

# EES chapter 15 - Comparative Evaluation of Trail 1 and Trails 45 to 47

Warburton Mountain Bike Destination

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## 15.0 Comparative Evaluation of Trail 1 and Trails 45 to 47

Arising from the trail screening process set out in **EES Attachment II – Alternatives Assessment Report**, a full assessment has been undertaken of two alternatives; Trail 1 and Trails 45 to 47 to inform a decision on which alternative would be included in the trail network. The base case for the project assessed in the preceding chapters includes Trail 1, with a comparative assessment against Trails 45 to 47 also presented in each technical chapter. This chapter summarises the comparative assessment of Trail 1 and Trails 45 to 47 and includes an integrated discussion of the advantages and disadvantages of these alternatives. The information in this chapter is drawn from **Technical Reports A to F**.

### 15.1 Introduction

During the project development process, consideration was given to alternatives for key trails with the potential for significant environmental impact. Through a screening process that focused on ecological, heritage and socio-economic factors, the need to investigate alternative trail alignments was identified in order to ensure a network design that minimised the potential for significant environmental impact. A framework was developed to rate each trail according to the priority for further examination of alternatives. The trails were given a rating of low, moderate, high or very high. **Chapter 4: Project Development and Alternatives** and **Attachment II: Alternatives Assessment Report** further describes the framework and trail screening process.

Under the framework, any trail assigned as very high or high priority would be subject to further consideration of alternatives. 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) as shown in Figure 1 have been assessed by all specialist disciplines.

Both Trail 1 and the combination of Trails 45, 46 and 47 are capable of delivering a project that meets the project objectives. Trail 1 is approximately 22 kilometres in length and traverses the Yarra Ranges National Park from the summit of Mount Donna Buang travelling in a westerly direction through forested land alongside Road 2 before meandering generally south east through forested land towards the Warburton township, also intersecting Woiwurrung State Forest. Trails 45 and 46 are within the Yarra Ranges National Park and commence at the summit of Mount Donna Buang, following a south easterly direction through forested land towards the Warburton township before tying into Trails 5 and 6. Trail 47, also within the Yarra Ranges National Park commences at Mount Donna Buang Road and travels east to tie into Trail 8. The trails are, respectively, four kilometres (Trail 45), 5.5 kilometres (Trail 46) and 5.6 kilometres (Trail 47), in length. Trail 1 and Trail 46 are wilderness style trails of intermediate difficulty. Trail 45 is a wilderness style trail rated difficult and Trail 47 is an adventure style trail rated easy.

