

# Warburton Mountain Bike Trails Trail Operations Plan

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## 1. INTRODUCTION

The Warburton Mountain Bike Destination is a world class mountain biking destination centered around Warburton, approximately 70km north east of Melbourne.

A significant informal network of mountain bike trails has developed over time within the region and there is evidence of increasing usage of these trails by local and visiting riders. Mountain biking in this locality started around 15 years ago and was concentrated on a route from Mount Tugwell to Imuka Road near the La La Falls car park.

Yarra Ranges Council identified mountain biking as an opportunity for tourism growth within this region which would also support the township and the health and well-being of its residents. It seeks to create iconic trails eligible for International Mountain Bike Association (IMBA) Gold Trail Centre status which would position Warburton as an internationally significant mountain bike destination.

The WMBD project is proposed as a ski style resort with visitors able to access world class trails directly from their accommodation, or parking facilities in town. It consists of approximately 180km of mountain bike trails providing both all mountain and cross-country style trails.

The project is situated within the Warburton valley, characterised by densely forested slopes to the north and south, with the township of Warbuton nestled upon the valley floor. The trail alignment traverses private land and several Crown land tenures including the forested slopes to the north, part of the Yarra Ranges National Park managed by Parks Victoria, with areas to the south, part of the Yarra State Forest, managed by the Department of Environment, Land, Water and Planning.

Mt Donna Buang forms a continuous ridgeline to the north, reaching a high point of 1245 metres. To the south, Mt Little Joe rises to 510 metres, and Mt. Tugwell to 790 metres, together forming the smaller valley on either side of Old Warbuton Road. Warburton sits at 159 metres.

Vegetation within forested slopes surrounding the valley include Mountain Ash forest with an understorey of tree ferns and gullies of cool temperate rainforest, with some sub-alpine vegetation areas of higher elevation such as Mt. Donna Buang summit.

### 1.1 OBJECTIVES OF THIS OPERATIONS PLAN

The Trail Operations Plan provides a clear, concise and practical framework for the trail's future management, use, development and maintenance.

The Plan outlines management strategies that protect and manage the values of the trail

network and provide for public safety, in accordance with community expectations and legislation. The Plan will be reviewed annually and updated, as a minimum, every ten years.

## **2. MANAGEMENT FRAMEWORK**

### **2.1 KEY STAKEHOLDERS**

#### **Yarra Ranges Council**

Yarra Ranges Council are responsible for development of the trail network.

#### **Parks Victoria**

The Yarra Ranges National Park, comprising of the Northern trail network is land managed by Parks Victoria.

#### **Department of Environment, Land, Water and Planning**

Crown land in Victoria is owned by the State and management is variously delegated. Crown land reserves are areas of public land set aside for the benefit and enjoyment of the people of Victoria. The Yarra State Forest, comprising of the Southern trail network is land managed by the Department of Environment, Land, Water and Planning.

#### **Wurundjeri**

The Wurundjeri are the traditional owners of the land and tribe that occupied the area the trail network is located within.

#### **Mountain Bike Users**

The development of mountain bike trails within the area was a result of significant interest and effort from local mountain bike user groups, particularly the Yarra Ranges Mountain Bikers. The network has expanded beyond local interest and is now a popular destination with interstate and international riders.

#### **Local Community**

The Yarra Ranges National Park and Yarra State Park have a long history of use for recreation by the local community. Visitors use the site for horse riding, bushwalking, 4wding, orienteering, picnicking, and other events and it is intended that this use will continue. The management model will need to consider community expectations when managing and developing plans for the trail network.

### **2.2 INCORPORATED ASSOCIATION**

It is proposed to establish an incorporated association as the governance entity to provide support for the management and marketing of the trail network. It seeks to bring together the Yarra Ranges Council, Parks Victoria and DELWP and at least two other partners, likely to be Yarra Ranges Tourism Inc and cycling associations or clubs. An agreement between the parties would establish the financial contributions to be made by each party. The Association would be the primary focal point for community-based support and involvement and would have primary responsibility for raising and expending funds, and promoting and maintaining the trail network.

### 3. RISK MANAGEMENT

#### 3.1 RISK REGISTER

It is anticipated that the Incorporated Association will contribute to the identification, assessment, treatment and monitoring of risks. The following is a draft register of residual risks that is proposed. The matrix uses a “Current Risk Assessment” which is the risk rating considering the controls to manage the risk. Each risk has been assessed considering the likelihood and consequence in each of the four categories: Financial, Safety, Assets or Relationships. The highest scoring category is identified in parenthesis.

ID	Risk description (what may happen)	Likelihood	Consequence	Rating	Controls to manage the risk
1	Erosion or maintenance works on trails, development of shortcuts, or unauthorised construction of new trails damages a. Cultural heritage b. Native vegetation c. Soil and waterways	a. Medium b. Medium c. Medium	a. Low b. Low c. Low	a. C (Rel) b. C (Asset) c. C (Asset)	<ul style="list-style-type: none"> <li>Regular inspections of trails in accordance with the Maintenance schedule</li> <li>Regular maintenance</li> <li>Early intervention and remediation works</li> <li>Cultural Heritage Management Plan (CHMP) and contingency plan</li> <li>Signage to protect values from damage and promote the trail network Code of Conduct</li> </ul>
2	Authorised construction of new trails damages a. Cultural heritage b. Native vegetation c. Soil and waterways	a. Low b. Low c. Low	a. Medium b. Low c. Low	a. C (Rel) b. D (Asset) c. D (Asset)	<ul style="list-style-type: none"> <li>Strategy for appropriate design and siting of any proposed new trails</li> </ul>
3	Impacts from users (other than mountain bike trails) damages a. Cultural heritage  b. Native vegetation c. Soil and waterways	a. Low  b. Low c. Low	a. Low  b. Low c. Low	a. D (Rel)  b. D (Asset) c. D (Asset)	<ul style="list-style-type: none"> <li>Regular site inspections of trails and facilities in accordance with the Maintenance schedule</li> <li>Signage to protect values from damage and promote the trail network Code of Conduct</li> </ul>
4	The safety of users of the trail network is at risk during a. Routine operations b. Emergency	a. Low b. Low	a. Low b. High	a. D (Safe) b. B (Safe)	<ul style="list-style-type: none"> <li>Regular site inspections of trails and facilities in accordance with the Maintenance schedule</li> <li>Provide directional, safety and warning signage and erect temporary signage as required to provide users with additional warnings and advice such as trail closures or Park closures on days of Code Red fire danger</li> </ul>

ID	Risk description (what may happen)	Likelihood	Consequence	Rating	Controls to manage the risk
					<ul style="list-style-type: none"> <li>Follow Emergency Management Plan</li> </ul>
5	Recreation values are impacted by conflict between Park users	Medium	Low	C (Rel)	<ul style="list-style-type: none"> <li>Signage to designate permitted usage of trail network and promote Code of Conduct</li> <li>Develop and use new or existing websites and social media to communicate with users and ensure users, stakeholders and the community have a point of contact to provide feedback</li> <li>Manage events and activities with the potential for conflict with other users through issue of a permit</li> </ul>
6	Management of the site does not lead to improved environmental values (failure to reduce weed infestations on site)	Low	Low (A)	D (Asset)	<ul style="list-style-type: none"> <li>Regular site inspections of trails and facilities in accordance with the Maintenance schedule</li> <li>Monitor the health of the National and State Forest and if required seek funding for management</li> <li>Use signage to encourage users to wash down their bike and gear after every ride and support provision of wash down facility</li> <li>Ensure only clean materials are imported to the trail network</li> <li>Undertake pest plant and animal control according to the Catchment and Land Protection Act (CaLP Act) and seek funding for works to implement Weed Management Plan.</li> </ul>

Table XX Draft risk register for Warburton Mountain Bike Destination. The abbreviations in parenthesis refer to assessment categories Financial (Fin), Safety (Safe), Assets (Asset) or Relationships (Rel)

Rank	Classification
A	Risk is intolerable and cannot be justified on any grounds.
B	Risk must be reduced unless the cost or effort of reducing the risk is grossly disproportionate to the benefits gained.
C	Risk may be reduced unless the cost or effort of reducing the risk is disproportionate to the benefits gained.
D	Maintain current systems of monitoring and review. Generally, no additional action is required to reduce the risk.

## 3.2 MONITORING

The trail network operator must conduct inspections of the trail network in accordance with the maintenance schedule. This will ensure this OMP is implemented effectively and that the environmental and emergency management objectives are being met.

