THREDBO

ALPINE VILLAGE

Thredbo MTB

Mountain Bike Trail Management Plan

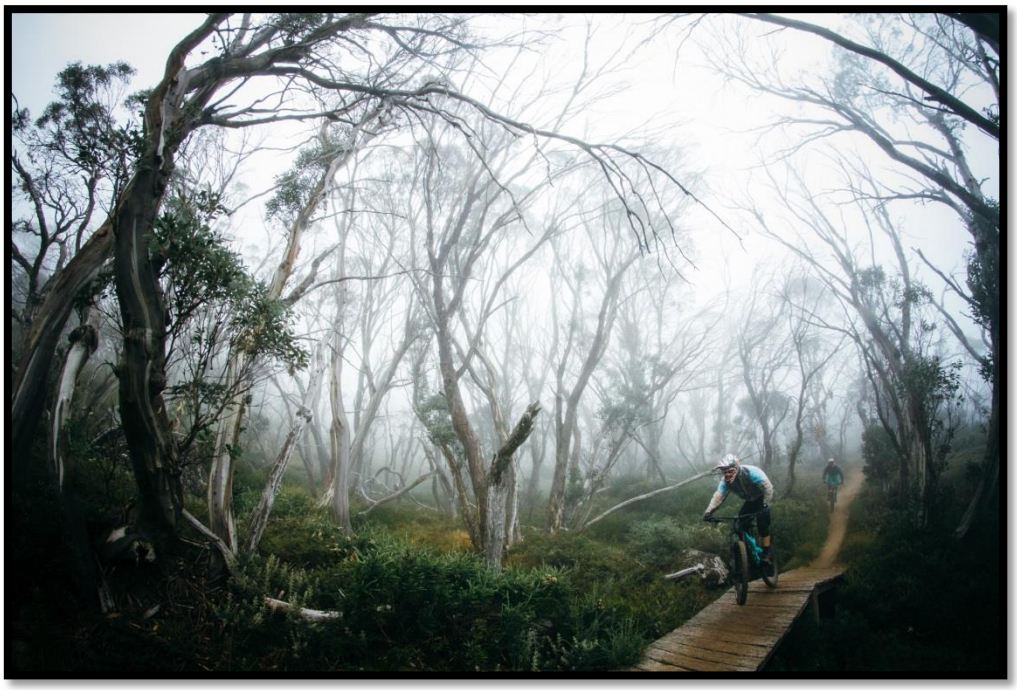

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Table of Contents

1 Introduction

Mountain biking at Thredbo is a large component of the summer activities offered within the resort. The increasing mountain bike visitation to the resort has triggered the need for expansion of the trail network. Increased mountain bike traffic and an increased footprint from the development of additional trails results in additional environmental impact from the trail network and its use. The requirement for a mountain bike trail management plan has been identified as a component of the development application process for additional trails within Thredbo resort. The management plan is aimed to set out the management requirements and guide the maintenance works required to sustainably manage the trail network. As an additional component, the management plan sets out the monitoring and reporting requirements to monitor the environmental condition of the trails and their impact on the surrounding environment.

1.1 Background

Thredbo resort is located in the southern ranges region of New South Wales, occupying an area of 960 ha within the southern portion of the Kosciuszko National Park, approximately 35 km from Jindabyne (figure 1). Thredbo resort is a year round tourist destination, with snow related activities on offer during the winter months and activities such as hiking and mountain biking during the summer months.

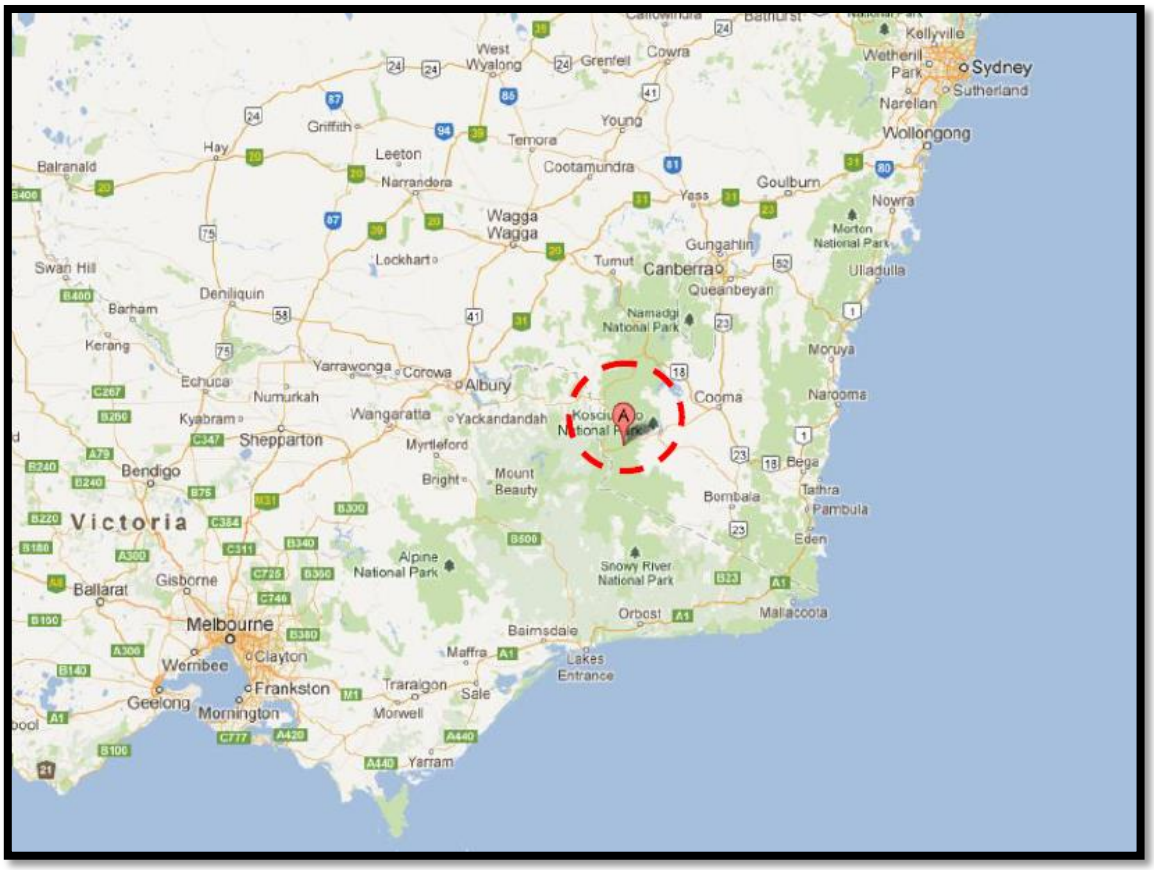


Figure 1 - Location of Thredbo Village (Source: Google Maps)

Thredbo offers a largely gravity focussed mountain biking experience, with a total of 28.5 km of mountain bike trails and summer long chairlift access. The gravity focus of Thredbo's trail network compliments the Snowy Mountains region's mountain bike offerings, with the Thredbo Valley Track, Lake Crackenback Resort, Lake Jindabyne and Cooma trails providing a predominantly cross country riding experience.

Thredbo's mountain bike trails originally utilised the existing mountain access road network until purpose built trails were constructed. The initial construction works involved the establishment of the Thredbo Downhill trail, an advanced level trail. In 2012 an intermediate level trail, the Kosciuszko Flow trail, was constructed to cater to less advanced riders. In 2015 Thredbo's All Mountain Trail was proposed to be a new intermediate level trail in Thredbo's network. The All Mountain Trail is designed to provide the longest trail in both length and elevation descent within the resort. The trail has a focus on flow with technical trail sections while providing scenic views of the Thredbo Valley and surrounding area. Links to Thredbo's cross country trail network, and the Thredbo Valley Track, are incorporated into the trail. The construction of the All Mountain Trail and the integrated cross country trails was undertaken in several stages, with the final completed trail opened in 2017.