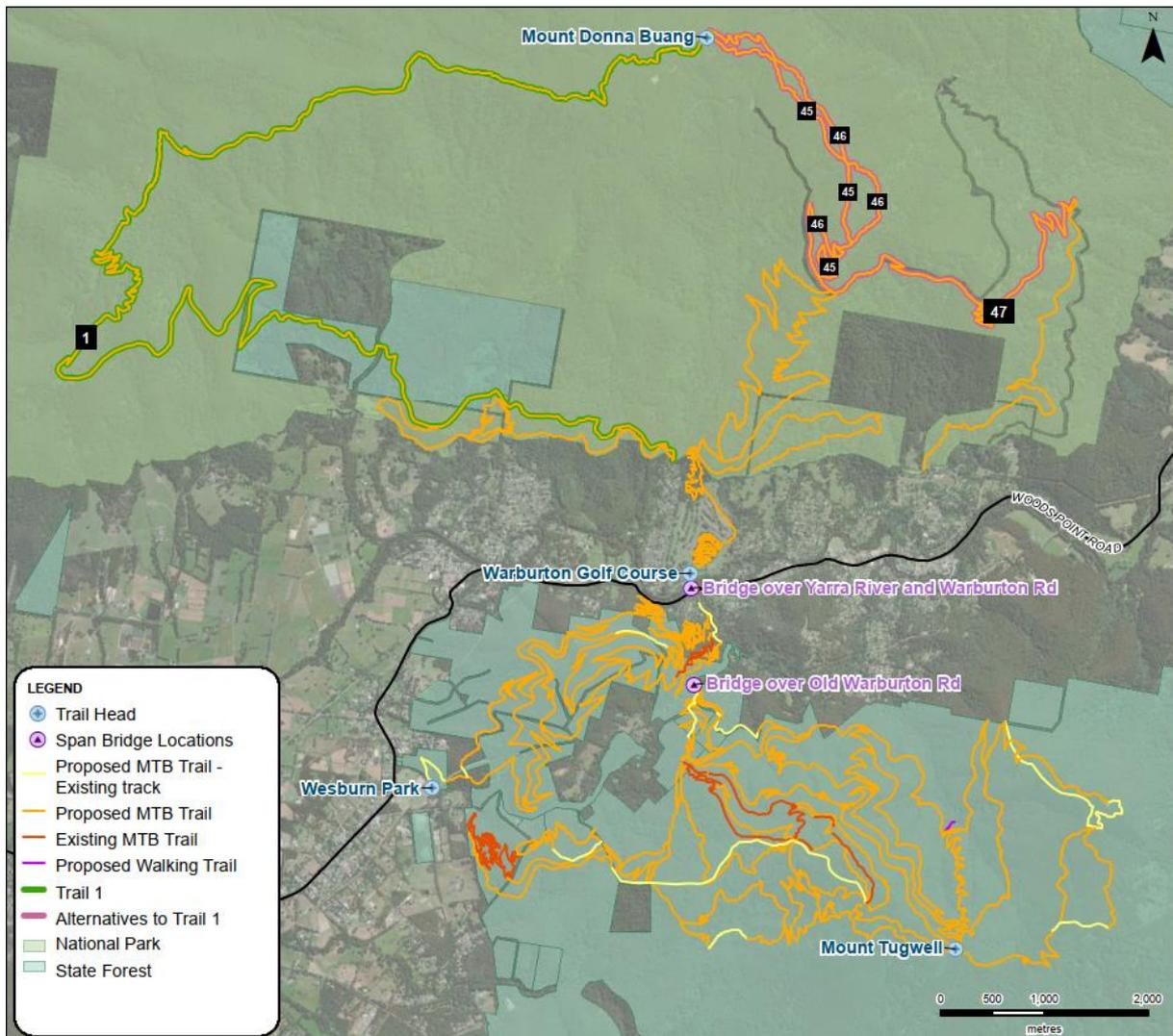


Figure 1: Trail 1 and Trails 45, 46 and 47

## 15.2 Assessment

The comparative assessment includes the consideration of the relative benefits and the relative impacts of Trail 1 and the Trails 45 to 47. This section contains a summary of the comparative assessments undertaken by each of the technical specialists. An integrated synthesis of the results is provided in Section 15.3

### 15.2.1 Economic benefits

In relation to economic benefits, the tourism potential of the mountain bike network depends on its attractiveness to visitors. The attractiveness to visitors will influence visitor numbers, spend in the region and the numbers of jobs generated.

TRC in conjunction with Instinct and Reason has predicted that visitor numbers, spend in the region and jobs for a range of scenarios including the base case which includes Trail 1 and the base case without Trail 1. Detailed economic analysis, including supporting evidence is provided in the Developing Warburton as a World Class Mountain Bike Destination, and Economic Feasibility Study as part of **Attachment II: Alternatives Assessment Report**.

For the purposes of the comparative analysis, the network with Trails 45 to 47 was assumed to be equivalent to the network without Trail 1. This is considered to be a reasonable assumption based on the following:

- Trail 1 is a unique experience in the network, offering a long-distance wilderness trail that traverses large sections of rainforest, visits Ben Cairn, offers unparalleled views across the Yarra Valley and crosses several significant waterways. Trails 45 to 47, although still in a National Park setting, do not have the same high level of natural attractions that provide an important motivator for visitation.

- Trail 1 has been designed to provide a wide market appeal that will help support increased diversity in mountain bike riders and appeal to the broader tourism market. The alignment was specifically developed to enable beginner riders, while remaining challenging for intermediate to advanced riders. Trails 45 and 46 are steeper and more challenging due to the topography and constraints, leading to a narrower market appeal.
- Trail 1 is considerably longer than Trails 45 to 47. The style and nature of Trail 1 will lead to an extended rider journey, with many riders likely to set aside a full day to undertake the ride. This then generates additional overnight stays, further supporting the regional economy.

**Table 1 Comparative economic assessment of Trail 1 and Trails 45, 46 and 47**

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
<b>Economic benefits</b>			
Visitor numbers	The trail network with Trail 1 included is predicted to attract 221,454 visitors annually.	With removal of Trail 1 from the trail network, the project is predicted to attract 153,769 visitors.	Visitor numbers are predicted to be significantly less for the project without Trail 1.
Spend in the region	The trail network with Trail 1 included generates spend in the region of an estimated \$46.6M annually.	With removal of Trail 1 from the trail network, the project is predicted to generate spend in the region of an estimated \$31.5M annually.	Spend in the region is predicted to be significantly less for the project without Trail 1.
Jobs created	The trail network with Trail 1 included is predicted to create around 229 jobs.	With removal of Trail 1 from the trail network, the project is predicted to create around 148 jobs.	The creation of jobs is predicted to be significantly lower for the project without Trail 1.