Yarra Ranges Council may undertake scheduled and unscheduled audits of the OMP and its implementation. Audits will be conducted as required but will generally occur in response to complaints from members of the public, the Incorporated Association, or government agencies. Audits will be conducted in consultation with the Incorporated Association who are required to provide access to all necessary documentation to allow DELWP, or its representative, to conduct the audit.

## 3.3. REPORTING

The trail operator is required to report significant incidents, near misses or concerns. Matters that must to be brought to the immediate attention include:

- Issues or incidents impacting public safety or amenity,
- An incident which has or may cause environmental harm, including significant erosion near to watercourses, or unauthorised removal of native vegetation, or
- Potential or actual impact on threatened flora or fauna habitat or cultural heritage.

Yarra Ranges Council, in consultation with the Incorporated Association will assess the action required and the need to involve other agencies. The investigation will identify the:

- cause, extent and responsibility of the incident (specialist advice may be sought and monitoring undertaken),
- corrective actions necessary, and who is responsible for implementing these actions, and
- controls that need modifying to prevent the incident from repeating.

The incident and all corrective action taken must be documented by the Incorporated Association.

## 3.4 COMPLAINTS

The Incorporated Association must keep a register of serious complaints raised by members of the public or government agencies. The Register must include, as a minimum, the date, contact details (if available), nature of complaint and resolution, including timeframe. Serious complaints are defined as genuine concerns raised regarding the safety or amenity of trail network users. General comments on rideability of trails and other minor concerns will not be recorded in the register of complaints.

### 3.5. EVALUATIONS

Ongoing evaluation is required to respond to gradual changes in trail conditions and user expectations. For example, the description of trails may be changed based on user comment or incidents. Feedback from trail users, neighbours and the community should be encouraged via:

- Signage or brochures providing contact details for providing feedback, and
- New or existing website or social media sites where users can provide feedback. Mountain bike user groups already have well established social network, codes of conduct and communication channels.

## 4. MANAGING CULTURAL VALUES

### 4.1 INDIGENOUS HERITAGE

The trail network lies within the lands traditionally associated with the Wurundjeri (south of the Great Dividing Range). This Aboriginal community assert a spiritual and cultural connection to the area and have expressed an interest in helping protect the areas Aboriginal cultural values.

Local Aboriginal people have an interest in the landscape and flora and fauna of the area. Materials are occasionally sought for traditional purposes, including the teaching of traditional uses to Aboriginal children. The preservation and maintenance of cultural uses of materials is an important part of Victoria's heritage.

#### Aims

- Protect all aboriginal cultural heritage within the trail network.
- Enhance public appreciation of the aboriginal cultural values of the area.
- Improve knowledge of archaeological and historic sites and places and traditional uses.
- Involve the Wurundjeri in decision making and management of natural resources, including interpretation/education opportunities, land rehabilitation, use for events, weed management and revegetation.

#### Strategies

- Use the *Warburton Mountain Bike Destination Cultural Heritage Management Plan* to provide guidance for the maintenance of trails and facilities developed within the scope of the original CHMP.
- Use regular site inspections of trails to identify early and address erosion or damage to trails, trail widening or braiding, development of shortcuts, or unauthorised construction of new trails.
- Refer the design and siting of any proposed new trails or facilities to the Wurundjeri Tribe for consideration. Any high impact activities outside the initial development of the network will require a Cultural Heritage Management Plan or Cultural Heritage Permit.
- Assess the potential effect of any proposed development works or ground disturbance on Aboriginal or other cultural values and undertake site specific surveys within areas that could be an archaeological site or place, prior to implementation of the works.
- Liaise with local Aboriginal communities including the Wurundjeri, and those nominated in relevant legislation or by Aboriginal Affairs Victoria NRE, on Aboriginal cultural interests in the area.
- Use signage to promote awareness in visitors and users of the trail network of the indigenous cultural values and the need to protect these values from damage, interference, displacement or theft.

## 4.2. HISTORIC HERITAGE

The extensive European history of the area offers an important opportunity to protect and present one of the best collections of places representing the full range of historical themes associated with the forests in such close proximity to Melbourne. By the 1840s squatters had occupied surrounding areas but did not permanently settle the densely forested terrain of the Yarra Ranges. Goldfields opened up around the Warburton to Reefton Spur area in the 1850s and 1860s. The Yarra Track provided access to the Woods Point goldfields via Healesville, Fernshaw and Cumberland. The tall trees of the Yarra Ranges attracted wide interest and, from the 1880s, townships such as Warburton became popular tourist destinations. A tourist track from Warburton to Walhalla through the Upper Yarra catchment was popular with walkers and horse riders in the early decades of the 20th century.

Diversions for Melbourne's water supply commenced in 1886 with a weir on the Watts River, followed by the O'Shannassy and Maroondah Dams (1920s) and the Upper Yarra Dam (1957). Outside the closed catchments, temporary sawmill settlements and timber tramways expanded from the 1880s to 1950.

Downhill snow skiing was popular at Mount Donna Bung from 1912 to the 1950s. A number of old huts remain in the National Park. Most are in a state of disrepair and are relatively inaccessible, though at least one is still used and maintained by a walking club. Historic and cultural places will be managed in accordance with the Heritage Act 1995 (Vic.)

### Aims

- Protect non-indigenous historic heritage places of significance in the trail network.
- Maintain heritage values associated with the recreational use of the trail network.
- Provide sufficient access to, and interpret, suitable places, to allow people to appreciate the full range of historic and cultural themes associated with the area, and consistent with protection of the places, artefacts and relics.
- Enhance public appreciation of the historic cultural values of the area.
- Improve knowledge of historic sites and places.

### Strategies

- Liaise with local historical societies and individuals to improve knowledge of the cultural heritage of the area and identify opportunities for education.
- Use signage to promote awareness in visitors and users of the trail network of the historic cultural values and the need to protect these values from damage, interference, displacement or theft.

## 5. MANAGING BIODIVERSITY VALUES

### 5.1. NATIVE VEGETATION AND THREATENED SPECIES

#### Aims

- Protect native vegetation and habitat for threatened species within the trail network.
- Conserve native plant communities in their natural condition and maintain habitat diversity while allowing natural environmental processes to continue.
- Provide special protection for significant plant species and communities.

#### Strategies

- Apply an Environmental Risk Assessment process to the design, construction and management of the trails.
- Document and apply appropriate plans to protect values under state EES and federal EPBC legislation.
- Use regular site inspections of trails to identify early and address erosion or damage to trails, trail widening or braiding, development of shortcuts, or unauthorised construction of new trails.
- Any proposed new trails must consider during the design stage areas of high value native vegetation and habitat for rare or threatened fauna and avoid these areas should construction be approved.
- Use signage to promote awareness in visitors and users of the trail network of the biodiversity values and the need to protect these values from damage.
- Seek funding to undertake revegetation works in targeted areas using indigenous species reflecting as closely as possible the pre-clearing Ecological Vegetation Community.
- Actively manage threatening processes such as weed invasion to protect significant species and communities.
- Identify opportunities to interpret natural values and increase community knowledge and respect for the environment.
- Identify opportunities to address threatening process' for threatened species and communities above regulatory requirements. E.g.
- Work with land managers to develop and implement an appropriate research and monitoring plan to understand impacts of the development over time.

## 5.2. PEST PLANT AND PATHOGEN CONTROL

### Aims

- Minimise the risk of the introduction and spread of *Phytophthora cinnamomi* and other soil pathogens.
- Control pest plant, prioritising high threat species.
- Minimise the potential for Myrtle Wilt to spread

### Strategies

- Use signage to encourage users to wash down their bike and gear after every ride to prevent spread of weeds.
- Support the provision of wash-down facilities.
- Implement prioritised pest plant in accordance with the *Catchment and Land Protection Act 1994*. Use the *Warburton Mountain Bike Trails Weed Management Plan* to guide weed control.
- Seek funding to control pest plant infestations.
- Any proposed new trails must consider during the design stage areas of weed infestation and avoid these areas should construction be approved.
- If materials are imported to the site, ensure they are from suppliers used by Yarra Ranges Council and provide guidelines for: the prevention of weed seed spread by machinery and equipment; and vehicle hygiene (wash down prior to entry/on exit from trail network).
- Minimise the potential for Myrtle Wilt to spread by preparing a special prescription for the planning, construction and maintenance of trails near Myrtle Beech trees.

