantly increased by inclusion of trails within the National Park. Moreover, the difference in the economic modelling for the removal of all trails within the National Park (Case 2) and the removal of Trail 1 (Case 3) indicates that the removal of the alternative trails (Trails 45, 46 and 47) does not have a significant economic impact. Therefore, a network including Trail 1 has significantly greater economic benefits than a trail network without Trail 1.

Overall, it is concluded that exclusion of trails from the Yarra Ranges National Park would not allow the Warburton Mountain Bike Destination to realise its full potential and compromise its ability to meet the project objectives. Accordingly, subject to full and detailed assessment as part of the EES process to determine that the potential biodiversity impacts can be effectively managed, Yarra Ranges Council believes trails within the Yarra Ranges National Park are warranted as part of the project because of the additional benefits they bring.

4.6 Trail screening to identify priority trail sections

As part of the alternatives assessment process, trail screening was undertaken to determine the trail sections for which further investigation of alternatives is warranted. Each of the 66 trails were given priority ratings by the biodiversity, heritage and socio-economic specialists.

The following key issues were driving considerations for the priority ratings:

- Biodiversity: records of significant species and communities and their habitat, including Leadbeater's Possum, Mount Donna Buang Wingless Stonefly and Cool Temperate Rainforest occurring in proximity to the trail alignments.
- Heritage: proximity to Heritage Overlay and Victorian Heritage Inventory sites and potential for conflicts between proposed trails and gold mining artefacts, in particular remnants of tramways and water races. In relation to Aboriginal heritage, proximity to areas of sensitivity and known artefacts were considered.
- Socio-economic: the intersection of proposed mountain bike trails with existing walking trails and private property (including the Warburton Golf Course, which is an operating business).

Trails receiving a very high or high rating for any discipline have been given further consideration with respect to alternatives and fully assessed within the relevant technical reports of the EES. Trails rated very high or high are described in the proceeding sections.

All trail sections were rated as moderate or low priority in relation to heritage and socio-economic aspects. Trails rated at moderate or low priority are addressed in the full impact assessment presented in the EES including identification of further avoidance and minimisation measures to be adopted where determined to be necessary by the assessments.

4.6.1 Very high

One trail was identified to be a very high priority, being Trail 1 (Drop-a-K), due to records of significant species and communities occurring between Mount Donna Buang and Ben Cairn, including Leadbeater's Possum, Mount Donna Buang Wingless Stonefly and Cool Temperate Rainforest. Accordingly, further investigations (including field inspections) were undertaken to identify an alternative to Trail 1.

4.6.2 High

As a consequence of Trail 1 being rated very high, Trails 45, 46 and 47 were identified as an alternative that could achieve comparable benefits to Trail 1 (see Figure 4-2 below). Whilst each of these trails were determined to have lower ratings for biodiversity than Trail 1, they were still rated as a high priority for the examination of alternatives.

The trail screening process also identified two other Trails (5 and 50) as being high priority for assessment of alternatives.