### 15.2.2 Biodiversity and habitats

The length of trail through the Yarra Ranges National Park is around 2.3 kilometres more for Trail 1 than for Trails 45, 46 and 47. Trail 1 also requires removal of more native vegetation, intersects the key vegetation communities of Cool Temperate Rainforest and Cool Temperate Mixed Forest for a greater distance than for the alternative and would come closer to Leadbeater's Possum translocation sites between Donna Buang Summit and Ben Cairn. The comparative impacts for Trail 1 and the alternative (Trails 45, 46 and 47) are presented in Table 2. The supporting impact assessment is provided in **Technical Report A: Biodiversity and habitats**.

Table 2 Comparative biodiversity and habitat assessment of Trail 1 and Trails 45, 46 and 47

Impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
Trail length within National Park	18.215 km (the remaining 4.325 km of this trail is in State Forest or private land)	15.188 km (0.493 km is in the RDZ along Donna Buang Road with the National Park)	There is 2.327 km less trail in the National Park for the alternative..
Vegetation condition	Total vegetation removal is 4.855 ha as per the condition class break down below:  0.164 ha of vegetation removal with a VQA score of <=0.6.  2.663 ha of vegetation removal with a VQA score of >0.6 and <=0.85.  2.027 ha of vegetation removal with a VQA score of >0.85.	Total vegetation removal is 3.562 ha as per the condition class break down below:  Trail 45 = 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	There is less requirement for native vegetation removal for the alternative.
Threatened ecological communities	1.870 km intersects pure Cool Temperate Rainforest  4.572 km intersected Cool Temperate Mixed Forest	0.616 km intersects pure Cool Temperate Rainforest  2.435 km intersected Cool Temperate Mixed Forest	The alternative alignment has less than half the impact of Trail 1 on Cool Temperate Rainforest  The alternative alignment has approximately half the impact of Trail 1 on Cool Temperate Mixed Forest
Key threatened species	Dense montane thicket 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 species below Ben Cairn would be required).  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.  Tree Geebung occurs at montane elevations between Donna Buang Summit and Ben Cairn  Records of Southern Greater Glider occur in proximity to Trail 1.	Dense montane thicket Leadbeater's Possum habitat and translocation sites are avoided by the alternative trails, scattered areas of open thicket and associated thicket species occur near sections of Trails 45 and 46 (very minor pruning of thicket species may be required for the alternatives).  Mount Donna Buang Wingless Stonefly was recently confirmed in headwaters of tributaries that are issued from the ridges and slopes between Donna Buang summit and Mount Victoria (Ythan Creek and Cement Creek).  Tree Geebung occurs at montane elevations between Donna Buang Summit and Mount Victoria.  Records of Southern Greater Glider occur in proximity to the alternative trail alignments.	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 Leadbeater's Possum translocation sites between Donna Buang Summit and Ben Cairn.  Construction phase noise has the potential to disturb Leadbeater's Possums during daytime denning in nest boxes and natural tree hollows. Where construction is occurring in proximity to Leadbeater's Possum translocation sites, it is proposed that trail would be hand built so that the construction noise profile would be lower. Trail building would occur during daylight hours to avoid disturbance to nocturnal activities.

### 15.2.3 Surface water, groundwater and geotechnical hazards

For both construction and operation, Trail 1 and the alternative would have similar residual impacts. The implementation of proposed mitigation measures (which include installation of bridges or boardwalks over identified waterways and rock armour for crossings over headwater channels and gullies not identified as waterways) are expected to minimise impacts. 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 m) and education during construction and operation, the impact to drinking water supply would be low. The impacts for Trail 1 and the alternative (Trails 45, 46 and 47) are presented in Table 3. The supporting impact assessment is provided in **Technical Report B: Surface water, groundwater and geotechnical hazards**.

Table 3 Comparative surface water, groundwater and geotechnical hazards assessment of Trail 1 and Trails 45, 46 and 47