### Phytophthora cinnamomi

*Phytophthora cinnamomi*, is a foreign plant pathogen which attacks the root systems of susceptible plant species including Grass-trees, Heath and Eucalypt species. *Phytophthora* does not spread quickly by itself across the landscape but may be transported in muds or running water containing the fungus. There is currently no means to eradicate it once established.

*Phytophthora* has infected many areas of bushland in Victoria including the Grampians, Brisbane Ranges, the Otways and Gippsland. It is not known to be present or causing significant impacts in the Yarra Ranges area. Mountain bikes may spread *Phytophthora* via mud carried on frames and wheels although the risk is low given the small amounts of soil they might carry.

## Weed management plan

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

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

Three declared noxious weeds listed under the Catchment and Land Protection (CaLP) Act 1994 was identified within the trail alignment. Plants occurring on this list are known to or have the potential to result in detrimental environmental or economic impact. Although minor in their current extent, these weed species typically thrive in disturbed environments and the proposed earthworks may encourage these small populations to rapidly spread.

Table xx Declared Noxious weeds occurring within the trail network:

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

See appendix xx for full weed management plan.

### 5.3. FAUNA AND THREATENED SPECIES

The area the trail network is located within is one of the key regions in the State for its diversity of mammals and other vertebrates. This diversity results from the diversity of types and ages of ecological communities, which provide a broad range of habitats, and the undisturbed nature of the catchments, which have been largely protected from human activity. The large areas of mature and mixed-age forests are particularly important for the conservation of hollow dependent species such as arboreal mammals, bats, owls and parrots. Twenty-one species are considered threatened, including 10 listed under the Flora and Fauna Guarantee Act. Some 40 native mammal species are known to occur in the National Park, and of these eight are listed as threatened in Victoria. Of particular interest is the endangered Leadbeater's Possum. The National Park contains more than 20 per cent of its known habitat, which is confined almost entirely to the ash forests of the Central Highlands. The area is a vital refuge for Leadbeater's Possum and other threatened species including the Spotted Quoll and Smoky Mouse. The National Park provides habitat for 120 recorded species of native birds. Threatened species include the hollow-using Sooty Owl, Powerful Owl and Barking Owl. Notable species include the Pink Robin, Yellow-tailed Black-Cockatoo, Australian King-Parrot and Grey Goshawk. The Taggerty River, upstream of the Lady Talbot Drive crossing, is important habitat for the Barred Galaxias, which is listed as critically endangered in Victoria. Sedimentation of streams arising from poorly designed or maintained roads or eroding areas is a potentially threatening process for this and other stream-dwelling fauna. The summit of Mt Donna Buang contains the entire known population of the vulnerable Mt Donna Buang Stonefly. Potential threats to faunal populations include modifications to ecosystems by weed invasion, wildfire, soil erosion and the impacts of pest animals. Maintaining a supply of mature hollow-bearing trees is important for preserving species such as Leadbeater's Possum.

#### Aims

- Protect native fauna species and maintain genetic diversity.
- Provide special protection for significant fauna and their habitat.
- Increase knowledge of the distribution and management of significant fauna species.

#### Strategies

- Support research and monitoring of Leadbeater's Possum to ensure that the area continues to support viable populations of this endangered species.
- Maintain and enhance fauna habitat through the control of potentially threatening processes, including pest plant and animal control.
- Communicate the policy of no feeding of wildlife on the trail network to visitors, and prohibit the sale or distribution of birdseed within the area.
- Use signage to promote awareness in visitors and users of the trail network of the threatened species and the need to protect.

## 5.4. PEST ANIMAL CONTROL

Pest animal trapping indicates that introduced predators, particularly foxes, cats and dogs, are present in the area in large numbers. Introduced trout inhabit the Yarra River downstream from the Upper Yarra Dam.

Sambar deer are also present in the area in large numbers. Although Sambar deer are an introduced species, they are protected wildlife under the Wildlife Act 1975 (Vic.). There is evidence of substantial grazing at some locations in the trail network. Insufficient knowledge is available on the impacts of deer populations on native environments and the management requirements to protect the trail network.

### Aims

- Protect native fauna and flora species.
- Protect the trail network from damage caused by pest animals.

### Strategies

- Work with land managers to monitor, control and, where possible, eradicate, pest animals in the trail network.
- Work with land managers to minimise the impact of control programs on native fauna.
- Monitor deer populations to determine their impact on the trail network.
- Work with land managers to implement appropriate control strategies where detrimental impacts have been identified.

## 6. MANAGING LANDSCAPE VALUES

The Yarra Ranges are highly scenic, being part of the Central Highlands at the southern end of the Great Dividing Range. The rugged terrain rises abruptly from the Yarra River floodplain and forms a prominent scenic backdrop, much of which can be seen from the eastern suburbs of Melbourne to the Yarra Valley. The National Park's most significant feature is the tall Mountain Ash forests with their understorey of tree-ferns and adjacent gullies of Cool Temperate Rainforest. The highest elevations of Mt Donna Buang grade into sub-alpine landscapes, and snow is a regular winter attraction.

High rainfall, steep slopes and deep soils make large parts of the trail network area naturally susceptible to soil erosion. The undesirable impacts of soil erosion include degradation of conservation values and water quality. Natural agents such as plant disease, fire, excessive rainfall and uprooting of trees by wind can expose soils or cause landslips, leaving soils exposed to erosion by wind, water and, in the higher elevations, frosts.

### 6.1. SOILS AND EROSION

#### Aims

- Minimise erosion to the greatest extent possible, particularly erosion of trails

#### Strategies

- Use regular site inspections of trails to identify early and address erosion or damage to trails, trail widening or braiding, development of shortcuts, or unauthorised construction of new trails.
- Use signage to promote the trail network Code of Conduct.
- Use rabbit control and natural revegetation to manage sheet, track and wind erosion.
- Maintain armouring on trails with slopes of >20%.

## 6.2. HYDROLOGY (Water Quality)

### Aims

- Protect water quality of watercourses from sedimentation or pollution.

### Strategies

- Use regular site inspections of trails near to water courses and water course crossings to identify early and address erosion or damage to trails, trail widening or braiding, development of shortcuts, or unauthorised construction of new trails. See Appendix 4 for information on maintaining sustainable mountain bike trails.
- Maintain waterway crossings in accordance with conditions on existing Works in Waterways Permit (see Appendix 10).
- Consider land capability early in the design phase of any proposed new trails and design and construct new trails in accordance with International Mountain Bicycling Association standards (see also Appendix 4).
- Any works within waterways must be in accordance with a Works in Waterways Permit issued by North Central CMA.
- Use signage to promote the trail network's Code of Conduct and manage pollution of waterways resulting from visitor use: take your rubbish with you, don't use soaps, detergents or shampoos near waterways, no toileting near stream and encourage the use of constructed toilet facilities within the Warburton township and at trail heads.

### Susceptibility to water quality impacts

Water course crossings have the potential for the greatest impact on water quality and are where water has the greatest potential to damage the trail. Locations where the trails cross creek lines or drainage lines have been protected with elevated platforms to cross the water source and rock armouring.

### Ground water management

Shallowest groundwater levels are in the order of 5-10 m below ground level. Seasonal water tables in alluvial materials associated with drainage lines are likely to be temporarily shallower. There are no specific management controls proposed for groundwater.

## 6.3. MANAGEMENT OF WASTE

### Aims

- Minimise harm from waste generated by recreational use of the trail network.

### Strategies

- Use signage to manage littering by visitors. There are no rubbish bins within the trail network. Visitors will be directed to take their rubbish home or use the rubbish bins provided in Warburton.

## 7. MANAGING RECREATION VALUES

### 7.1. MOUNTAIN BIKE TRAILS

#### Aims

- Ensure that mountain bike trails do not diminish cultural, biodiversity, landscape or recreational values.
- Ensure mountain bike trails are safe and accessible.

#### Strategies

- Use regular site inspections of trails to identify early signs of problems and address erosion or damage to trails, trail widening or braiding, development of shortcuts, or unauthorised construction of new trails.
- Any new trails proposed must be designed and sited in accordance with land capability, proposed use and International Mountain Bicycling Association Standards.
- Provide directional, safety and warning signage in accordance with signage plan. Promote the single-use and one-way nature of the mountain bike trails.
- Ensure users, stakeholders and the community has a point of contact to provide feedback for evaluation of gradual changes in trail conditions and user expectations.

