Statement of Environmental Effects

Kosciuszko Flow Trail Realignment, Little Beauty Jumps Bypass and Wombat Walk Connector Mountain Bike Trails

Thredbo Alpine Resort
Kosciuszko National Park, NSW

January 2024

Kosciuszko Thredbo Pty Ltd
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Document Control

Revision	Date	Revision Type	Author	Approved by
A	7.11.2023	Draft	C.Chalk	K.Delpit
0	10.01.2024	Final	C.Chalk	A.Harrigan
1	5.03.2024	Updates to section 7, table 8 as per NPWS referral comments (condition 3.7).	J.Best	C.Chalk

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Summary of the Development Application	
Development Proposal	This Statement of Environmental Effects (SEE) has been prepared to support the Development Application (DA) for the Kosciuszko Flow Trail Realignment, Little Beauty Jumps Bypass and Wombat Walk Connector mountain bike trails within Thredbo Alpine Resort (Thredbo), NSW 2625.
Site Details	**Lot Description**: Lot 876/DP 1243112
	Location within resort: Little Beauty Jumps Park, Lower Supertrail and Milk Run ski runs, Wombat Walk access track, Lovers Leap and Sundance ski runs.
	Zoning: Kosciuszko National Park (C1: National Parks and Nature Reserves)
	Disturbance: approximately 2,732.5 m^2 (0.27 ha).
Applicant	Kosciuszko Thredbo Pty Ltd
Key Planning Considerations	The proposed development is subject to the requirements of the *State Environmental Planning Policy (Precincts – Regional) 2021* (Precincts – Regional SEPP). As such, the Department of Planning and Environment (DPE) Minister for Planning is the consent authority for the DA. The Development has been assessed against the relevant requirements of the *Environment Protection and Biodiversity Conservation Act 1999* (Cth) (EPBC Act), *Environmental Planning and Assessment Act 1979* (EP&A Act), *National Parks and Wildlife Act 1974* (NPW Act)*, Biodiversity Conservation Act 2016* (BC Act), *Water Management Act 2000* (WM Act) and associated statutory instruments. The Development is integrated development requiring referral to DPE-Water.
Key Environmental Matters	Approximately 0.13 ha of Subalpine Woodland is expected to be affected by the Development. The Development will not trigger the Biodiversity Offsets Scheme (BOS). The Flora and Fauna Assessment concluded that the Development is unlikely to have a significant effect on threatened species, populations or ecological communities or their habitats (ELA 2023). Following consideration of the administrative guidelines for determining significance under the EPBC Act, it is concluded that the Development is unlikely to have a significant impact on matters of National Environmental Significance or Commonwealth land, and a referral to the Commonwealth Environment Minister is not necessary. The Development is considered minor construction works which present "minimal or no geotechnical impact" on the site as determined by the attached Form 4. There are no known heritage sites or areas of PAD within the project area. There are no heritage constraints on the Development (Past Traces 2023). The Development will not cause any significant adverse impacts to the surrounding landscape characteristics or visual amenity. The Development will have positive impacts on the existing socio-economic environment through the provision of sustainable trails that can be experienced by a range of mountain bikers of varying ability. The impacts of the Development are considered to be largely positive, and no significant adverse environmental impacts are proposed. With the implementation of appropriate mitigation and management measures during construction and operation, the environmental impacts are considered acceptable. Therefore, the Development is considered suitable for the site and within the public interest.

1 Introduction

This Statement of Environmental Effects (SEE) has been prepared to support the Development Application (DA) for the Kosciuszko Flow Trail Realignment, Little Beauty Jumps Bypass and Wombat Walk Connector (hereinafter referred to as the Development). The Applicant for the DA is Kosciuszko Thredbo Pty Ltd (KT) (ABN 95 000 139 015).

The Development site is located within Thredbo Alpine Resort (Thredbo), within Kosciuszko National Park (KNP), approximately 30 kilometres (km) south-west of Jindabyne, New South Wales (NSW).

The application is seeking approval for the following works:

- Vegetation clearing;
- Construction of mountain bike trail, including earthworks and installation of platform; and
- Rehabilitation works.

Development in NSW alpine resort areas is governed by the *State Environmental Planning Policy (Precincts – Regional)* 2021 (Precincts – Regional SEPP). The Department of Planning and Environment (DPE) Minister for Planning is the consent authority for development in the alpine resort areas under Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). This SEE has been prepared in accordance with the relevant statutory requirements.

The Development is integrated development under the *Water Management Act 2000* (WM Act) requiring referral to DPE-Water.

1.1 Purpose

The purpose of this SEE is to:

- describe the proposed development in relation to the existing environment;
- evaluate the proposed development against the relevant statutory planning framework; and
- assess the following key issues in relation to the proposed development –
    - the impacts of the development on the natural, human and built environment and how these impacts have been identified
    - mitigation and management measures that will be taken to protect the environment or to reduce expected environmental harm
    - any specific matters identified by the Secretary of DPE.