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion																				
<b>Surface Water</b>																							
Trail construction results in increased turbidity and sediment in waterways	Total number of crossings: 166  Number of crossings with 'high' erosion risk: 121	Total number of crossings: 157  Number of crossings with 'high' erosion risk: 118	There are three more crossings for the trail network including Trail 1 that are classified as having a higher erosion risk.  The residual impacts for Trail 1 and the alternative are considered to be the same when mitigation measures are implemented.																				
Changes to surface water hydrology during trail network construction: <ul style="list-style-type: none"> <li>The removal of vegetation in the construction corridor may lead to increased runoff</li> <li>Compaction of the trail will increase runoff</li> <li>Flow may be directed down the mountain bike trail changing the flow regime.</li> </ul>	Approximate length of new trails: 164.5 km  Total number of crossings: 166	Approximate length of new trails: 157.5 km  Total number of crossings: 157	The residual impact for Trail 1 and the alternative is considered to be the same when mitigation measures are implemented.																				
Trail being constructed crosses a waterway without a bridge or other appropriate infrastructure, resulting in sedimentation.	<table border="1"> <thead> <tr> <th>Measure</th> <th># Crossings</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>54</td> </tr> <tr> <td>Rock armour</td> <td>61</td> </tr> <tr> <td>Bridge</td> <td>51</td> </tr> <tr> <td>Total</td> <td>166</td> </tr> </tbody> </table> Mean geomorphic risk: 3.69	Measure	# Crossings	None	54	Rock armour	61	Bridge	51	Total	166	<table border="1"> <thead> <tr> <th>Measure</th> <th># Crossings</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>54</td> </tr> <tr> <td>Rock armour</td> <td>60</td> </tr> <tr> <td>Bridge</td> <td>43</td> </tr> <tr> <td>Total</td> <td>157</td> </tr> </tbody> </table> Mean geomorphic risk: 3.71	Measure	# Crossings	None	54	Rock armour	60	Bridge	43	Total	157	The residual impact for Trail 1 and the alternative is considered to be the same. An increased number of crossings would be located on National Park land for Trail 1.
Measure	# Crossings																						
None	54																						
Rock armour	61																						
Bridge	51																						
Total	166																						
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None	54																						
Rock armour	60																						
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Total	157																						

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
	Number of crossings with 'high' erosion risk: 121 Number in National Parks: 32 Number in state forest: 108	Number of crossings with 'high' erosion risk: 118 Number in National Parks: 27 Number in state forest: 108	
Direct impact to waterways	Total number of crossings: 166	Total number of crossings: 157	The residual impact for Trail 1 and the alternative is considered to be the same when mitigation measures are implemented.
Reduced drinking water quality	Approximately 458 metres of Trail 1 is proposed within the Coranderrk Creek drinking water catchment.  With the adoption of the proposed mitigation measures, the risks to drinking water quality from construction and operation of Trail 1 within the Coranderrk Creek drinking water catchment were assessed to be low as per Section 11.12 and 12.8 of <b>Technical Report B: Surface Water, Groundwater and Geotechnical Hazards.</b>	None of Trails 45, 46 and 47 are proposed within the Coranderrk Creek drinking water catchment, although they are proposed within the Cement Creek water protection catchment.	Whilst the risks to drinking water quality from construction and operation of Trail 1 within the Coranderrk Creek drinking water catchment are assessed to be low, Trails 45, 46 and 47 totally avoid this catchment.
Spillage of hazardous construction material during construction resulting in degradation of downstream surface water quality	Total number of crossings: 166	Total number of crossings: 157	The residual impact for Trail 1 and the alternative is considered to be the same when mitigation measures are implemented.
Toilets and amenities at trail heads that are not sewered – septic system results in nutrient loads to surface water and waterways	Toilet facilities provided at trail heads	Toilet facilities provided at trail heads	Trail 1, Trail 45 and Trail 46 all begin at the Mount Donna Buang trail head and would have the same toilet and amenities.
Disturbance of contaminated ground mobilises constituents and results in the degradation of surface water.	Approximate length of new track: 164.5 km  Total number of crossings: 166  Number of crossings with 'high' erosion risk: 121	Approximate length of new track: 157.5 km  Total number of crossings: 157  Number of crossings with 'high' erosion risk: 118	The residual impact for Trail 1 and the alternative is considered to be the same when mitigation measures are implemented.
Yarra River Bridge impacts hydrological regime	Bridge crossing of the Yarra River	Bridge crossing of the Yarra River	The impact from the Yarra River Bridge crossing would be the