## 7.2. COMMUNICATIONS

### Aims

- Communicate information that enhances visitor understanding and enjoyment of the trail network, protects cultural, biodiversity and landscape values and provides directional, safety and warning information to users of the trail network.

### Strategies

- Use regular inspections of trails to maintain the existing signage within the trail network.
- Erect temporary signage as required to provide users with additional warnings and advice such as trail closures or Park closures on days of Code Red fire danger.
- Develop and use new or existing websites and social media to communicate with users and ensure users, stakeholders and the community have a point of contact to provide feedback.

### Signage plan

Good signage is a crucial element in making trails accessible and user-friendly, and managing risk by providing information on hazards and trail difficulty. A signage plan was prepared and signage installed prior to the opening of the mountain bike trails. The maintenance of signage is a key component of the maintenance schedule (Section 3). Any new or replacement signage should conform to the signage plan.

The trail signage includes:

- trail maps showing difficulty (IMBA classification, see Figure 5) and length of trails,
- trail start and finish points, and
- waypoint markers.

Information signage is located at the trail head in Warburton and at the trail network entrance and provides:

- overview of the trails and Park facilities,
- information on cultural values within the area,
- trail code of conduct for the safety and enjoyment of all users, and
- safety precautions.

## Trail Classification

Figure XX IMBA Australia – Trail difficulty rating system

	VERY EASY 	EASIEST 	MORE DIFFICULT 	VERY DIFFICULT 	EXTREMELY DIFFICULT 
<b>Description</b>	Likely to be a fire road or wide single track with a gentle gradient, smooth surface and free of obstacles.  Frequent encounters are likely with other cyclists, walkers, runners and horse riders.	Likely to be a combination of fire road or wide single track with a gentle gradient, smooth surface and relatively free of unavoidable obstacles.  Short sections may exceed these criteria. Frequent encounters are likely with walkers, runners, horse riders and other cyclists.	Likely to be a single trail with moderate gradients, variable surface and obstacles.	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles.	Extremely difficult trails will incorporate very steep gradients, highly variable surface and unavoidable, severe obstacles.
<b>Suitable for</b>	Beginner/ novice cyclists. Basic bike skills required. Suitable for most bikes.	Beginner/ novice cyclists. Basic bike skills required. Suitable for most bikes.	Beginner/ novice cyclists. Basic bike skills required. Suitable for most bikes.	Experienced mountain bikers with good skills. Suitable for better quality mountain bikes.	Highly experienced mountain bikers with excellent skills. Suitable for quality mountain bikes.
<b>Fitness Level</b>	Most people in good health.	Most people in good health.	A good standard of fitness.	Higher level of fitness.	Higher level of fitness.
<b>Trail Width</b>	Two riders can ride side by side.	Shoulder width or greater.	Handlebar width or greater.	Can be less than handlebar width.	Can be less than handlebar width.
<b>Trail Surface and obstacles</b>	Hardened with no challenging features on the trail.	Mostly firm and stable. Trail may have obstacles such as logs, roots and rocks.	Possible sections of rocky or loose tread. Trail will have obstacles such as logs, roots and rocks.	Variable and challenging. Unavoidable obstacles such as logs, roots, rocks drop-offs or constructed obstacles.	Widely variable and unpredictable. Expect large, committing and unavoidable obstacles.
<b>Trail Gradient</b>	Climbs and descents are mostly shallow.	Climbs and descents are mostly shallow, but trail may include some moderately steep sections.	Mostly moderate gradients but may include steep sections.	Contains steeper descents or climbs.	Expect prolonged steep, loose and rocky descents or climbs.

Taken from IMBA Australia - Trail Difficulty Rating System 2013

Trail classification within the trail network is based on IMBA Australia Trail Difficulty Rating System (see Figure xx) according to tread width, surface, trail grade, natural obstacles and technical trail features. Trails within the network are classified easiest, more difficult and very difficult.

1	More Difficult	10		19	Very Difficult	28	More Difficult
2	More Difficult	11	Easiest	20	Easiest	29	Very Difficult
3	More Difficult	12	Easiest	21	More Difficult	30	Very Difficult
4	More Difficult	13	Easiest	22	More Difficult	31	Very Difficult
5	More Difficult	14	Easiest	23	Easiest	32	More Difficult
6	Very Difficult	15	More Difficult	24	Easiest	33	Very Difficult
7	Easiest	16	Very Difficult	25	More Difficult	34	More Difficult
8	Easiest	17	More Difficult	26	More Difficult	35	More Difficult
9		18	More Difficult	27	More Difficult	36	More Difficult

## Code of conduct

Conflict between users of the trail network can be managed through information and education. For the safety and enjoyment of all users, a Code of Conduct has been developed for the Park. The Code will be promoted through signage as well as through publications and websites or social media. The Code is based upon the internationally recognised “rules of the trail” developed by the International Mountain Bicycling Association (<https://www.imba.com/about/rules-trail>).

Mountain bike riding involves a high degree of personal risk and should be always be undertaken with care and regard for the riding conditions. For the safety and enjoyment of all users, the following code of conduct applies:

- Ride safely: Always wear a helmet and appropriate safety gear. Know your ability and ride within your limits. Inspect all trails, jumps and technical trail features before proceeding.
- Respect others: Look out for slower riders. Do your utmost to let your fellow trail users know you’re coming – a friendly greeting or bell ring are good methods. Try to anticipate other trail users as you ride around corners. Stay within the trail network boundaries and do not trespass on private property.
- Respect the environment: Stay on the existing mountain bike trails, do not take short cuts and do not create new trails. Avoid skidding as it damages the trails. Look out for wildlife, including snakes. Take your rubbish with you. Keep your bike clean to reduce the spread of weeds.

### Warning

The trail network includes jumps, drops and technical features and is unsupervised. All users of the trail network do so entirely at their own risk. Mountain biking by its nature is a dangerous sport. The trails and various technical features have been designed to cater for a wide variety of rider abilities. Please ride within your ability and on trails and features that are suitable to your skill level

Children must be supervised at all times.

In case of an emergency, call 000.

# Appendix 1:

# Warburton Mountain Bike Trails

# Weed Management Plan

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## 4. INTRODUCTION

This management plan outlines the weeds present and recommends management under the relevant legislation for the mountain bike trail network located within Warburton. This Weed Management Plan (WMP) is to be read in conjunction with the Warburton Mountain Bike Trails Operations Management Plan (OMP). This WMP is an appendix to the OMP.

The trail network is located in and around the hills of Warburton. The northern aspect of the network is located on Mt Donna Buang in the Yarra Ranges National Park, while the southern network is located in the Yarra State Forest on Mt Little Joe and Mt Tugwell.

This document has been prepared to advise the trail operator of its obligations under the Catchment and Land Protection Act (CaLP Act) to control weeds. Additionally, the WMP discusses management of environmental weeds for good environmental outcomes.

This WMP provides the trail operator with systems and timeframes to control weeds across the trail network.

## 5. LEGAL AND OTHER REQUIREMENTS

### 2.1. Catchment and Land Protection Act

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

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

as plants, seeds or contaminants in other material is prohibited.

Three declared noxious weeds listed under the Catchment and Land Protection (CaLP) Act 1994 was identified within the trail alignment. Plants occurring on this list are known to or have the potential to result in detrimental environmental or economic impact. Although minor in their current extent, these weed species typically thrive in disturbed environments and the proposed earthworks may encourage these small populations to rapidly spread.

*Table 1: Declared Noxious weeds occurring within the trail network:*

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

Under section 20 of the CaLP Act, all land owners including the Crown; public authorities and licensees of Crown lands must, in relation to their land, take all reasonable steps to:

- eradicate regionally prohibited weeds;
- prevent the growth and spread of regionally controlled weeds and;
- prevent the movement and spread of restricted weeds.

## 2.2. High Threat Weeds

High threat weeds were notably sparse throughout the majority of the trail network corridor. During ground truthing assessments, locations of high threat weeds were mapped (see appendix xx).

The main weeds identified were small areas of Blackberry\**Rubus fruticosus* spp. Agg, patches of Ragwort \**Jacobaea vulgaris* and Foxglove \**Digitalis purpurea*. These were observed in areas of sparser canopy where there was enough light to penetrate the forest floor.