1.2 Objectives

The objective of the trail management plan is to set out the management, maintenance and monitoring requirements in order to effectively manage Thredbo's mountain bike trail network. The objectives of the plan are as follows:

- Identify key staff in the daily management of the trail network;
- Set out trail maintenance requirements and priorities;
- Provide guidance for the trail construction and maintenance activities;
- Dictate trail opening and closing parameters;
- Set out the trail monitoring and reporting requirements;
- Ensure conformance to the principles of the trail management and maintenance guidelines set out by the International Mountain Bicycling Association (IMBA).

This management plan is intended to provide an overarching management framework for the entire Thredbo mountain bike trail network (existing and proposed) as well as specifically addressing the requirements set out in condition G.5 of the development consent for the construction of Thredbo's mountain bike trails stage 1B (DA 6571), while maintaining consistency with the Sustainable Mountain Biking Strategy (NPWS). This plan has been created with reference to the Kosciuszko National Park Plan of Management (2006) and the International Mountain Biking Association guidelines (Trail Solutions and Managing Mountain Biking).

2 Trail Network

2.1 Existing Trail Network

Thredbo's existing trail network consists of nine trails, with a total length of 28.5 km. The network is comprised of three gravity focused trails and six cross country trails. The network is comprised of a mix of single track and shared use trails, with three of the cross country trails also being utilised as walking trails within the village. The three gravity focussed trails and three of the cross country trails are dedicated single track. A map illustrating the trails is provided as appendix 1.

2.1.1 Gravity Trails

Thredbo Downhill

The Thredbo downhill is Thredbo's premier gravity focussed trail. Graded as a double black diamond, the trail has advanced technical sections and a dedicated jump park incorporated into the 3km of trail. The Thredbo Downhill is the main trail to host events including the Cannonball Downhill. The downhill trail is a legacy trail first constructed in the early 1990's with no formal DA approval, as construction pre-dated the Alpine State Environmental Planning Policy (SEPP) and IMBA guidelines. The trail was formalised in its current alignment in the 1995/6 summer period.

Kosciuszko Flow

The Kosciuszko Flow trail is Thredbo's intermediate trail, with an increased focus on flow in comparison to the Thredbo Downhill trail. The trail is 4 km in length and primarily gravity focussed, with some intermediate level technical sections. The Kosciuszko Flow trail was first established in 2005 to cater to riders with less technical skill than required for the Thredbo Downhill trail. The trail is not subject to an approved development application.

All Mountain

Thredbo's All Mountain trail is an 8.5 km trail traversing from the alpine zone (above 1800m elevation) to the valley floor. The trail began construction in the 2014/15 summer period, with section 1A (DA 6114) beginning at the top of the Gunbarrel chairlift and returning to the base of the Kosciuszko Express chairlift. The trail also has a return to link to Friday Flat via the Friday Flat loop trail and the Kosciuszko Flow trail via the Flow Link Trail. The second stage of the All Mountain Trail (DA 6571) begins at the top of the Kosciuszko express chairlift and connects to stage 1A at the top of the Gunbarrel chairlift. Stage 1B was constructed over the 2015/16 and 2016/17 summer periods.

2.1.2 Cross-Country Trails

Village Loop

The village loop trail is a 2.8 km single track cross country trail which forms a loop of the Valley Terminal end of Thredbo Village. The trail was constructed as a component of Thredbo Mountain Bike Trails – Stage 1A (DA 6114).

Friday Flat Loop

The Friday Flat Loop trail is a 2.5 km single track cross country trail situated in the Friday Flat area of the village. The trail was originally constructed as a component of Thredbo Mountain Bike Trails – Stage 1A (DA 6114).

Pipeline Path

The pipeline path is a legacy trail originally being constructed as part of Thredbo's walking trail network. The trail is a 2.3km shared use trail, forming a loop following the Thredbo River and Thredbo's snowmaking reservoirs and back along Friday Drive. As a component of DA6114 the pipeline path was extended to follow the edge of the Friday flat day carparks. The trail also provides a link from the Pipeline path to the Friday Flat loop trail and the Thredbo Valley Track trailhead.

Bridle Trail Loop

The Bridle Trail Loop is a 2.3 km legacy shared use trail which utilises the first 1km section of the Thredbo Valley Track with a loop at the end of this section and returning to Friday Flat along the same section of the Thredbo Valley Track. The Bridle Loop trail was originally constructed as a component of Thredbo's walking trail network with no formal DA approval.

Golf Course Loop

The Golf Course Loop trail is a 2.4km shared use legacy trail originally constructed as a part of Thredbo's walking trail network with no formal DA approval. The trail forms a loop of the Thredbo golf course, utilising the first 1 km of the Riverside walk and returning to the start of the trail via Crackenback drive.

Golf Course Connector

The Golf Course connector is a 0.6 km link trail which connects the Golf Course loop trail to an intersection with the Kosciuszko Flow, All Mountain and Village loop trails. The trail was initially established as a component of the Golf Course Loop trail for use in cross country biking events.

2.1.3 Parks

Pump Track

The Village Green has a purpose built pump track for skill development, park based riding and events. The pump track has development consent as part of the Village Green Enhancement Project (DA 6877)

Skills Park

The resort has a small skills park at the Valley Terminal based area utilised to induct first time riders prior to accessing the gravity trails.

Hollywood and Kosci Jumps Parks

As part of the Cannonball and Flow trail gravity experiences there are two jump parks – Hollywood Park located above the Catshed between the Kosciuszko Express and Snowgums chairlifts and the Kosci Park on the Village Trail just above Valley Terminal. In both cases the

park features are built prior to the mountain bike season and then de-constructed for the snowsports season so as to return the ski area to safe and manageable (groomable) slopes.

Spring construction involves building of earthen features (jumps, pump features and berms) along with built features such as wall rides and bridges. All earthen features will be formed with existing site soil (de-constructed in autumn) by excavator. Features will not exceed 2.4 metres in height from natural ground level. Construction will not require cut excavation with all material re-shaped from the previous year. Autumn de-construction will involve flattening and spreading of all material for re-use in the next spring construction period.

All constructed features will have their side walls, batters or berms appropriately covered with matting, mulch, tacifier and chewings fescue grass seed. All reasonable efforts will be made to maintain cover on these walls, batters and berms as erosive resistant.

2.1.4 Hygiene Stations

Valley Terminal bike bunded washdown facility with dedicated wash bay, high pressure water and cleaning facilities.

Dry hygiene stations at Valley terminal (tennis court), Friday Flat and TVT trailhead. All are the NPWS standard dry hygiene station as found on the TVT.

2.2 Planned Trail Network

Thredbo has engaged DirtArt, Australia's leading mountain bike and recreational trail design, consultancy and construction company to produce a Trail Master Plan for the resort. This plan is aimed to set out the future direction of mountain biking within Thredbo and provide concept designs for future trail development within the resort. This Mountain Bike Master Plan is currently under development.

3 Trail Management and Maintenance

The mountain bike trail management prescriptions, maintenance actions and schedule are detailed below, with the organisational management structure associated with the day to day operations and management of the trail network identified. The trail management and maintenance section of this plan guides the management and maintenance works required for the trail network.