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion																				
			same for Trail 1 and the alternative.																				
Trail construction may cause micro-climatic changes affecting surface water, temperature, evaporation rates and soil water content.	Approximate length of new track: 164.5 km Total number of crossings: 166	Approximate length of new track: 157.5 km Total number of crossings: 157	The residual impact for Trail 1 and the alternative is considered to be the same when mitigation measures are implemented.																				
Trail construction encourages the funnelling and greater concentration of deer movements into waterways	Total number of crossings: 166 Number in National Parks: 32 Number in state forest: 108	Total number of crossings: 157 Number in National Parks: 27 Number in state forest: 108	The residual impact for Trail 1 and the alternative is considered to be the same when mitigation measures are implemented.																				
Trail construction and operation cause the spread of weeds and soil pathogens.	For Trail 1, the spread of weeds and soil pathogens could be effectively managed through the implementation of proven mitigation measures during construction	For the alternative, the spread of weeds and soil pathogens could also be effectively managed through the implementation of proven mitigation measures during construction	It is expected that the risk of spread will be equivalent for Trail 1 and the alternative.																				
Increased sedimentation of waterways during operation	<table border="1"> <thead> <tr> <th>Measure</th> <th># Crossings</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>54</td> </tr> <tr> <td>Rock armour</td> <td>61</td> </tr> <tr> <td>Bridge</td> <td>51</td> </tr> <tr> <td>Total</td> <td>166</td> </tr> </tbody> </table> <p>Mean geomorphic risk: 3.69 Number of crossings with 'high' erosion risk: 121</p>	Measure	# Crossings	None	54	Rock armour	61	Bridge	51	Total	166	<table border="1"> <thead> <tr> <th>Measure</th> <th># Crossings</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>54</td> </tr> <tr> <td>Rock armour</td> <td>60</td> </tr> <tr> <td>Bridge</td> <td>43</td> </tr> <tr> <td>Total</td> <td>157</td> </tr> </tbody> </table> <p>Mean geomorphic risk: 3.71 Number of crossings with 'high' erosion risk: 118</p>	Measure	# Crossings	None	54	Rock armour	60	Bridge	43	Total	157	<p>The residual risk of increased sedimentation of waterways once the mountain bike trail is operational is similar for Trail 1 and the alternative.</p> <p>Eight of the ten crossings along Trail 1 would have bridges.</p>
Measure	# Crossings																						
None	54																						
Rock armour	61																						
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Total	166																						
Measure	# Crossings																						
None	54																						
Rock armour	60																						
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Total	157																						
Trail crosses a channel that has become a 'waterway' due to heavy rainfall or other change in hydrology, e.g. a temporary spring forms. Riders travelling through these channels may cause erosion and sedimentation in downstream surface water.	Based on spatial analysis there are ten channel crossings of this type. Based on ground-truthing it was determined that eight would have bridges, one would have rock armour and one would not require mitigation measures.	There is one channel crossing of this type. Based on ground-truthing it was determined not to require mitigation measures.	<p>There are two channel crossings on Trail 1 that are not proposed to be elevated compared to one crossing on the alternative.</p> <p>The residual impact for Trail 1 and the alternative are considered to be the same when mitigation measures are implemented.</p>																				
Changes to surface water hydrology due to trail use	<table border="1"> <thead> <tr> <th>Measure</th> <th># Crossings</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>54</td> </tr> </tbody> </table>	Measure	# Crossings	None	54	<table border="1"> <thead> <tr> <th>Measure</th> <th># Crossings</th> </tr> </thead> <tbody> <tr> <td>None</td> <td>54</td> </tr> </tbody> </table>	Measure	# Crossings	None	54	There is little difference in the number of crossings that are not elevated. Therefore,												
Measure	# Crossings																						
None	54																						
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None	54																						

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion														
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Rock armour	61																
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None	54																
Rock armour	60																
Bridge	43																
Total	157																
Riders use bush areas around trails (particularly in remote areas, and far from trail head facilities) as toilets resulting in pathogens contaminating surface waters.	Approximate length of new track: 164.5 km Total number of crossings: 166	Approximate length of new track: 157.5 km Total number of crossings: 157	The residual impact for Trail 1 and the alternative are considered to be the same when mitigation measures are implemented. Trail 1, Trail 45 and Trail 46 start at the Mount Donna Buang trail head where toilet facilities are available.														
Bike washing at trail heads with wash water with sediment reaching waterways.	Bike washing facilities provided at trail heads	Bike washing facilities provided at trail heads	The trail head infrastructure would be the same for Trail 1 and for the alternative.														
Surface water management at Warburton Golf Course Trail Head.	Trail 1 terminates near the Warburton Golf Course Trail Head.	Trails 45, 46 and 47 also terminate near the Warburton Golf Course Trail Head.	Users of both Trail 1 and the alternative would access the trail head facilities at the Warburton Golf Course.  A stormwater treatment system that meets Melbourne Water standards would be adopted. Accordingly, impacts on surface water are likely to be negligible and the same for Trail 1 and the alternative.														
Increase in water pollution from littering and illegal rubbish dumping.	Total number of crossings: 166	Total number of crossings: 157	Whilst littering and illegal rubbish dumping would be addressed by the provision of appropriate waste management infrastructure, it is most likely to occur at the trail heads rather than along trails. Accordingly, the residual impact for Trail 1 and the alternative are considered to be the same.														

### 15.2.4 Cultural heritage

For Aboriginal heritage, there is no discernible difference between Trail 1 and Trails 45, 46 and 47. In relation to historic heritage, whilst neither Trail 1 or the alternative are expected to have a significant impact on historic heritage values, the alternative to Trail 1 has less potential for impact. The comparative impacts for Trail 1 and the alternative (Trails 45, 46 and 47) are presented in Table 4. The supporting impact assessment is provided in **Technical Report C: Cultural heritage**.