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

## 6. WEED MANAGEMENT

### 3.1. Weed Control Hierarchy

The Victorian Government's Invasive Plants and Animals Policy describes a four-tiered approach to managing invasive species:

- Prevention is the most cost effective form of weed control as weeds are absent and monitoring is the control method.
- Eradication of a new introduction (small number of localized populations) is also good value as once eradicated, prevention is the control method.
- Containment of a rapidly increasing or abundant species (many populations) is worthwhile to manage the impacts of a weed on weed free areas.
- Asset Based Protection is the most appropriate control method when a weed is widespread and abundant.

### Weed Control Techniques

The most cost effective and successful weed control is achieved through an integrated weed control program, using a number of complementary methods together to achieve sustainable, long-term weed control.

**Chipping** with a mattock or similar tool to manually chip out weeds is very effective for smaller weed infestations. When chipping, it is important to minimise soil disturbance to avoid stimulating the weed seed-bank. Ideally, chipping should be undertaken when weeds are not in seed to minimise accidental spread. Chipped weeds are normally left to rot in the paddock.

**Hand pulling** weeds can be done at any time of the year, however, it is easiest when the soil is soft just after rain. Care needs to be taken to extract the whole plant and root system because many plants can regenerate from root fragments left in or on the ground. Hand-pulled weeds can be disposed of in the same way as chipped weeds.

**Cultivation** and ploughing are effective means of weed control and are usually used as a preparation for sowing or planting pastures and crops.

**Grooming** is carried out by a specialised machine or an attachment on an excavator. Groomers are commonly used to mulch large woody weed infestation, such as gorse and hawthorn, minimising soil disturbance and the use of chemicals. This technique is usually followed up with spot-spraying of any re-growth. Ideally, this technique should be undertaken in stages and the weed infestation substituted with native vegetation in order to replace lost habitat for native animals.

**Brushcutting/slashing** is used primarily to reduce overall weed cover or as a short-term measure to stop seed-set on a particular weed. Any resulting re-growth will need to be followed up with weed control, e.g spraying, grazing.

**Chemical:** Used correctly, herbicides can be a very effective tool to control weed infestations. It is important to select the most appropriate chemical for your circumstances. Selective herbicides only target

weeds with a certain characteristic, e.g. broad leaves, leaving grasses unaffected. This is very useful when dealing with broadleaved weeds in pasture or areas of native grass. Non-selective herbicides will control a wide variety of weeds.

**Chemical safety:** Always follow the recommendations on the label to achieve the best results. Do not be tempted to alter the amount of chemical recommended on the label by adding 'a little bit more just to make sure'. Often, such practices can lead to substandard results, sometimes even making the herbicide inactive or dangerous. Many chemicals require the user to have an Agricultural Chemical Users Permit (ACUP), which is a certificate attained following training on safe use and handling of chemicals. When using chemicals, always wear personal protective equipment such as overalls, PVC or rubber gloves, PVC or rubber boots, washable hat, face mask/respirator, and if necessary, breathing apparatus.

Always take note of withholding periods for chemicals when spraying amongst crops or in areas used by livestock. Care should be taken to ensure that there is no spray-drift to 'off-target' plants on your own property or neighbouring properties. Particular care needs to be taken near waterways to avoid contamination. Restrictions also apply on the types of chemicals that can be used in the Agricultural Chemical Control Area (CCA).

For further information on the CCA or about obtaining an ACUP contact the Department of Primary Industries (DPI) on 136 186 or visit the DPI's website [www.dpi.vic.gov.au](http://www.dpi.vic.gov.au) \*State government has changed them to the Department of Jobs, Precincts and Regions ([www.djpr.vic.gov.au](http://www.djpr.vic.gov.au)) under the group 'Agriculture Victoria'

There are a variety of chemical application techniques used for weed control. It is important to consider the target weed and desired outcome before selecting your technique. Be aware that the risk of weeds developing herbicide resistance is increased if the same chemical is used repeatedly on the same weed in the same location. It is advisable not only to vary the herbicide used but also the control method as part of an integrated control program.

**Spot spraying** can be undertaken using a hand-held spray unit, backpack, or large or small tanks fitted to a quad-bike, ute or trailer. An applicator such as a gun or a wand is used to direct the spray onto the target plant. Spot spraying is suitable for small outbreaks of weeds or when applying herbicide amongst desirable plants such as improved pasture or native vegetation. Foliar spraying is a form of spot spraying typically used on larger woody weeds such as gorse, blackberry and hawthorn ( this weed is mainly cut & paint, or drill/fill) Perhaps use Broom species or Spanish Heath.

**Boom spraying** requires specialised equipment fitted to a quad-bike or tractor, and is used for the application of herbicide on dense infestations of weeds or on large areas of weed infestation. Boom spraying is often undertaken prior to pasture renovation or cropping.

**Cutting and painting** is generally performed on trees and shrubs with smaller trunks and stems using secateurs, loppers, handsaw or chainsaw. The main stem of the plant must be cut as close as possible to ground level to prevent potential suckering. To ensure the plant takes up the herbicide, paint the stump with undiluted herbicide within 15 seconds of the initial cut. If this procedure takes longer or the surface becomes contaminated with dirt, it may be necessary to re-cut or scrape the cut surface before applying the herbicide. A paint brush, atomiser or sponge can be used to apply the herbicide.

**Drilling/frilling and filling** is generally performed on trees and shrubs with thick trunks or where habitat for fauna needs to be maintained. Using a cordless, electric drill or hand drill, holes are made into the trunk on an angle 2-3cm deep and 5-10cm apart around the circumference. Alternatively, a hammer and chisel, an axe or tomahawk can be used to create wounds around the trunk. This technique is called 'frilling and filling'.

Within 15 seconds of the holes being drilled, or the frills being made, undiluted herbicide is injected/poured into each hole. To avoid suckering, the holes must be as close to the base of the plant as possible. It is important to treat every stem/trunk originating from the ground to prevent re-growth. Large

multi-stemmed trees may also require the main branches to be drilled/frilled and filled. Deciduous trees should only be treated when they are actively growing, i.e. during spring and summer to ensure the plant takes up the herbicide

**Stem scraping** is a technique that is often used on vines or when trees are growing horizontal to the ground, preventing drilling or frilling around the entire trunk. Simply scrape back the bark using a chainsaw or hand-tools, then apply herbicide as described for 'cutting and painting'.

There are a variety of non-chemical and nonmechanical weed control methods which can be used as part of a sustainable, integrated weed control program.

**Solarisation** involves laying sheets of black plastic over weed infestations and letting the sun effectively 'cook' the plants. Best results are achieved on weeds growing in full sun, however, the sheet of plastic will need to remain securely in place for some time.

**Mulching** with a 10 cm layer of mulch will help reduce the chance of weed seeds germinating. Securely placed old carpet or underlay, or a thick layer of newspaper, presoaked in water, can also be an effective way to smother weeds.

**Biological weed control** using a biological control agent is an effective way to reduce the size and density of large weed infestations. Biological control should be viewed as a long-term weed control method that must be used in conjunction with other control techniques for an effective outcome. Results can sometimes take long periods of time before they become obvious. Biological control has the benefit of reducing the amount of chemicals required, minimising environmental impacts and reducing costs. All biological control agents must undergo stringent testing to ensure there are no detrimental impacts on agriculture or the environment.

**Fire** can be used to control and suppress weeds, however should only be used as a last resort because of the inherent risk of using fire. It generally does not kill the targeted weed, but is primarily used to reduce the overall cover of weeds and the need for large amounts of chemical. Fire can also be used to deliberately stimulate germination of weed seeds in the soil. The resulting new weed growth must then be controlled with followup weed control. It is important to note that using fire as a weed control technique may risk damaging or destroying all vegetation, including desirable plants, and can result in re-invasion of weeds.

**Competition/replacement:** One of the most effective weed control techniques is to prevent or minimise weed invasion by providing competition with desirable plants, e.g. pasture or native vegetation. Implementing replacement and management techniques is a long-term, cost effective and sustainable approach to weed management, and can enhance and protect natural resources. Providing competition will also ensure valuable resources such as water and nutrients are unavailable to weeds.

**Pasture improvement/management:** Healthy, well-managed pastures resist weed invasion far better than those that are rundown and poorly managed. Through appropriate management, including rotational grazing, resting paddocks and monitoring soil fertility, healthy and drought-hardy pastures can be achieved. It is important to allow pastures to rejuvenate from time to time. Removing stock during late spring-early summer will allow native pasture a chance to set seed and maintain adequate cover. This is an important strategy for encouraging competition against existing weeds and further weed invasion.