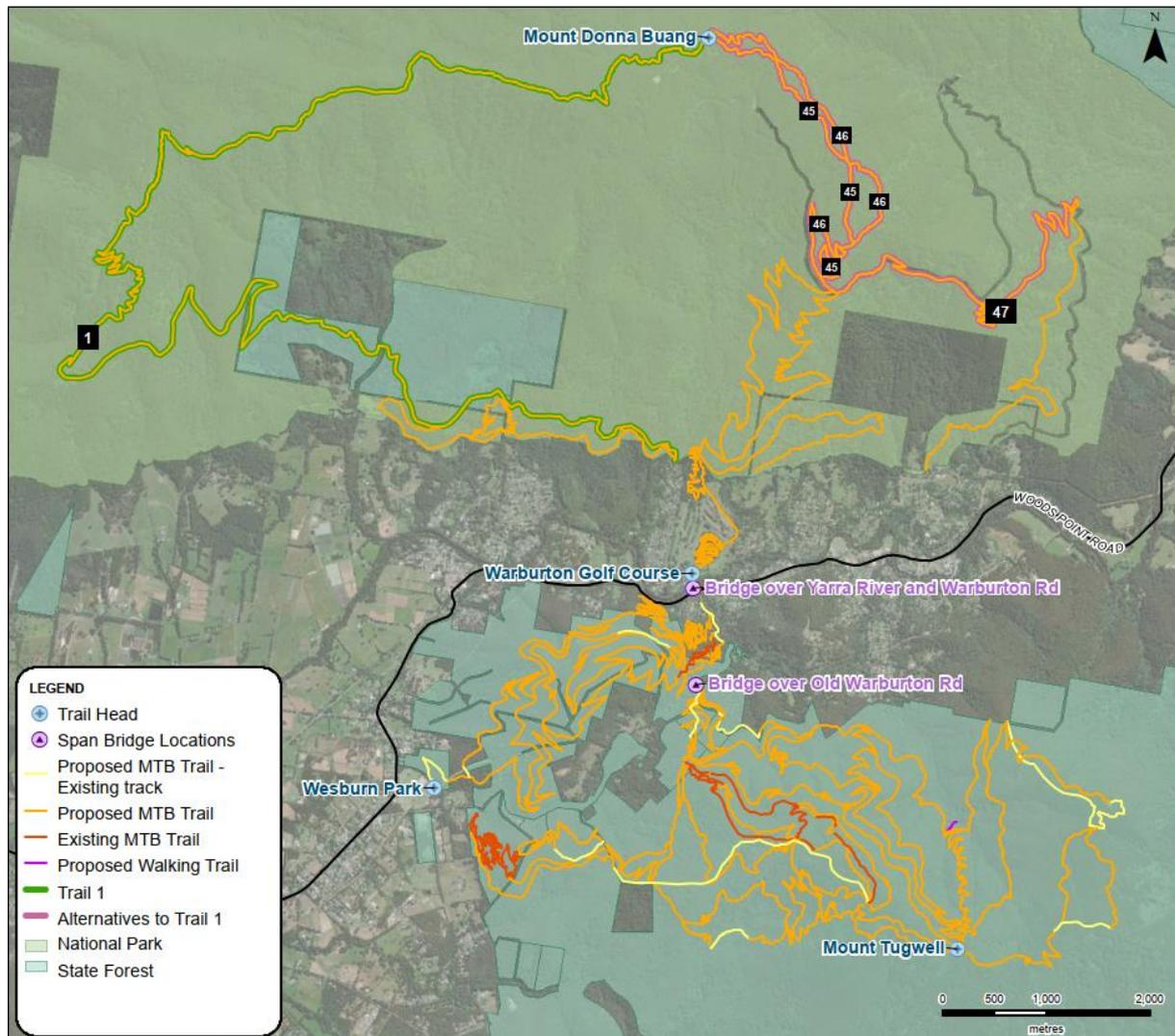


Figure 4-2 Trail 1 and Alternative to Trail 1

4.7 Further investigation of alternatives for priority trails

Both Trail 1 and the alternative (Trails 45, 46 and 47) have been fully assessed and compared within the EES to fully understand the relative merit of the options and to determine for each whether potential biodiversity impacts could be effectively managed. This assessment has been undertaken for all specialist disciplines and can be found in Chapters 8 – 14 of the EES.

Trail 5 was also identified as high priority in the assessment process. The key driver of this rating is the trail length within the Yarra Ranges National Park. No options have been identified outside the National Park to achieve the aims of this trail and it is not possible to reduce the length of this trail because this would in turn make it steeper (changing the trail rating from intermediate to difficult) and increase erosion risk. This trail has been assessed in **Technical Report A: Biodiversity and Habitats** and **Chapter 8: Biodiversity and habitats** to determine whether the potential biodiversity impacts associated with Trail 5 can be effectively managed.