**Table 4 Comparative cultural heritage assessment of Trail 1 and Trails 45, 46 and 47**

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
<b>Cultural heritage</b>			
Aboriginal heritage	The location of Trail 1 is a low sensitivity area with respect to Aboriginal cultural heritage and without any recorded Aboriginal places. The results of auger testing in the area indicated homogeneous soil profiles. The trail is on the edge of a steep ridge that is difficult to access, would have contained little resource and would have poor place preservation due to natural impacts.	The location of Trails 45, 46 and 47 is also a low sensitivity area with respect to Aboriginal cultural heritage and without any recorded Aboriginal places. Similar to the Trail 1 area, the results of the auger testing indicated homogeneous soil profiles. These trails are also on the edge of a steep ridge that is difficult to access, would have contained little resource and would have poor place preservation due to natural impacts.	Trail 1 is significantly longer than Trails 45, 46 and 47 and therefore has greater potential to cause harm to unknown Aboriginal places than Trails 45, 46 and 47. However, given that all four of the trails are deemed unlikely to have Aboriginal places present, from an Aboriginal heritage perspective, there is no discernible difference between the alternatives.
Historic heritage	The location of Trail 1 is considered to be a high sensitivity area because it: <ul style="list-style-type: none"> <li>• Intersects the HO 140 area</li> <li>• Intersects two areas of archaeological sensitivity associated with hut sites</li> <li>• Intersects area of archaeological sensitivity associated with sawmill</li> <li>• Intersects water race and three tramways</li> <li>• Is in proximity to hut sites.</li> </ul>	In contrast to the location of Trail 1, the location of Trails 45, 46 and 47 is considered to be a moderate sensitivity area. Whilst trails 45 and 46 intersect the HO 140 area, Trail 47 does not intersect any known historic heritage places.	From an historic heritage perspective, whilst neither alternative would be expected to have a significant impact on historic heritage values, Trails 45, 46 and 47 have less potential for impact than Trail 1.

### 15.2.5 Land use and planning

The potential impacts in relation to land use and planning do not substantially differ between Trail 1 and Trails 45 to 47. Both alternatives are equally preferred. The findings of the comparative assessment are presented in Table 5. The supporting impact assessment is provided in **Technical Report D: Land use and planning**.

**Table 5 Comparative land use planning assessment of Trail 1 and Trails 45, 46 and 47**

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
<b>Land use and planning</b>			
Temporary change in land use as a result of construction.	Trail 1 is longer than the alternative, meaning that the minor residual impacts from temporary land occupancy would extend to a larger area of land. The land is, however, forested land within the PCRZ and RDZ1 and is not accessed on a regular basis.	The alternative is shorter than Trail 1, resulting in less land affected by temporary occupancy. The land is within the PCRZ and RDZ1 and is not accessed on a regular basis.	The residual impact would not be substantially different between Trail 1 and the alternative. The difference relates to the length or extent of land temporarily occupied for construction; however, the difference in residual impact is minor as the area is not regularly accessed.
Potential amenity impacts during construction including visual impacts from construction equipment, noise impacts from construction works and vehicle movement, and reduced air quality from dust during construction.	Trail 1 is longer than the alternative. Therefore, there would be minor residual amenity impacts during temporary land occupancy for construction, over a larger area of land. The land is, however, forested land within the PCRZ and RDZ1 and there are no sensitive receptors.	The alternative is shorter than Trail 1, resulting in less land being subject to minor residual amenity impacts during temporary occupancy for construction. The land is within the PCRZ and RDZ1 and there are no sensitive receptors.	The residual impact would not be substantially different between Trail 1 and the alternative. The difference relates to the extent of land affected by minor residual amenity impacts during construction. This difference is insignificant given the absence of sensitive receptors in the location of the alternatives.
Permanent land use impacts as a result of the project	Trail 1 is longer than the alternative and therefore a larger amount of land currently conserved for natural assets will be impacted by a change in the use of land, introducing mountain bike riders to the area. Part of land nearby or alongside Mount Donna Buang Road would also be impacted by the change in land use and the associated impacts.	The alternative is shorter than Trail 1, resulting in a smaller area of land undergoing a change in land use. Part of land nearby or alongside Mount Donna Buang Road would also be impacted by the change in land use and the associated impacts.	The existing land use conditions of Trail 1 and the alternative are similar as the current use is as forested land as part of the Yarra Ranges National Park as well as Mount Donna Buang Road. From a land use perspective, neither Trail 1 or the alternative would be more substantially impacted, other than that Trail 1 is longer and therefore more land is affected.
Use of land for the project resulting in amenity impacts including noise, traffic and air quality impacts.	Trail 1 is longer than the alternative, meaning that the minor residual amenity impacts from permanent land use change, would affect a larger area of land. The land is, however, forested land within the PCRZ and RDZ1 and there are no sensitive receptors.	The alternative is shorter than Trail 1, resulting in less land affected by minor residual amenity impacts from permanent land use change. The land is within the PCRZ and RDZ1 and there are no sensitive receptors.	The residual impact would not be substantially different between Trail 1 and the alternative. The main difference is the length or extent of land affected by land use change. The difference in residual amenity impact is insignificant as there are no sensitive receptors. Furthermore, Trail 1 and the alternative do not pose a difference in scale or intensity of use, only that the use will be spread out on a slightly larger footprint.