1.2 Supporting Documentation

Documentation supporting this application is listed below.

Document	Title	Author / Prepare by	Document Reference
Flora and Fauna Assessment	Kosciuszko Flow Trail Realignment – Little Beauty Jumps Park Bypass and Wombat Walk Connection – Thredbo Alpine Resort – Flora and Fauna Assessment	Eco Logical Australia Pty Ltd	2
Aboriginal Cultural	Aboriginal Cultural Heritage Due Diligence Assessment Kosciuszko Flow	Past Traces Pty Ltd	V1.1

Heritage Due Diligence Assessment	Trail Realignment and Wombat Walk Connector		
Geotechnical Assessment	Proposed Wombat Walk Connector, Thredbo NSW Geotechnical Investigation Report	ACT Geotechnical Engineers Pty Ltd	AS/C14767.2
Site Environmental Management Plan	Site Environmental Management Plan, Kosciuszko Flow Trail Realignment, Little Beauty Jumps Bypass and Wombat Walk Connector Mountain Bike Trails	Kosciuszko Thredbo Pty Ltd	Rev 0
Cost of Works	Estimated Cost of Works, Kosciuszko Flow Trail Realignment, Little Beauty Jumps Bypass and Wombat Walk Connector Mountain Bike Trails	Kosciuszko Thredbo Pty Ltd	108,814.16
Plan	Typical Modular Bridge	Camstruct Consulting Pty Ltd	23045-S01, A
Plan	Typical Modular Bridge Handrail	Camstruct Consulting Pty Ltd	23045-S02, 1

2 Site Context

2.1 Regional Context

The Development site is located in Thredbo, within the southern part of KNP, approximately 35 km south-west of Jindabyne in the Snowy Monaro Regional Local Government Area (LGA) (**Figure 1**).

2.2 Local Context

The Flow Trail Realignment commences at the top of the Little Beauty Jumps Park and traverses the native vegetation adjacent to the jumps park and Lower Supertrail ski run.

The Wombat Walk Connector starts on the existing Flow trail on the edge of the tree island (skiers right) of Milk Run ski run, follows the existing Wombat Walk access track onto the Village Loop and Home Run trails, then down to the base of Snowgums chairlift at Valley Terminal via the lower section of Lovers Leap and Sundance ski runs.

The Development is located within the Thredbo Head Lease Area, on land formally described as Lot 876 DP1243112 (**Figure 3**).

2.3 Present and Previous Land Uses

The site and surrounds comprise ski runs and snowmaking infrastructure, MTB trails, walking tracks, access tracks and roads, and a mix of disturbed and undisturbed native vegetation.

The site is zoned as C1 – National Parks and Nature Reserves (formerly E1) under the *Snowy River Local Environmental Plan 2013*.

Figure 1: Regional Context

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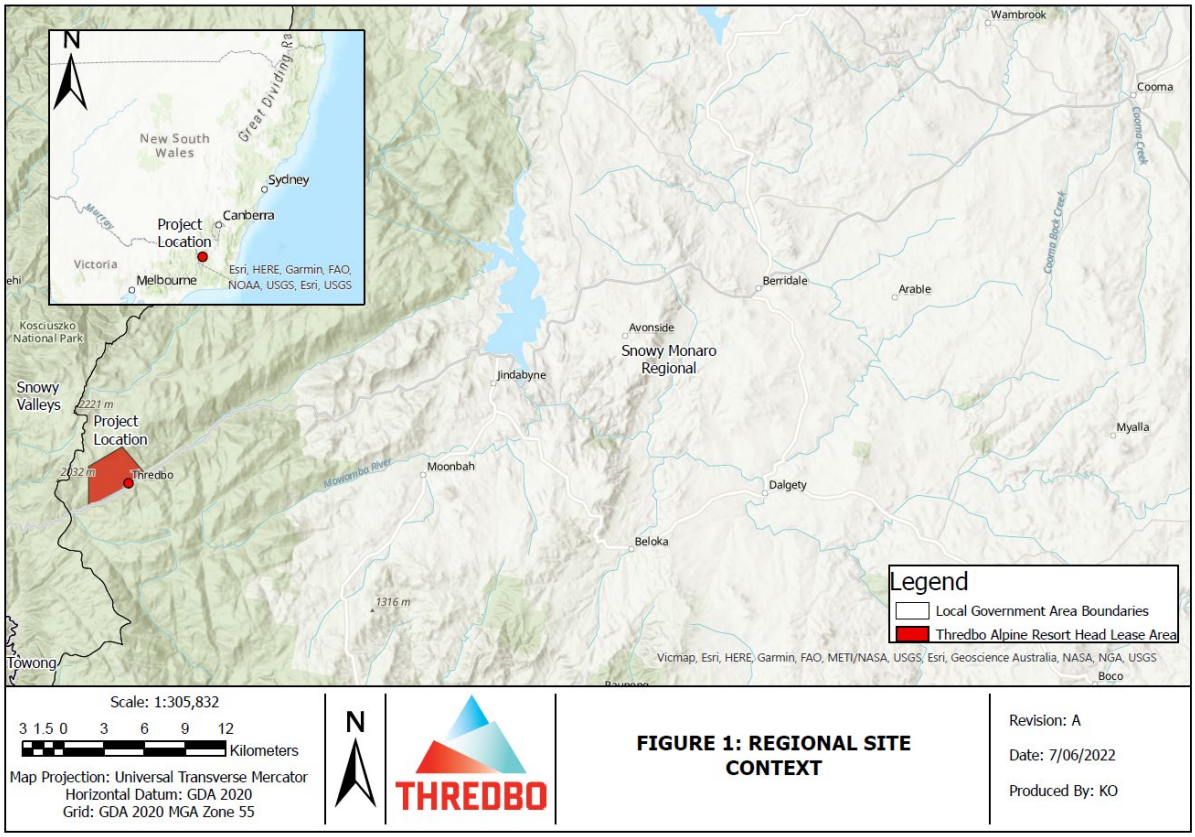