3.1 Management Structure

3.1.1 Key Management Staff

The key management personnel associated with the day to day operations and management of the trails are identified as follows with an outline of the responsibilities of each position relevant to the management of the trail network.

Resort Operations Manager

- Oversee all aspects of resort operations, including mountain biking
- Engagement of contractors
- Compliance monitoring
- Community and Stakeholder engagement

Mountain Manager

- Oversee day to day mountain operations, including mountain bike trail management
- Trail monitoring inspections and works scheduling
- Compliance monitoring and reporting
- Stakeholder engagement

Slopes Manager

- Coordination of trail crews
- Trail monitoring inspections
- Works scheduling
- Compliance Monitoring

Environmental Coordinator

- Environmental monitoring and reporting
- Trail monitoring inspections
- Compliance Monitoring and reporting
- Stakeholder engagement

Trail Maintenance Crew Leader

- Trail construction and maintenance
- Direction of works crews
- Trail monitoring inspections
- Compliance monitoring

3.1.2 Operational Staff

The operational departments associated with the day to day maintenance and management of the trail network are identified below, with a brief outline of the responsibilities of each department relating to trail maintenance and management.

Trail Maintenance Crews

- Undertake trail maintenance and construction works, including rehabilitation and stabilisation works
- Trail condition inspections and issue reporting

Mountain Bike Trail Guides

- Day to day public trail use management
- Daily trail condition monitoring inspections
- Environmental and safety issue reporting

Bike Patrol

- Emergency first response and management
- Trail safety monitoring inspections
- Trail signage inspection and maintenance
- Undertake trail maintenance works as required

3.2 Staff Training and Induction

A formalised staff induction and training regime is conducted on an annual basis, prior to any construction or preparation works associated with the trail network commencing each season. The training and induction program is provided through a combination of an internal mountain bike trail specific induction/training course and external trail building workshops and training courses.

The internal induction and training course is a requirement for all new staff associated with the mountain bike trail network, with the requirement for an annual refresher course to be undertaken by permanent and returning staff. The opportunity for external training for select staff is sought periodically, with priority given to permanent and returning staff members. The staff members selected for external training courses is at the discretion of the Mountain Manager. The details of the mountain bike trail induction are set out in a separate document, with an outline of the induction contents set out below.

3.2.1 New Staff Training/Induction

The training program for all new staff associated with the maintenance and management of the mountain bike trail network is based around a mountain bike trail specific induction. This induction and training is an in house 2 day course conducted prior to the commencement of each mountain biking season by KT management staff, with assistance from guest instructors engaged to conduct the course. The modules included in the induction and training course include the following:

1) **Hazard Identification and Safety Procedures**
    - Safe operating procedures and safe work method statements
    - Hazard identification and reporting
    - Incident reporting and management
    - Mountain and trail access, including 4wd vehicle operation
    - Communication procedures and protocols

2) **Environmental Awareness**
   - Mountain ecology overview, including alpine area sensitivity
   - Environmental impact minimisation
   - Pest and weed identification and management
   - Erosion and Sediment control
   - Environmental issue identification and reporting
   - Revegetation and rehabilitation
   - Bike hygiene station location, operation, and maintenance
   - Guest information and education
3) **Trail Construction and Maintenance**
   - Introduction to International Mountain Biking Association guidelines
   - Trail construction and maintenance procedures and techniques
   - Trail drainage and water management
   - Site stabilisation and revegetation
4) **Trail monitoring**
   - Introduction to trail monitoring program
   - Safety monitoring and issue reporting
   - Environmental monitoring and issue reporting
   - Trail opening and closing parameters

3.2.2 Permanent/Returning Staff Training and Induction

The refresher course for permanent and returning staff associated with the maintenance and management of the mountain bike trail network is based around a mountain bike trail specific induction. The induction and training course is a 1 day course conducted prior to the commencement of each mountain biking season by KT management staff, with assistance from guest instructors engaged for training purposes. The modules included in the induction and refresher course include the following:

1) **Hazard Identification and Safety Procedures**
   - Safe operating procedures and safe work method statements
   - Hazard identification and reporting
   - Incident reporting and management
2) **Environmental Awareness**
   - Environmental impact minimisation
   - Pest and weed identification and management
   - Erosion and Sediment control
   - Environmental issue identification and reporting
   - Revegetation and rehabilitation
   - Bike hygiene station operation and maintenance
   - Guest information and education
3) **Trail Construction and Maintenance**
   - International Mountain Biking Association guidelines
   - Trail construction and maintenance procedures and techniques
   - Trail drainage and runoff management
   - Site stabilisation
4) **Trail monitoring**
   - Safety monitoring and issue reporting
   - Environmental monitoring and issue reporting
   - Trail opening and closing parameters

3.3 Trail Opening and Closing

The trail network periodically requires either partial or full closure, which is dictated by factors such as rider safety, adverse weather conditions and mountain bike event schedules. The primary factors influencing the periodic opening and closing of trails is rider safety and the potential for the trail and surrounding environment to sustain damage due to trail use. The potential for damage to the trails and surrounding environment arising from trail use is largely dictated by the nature and severity of weather events. The secondary factor in periodic trail closure is operational requirements for trail maintenance activities. Mountain bike events are planned in advance with measures for trail closure in place prior to the event date. In the event of one of the following trail opening and closing parameters being triggered, the trials will not be opened for daily operations in the first instance with issues detected during operations triggering the closure of the trail.

3.3.1 Trail Opening and Closing Parameters

3.3.1.1 Trail User Safety

The daily trail monitoring events (detailed in section 4 of this plan) are aimed to ensure the trails are safe for public use, with all trails signed off by the MTB trail guides prior to the commencement of daily operations. As rider safety issues are largely influenced by the overall trail condition, environmental factors play a large role in the safety of riders using the trail network. The issues triggering trail closure include, but are not limited to the following:

- Integrity of the trail surface, including trail features (jumps, berms, bridges, etc.)
- Damage to structures (platforms, bridges, jumps, etc.)
- Trail drainage and water management
- Obstructions within the trail corridor (tree branches, rocks, etc.)
- Daily weather (outlined in section 3.3.2)
- Snow covering the trail surface

Shared use trail user safety will be managed through the provision of guest education and signage. Thredbo's shared use trail policy is that walkers give way to riders in order to minimise user conflict and potential for injury to any party.

3.3.1.2 Weather

The potential of the trails and surrounding environment to sustain damage due to trail use is impacted to a large degree by the severity of weather events. Major rain and snow events cause the trail surface to become unsuitable for traffic, due to the increased potential for sediment movement. The daily weather conditions are constantly monitored by the Mountain Manager and Lifts Manager, with advice forwarded to the MTB trail guides prompting trail inspections to assess the trail condition. If the intensity of any rainfall event causes substantial runoff or pooling on the trails, the trails are closed until conditions have improved enough to allow trail opening. In the event of snow lying on the trails, the trail network is closed until the snow has thawed and the trail surface has sufficiently drained to allow trail use. The guidelines for weather events triggering additional trail inspections and closure are set out below.

- Additional trail inspections by trail guides – > 10mm rainfall over a 4 hour period (within 1 calendar day)
- Trail closure - >30mm of rain within a 12 hour period (within 1 calendar day)

3.3.1.3 Maintenance Works

The operational requirements for trail maintenance activities may necessitate either partial or full closure of the trail on which the maintenance works are being carried out. The scale and extent of the trail maintenance works dictates the length of trail to be closed for each maintenance event. In the event of a partial trail closure, a bypass of the trail section undergoing maintenance works is to be put in place to exclude riders from the work site. Trail maintenance works may also be conducted outside of operational hours to avoid the closure of trails. All trail closures are to be implemented as outlined in section 3.3.5 of this plan.