Additionally, Trail 50 intersects a very small area of cool temperate mixed forest at the headwater of Calder Creek. Upstream and downstream alternatives were explored but these have denser stands of cool temperate mixed forest. Consequently, this trail has also been assessed in **Technical Report A: Biodiversity and Habitats** and **Chapter 8: Biodiversity and habitats** to determine whether the potential biodiversity impacts associated with Trail 50 can be effectively managed.

4.8 Summary of the comparative analysis of Trail 1 and Trails 45, 46 and 47

A comparison of Trail 1 with the alternative (Trails 45, 46 and 47) was undertaken as part of each of the technical assessments completed for the EES. The comparative analysis for each assessment was based on the residual impact of these options assuming effective implementation of the proposed mitigation measures.

Trail 1 and the alternative (Trails 45, 46 and 47) are both located within the Yarra Ranges National Park, within natural areas. These options both satisfy the project objective of providing an iconic mountain biking experience within a wider trail network that provides a wide range of trails of different types.

Surveys of visitors to Derby, Tasmania, indicate that spectacular scenery and natural values are key drivers for doing the Blue Tier and Bay of Fires mountain bike trails. For the Warburton Mountain Bike Destination, Trail 1 would be equivalent. Accordingly, because of its features including its length as a single trail with spectacular scenery, Trail 1 has potentially greater marketing potential than Trails 45, 46 and 47, although these trails also have unique characteristics.

The visitor numbers expected for a trail network containing Trail 1 are predicted to be significantly greater than for the alternative. Accordingly, the economic benefits reflected in the spending in the region and the number of jobs created are also envisaged to be greater.

The potential socio-economic and transport impacts related to the attraction of visitors were assessed to be similar. The residual impacts on traffic and parking and other recreational activities and community infrastructure would not be discernibly different, although there is a difference regarding the safety of the crossings of Donna Buang Road where Trail 1 was determined to be superior.

As both Trail 1 and the alternative are in natural environments remote from residential areas and other land uses, the land use and planning impacts were assessed to be minor and comparable.

In relation to Aboriginal heritage no discernible difference was identified between Trail 1 and the alternative. However, in relation to historic heritage, Trail 1 has a higher potential for impact due to the known presence of a number of registered heritage sites and other unregistered artefacts. Whilst these potential impacts can be mitigated, Trails 45, 46 and 47 are slightly preferred to Trail 1 from a historic heritage perspective.

In relation to surface water, groundwater and geotechnical hazards, the potential impacts of the options were assessed to be comparable. The assessment found that both options are located in forested catchments. The main difference is that the alternative (Trails 45, 46 and 47) traverse a lower number of waterways than Trail 1 (157 compared to 166). Whilst Trail 1 has more waterway crossings than the alternative, with the implementation of the proposed mitigation measures the difference in residual impacts between the options is considered to be very small. Additionally, Trail 1 is situated within the Coranderrk Creek catchment boundary for approximately 458 metres. It is anticipated that with mitigating factors including adequate provision of proper toilet facilities, buffer zones to the nearest tributary (200 metres) and education during construction and operation, the impact to drinking water supply would overall be low. From a groundwater and geotechnical perspective, both alignments are located mostly on the same geology with similar water table depths anticipated. The construction and operation of Trail 1 and the alternative would therefore have similar residual impacts.

The most significant differences between Trail 1 and Trails 45, 46 and 47 relate to biodiversity and habitats. The length of trail within the Yarra Ranges National Park is 2.327 kilometres more for Trail 1 in comparison to the alternative. A greater extent of native vegetation removal would be required for Trail 1 in comparison to the alternative. The difference is estimated to be 1.288 hectares. Additionally, Trail 1 intersects cool temperate rainforest and cool temperate mixed forest threatened ecological communities for a greater distance (approximately 6.442 kilometres for Trail 1 compared to 3.069 for the alternative). Trail 1 also comes closer to the Leadbeater's Possum translocation site between Donna Buang Summit and Ben Cairn. Noise impacts to Leadbeater's Possum translocation sites could occur during construction. The project is therefore committed to hand-building the section of the trail in proximity to Leadbeater's Possum translocation sites to minimise potential noise effects.