Figure 2: Site Overview – Kosciuszko Flow Trail Realignment, Little Beauty Jumps Bypass and Wombat Walk Connector

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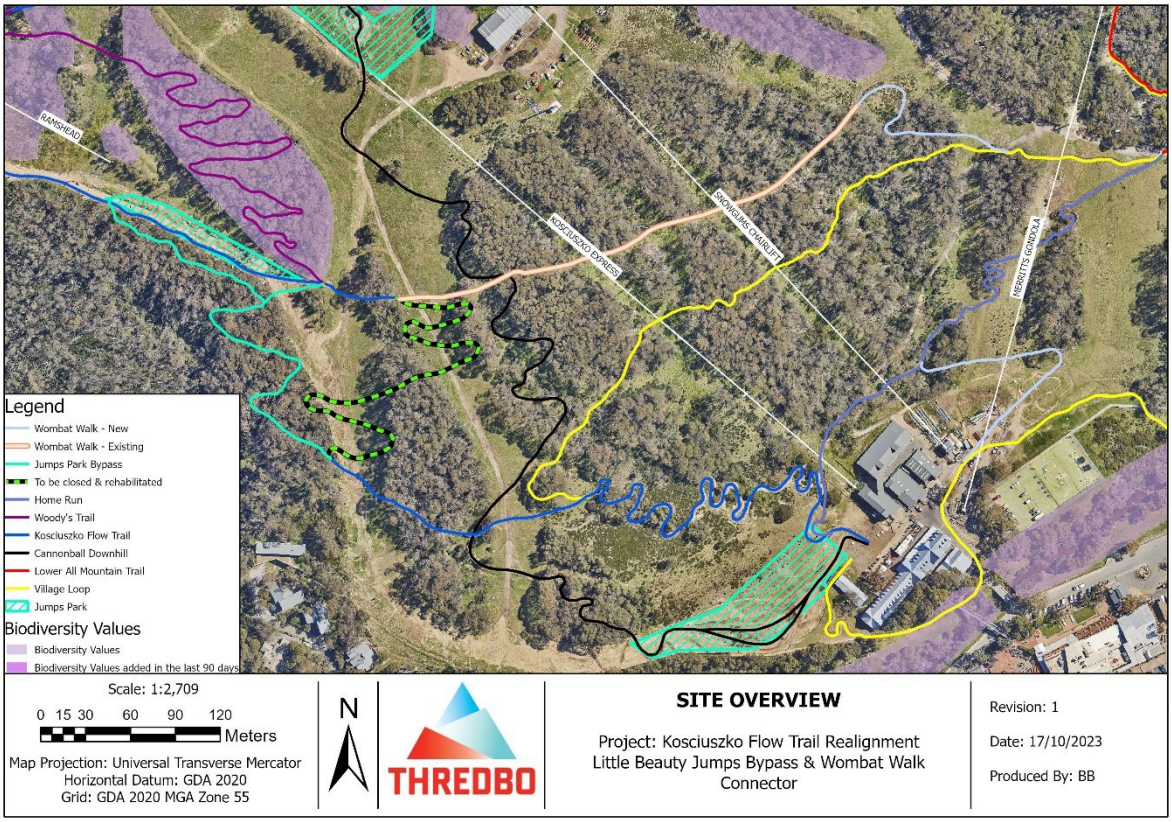

Figure 3: Site Plan – Kosciuszko Flow Trail Realignment Little Beauty Jumps Bypass