3.3.1.4 Mountain Bike Events

Mountain Bike events are pre-scheduled with all trail closures set in place prior to the beginning of the event. Information on all trail closures and times is provided to the public through notification on Thredbo's website, information available at the ticket office and MTB retail and rental store and Thredbo's information centre. All mountain bike events are run with regard to all of the trail opening and closing parameters.

3.3.1.5 Hygiene Stations

Mountain bike and boot hygiene stations have been installed at Valley Terminal and Friday Flat base areas in order to minimise the amount of foreign soil and weed propagules transported from outside of the National Park. These hygiene stations consist of both wet and dry stations for bikes and brushes at each station for boots. In the event of the bike and boot hygiene stations being not operational the trails will not be opened for daily operations. If the stations become inoperable at any stage during the day any new riders will not be allowed to use Thredbo's trail network until the hygiene stations have been returned to appropriate operating condition.

3.3.2 Trail Closure Procedure

All trail closures (full and partial) require the notification of guests and riders on the trail status. This information is to be provided to guests indirectly via Thredbo's website and social media pages and directly through Thredbo's guest services, Thredbo's ticket office and Thredbo's MTB rental and retail store. Trail closure notification is also required on each closed trail. The on-trail notification is to consist of the installation of appropriate signage at the base of the access chairlift and the start of each closed trail. In the event of a partial trail closure, appropriate signage is to be installed prior to the bypass with the trail section taped off to exclude riders from the work site.

3.4 Emergency Response

Emergency and incident response is undertaken by Thredbo Bike Patrol personnel, with the assistance of NSW Emergency Services where required. Thredbo Bike Patrol liaises with the NSW Emergency Services in the event of a major incident and where additional assistance is required.

3.4.1 Emergency Contact

Emergency contact numbers, including contact numbers for Thredbo bike patrol are displayed at all trail head locations and at the base stations of lifts. The emergency contact numbers are as follows:

Thredbo Bike Patrol	NSW Emergency Services	Thredbo Medical Centre
Phone: (02) 64594147	000	(02)64576254

3.4.2 Emergency Access

Bike patrol and emergency services vehicle access to all sections of the trail network is facilitated by Thredbo's mountain road network. The mountain road network allows on-ground evacuation from the trail network. The vehicles used to access all areas of the mountain consist of the following:

- 4WD Vehicle (Ski Patrol Toyota Landcruiser)
- Kubota ATV
- Quad Bikes
- Mountain Bikes

The village green precinct in Thredbo serves as the emergency helicopter access point for patient transfer from ground to air transport.

3.4.3 Trail Position and Maps

The trail network is equipped with markers clearly displaying the trail distance traversed (since start of trail) at 200m intervals. These markers allow riders to assist Bike Patrol and Emergency services in locating injured riders. Thredbo Bike Patrol and the NSW Emergency services (Thredbo Fire Brigade) have been supplied with a trail zone map clearly displaying the trail and mountain road network. The trails on the map are divided into operational zones to assist in emergency response and trail access planning. The trail zone map is provided in this plan as appendix 2.

3.5 Trail Maintenance

3.5.1 Management Prescriptions

The trail network is to be subject to a comprehensive monitoring program (detailed in section 4 of this plan). The monitoring events are undertaken to identify environmental and safety issues associated with the trails and determine the nature and extent of the maintenance works required to rectify any issues. The general maintenance works required for the trail network are outlined below; however the maintenance works are not limited to the following.

- Drainage and erosion issues are to be addressed to achieve effective water management and minimise soil movement from the trail;
- Exposure of tree roots/bases and sub surface rocks is to be addressed to ensure the protection of vegetation;
- Braking ruts are to be addressed to ensure trail surface integrity;
- Berms and embankments are to be re-instated/re-constructed where required to minimise soil movement and ensure trail surface integrity;
- Stabilisation and revegetation of disturbed areas to minimise soil movement and inhibit weed colonisation;
- Weed management within trail verges and adjacent to trail corridor;
- Maintenance of revegetated areas to ensure effective establishment;
- Delineation of trails to ensure riders stay on track;
- Built structures are to be maintained to ensure protection of sensitive areas and rider safety.

All trail maintenance works are to be carried out manually with the use of rakes, picks, shovels, handheld brush cutters, chainsaws and mini-excavators for larger scale trail maintenance and construction works. The works are to be undertaken with regard to minimising direct and indirect adverse environmental impacts including damage to the surrounding environment. The trail design and associated maintenance works are to be carried out to ensure soil retention and erosion prevention in the first instance, ensuring an environmentally sustainable trail.

3.5.2 Maintenance Works Triggers

The requirement for maintenance works is triggered by the observation of environmental issues, identified through the trail monitoring (detailed in section 4 of this plan). The maintenance works triggers take into account issues on the trail tread, trail verges and areas adjacent to the trails. The observations which trigger the maintenance works are outlined as follows:

1. **Erosion and Water Management:**
    - Water pooling on trail
    - Water channelling
    - Sediment runoff from trail
    - Sediment collection in sumps
    - Tree root/base exposure
    - Sub-surface rock exposure
    - Stutter bumps/braking ruts
2. **Batters, Berms and Embankments**
    - Loose soil on embankments/batters
    - Sediment movement from embankments
    - Undercutting of berms/batters/embankments
3. **Vegetation**
    - Damage to native vegetation
    - Weed occurrence in trail verges and adjacent to trails
    - Re-vegetation area maintenance
4. **Unauthorised Trail Formation**
    - Trail widening/rock avoidance
    - Corner cutting
    - Stop off areas
    - Intentional unauthorised trail construction
5. **Built Structures**
    - Damage to structures
    - Damage to entrance/exit from structures
    - Season opening and closing bridge decking refitting/removal
    - Damage to hygiene stations and general maintenance

3.5.3 Maintenance Schedule

The maintenance schedule (tabled below) is aimed to guide the trail management actions and timing of the works required to maintain the trail network to the required standard. The maintenance schedule is also aimed to assist with the planning of pre and post mountain biking season trail works.

Category	Maintenance Trigger	Management Prescription	Method	Timing
Erosion and Water Management	Water pooling	• Ensure effective trail drainage and water management • Minimise sediment movement • Minimise potential for frost heave	• Manual shaping of trail surface • Installation of additional drainage measures • Manual re-construction of trail section	• Prior to season opening • After rain and snow events • Ongoing as required
	Water channelling	• Minimise sediment movement • Ensure effective trail drainage and water management • Minimise sedimentation of surrounding environment • Ensure integrity of trail surface	• Manual shaping of trail surface • Installation of additional drainage measures • Installation of additional trail protection measures	• Prior to season opening • After rain and snow events • Ongoing as required
	Sediment runoff	• Minimise sediment movement • Minimise sedimentation of surrounding environment	• Installation of additional drainage measures • Installation of sediment controls • Manual re-construction of trail section	• Prior to season opening • After rain and snow events • Ongoing as required
	Sedimentation of sumps	• Minimise sediment movement • Ensure effective trail drainage and water management • Minimise sedimentation of surrounding environment	• Manual shaping of trail surface • Installation of additional drainage measures • Installation of additional sediment controls	• Prior to season opening • After rain and snow events • Ongoing as required
	Tree root/base exposure	• Minimise sediment movement • Protect native vegetation • Ensure rider safety	• Manual shaping of trail surface • Installation of additional tree protection • Re-surfacing of trail • Re-construction of trail section	• Prior to season opening • Ongoing as required
	Sub-surface rock exposure	• Minimise sediment movement • Ensure integrity of trail surface • Ensure rider safety	• Manual shaping of trail surface • Re-surfacing of trail • Manual re-construction of trail section	• Prior to season opening • Ongoing as required
	Stutter bumps/braking ruts	• Minimise sediment movement • Ensure integrity of trail surface • Ensure rider safety	• Manual shaping of trail surface • Re-surfacing of trail • Installation of additional trail protection measures	• Ongoing as required • After MTB events and busy periods