**Revegetation:** When controlling large infestations of weeds, particularly woody weeds such as gorse and blackberry, it is important to undertake it in stages. This allows the woody weeds to be substituted with native vegetation, replacing valuable habitat for native animals. Replacing woody weeds also provides valuable competition against re-invasion of weeds.

**Follow-up:** To achieve successful weed control, regular monitoring of treated areas must be undertaken for any re-growth or new germinations of weeds. New outbreaks of weeds must be controlled before they have a chance to reproduce and re-infest the site. Monitoring and follow-up weed control may need to occur for many years in order to eliminate an infestation completely.

## Timing and Control Methods

Each weed species has a different ecology and phenology. Therefore, the best approach to control or eradicate differs from species to species.

It is important for example, to consider whether a species is dormant at certain times of the year (and less susceptible to weedicide sprays) or is more vulnerable when flowering. Method and vectors of weed spread must also be considered as plants which reproduce through vegetative propagules need to be treated differently from those which promulgate themselves by seed only.

Table 2 details the type of control recommended for each weed and how that species should be managed considering the Weed Control Hierarchy.

*Table 2: Weed Control Regime and Timing.*

Species	Common Name	Timing	Suggested method of control	Indications of effective management	Location
<b>Anthoxanthum odoratum</b>	Sweet Vernal-grass	Sep – Dec	Spray		<b>Mt Tugwell</b>
<b>Arctotheca calendula</b>	Cape weed	Dec – June	Spray		<b>Mt Tugwell</b>
<b>Asparagus scandens</b>	Asparagus Fern	June – Dec	Spray		<b>Mt Tugwell</b>
<b>Cirsium vulgare</b>	Spear thistles	Aug – Dec	Spray	<b>Reduced in abundance and controlled in extent</b>	Drop A K South/ East Mt Tugwell
<b>Conium maculatum</b>	Hemlock	Aug- Dec	Spray		<b>Mt Tugwell</b>
<b>Digitalis purpurea</b>	Foxglove	Sep- Dec	Spray		<b>Mt Tugwell</b>
<b>Galium aparine</b>	Cleavers	Sep- Feb	Hand weed, Spray		<b>Mt Tugwell</b>
<b>Hypochaeris glabra</b>	Smooth Cat's-ear	All Year	Spray		<b>Drop A K Mt Tugwell</b>
<b>Hypochaeris radicata</b>	Flatweed	All Year	Spray		<b>Drop A K Mt Tugwell</b>
<b>Ilex aquifolium</b>	English Holly	Sep- Apr	Cut & paint, Drill/Fill		<b>Mt Tugwell</b>
<b>Jacobaea vulgaris</b>	Ragwort	Aug- Feb	Spray, Hand weed		<b>Drop A K</b>
<b>Lonicera japonica</b>	Japanese Honeysuckle	Aug- Feb	Cut & paint, Spray		<b>Mt Tugwell</b>
<b>Myosotis sylvatica</b>	Wood Forget-me-not	Sep- Mar	Spray, Hand weed		<b>Mt Tugwell</b>

<b>Plantago coronopus</b>	Buck's horn Plantain	Sep-Mar	Spray		<b>Mt Tugwell</b>
<b>Plantago lanceolata</b>	Ribwort	Sep-Mar	Spray		<b>Mt Tugwell</b>
<b>Rubus fruticosus agg.</b>	Blackberry	Oct – Apr	Spray, Cut & Paint	<b>Populations reduced in abundance and extent</b>	<b>Mt Tugwell</b>
<b>Solanum mauritianum</b>	Wild Tobacco Tree	All Year	Hand weed, Cut & Paint, Drill/Fill		<b>Mt Tugwell</b>
<b>Trifolium spp.</b>	Clover	Sep-Mar	Spray		<b>Mt Tugwell</b>
<b>Zantedeschia aethiopica</b>	White Arum-lily	All Year	Hand Removal, Cut & Paint, Spray		<b>Mt Tugwell</b>

### Spear Thistle *Cirsium vulgare*



Erect annual/biennial herb matures from ground rosette to 2m. Showy red/purple flower heads on top of spine tipped stem. Widespread in pastures.



### Blackberry *Rubus fruticosus spp. aggregate*



Woody shrub with erect prickly cane stems that form dense thickets. Fruit spread by birds and foxes. Canes and root fragments form new plants.



### Ragwort *Jacobaea vulgaris*



Erect perennial herb to 1.2m. Initial rosette of leaves then produces erect stems. Numerous yellow daisy shaped flower heads. Poisonous. Can be confused with indigenous *Senecio* species.



#### Calendar key

Flowering

Seeding

Treatment



## 7. Compliance with Law

Managers are responsible for ensuring that employees and subcontractors are adequately trained in relevant environmental plans and procedures.

It is essential that those involved in the implementation of the handling and application of chemicals are fully trained. The following accreditations are the minimum requirements:

- Chemical Certification:
- AHCCHM101A – Follow basic chemical safety rules;
- AHCCHM201A – Apply chemicals under supervision;
- AHCCHM303A – Prepare and apply chemicals and
- AHCCHM304A – Transport, handle and store chemicals.
- First Aid and
- Drivers Licence – Light Vehicle.



# Appendix 2.

## Warburton Mountain Bike Trails

### Trail Inspection and Maintenance

### Guide

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#### 8. INTRODUCTION

Trails need to be maintained for the following reasons:

1. To achieve maximum usage by the intended users;
2. To make them last as long as possible;
3. To ensure that they do not become dangerous to the intended trail users;
4. To exercise the land manager's duty of care to the intended trail users to provide a safe trail;
5. To minimize the legal liability to the land manager.

All trails change and evolve over time. Changes that usually occur include:

- The accumulation of organic material (leaves, twigs etc) on the tread of the trail;
- The eventual obscuring of the trail by the growth of vegetation;
- Trees and branches frequently fall across trails, especially after heavy winds;
- Trail users often make unauthorised additions or alterations to trails;
- Local fauna can dig holes in trails or damage them with their hooves/feet;
- Landslips can cover trails, especially in steep or wet environments;
- Heavy rain can cause erosion;
- Trails that are heavily used can become compacted in the middle and cease to drain effectively.

Some of these changes are minor and unimportant and don't affect the experience, functionality or safety of the trail. Other changes have more significant effects and can have a drastic effect on the experience, functionality or safety of a trail.

The best way to manage the changes that can occur to a trail is to undertake trail maintenance. All trails need some level of maintenance. Even the most well-designed and constructed trails change over time and need some maintenance. A well designed trail should last many years, requiring only minor maintenance such as vegetation trimming, removal of organic material and drain cleaning. A poorly designed trail will not last very long and will require more frequent and more extensive maintenance works.

A good trail maintenance plan should have several components – routine inspections, routine maintenance days and the ability to respond as required to any major and unexpected maintenance needs (for example, after a storm when fallen trees or branches can render a trail unusable). It should be backed up with the necessary resources (both monetary and human) to implement the plan.

## 9. TRAIL INSPECTIONS

The most important element of any trail maintenance plan is probably the routine inspection. The point of these inspections is to identify any problems or changes to the trails that need to be repaired. They need to be undertaken regularly to be effective. The frequency of the inspections should be determined and depends on the resources available and the difficulty rating of the trail – the harder the trail, the less frequent the inspections.

This sliding scale for inspections is based on a trail's resilience to change and the needs of the likely users. For example, on an 'Easy' trail, if a tree falls across the trail, the trail is effectively no longer usable for the intended users (novice mountain bikers), as these users lack the skill to manipulate their bicycle up and over the fallen tree. On a 'Difficult' trail however, users expect to find fallen trees and other obstacles and possess the skill and willingness to jump their bicycle over them. Similarly, a hole on a 'Very Easy' trail could be construed as an unacceptable hazard, whereas the same hole on an 'Intermediate' trail would be expected and entirely normal. Trails that are intended for more advanced users are therefore more resilient to change.

The person/s conducting the inspections should possess a sound knowledge of trail construction and must:

- Be sufficiently familiar with the trails to be able to identify any problems/changes that have arisen;
- Be familiar with IMBA's TDRS;
- Have good attention to detail.