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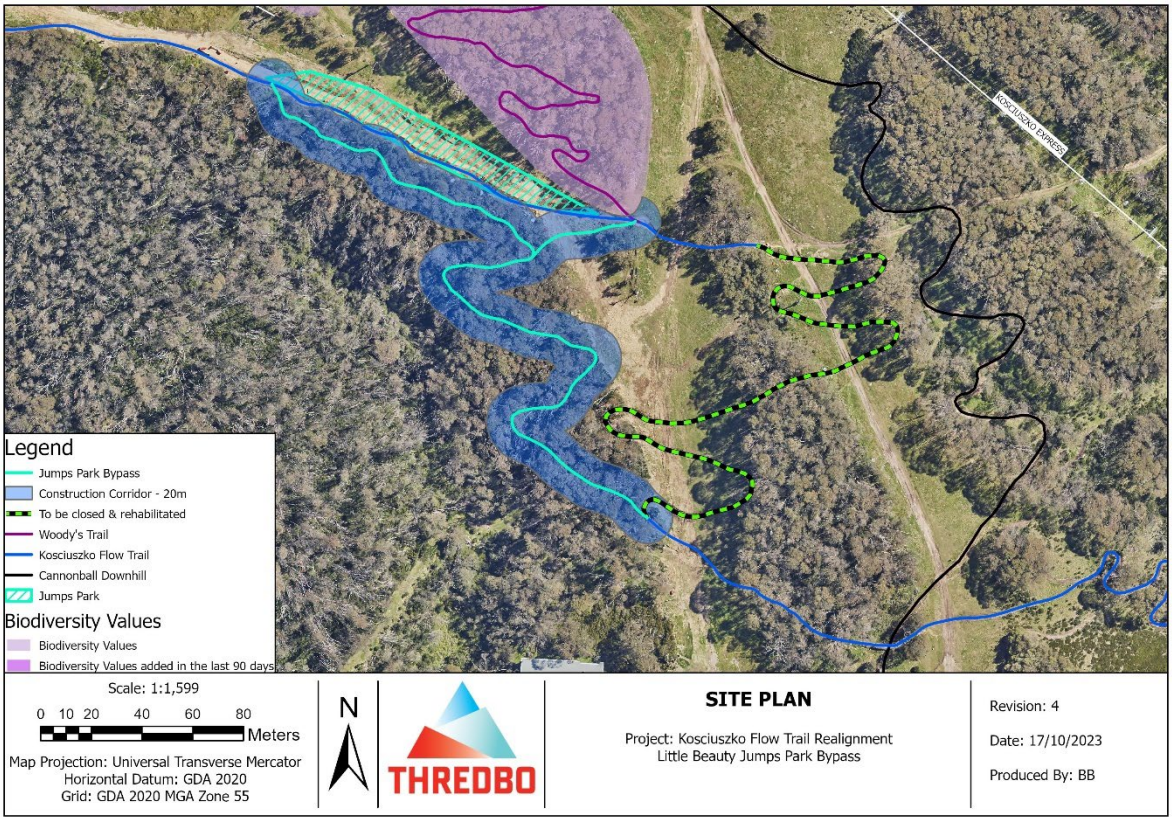