Category	Maintenance Trigger	Management Prescription	Method	Timing
Batters, Berms and Embankments	Exposed Soil	• Minimise soil movement • Minimise the potential for frost heave • Minimise sedimentation of surrounding environment	• Installation of stabilisation measures • Undertake re-vegetation works • Installation of additional sediment control measures	• Prior to season opening • Ongoing as required
	Sediment runoff	• Minimise soil movement • Minimise sedimentation of surrounding environment	• Installation of additional sediment control measures • Installation of stabilisation measures • Undertake re-vegetation works	• Prior to season opening • After rain and snow events • Ongoing as required
	Undercutting	• Minimise soil movement • Minimise the impact of sedimentation on surrounding environment • Ensure integrity of trail surface • Ensure rider safety	• Manual shaping of trail surface • Re-surfacing of trail • Manual re-construction of trail section	• Prior to season opening • After rain and snow events • After MTB events and busy periods • Ongoing as required
Vegetation	Damage to Native Vegetation	• Protect native vegetation	• Installation of additional protection measures • Additional delineation of trail	• Prior to season opening • After MTB events and busy periods • Ongoing as required
	Weed colonisation	• Protect native vegetation • Control weeds	• Manual weed removal • Weed spraying • Re-vegetation activities to minimise weed colonisation	• Prior to season opening • Ongoing as required
	Revegetation area maintenance	• Minimise soil movement • Protect native vegetation • Ensure revegetation areas are establishing effectively	• Installation of additional stabilisation measures • Watering of revegetation areas • Replacement of dead plants • Manual weed removal	• Prior to season opening • Ongoing as required

Category	Maintenance Trigger	Management Prescription	Method	Timing
Unauthorised Trails	Trail widening/rock avoidance	• Protect native vegetation • Ensure integrity of trail surface • Minimise sediment movement • Effectively manage trail use	• Installation of additional protection measures • Additional delineation of trail • Installation of additional stabilisation measures	• Prior to season opening • After MTB events and busy periods • Ongoing as required
	Corner cutting	• Protect native vegetation • Ensure integrity of trail surface • Minimise sediment movement • Effectively manage trail use	• Installation of additional protection measures • Additional delineation of trail • Installation of additional stabilisation measures • Undertake Re-vegetation works	• After MTB events and busy periods • Ongoing as required
	Stop off areas	• Protect native vegetation • Minimise sediment movement • Effectively manage trail use	• Installation of additional protection measures • Installation of stabilisation measures • Additional delineation of trail • Formalisation of stop off areas	• After MTB events and busy periods • Ongoing as required
	Unauthorised trail construction	• Protect native vegetation • Effectively manage trail use	• Installation of additional protection measures • Additional delineation of trail • Undertake Re-vegetation works	• Ongoing as required
Built Structures	Damage to structures	• Ensure integrity of trail surface • Ensure rider safety	• Maintenance and repair of built structures • Re-surfacing of trail at entrance/exits to structures	• Prior to season opening • After season closing • Before and after MTB events and busy periods • Ongoing as required
	Damage to entrance/exit from structures	• Minimise sediment movement • Ensure integrity of trail surface • Ensure rider safety	• Manual re-shaping of trail surface • Manual re-construction of trail section • Installation of additional protection measures	• Prior to season opening • After season closing • Before and after MTB events and busy periods • Ongoing as required

Category	Maintenance Trigger	Management Prescription	Method	Timing
	Season opening/closing bridge decking removal/refitting	• Ensure integrity of trail surface • Minimise potential for damage to built structures	• Manual removal/refitting of bridge decking	• Prior to season opening • After season closing • Ongoing as required

3.6 Sensitive Ecological Areas

The sensitive areas adjacent to the trail consist of areas of upland wetland, short alpine herbfield, snowpatch communities and riparian zones. These areas are shown on the vegetation maps produced and provided by Ecological Australia, included as appendix 3 of this report. The ongoing protection of sensitive ecological areas adjacent to the trail is to be carried out as a component of the trail maintenance and management regime.

The sensitive areas are to be a subject of the monthly environmental monitoring events (detailed in section 4 of this plan). The monitoring activities observe the impacts of the trail and trail use within these areas, with management controls and protection measures installed as necessary. The controls and protection measures are to include, but are not limited to the following:

- Delineation of the trail
- Fencing off the area
- Installation of additional protection measures (e.g. Rock work/edging, sediment controls)
- Installation of signage
- Undertaking rehabilitation/remediation works
- Closure of the trail adjacent to the sensitive area until rehabilitation/remediation works are complete (to the satisfaction of the Environmental Coordinator)

In the event of the sensitive ecological areas having sustained any impact as a result of the trails or trail use, advice will be sought from the Office of Environment and Heritage prior to rehabilitation/remediation works being undertaken.

4 Monitoring, Reporting and Review

Daily resort operations and the long term environmental sustainability of the mountain bike trail network necessitates an integrated approach to trail condition monitoring and management. This intensive monitoring regime is comprised of three main components, operational safety and environmental monitoring, pre and post seasonal monitoring and annual monitoring. The monitoring regime involves monitoring the trail network from four different aspects, one of which is focussed on the alpine sections of trail. The details of the trail monitoring regime and reporting requirements are provided below.

4.1 Trail Monitoring Regime

The monitoring activities carried out by KT staff consist of trail inspections aimed at assessing both rider safety and environmental issues. The trail monitoring inspections are carried out daily, monthly and pre and post season.

4.1.1 Daily Operational Monitoring

As a requirement of the daily trail opening and closing procedures the MTB trail guides inspect the entire trail network on bikes at the start and end of each day of operation. These daily inspections are primarily rider safety focussed, however an additional component of the inspections includes the recording of any major environmental concerns. In the event of environmental issues being noted the details are forwarded to the slopes manager for follow up inspection and appropriate works scheduling. The trail guides are required to complete a post inspection checklist after each morning inspection (provided as attachment 1); this checklist takes into account safety and environmental considerations. The trails are not opened for daily operations until inspections of all trails have been completed, with completed checklists provided to the Slopes Manager.

4.1.2 Monthly Environmental Monitoring

The monthly environmental monitoring inspections are to be carried out by the Slopes Manager and Environmental Coordinator, with the opportunity to attend the inspection events provided to the Mountain Manager. These trail inspections are carried out in order to direct the maintenance works required to ensure minimal environmental impact is sustained from ongoing trail use. A monthly report is to be produced by the Environmental Coordinator from the inspections detailing the overall condition of the trails and surrounding environment, with particular attention paid to sensitive ecological areas adjacent to the trails. This report is to include maintenance and trail management recommendations and is to be provided to the Mountain Manager and Slopes Manager for appropriate works scheduling.

4.1.3 Trail Condition Assessment

A comprehensive trail condition assessment is carried out before and after each mountain biking season by a representative from NPWS and the Environmental Coordinator. The trail condition assessment follows the model set up and initiated by the NPWS, involving the mapping of the Thredbo Downhill and Kosciuszko Flow trails and logging all environmental issues along the trail length with coordinate references and pictures as required. The trail condition assessment enables a report of the overall trail condition of the two trails to be produced, with the report, recommendations and associated spatial data provided to KT. The reports are to be used for the purposes of directing the maintenance, stabilisation and rectification works required along the two trails.