Further details are included in **Chapter 15: Comparative evaluation of Trail 1 and Trails 45 to 47.**

4.9 Rationale for decisions on other project components

The trail network configuration largely dictates the preferred locations for other supporting project components such as the trail heads and bridges. The rationale for the proposed locations of these components and other project decisions are presented below in Table 4-2.

Table 4-2 Rationale for project components

Project component	Rationale
Warburton Golf Course Trail Head	<p>The location of the Golf Course Trail Head was chosen because of:</p> <ul style="list-style-type: none"> • Its central position and proximity to the Warburton township providing easy access to the central shopping precinct and supporting economic outcomes • Accessibility to the northern and southern parts of the proposed mountain bike trail network and the Lilydale-Warburton Rail Trail • Accessibility from Warburton Highway • Existing open areas where facilities could be developed, avoiding the need to remove native vegetation (Technical Report A: Biodiversity and Habitats, Sections 6.3 and 9.12.2) • Existing infrastructure and services that can be redeveloped • Support from Parks Victoria and DELWP • Support from the Warburton Golf Course Committee (land is privately owned by the club).
Wesburn Park Trail Head	<p>The location of the Wesburn Park Trail Head was chosen because of:</p> <ul style="list-style-type: none"> • Accessibility to the southern parts of the proposed mountain bike trail network • Provides an opportunity to reduce traffic entering Warburton • Accessibility from Warburton Highway • Accessibility from the Lilydale-Warburton Rail Trail and planned Little-Yarra Trail • Existing wide-open areas where facilities including additional parking could be developed, avoiding the need to remove native vegetation (Technical Report A: Biodiversity and Habitats, Sections 6.3 and 9.12.2) • Supports diversification of use and utilisation of assets at Wesburn Park (in accordance with the Wesburn Park draft Master Plan) • Support from Parks Victoria, Melbourne Water and DELWP.
Mount Tugwell Trail Head	<p>The location of the Mount Tugwell Trail Head was chosen because of:</p> <ul style="list-style-type: none"> • Accessibility to the southern parts of the proposed mountain bike trail network • Identified by DELWP District as most appropriate location in the area • Accessibility from Mount Bride Road • Existing open areas where facilities could be developed, avoiding the need to remove significant amounts of native vegetation (Technical Report A: Biodiversity and Habitats, Sections 6.3 and 9.12.2) • Support from Parks Victoria and DELWP.
Mount Donna Buang Trail Head	<p>The location of the Mount Donna Buang Trail Head was chosen because of:</p> <ul style="list-style-type: none"> • Maximising the use of existing assets (toilets, car parks, facilities) already established at the summit • Its central position • Accessibility to the northern parts of the proposed mountain bike trail network • Accessibility from Mount Donna Buang Road • Existing open areas where facilities could be developed, avoiding the need to remove native vegetation (Technical Report A: Biodiversity and Habitats, Sections 6.3 and 9.12.2) • Support from Parks Victoria and DELWP.
Bridge over the Yarra River	<p>The location of the bridge over the Yarra River was chosen because:</p> <ul style="list-style-type: none"> • It is able to provide direct access between the northern and southern parts of the proposed mountain bike trail network and the Lilydale-Warburton Rail Trail near the Warburton Golf Course trail head • It allows mountain bikers, cyclists and pedestrians the ability to cross over the Yarra River and Warburton Highway and Dammans Road safely