Figure 4: Site Plan – Wombat Walk Connector

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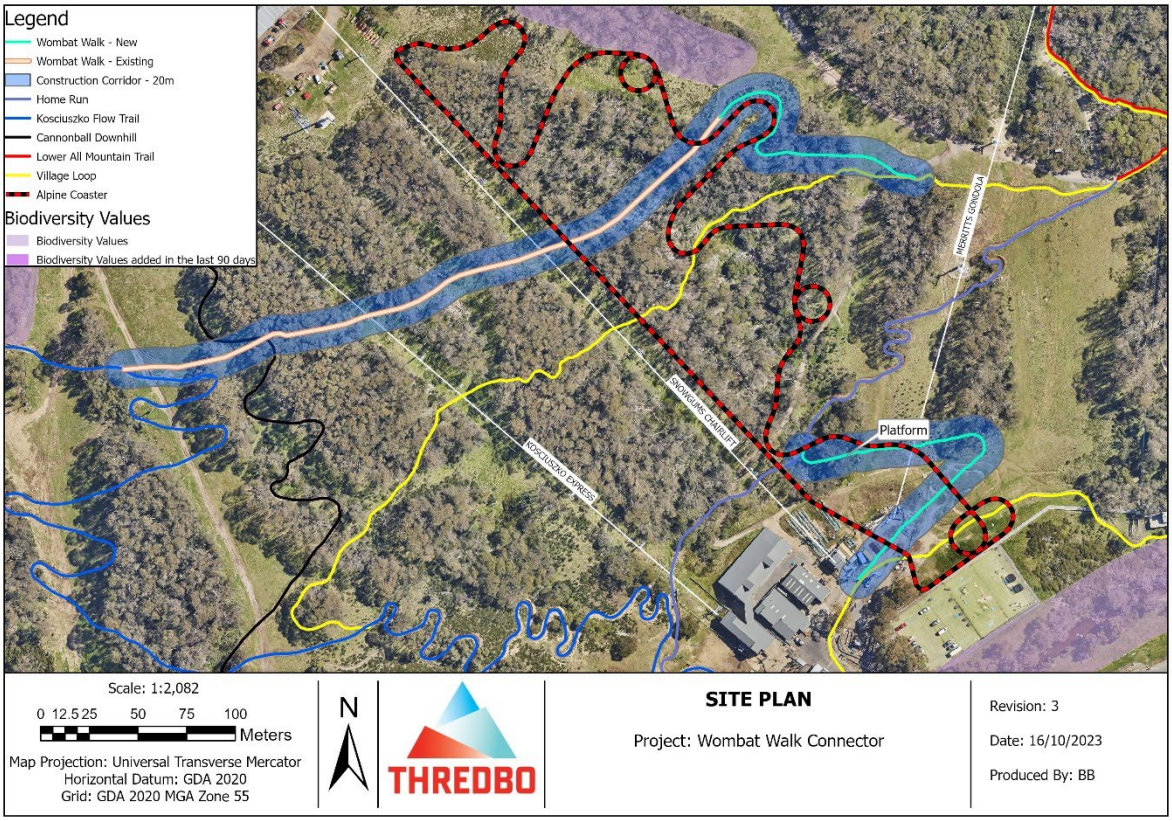

3 Development Overview

3.1 Background

Thredbo has long been associated with mountain biking in the Snowy Mountains regions of NSW. As Australia's premier biking destination with lift accessed gravity trails, Thredbo has continued to attract recreational and competitive mountain bikers to the resort since the early 1990s. Each year KT hosts a series of competitions and events, such as the Cannonball Mountain Bike Festival, Gravity Series and Australian Mountain Biking Interschools.

As part of KT's vision to remain a premier year-round destination, KT has continued to developed new trails of varying length and difficulty of terrain so as to attract new riders and retain the interest of existing riders. The Thredbo Mountain Bike Trail Network (Thredbo MTB Trail Network) has been developed with the input of leading trail designers such as World Trail Pty Ltd and Dirt Art through a considered master planning process designed to provide high quality sustainable trails in accordance with the internationally accepted IMBA standards.

Thredbo's future trail construction is focused on improving maintenance, sustainability and rideability for existing trails while also designing new trails. This will be achieved through providing short interconnected trails off the main "spine" trails and moving trails off the groomed and steep ski runs where deemed necessary to ensure the sustainably of the trail network.

Creating interconnecting trails off the existing spine network is beneficial in many ways; it creates variety and more interesting riding, spreads traffic which facilitates better trail maintenance increasing the sustainability of the trail. Nodes allow for safer and more effective extraction of injured riders in hard-to-reach areas by providing the ability to close sections and divert riders to other nodes when required. Similarly, nodes/ interconnecting trails provide the ability to close busy sections for extended periods of time to complete necessary repairs and maintenance.

3.2 Overview of Development

3.2.1 Flow Trail Realignment, Little Beauty Jumps Bypass

The purpose of the Flow trail realignment is to enable the closure and rehabilitation of sections of the existing Flow trail that are located on the groomed ski runs (Milk Run and Lower Supertrail) that are subject to ongoing erosion issues (refer **Plate 1** and **Plate 2**), and improve rideability by using natural terrain and features within the native vegetation.

The trail commences at the top of the Little Beauty Jumps Park on the Kosciuszko Flow Trail and terminates on the skiers right of the Lower Supertrail ski run, connecting back onto the Kosciuszko Flow Trail. The realignment also includes a short linking trail below the jumps park from Woody's trail. An overview of the trail with photo reference points is provided in **Figure 5** and **Table 1.**

Plate 1: Section of Kosciuszko Flow trail below Wombat Walk access track on Milk Run to be closed

Plate 2: Section of Kosciuszko Flow Trail on Milk Run ski slope to be closed

Figure 5: Photo Points – Kosciuszko Flow Trail Realignment, Little Beauty Jumps Park Bypass