4.1.4 Alpine Trail Monitoring

Additional monitoring requirements for the section of the All Mountain trail constructed in the alpine zone (above 1800m elev.) were identified in the development application procedure for Thredbo Mountain Bike Trails – Stage 1B (DA 6571). The requirement set out in condition E.10 of the development consent consists of the capturing of a baseline dataset as a starting point for the comparison of environmental condition with on-going annual monitoring data. The requirement for ongoing annual monitoring is set out in the Baseline Monitoring Data Report (Ref: BW16:30), and is to be incorporated into the Environmental Offsets Monitoring Plan. A map displaying the monitoring points for the alpine section of the All Mountain trail is provided as appendix 4.

4.2 Reporting

As an additional requirement of the monitoring activities, a reporting regime is to be implemented. The reporting is to be based on the trail monitoring events, with the reports provided to the Office of Environment and Heritage as set out below.

4.2.1 Trail Condition Assessment Report

The trail condition assessment, as detailed in section 4.1.3 of this report, is to be undertaken prior to season opening and after season closing. The trail condition assessment report is to be completed by a representative from NPWS in consultation with Thredbo's Mountain Manager and Environmental Coordinator. The pre-season report will be finalised, with a copy provided to KT, before the 30th of November each year. The post-season report is to be finalised, with a copy provided to KT, prior to the 1st of June each year.

4.2.2 Alpine Trail Monitoring Report

The alpine trail monitoring report, as detailed in section 4.1.4 of this report is to be carried out as a component of the environmental offset monitoring report for Thredbo Mountain Bike Trails – Stage 1B (DA 6571). The environmental offsets monitoring report is to be provided to the Office of Environment and Heritage before the 31st of December each year.

4.3 Management Plan Review

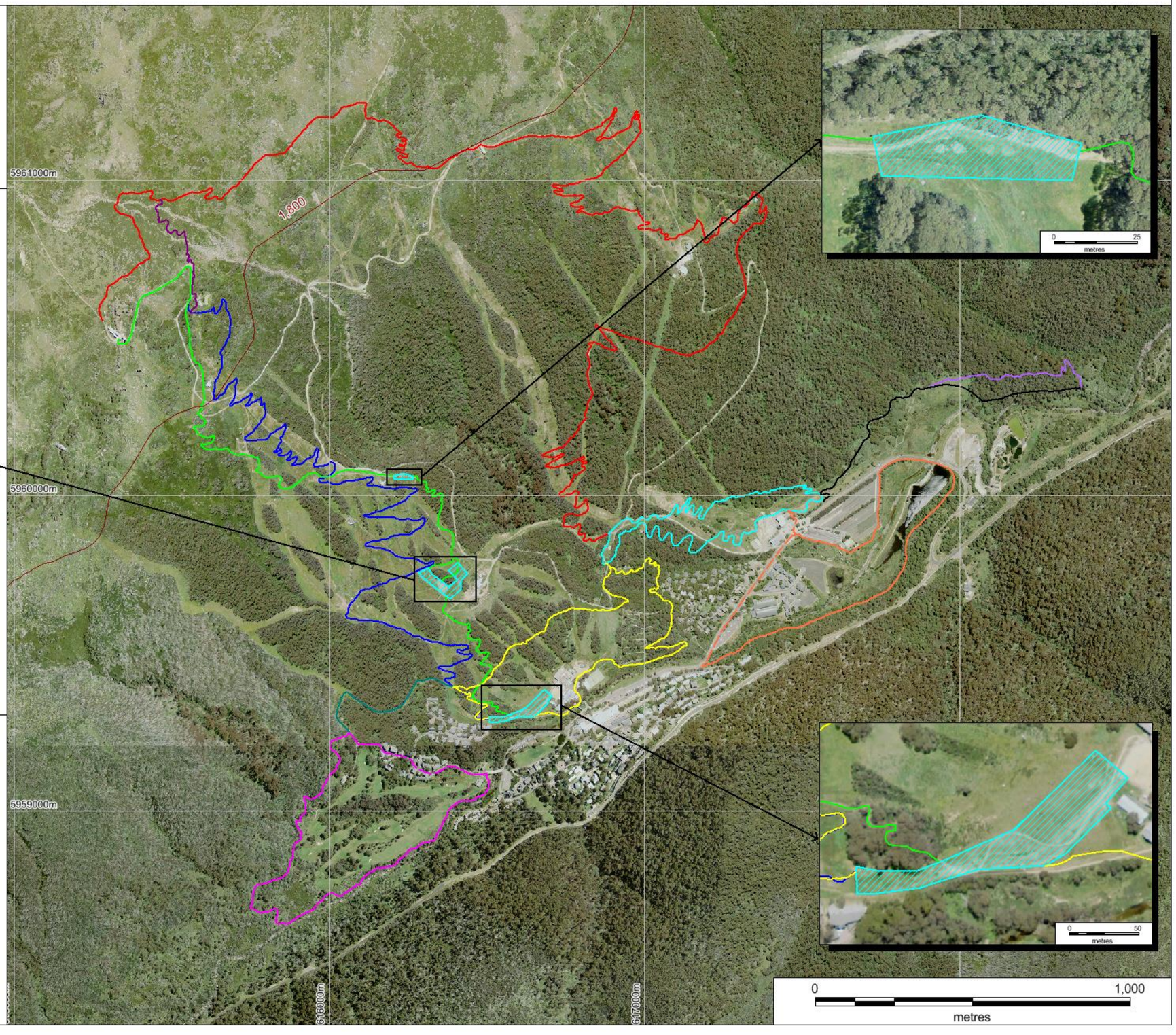
This management plan is intended to be a working document, to be updated as necessary. As such, this plan is to be subject to biennial internal review.

5 Appendices

5.1 Appendix 1 – Thredbo Mountain Bike Trail Map

Thredbo Mountain Bike Trails

THREDBO
ALPINE VILLAGE



Map Legend

- Thredbo Downhill
- Kosciuszko Flow Trail
- All Mountain Trail
- Flow Link Trail
- Village Loop
- Friday Flat Loop
- Pipeline Path
- Golf Course Loop
- Golf Course Connector
- Bridle Loop
- Thredbo Valley Track
- 1800m contour
- Seasonal Jump Park Construction Area

N

Datum/projection: GDA 1994 MGA Zone 55
Prepared by: BW Date: 26/09/17

5.2 Appendix 2 – Trail Zone Map

DOWNHILL & FLOW

DOWNHILL ZONES

Start: Fire Road

1. Top of Snowgums
2. Kareela
3. Snakes and ladders
4. True blue
5. Snow gun heights
6. Bunnywalk Station
7. Magnetic, bottom of Rossi
8. River Rapids
9. IMBA"S
10. Finish area

FLOW ZONES

1. Start Eagles Nest
2. Flow/ All Mountain intercept
3. Black Sallees START
4. Kareela
5. Supertrail Summer Road Kareela
6. T18
7. Scaffold
8. Tower 12 Snowgums Chair
9. Tower 9 Kosciuszko Express
10. Tower 11 Ramshead Chair
11. Milk run Tower 7 Ramshead
12. Flow and All Mountain intercept
13. Ski in ski out

Mountain Bike Trails Legend

- Pipeline Path
- Bridle Trail
- Valley Terminal Loop
- Thredbo Valley Track
- Flow Trail
- Friday Flat Loop
- All Mountain Trail
- Thredbo Downhill Trail
- ***ALL Mountain Temporary Access

ALL MOUNTAIN

ALL MOUNTAIN ZONES

1. START Eagles Nest
2. Flow intersection
3. Temporary Access
4. Top Gunbarrel
5. Walkabout mid slope
6. Bottom of Cruiser
7. Bottom of Easyrider
8. Summer Road Crossover
9. Top of Dream Run (Bridge)
10. Bottom High Noon Steeps (exit to water reservoir)
11. Creek Station
12. Quad Bike Road crossing
13. Downhill crossing above wall ride

***All Mountain temporary access starts after the track crosses Anton's T-bar track and continues on the road to the top of Gunbarrel.