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
			Traffic impacts are also described in Section 15.2.7.
<b>Air quality</b>			
Dust impacts during construction of Visitor's Hub and trail heads	Potential dust impacts for Trail 1 were determined to be negligible to low for dust soiling and low for human health.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Air quality impacts from vehicles during construction of Visitor's Hub and trail heads	Air quality impacts beyond 50m of work sites are likely to be negligible.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Air quality impacts during construction of trails	Dust impacts during construction of the trails are expected to be negligible.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Air emissions from vehicle traffic and shuttle buses	At the closest sensitive receptors to the project, pollutant concentrations due to vehicle traffic are likely to be negligible.  Wheel generated dust from mountain bikes using the trails are not expected to cause dust emissions discernible at sensitive receptors.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Maintenance	Air quality impacts due to trail maintenance are expected to be negligible due to highly localised works, short duration and distance from receptors.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Mountain biking events	Traffic Management Plans required during major mountain biking events would minimise excessive queueing and congestion which could cause an increase in vehicle emissions near the project.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Erosion	Widespread erosion that results in a significant source of dust is unlikely due to the narrow design of the trails and surrounding vegetation and effective trail design and management.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
<b>Visual</b>			
Location of new trails within LCT5 (Forested Slopes)	The natural vegetated character of the landscape character type would be retained.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Large tree removal	No large tree removal is proposed as part of the trail construction.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
<b>Noise</b>			

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
Construction noise	Construction noise would be audible for up to six months in some locations.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Operational noise	A noise barrier is proposed in the vicinity of Martyr Road, Warburton to mitigate operational noise at nearby residences.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.
Events noise	Specific management plans would be developed for major events to ensure that potential noise effects are effectively managed.	A similar level of residual impact is expected for Trail 1 and the alternative.	No discernible difference in level of impact between Trail 1 and the alternative.

### 15.2.6 Socio-economic

The potential socio-economic impacts do not substantially differ between Trail 1 and Trails 45 to 47. Trail 1 would have some minor impacts on residents and bushwalkers, whereas the alternative would have no impacts. Given that impacts for Trail 1 would be minor, there is no strong preference. The comparative impacts for Trail 1 and the alternative (trails 45, 46 and 47) are presented in Table 6. The supporting impact assessment is provided in **Technical Report E: Socio-economic**.

**Table 6 Comparative socio-economic assessment of Trail 1 and Trails 45, 46 and 47**

Potential impact	Trail 1	Alternative (Trails 45, 46 and 47)	Conclusion
Bushwalking	There are possibly up to 50 walkers a day on Mount Donna Buang. Local bushwalkers have expressed their concerns regarding increased noise, congestion and safety risks from the Warburton Mountain Bike Destination. In responding to this, trails have been moved away from existing tracks, with points of intersection minimised. Experience from comparable mountain bike projects in Tasmania (Derby and St Helens (Bay of Fires)) and in Bright indicate that incidences of conflict between walkers and riders have been minimal.	No known bushwalking occurs in the vicinity of the alternative trails.	Both trails would have minimal socio-economic impact.
Impact on residential properties	The end of Trail 1 is around 30-50m from three landholders on Sussex St. The trail is however unlikely to be in line-of-sight of these properties and usage is highly unlikely to cause any significant noise, dust, or inconvenience to residents.	No residential properties are near the alternative trails.	Both trails would have minimal socio-economic impact.

## 15.2.7 Transport

Traffic generation and potential transport impacts for construction and operation of Trail 1 and Trails 45, 46 and 47 are expected to be the same. Whilst each option would have different crossing points of Donna Buang Road, these are comparable from a safety perspective. The comparative impacts for Trail 1 and the alternative (trails 45, 46 and 47) are presented in Table 7. The supporting impact assessment is provided in **Technical Report F: Transport**.