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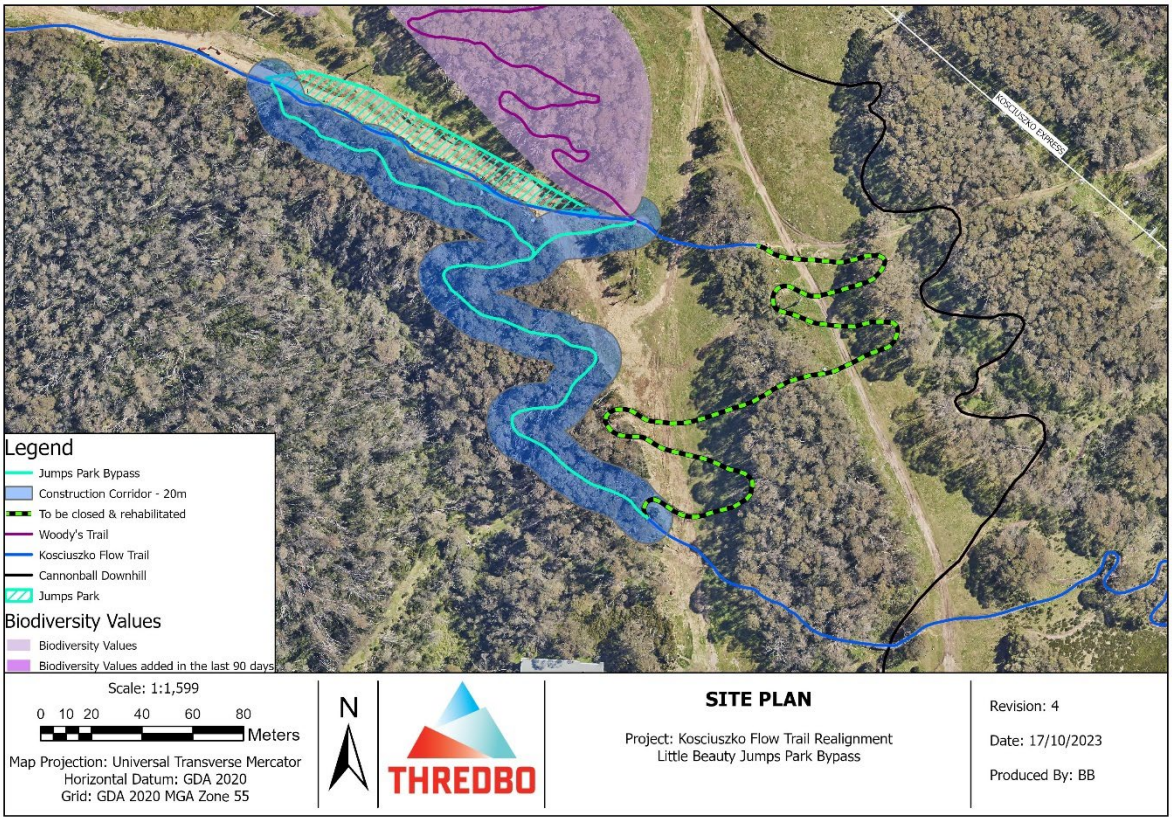
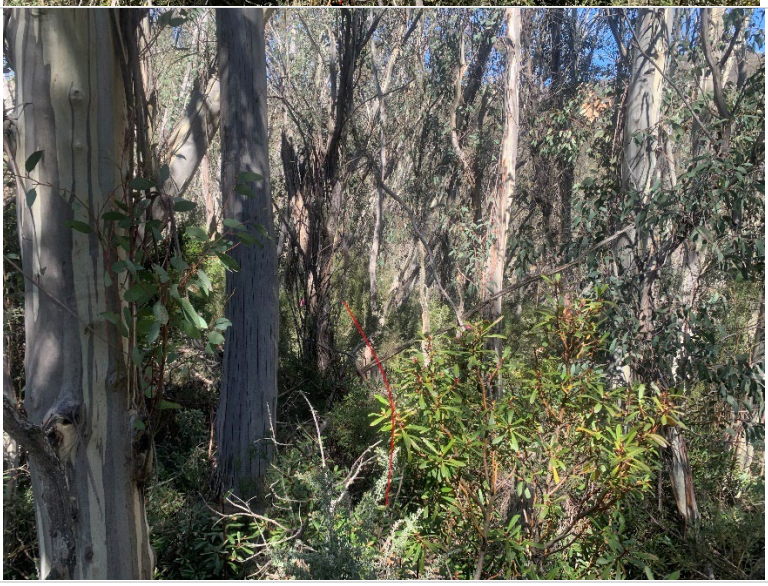
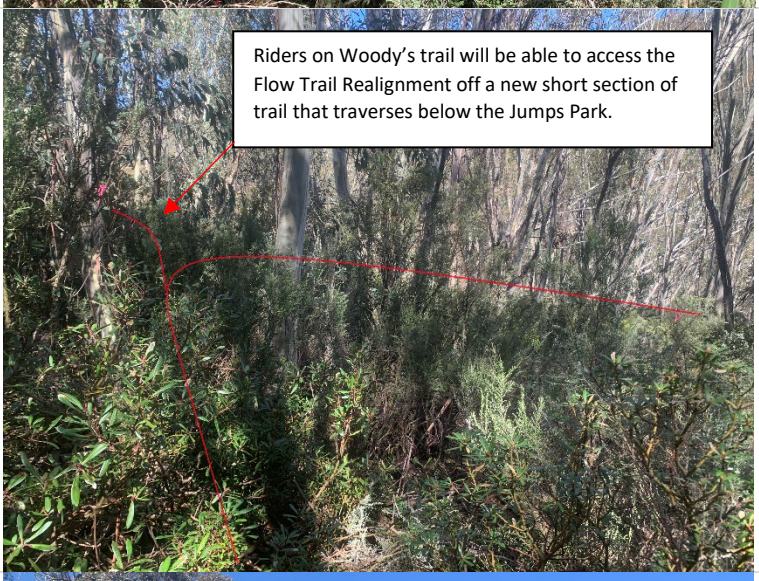