When undertaking an inspection, the inspector is attempting to identify any problems/changes to the trail, especially any that could lead to safety issues or the erosion of the trail. Typical problems or changes that could reasonably be expected to occur include the following. Note that many of these problems are specific to certain classes of trails and not to others:

### **Water damage**

All work undertaken by World Trail incorporates erosion protection measures that are designed to push water off the trail or protect the surface. Despite this, extreme weather events can occur which may cause damage to the trail. Extremely heavy rainfall events, due to the sheer volume of water unleashed, can overcome these erosion prevention measures and end up eroding the trail surface and batters. All trails should be inspected for water damage after excessively heavy rainfall events.

### **Loss of outslope**

Where a trail traverses a side slope, it should be slightly tilted or 'cambered' towards the downhill side. This is called outslope and ensures that any surface water flowing onto the trail from above will flow across the trail and continue down the hill (sheet flow), instead of being diverted along the trail (channelling). Over time, outsloped trails can become flat or even slightly 'cupped' or concaved. This 'cupping' is caused by two things: 1. The downward force applied by the tyres of mountain bikes causing the soil to compact in the middle of the trail; and 2. The flow of water and the impact of trail users causing organic material to migrate towards the lower edge of the trail, where it accumulates, causing the edge of the trail to become higher than the middle of the trail.

### **Blockage of grade reversal outlets**

A grade reversal is essentially a point where the trail changes from downhill to uphill. Any water flowing down the trail reaches the grade reversal and can go no further and so is forced off the trail. At the lowest point of the grade reversal, the edge of the trail should be scalloped out to ensure that there is a wide, clear outlet for the water. This outlet must be kept clear of organic material (leaves, bark, sticks) and soil in order for it to continue functioning properly. This is a key maintenance task, as any organic material that falls anywhere on the trail will eventually be pushed towards the grade

reversal outlet by the action of water and trail users. This is an ongoing and essential maintenance task. No matter how well constructed the trail is, in time the grade reversals will become clogged with organic material and soil. How quickly this occurs depends on the surface material of the trail, the amount of usage the trail receives, the volume and frequency of rainfall and even the surrounding vegetation.

#### **Build up of sticks/branches/trees/leaves on the trail**

Over time leaf litter accumulates on the trail surface. A moderate amount of leaf litter is acceptable, as it can slow the flow of water, thus protecting the actual trail surface, and it can also provide an enjoyable riding surface and a natural appearance. However, large sticks, branches or trees must be removed as soon as possible. Such items pose a hazard to the trail users and can also provide cause for users to detour around them, widening the trail or creating a new route.

#### **Usage by unauthorised users**

Recreational trails are often used by unauthorised trail users, such as motorbike riders, four wheel drives and even horse riders. This is particularly a problem in urban areas. In some instances, the trail is robust enough to withstand usage by these other users, but in many cases trail damage occurs, especially from motorised vehicles. These users exert more pressure on the trail than and can damage the trail surface. Motorbikes and four- wheel drives in particular can cause substantial displacement of the trail surface. Once a rut appears this can then affect the correct drainage patterns of the trail, causing water to pool on the trail. Water pooling on the trail can cause legitimate trail users to detour off the trail and can also lead to softening of the trail surface.

#### **Damage to signage**

Signage plays an important role in aiding navigation along trails and risk management. Unfortunately, it is subject to damage, through natural causes or human intervention. Natural causes include branches/limbs of trees falling and damaging signs, bushfires, strong winds etc. In urban areas, signage is often likely to suffer from some form of vandalism. Typically, signage may be defaced or graffitied, damaged or even stolen. As it forms a key tool in communicating the risks of the trail to the users, it is important that the signage is maintained so that it remains clear and legible.

#### **Loose rocks**

The movement of bike tyres and water can occasionally cause large rocks (100mm or larger) embedded in the trail tread to become loose. On the surface of the trail, such loose rocks can pose a hazard to riders. Rocks pulled out of the trail surface can also leave significant holes, which in turn become hazards or hold water. Holes should be filled with soil and compacted. Again, the urgency of this problem is dependent on the class of the trail. A large hole in the middle of an 'Easy' trail is a significant issue, whereas on a 'Difficult' trail it is not so urgent.

#### **Exposed tree roots**

Exposed tree roots can often be very slippery and thus present a hazard to some users on some classes of trail. Over time roots can become exposed by the gradual removal of soil from the trail tread. They only become hazardous when they stick up substantially above the surrounding trail tread, threatening to catch a tyre. The best treatment is to use soil to re-cover them as this avoids doing damage to the tree.

#### **Vegetation protruding into the trail corridor**

A well maintained trail should have a clear corridor, free of vegetation. The trail corridor should be as wide as the trail and approximately 2-3m high. Although heavy trail use tends to discourage heavy vegetation growth, over time vegetation lining the trail is likely to grow into the trail corridor. On trails that are rarely used, new plants can even become established in the trail tread itself. This vegetation poses a number of problems:

- o It can be dangerous to users if it protrudes into the trail corridor near eye height;
- o It can be annoying to trail users, detracting from the overall trail experience;

- o Some vegetation can be sharp or hard and can be extremely painful to push past;
  - o It can block the line of sight for trail users;
  - o It can push riders towards the outside edge of the trail, instead of the middle part of the trail.
- This part of the trail is often less stable than the middle and can lead to potential slumping of the lower batter.

These are just some of the changes that can occur to trails over time. This is not an exhaustive list. The actions of water, wind, animals and trail users are difficult to predict over long periods of time, hence the need to monitor and inspect the trails regularly.

## 2.1. INSPECTION FREQUENCIES

Australian Standard 2156.1 Walking Tracks Part 1: Classification and signage outlines the required inspection frequencies for each class of trail. In the absence of any similar standards for mountain bike trails that set out inspection frequencies it is recommended that inspections be undertaken in accordance with the Australian Standards for walking tracks, which are listed below.

- Class 1 (mostly closely corresponds to white circle IMBA) – monthly or less
- Class 2 (most closely corresponds to green circle IMBA) - 3 monthly or less
- Class 3 (most closely corresponds to blue square IMBA) - 6 months or less
- Class 4 (most closely corresponds to black diamond IMBA) - 6 to 12 months
- Class 5 (most closely corresponds to double black diamond IMBA) - 6 to 18 months

Based on the above, minimum inspection frequencies of the Warburton Mountain Bike trails should be:

1	6 months	10		19	6 to 12 months	28	6 months
2	6 months	11	3 months	20	3 months	29	6 to 12 months
3	6 months	12	3 months	21	6 months	30	6 to 12 months
4	6 months	13	3 months	22	6 months	31	6 to 12 months
5	6 months	14	3 months	23	3 months	32	6 months
6	6 to 12 months	15	6 months	24	3 months	33	6 to 12 months
7	3 months	16	6 to 12 months	25	6 months	34	6 months
8	3 months	17	6 months	26	6 months	35	6 months
9		18	6 months	27	6 months	36	6 months

Noting these represent the minimum inspection frequencies that are required and more regular inspections are encouraged, particularly following extreme weather events, pre and post events, and following any reports of vandalism or damage.

## 10. TRAIL MAINTENANCE WORKS

Trail inspections generate trail maintenance works. That is, through the process of undertaking the inspection, problems/changes are identified that need to be addressed.

These works could be either urgent or non-urgent. This requires the person undertaking the inspection to make a subjective (but informed) assessment as to whether a problem is considered urgent or non-urgent. A problem would be considered urgent if it:

- Poses a significant safety risk (eg. a broken timber on a bridge or wooden berm);
- Is likely to lead to significant trail damage if not rectified (eg. a spring has appeared above the trail and is causing erosion of the trail tread);
- Makes the trail un-usable.

Whether a problem is urgent or not may also depend on the difficulty rating of the trail and the level of usage it receives.

In some cases, the simplest way to fix a problem on a trail is to fix it while undertaking the inspection. However, many problems that need to be fixed require more people, equipment or materials than it is practical or economically feasible to send out on an inspection. A more efficient approach is to simply record the works required and add them to a list of works to be carried out at the next scheduled trail maintenance day (assuming that they are not urgent).

### 3.1. SCHEDULED MAINTENANCE DAYS

Scheduled trail maintenance days are planned to occur on a regular basis into the future. By allocating time and resources to trail maintenance on a regular basis, rather than on an 'as needs' basis, it is possible to estimate and plan for the cost of undertaking that maintenance. The nature and location of the works will be dictated by the information recorded during the inspections. For example, during an inspection it is recorded that grade reversals have become clogged with organic matter and are not draining properly. This problem is not deemed especially urgent and so it is placed on the work program for the next scheduled trail maintenance day.