Project component	Rationale
	<ul style="list-style-type: none"> The topography allows the bridge pylons to be constructed on the crest of the existing river channel avoiding works in the river itself and effects on river flows Construction of the bridge would not require the removal of significant quantities of native vegetation (Technical Report A: Biodiversity and Habitats, Sections 6.3 and 9.12.2) The bridge can be constructed on land managed by Yarra Ranges Council Existing clearings are available on each side of the bridge that could be used as laydown areas during construction.
Bridge over the Old Warburton Highway	<p>The location of the bridge over the Old Warburton Highway was chosen because:</p> <ul style="list-style-type: none"> A key driver in the location was to avoid impacts to Old Warburton residents. Previously an at-grade crossing was proposed adjacent to residential properties It is a logical connection point between two sections of the southern part of the proposed mountain bike trail network It allows mountain bikers to cross over the Old Warburton Highway Road safely Construction of the bridge would not require removal of significant quantities of native vegetation Existing clearings are available on each side of the bridge that could be used as laydown areas during construction.
Shuttle bus	<p>Shuttle buses would move riders and their bikes between the trail heads at Mount Donna Buang and Mount Tugwell via the Golf Course Trail Head. The decision to use shuttle buses reduces the amount of vehicle traffic on roads in the vicinity of the project, minimising congestion and disruption of other traffic using these roads.</p>
Waterway crossings	<p>The elevated crossings would enable mountain bike users to avoid and minimise impacts to waterways and associated biodiversity values. The construction methods adopted in environmentally sensitive areas would avoid excessive excavation, for example by using hydraulically-driven footing installation. Span lengths of up to five metres would be used to allow the bridges to cross waterways without the need for footings within the waterways.</p>
Site access roads	<p>The use of existing roads to access the Warburton Mountain Bike Destination avoids the removal of native vegetation for the construction of new roads.</p>

4.10 Conclusion

The project has been under development over several years and has been informed by considerable community and government agency consultation over that period. The avoidance and minimisation of impacts have therefore received significant attention. This chapter summarises the alternatives assessment process which has involved the following steps:

- Pre-EES design development – avoidance or minimisation of potential impacts on sensitive values through an iterative design development process to establish a network design for the purposes of project referrals
- Identification of the benefits of inclusion of trails within the Yarra Ranges National Park
- Screening of trails to identify any ‘priority trail sections’ that require further examination of potential alternative alignments.

The key findings of these investigations are summarised below:

- The design development process led to the production of a network design that was used for the purposes of project referrals. The referred network design was prepared in response to community feedback and addressed a range of sensitivities in the project area including known biodiversity and heritage values, whilst enabling the project to meet its overarching objectives. The process was iterative with many changes being made.
- Economic analysis has been undertaken to compare the relative benefits of the Warburton Mountain Bike Destination with trails in the Yarra Ranges National Park (Case 1), without trails in the Yarra Ranges National Park (Case 2) and without Trail 1 in the Yarra Ranges National Park

(Case 3). The analysis predicted that exclusion of trails from within the National Park would reduce total visitor numbers in 2031 from 221,454 to 140,014, and the exclusion of Trail 1 would reduce visitor numbers to 153,769. Annual spend in 2031 within the Yarra Ranges municipality is predicted to be \$48.6 million for the full trail network, \$28.4 million for the trail network without trails in the National Park and \$31.52 million for the trail network without Trail 1. Jobs generated during the project operations phase are predicted to reduce from 228 to 133 if the trails in the National Park are excluded, and to 148 if Trail 1 is excluded. The exclusion of trails from the Yarra Ranges National Park would not allow the Warburton Mountain Bike Destination to realise its full potential and compromise its ability to meet the project objectives.

- Trail 1 was assessed to be a very high priority due to records of significant species and communities, including Leadbeater's Possum, Mount Donna Buang Wingless Stonefly and Cool Temperate Rainforest. An alternative to Trail 1 (comprising Trails 45, 46 and 47) was identified with these individual trails each rated high priority. Accordingly, Trail 1 and the alternative (Trails 45, 46 and 47) have been assessed for all specialist disciplines. The findings are provided in **Chapter 15: Comparative evaluation of Trail 1 and Trails 45 to 47**.
- Trail 5 and Trail 50 were also assessed to be of high priority and consequently these trails have also been assessed in **Technical Report A: Biodiversity and Habitats** and **Chapter 8: Biodiversity and habitats** to determine whether the potential biodiversity impacts associated with Trail 5 and Trail 50 can be effectively managed. No viable alternatives were identified for these trails and therefore they were recommended to be taken forward for full assessment in the EES to determine whether the potential biodiversity impacts could be effectively managed.