Table 1: Description and Site Photos

Trail Description	Site Photos
PH1: The trail commences at the top of the Little Beauty Jumps Park and enters the native vegetation adjacent to the jumps park.	
PH2: The trail follows the contours (using the rolling contours concept) heading east.	
PH3: The trail continues to the southeast	

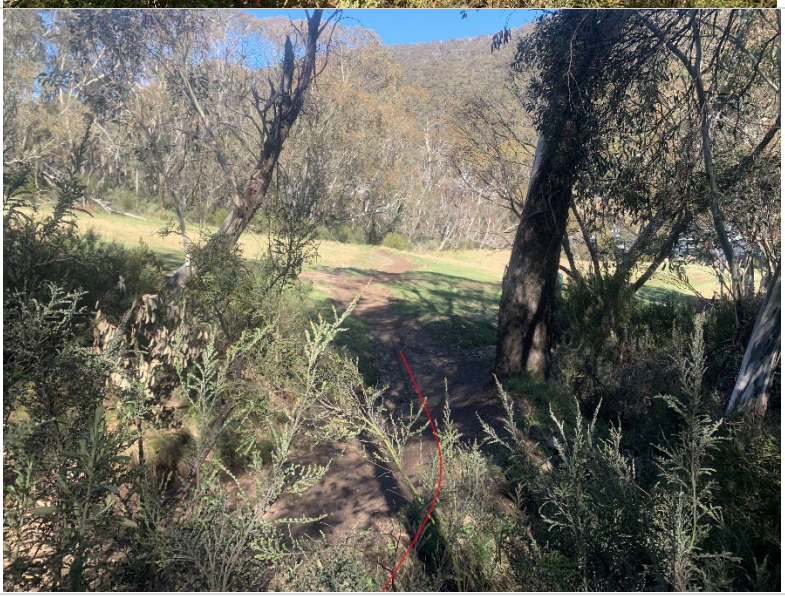
PH4: The trail continues through the native vegetation into a berm	
PH5: The trail traverses through the native vegetation following contours of terrain	
PH6: The trail continues to the east alongside the Jumps Park, following contours of the terrain	

PH7: The trail continues through the native vegetation to the southeast following contours of the terrain	
PH8: The trail continues southeast into a turn before heading west. Riders on Woody's trail will be able to access the trail from this junction.	
PH8A: New section of trail providing a link from Woody's trail to the new Flow Trail Realignment.	

PH9: Trail exists the turn and heads west into another berm	
PH10: The trail heads into a berm and continues to the west downhill following contours of terrain.	
PH11: The trail heads south back toward the ski run.	

PH12: The trail follows the contours heading towards the skiers right of Lower Supertrail.	
PH13: The trail continues along following terrain contours heading towards the edge of the Lower Supertrail ski run.	
PH14: The trail heads into a berm near the edge of the ski slope and then turns southwest	

PH16: The trail heads southwest downhill following terrain coutours	
PH17: The trail heads into a berm to the west	
PH18: The trail exits the berm and heads southeast following terrain contours	

PH19: The trail continues southeast heading towards the edge of the Lower Supertrail ski run.	
PH20: The trail exits the native vegetation on the skiers right of the Lower Supertrail ski run and connects into the existing Kosciuszko Flow Trail.	

3.2.2 Wombat Walk Connector

The purpose of the Wombat Walk Connector is to provide riders a trail that connects the western side of the trail network to the eastern side. With the planned upgrade of Snowgums Chairlift to a new 6-seat MTB compatible lift, a linking trail from the western side of the trail network will allow riders direct access to the Snowgums bottom station. This will help to alleviate the rider traffic and congestion often experienced at the bottom of the Kosciuszko Express chairlift during peak visitation periods.

The Wombat Walk Connector commences on the skiers left of the Milk Run ski run, follows the existing Wombat Walk access track onto the Village Loop and Home Run trails, then down to the base of Snowgums chairlift at Valley Terminal via the lower section of Lovers Leap and Sundance ski runs. An overview of the trail with photo reference points is provided in **Figure 6** and **Table 1**.