By grouping all the non-urgent maintenance works into scheduled trail maintenance days, efficiency and cost effectiveness is maximised. A small team of personnel (2-3 people) with the appropriate skills, equipment and qualifications to undertake the required works can be determined and allocated in advance. Most of the tasks undertaken are likely to be fairly minor in nature, requiring only basic tools and minimal personnel – trimming the trail corridor, removing organic matter and soil from grade reversal outlets, using leaf blowers to remove leaf litter from the trail etc. Sometimes more labour intensive tasks may be required, such as replacing some rock armouring or resurfacing a small section of trail. These tasks may require additional personnel, equipment and materials. By implementing regular trail inspections and having predetermined trail maintenance days, it is possible to plan in advance to ensure that the appropriate resources are available for the works required.

Typical tasks that would likely be undertaken during a scheduled trail maintenance day are shown in Table 1 below. This is not an exhaustive list.

**Table 1. Typical Trail Maintenance Tasks Undertaken on Scheduled Trail Maintenance Days**

<b>Problem</b>	<b>Solution</b>	<b>Tools Required</b>
Organic material and/or soil is blocking the egress of water off the track.	Remove soil and organic matter blocking the grade reversal outlet.	Shovel Rake hoe
Fallen sticks/ branches/leaves obscuring the trail surface, making it slippery and hard to see the trail surface.	Remove sticks/branches/ leaves from trail surface.	Leaf blower Grass rake Hand saw
Important directional or advisory signs graffitied.	Use a chemical solvent to remove spray paint.	Solvent
Important directional signposts removed.	Install new signposts or symbols (arrows, trail identification numbers etc) as required.	Shovel Auger Drill
Plants growing beside the trail are blocking the trail corridor, making it difficult to pass.	Prune/cut any vegetation protruding into the trail corridor. Pull out any plants growing on the actual trail surface.	Hand saw Chainsaw Hedge trimmer
Loose rocks in trail tread	Remove any loose or unstable rocks from the trail surface. Fill hole with soil and compact.	Shovel Mattock
Trail has become cupped instead of outsloped.	Remove soil that has built up on the lower edge of the trail.	Rake hoe Shovel Mattock
Handrail on bridge is showing signs of decay.	Remove old rotten handrail and fastenings and replace with a new handrail and fastenings.	Drill Saw Carpentry tools

Although scheduled trail maintenance days will account for the bulk of all maintenance works carried out, occasionally there may be a need to undertake maintenance works urgently. These maintenance works are generally required where the problem can't wait until the next scheduled trail maintenance day.

### 3.2. URGENT MAINTENANCE WORKS

Some likely types of works that would be considered urgent are listed in Table 2 below.

**Table 2. Possible Urgent Trail Maintenance Works**

<b>Problem</b>	<b>Solution</b>	<b>Tools Required</b>
Following extreme rain event the trail is substantially damaged by water.	Run-off channels need to be filled in, compacted and smoothed over. Puddles need to be drained, allowed to dry, filled in, compacted and smoothed over.	Shovel Rake Rake hoe
After heavy winds or storms, trees often fall across trails.	Trees need to be cut into smaller pieces and removed. Assessments by qualified arborists may be required if trees adjacent to the trail appear to be damaged.	Chainsaw
Trail slip. Trails built along side slopes can be prone to slipping. This usually occurs after heavy rain and can be caused by the top batter slumping onto the trail, or the lower batter slipping down the hill.	Upper batter slips can be easily fixed by removing the fallen soil and rocks and re-shaping the trail tread and batter. If the lower batter slips down the hill, the trail may need to be re-built with rocks or a different alignment.	Shovel Mattock Rake hoe Rake
Tree has fallen and broken a timber bridge or berm	Cut and remove tree. Replace timber member if possible.	Chainsaw Drill Saw Other carpentry tools

If an urgent problem cannot be rectified immediately, then the trail should be closed until it can be rectified.

When carrying out any trail maintenance works or inspections, all necessary safety precautions should be taken. World Trail recommends appropriate Personal Protective Equipment (PPE) be used for all works. Any tasks requiring machinery operation (excavator, chainsaw etc) must only be undertaken by suitably qualified and licenced individuals. All works should be undertaken to a thorough, professional, industry level standard.

### **3.3. MAINTENANCE TASKS**

The following list of maintenance activities should be undertaken as required on each trail. In general these should be undertaken (and recorded – see Section 4 below) during the trail inspections, or undertaken as required and/or identified during the regular inspections. All works should be undertaken in accordance with IMBA (International Mountain Bicycling Association) guidelines.

#### **10.1 Vegetation pruning**

As the trails are built in dense vegetation areas, any vegetation that is encroaching onto the trail corridor should be pruned back to provide a clear and safe trail corridor. Pruning of encroaching vegetation, should be carried out in accordance with AS 4373-2007, i.e. prune to the collar of any branch stem to allow the wound to heal naturally, and under-cut larger and/or heavy and/or awkward branches first to prevent bark tearing and reduce risk of infection.

Any removed vegetation should be disposed of away from the track edge and ensure no sharp protrusions (e.g. cut stumps) are left within the track corridor or rider fall zone.

#### **10.2 Trail sweeping**

The trail surface should be swept and/or blown as required to remove any surface deposits to keep the trail surface clear and safe for users. Fallen branches/trees across the trail should also be removed, some of which may first require hand or chain sawing.

#### **10.3 Trail edge mowing/brushcutting**

Any trail sections with grass edges should be mowed or brushcut as required to keep grass from encroaching onto the trail corridor.

#### **10.4 Weed control**

Invasive weed species should be chipped or sprayed from the track edges or track surface. If removal is done by mechanical chipping (e.g. pick) care should be taken not to damage the trail surface. Where spraying is used to treat weeds care should be taken to use herbicides registered for use near waterways (where relevant) and to avoid spraying in windy conditions and any collateral damage to surrounding vegetation. The actual ride lines will typically be kept clear by the mechanical shearing action of riding over any germinating weeds, however spraying is likely to be needed to keep weed species from encroaching on to the track edges.

#### **10.5 Clearing drains**

Collections of silt or other materials should be cleared from drainage structures to ensure water can flow clearly through the drain and continue to operate effectively (i.e. the low point on grade reversals).

## **10.6 Minor drainage works**

Minor drainage works should be undertaken where simple measures (e.g. trail knick, drain re-shaping) can remove water that is pooling on the trail surface. Significant or persistent drainage problems that require substantial drainage measures should be noted and reported for consideration for inclusion in future trail upgrade/construction works.

## **10.7 Minor trail surface repairs**

Minor trail surface repairs should be undertaken during the regular inspections (or as needed and identified during the inspections). This should include patching depressions or removing protrusions on the trail surface, trail edges, and drainage structures.

Basic, small-scale surface repairs can often be done simply by reworking that direct area – i.e. breaking the surface up, reshaping, watering and re-compacting. A shovel and watering can often be sufficient for these minor repairs.

## **10.8 Address detours (e.g. shortcuts)**

Minor works to remedy user-created detours and shortcuts should be undertaken if/as they are identified during inspections. This would typically involve laying nearby sticks, branches and leaf litter onto the shortcut. Large rocks and or strategic planting may be required to close off any persistent detours/shortcuts.

## **10.9 Removal of litter**

General litter and trash should be removed from within the trail corridor during each inspection as required. Significant litter/waste dumps should be reported to the land manager as soon as possible.

## **10.10 Signage**

Any observed signage that is missing or damaged should be reported and replaced as soon as possible.

## 11. REPORTING

It is recommended that maintenance activities be recorded during each regular inspection (and as undertaken) on a form similar to that provided below. This will help the land manager to:

- develop a long term record of maintenance activities undertaken that will assist with future budgeting requirements;
- provide a record that will assist with risk management, where records will demonstrate trail inspections and maintenance have been undertaken in accordance with recommended practices.

## Draft Maintenance Record Sheet

Date	Trail name	Describe tasks undertaken <sup>1</sup> And highlight any follow up required. (use reverse if additional space required)	Undertaken by	Hours work <sup>2</sup>

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<sup>1</sup>Tasks such as: Vegetation pruning; trail sweeping; edge mowing/brushcutting; weed control; clearing

<sup>2</sup>Hours work = number of staff x time worked