Section Closed

ANTONS T-BAR

SPONARS T-BAR

EASY RIDER T-BAR

Merritts Cafe

Black Sallees

Eagles Nest

Kareela Hutte

SNOWGUMS CHAIRLIFT

GUNBARREL CHAIRLIFT

MERRITTS CHAIRLIFT

Top Rossi Gap Jump

Scaffold

BUNNYWALK STATION

MEADOWS STATION

LOVERS LEAP STATION & CATSHED

CREEK STATION

FRIDAY FLAT

KOSCIUSZKO EXPRESS

Hollywood Jump Park

Beginner Skills Park

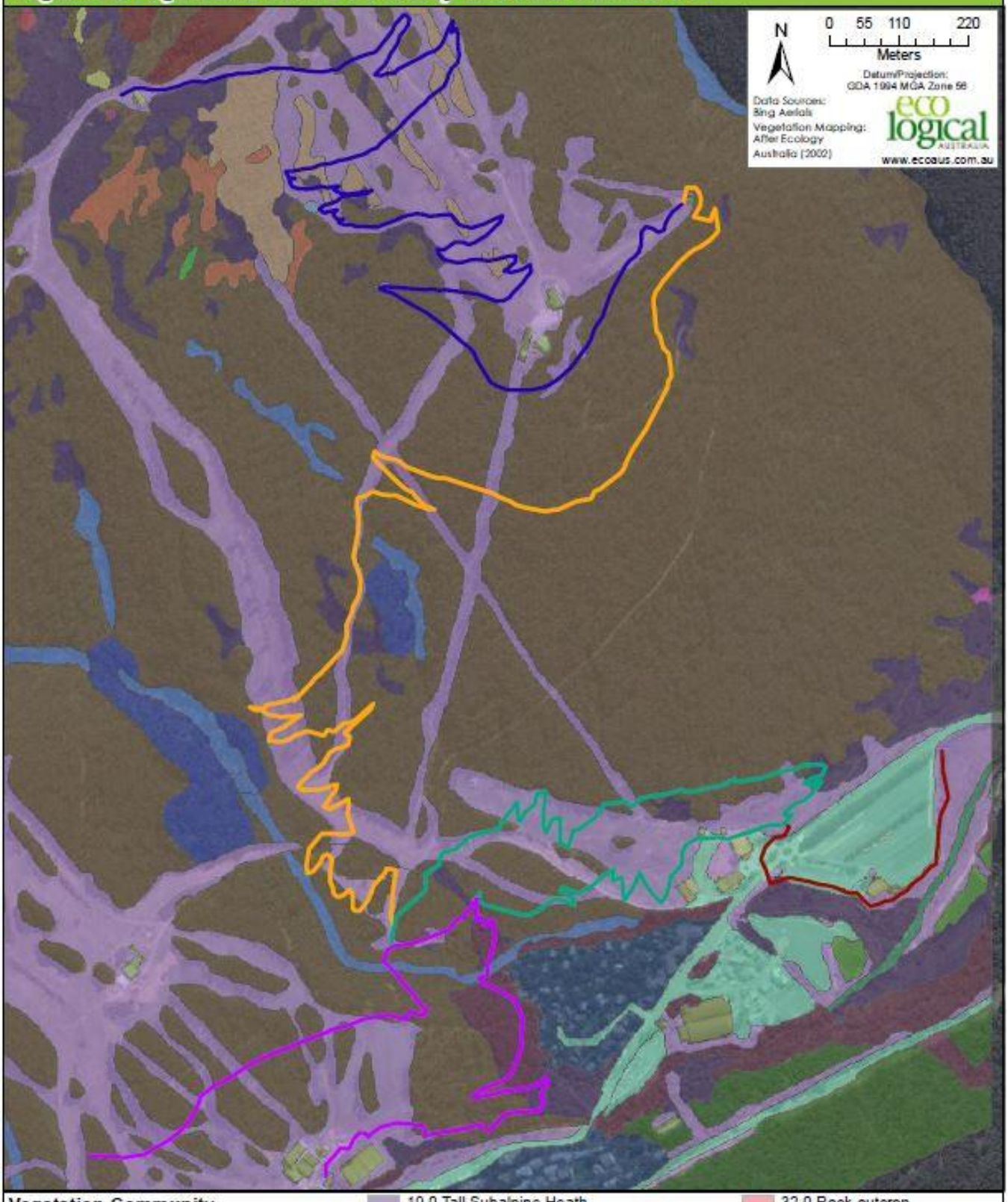
DH Wall Ride

SKI IN SKI OUT

VALLEY TERMINAL

Appendix 3 – Vegetation Maps

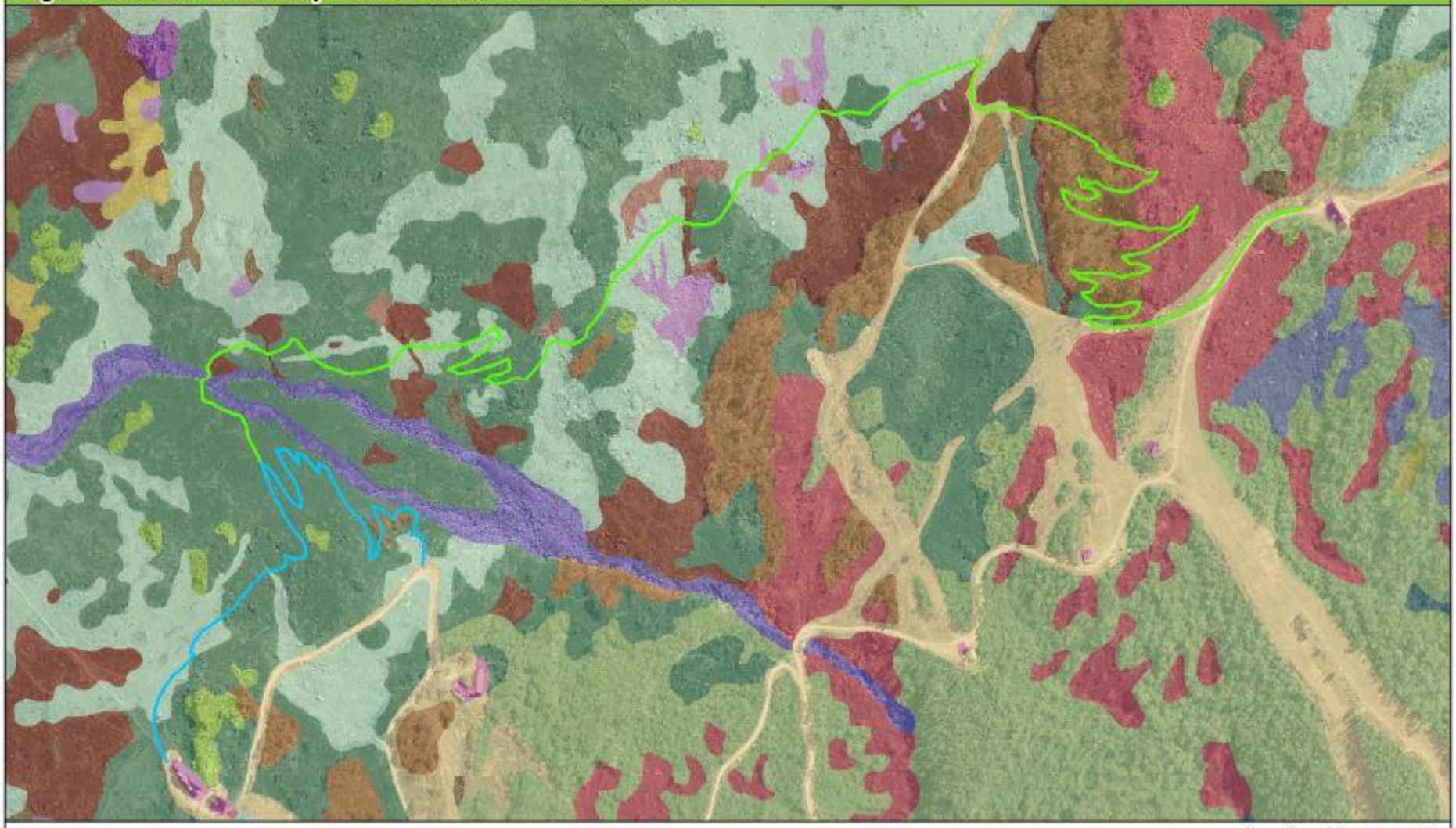
Figure 2: Vegetation within the study area and surrounds