**Table 7 Comparative transport assessment of Trail 1 and Trails 45, 46 and 47**

Potential impact	Trail 1	Alternative (Trail 45, 46 and 47)	Conclusion
Construction	<p>Construction of the entire project, including Trail 1, would generate modest amounts of traffic that would not cause significant congestion on the road network.</p> <p>Construction of bridges over the Yarra River and Old Warburton Road would cause temporary localised disruption.</p>	<p>In the context of the whole project, the amount of traffic generated for the construction of the alternative would not differ greatly from the traffic generated for the construction of Trail 1.</p> <p>The transport impacts associated with bridge construction would be unchanged for the alternative.</p>	No discernible difference in level of impact between Trail 1 and the alternative.
Operation	<p>Visitor numbers are predicted to be greater for the trail network with Trail 1 than with Trails 45, 46 and 47. Nevertheless, because there is sufficient capacity in the transport network, no change is expected in operational traffic impacts (including those related to parking) for Trail 1.</p> <p>Whilst visitor traffic generated by the project is within the capacity of the road network, careful management of parking will be required.</p> <p>The potential for conflict between motor vehicles and cyclists at intersections between mountain bike trails and roads is an important issue.</p> <p>Trail 1 involves a crossing of Donna Buang Road which has an estimated traffic volume of 1500 vehicles per day and a posted speed of 80km/h. Mitigation measures are proposed to ensure that this crossing is safe.</p>	<p>The alternative to Trail 1 would also have a crossing point on Donna Buang Road to connect Trails 45 and 47. The location of this crossing is at the shuttle bus drop off point at Victoria Spur. The crossing is in a different place to that for Trail 1, and due to having a posted speed of 80km/h and compromised sightlines, substantial mitigation measures are likely to be needed to ensure safety at a crossing at this location. If following further investigation an at grade crossing is not considered desirable, a bridge crossing could be contemplated.</p>	Because of the safety challenges with the crossing of Mount Donna Buang Road associated with the alternative, Trail 1 is slightly preferred from a transport perspective.

### 15.3 Synthesis

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 m) and education during construction and operation, the impact to drinking water supply would be overall 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 the Cool Temperate Mixed Forest for a greater distance (approximately 6.442 kilometres for Trail 1 compared to 3.069 kilometres 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.

## 15.4 Conclusion

A trail screening process was undertaken during the project development process to investigate the need for alternative trail alignments that would ensure a network design that minimised the potential for significant environmental impact. As a result of this process, the project has undertaken a comparative assessment of Trail 1 and an alternative (combination of Trails 45, 46 and 47).

The key findings of the comparative assessment are summarised below:

- **Economic benefits:** A trail network including Trail 1 has significantly greater economic benefits than a trail network without Trail 1, both in terms of tourism spend in the region and jobs created.
- **Land use and planning:** No discernible difference in residual impacts.
- **Socio-economic:** No discernible difference in residual impacts.
- **Transport:** Trail 1 is slightly preferred to the alternative due to improved safety of the crossing of Donna Buang Road.
- **Cultural heritage:** No discernible difference in residual impacts for Aboriginal heritage. A slight preference for the alternative over Trail 1 in relation to historic heritage.
- **Surface water, groundwater and geotechnical hazards:** The alternative traverses a lower number of waterways with slightly fewer crossings located within the Yarra Ranges National Park. Additionally, only Trail 1 traverses approximately 458 metres of Coranderrk Creek catchment boundary. However, it is anticipated that with the implementation of mitigation measures overall impact to drinking water quality is considered low. Therefore, with the implementation of mitigation during construction and operation, the alternative and Trail 1 would have similar residual impacts.
- **Biodiversity:** Trail 1 would traverse more of the Yarra Ranges National Park, require a greater extent of native vegetation removal, intersect a greater extent of Cool Temperate Rainforest or Cool Temperate Mixed Forest threatened ecological communities and come in closer proximity to the Leadbeater's Possum translocation site than the alternative.

The key differences between Trail 1 and the alternative (Trails 45, 46 and 47), relate to economic benefits and biodiversity and habitat. The economic analysis indicates that the project has significantly reduced economic benefit with the removal of Trail 1 due to the high attractiveness of this trail as a tourism product. The findings of the biodiversity and habitat assessment are also critical to a decision on whether Trail 1 should be adopted as part of the overall trail network (with implementation of proposed mitigation measures to address the key ecological issues) or whether the alternative should be adopted because it would avoid potential impacts associated with Trail 1 that cannot be adequately mitigated. The findings of this assessment are presented in **Chapter 8: Biodiversity and habitats** and **Technical Report A: Biodiversity and habitats**.

This chapter summarises the comparative assessment of Trail 1 and Trails 45 to 47 and includes an integrated discussion of the advantages and disadvantages of these alternatives. A decision on which trails would be included in the final trail network will be determined prior to construction, based on the outcomes of the EES process.