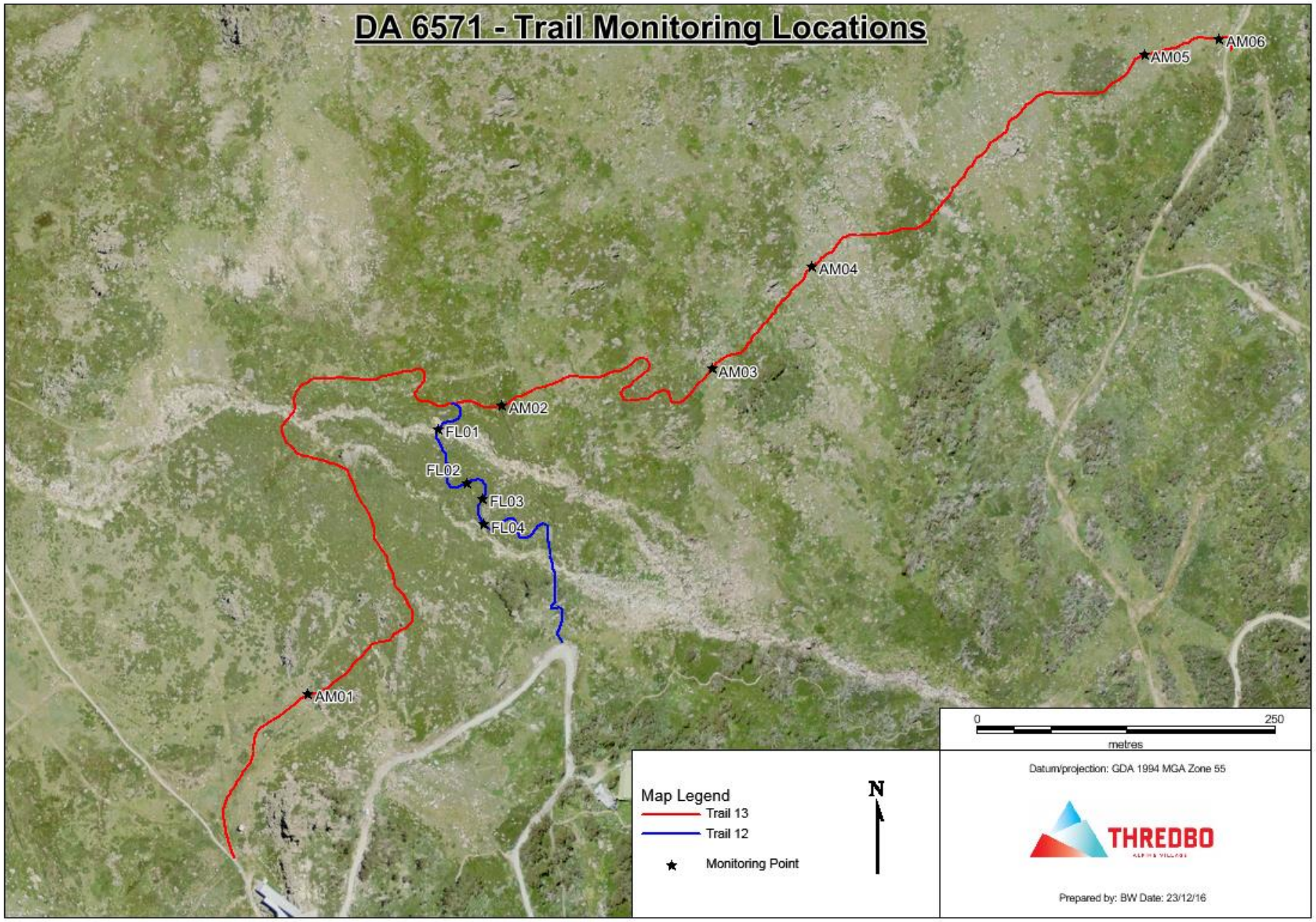
Vegetation Community

- 1.1 Tall Alpine Heath without Eucalypts
- 1.2 Tall Alpine Heath with Eucalypts
- 10.0 Feldmark
- 11.0 Upland Bog
- 15.0 Fen
- 17.0 Alpine Riparian Scrub (Baeckea)
- 18.0 Subalpine Woodland
- 19.0 Tall Subalpine Heath
- 24.0 Subalpine Bog
- 25.0 Sub-alpine Riparian Scrub
- 27.1 Montane Forest
- 27.2 Montane forest with E.dalrympleana
- 28.0 Montane Woodland
- 30.0 Disturbed vegetation
- 31.0 Buildings
- 32.0 Rock outcrop
- 34.0 Residential Development
- 4.0 Podocarp Heath
- 6.0 Tall Alpine Herbfield
- 9.0 Snowpatch
- A Asphalt Road
- R River
- W Water body

Vegetation within the study area and immediate surrounds



5.3 Appendix 4 – Alpine Trail Monitoring Points


DA 6571 - Trail Monitoring Locations
AM06
AM05
AM04
AM03
AM02
FL01
FL02
FL03
FL04
AM01
0
250
metres
Map Legend
Trail 13
Trail 12
Monitoring Point
N
Datum/projection: GDA 1994 MGA Zone 55
THREDBO
Prepared by: BW Date: 23/12/16

6 Attachments

6.1 Attachment 1 – Daily Operational Monitoring Checklist

MTB Course Inspections

Event Location: Thredbo MTB Trails Date: _____

All Mountain Trail	YES	Signed
❖ **Check fences and signage in place**	☐	
❖ **Take offs and landings inspected**	☐	_____
❖ **Trail surface inspected**	☐	_____
❖ **Full course inspection completed before opening to public**	☐	_____
		_____

Cannonball DH Trail/Flow Trail		
❖ **Check fences and signage in place**	☐	
❖ **Take offs and landings inspected**	☐	_____
❖ **Trail surface inspected**	☐	_____
❖ **Full course inspection completed before opening to public.**	☐	_____
		_____

Comments/Issues noted:

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I certify that I have inspected the course on behalf of Thredbo MTB Bike Patrol. I deem that the course has been constructed appropriately, inspected by myself and certify that it is fit for purpose.

Name……

Signature…….. **Date**……..