Figure 6: Photo Points – Wombat Walk Connector

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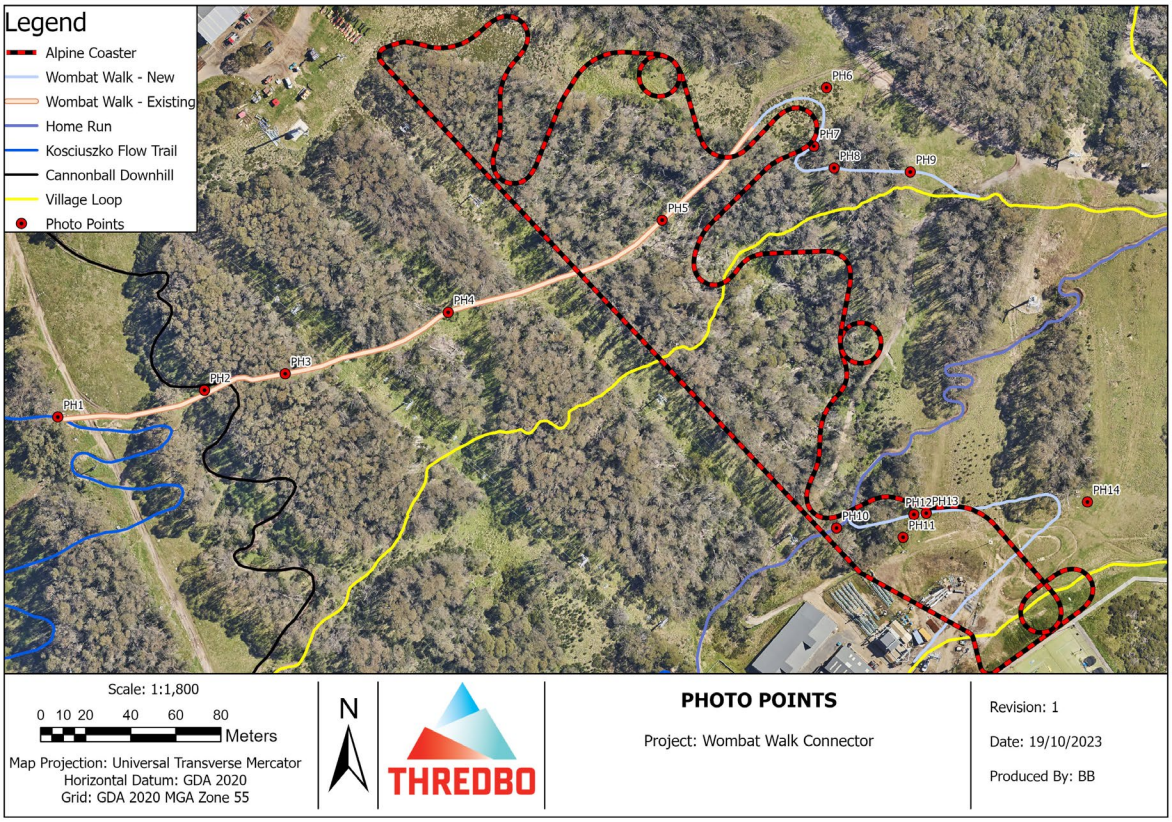

Table 2: Description and Site Photos – Wombat Walk Connector

Trail Description	Site Photos
PH1: The trail commences on the Kosciuszko Flow trail on the skiers right of Milk Run, traversing the ski slope towards an existing 4x4 track	
PH2: The trail enters the existing Wombat Walk access track on the skiers left of Milk Run.	
PH3: The trail continues east on the existing Wombat Walk access track.	

PH4: The trail continues on the existing Wombat Walk access track northeast and traverses under the Snowgums lift line.	
PH5: The trail continues on the existing Wombat Walk access track, traverses under the proposed Alpine Coaster track and continues northeast towards the Mountain access road. The trail alignment has been designed with consideration of the Alpine Coaster infrastructure within the locality to ensure safety of the public / riders.	
PH6: The trail has been aligned in this section to follow the outside of the proposed Alpine Coaster downhill track.	

PH7: The trail exits the turn and heads into another berm downhill of the proposed Alpine Coaster downhill track. The trail alignment has been designed with consideration of the Alpine Coaster infrastructure within the locality to ensure safety of the public / riders.	
PH8: The trail heads east through the native vegetation towards Lovers Leap ski run.	
PH9: The trail continues east across the cleared ski slope towards the top of the vegetation island where it links onto the Village Loop trail and then onto Home Run.	

PH10: The trail turns off Home Run before the uphill coaster track and heads east towards the ski slope.	
PH11: The trail traverses the drainage line below the Home Run platform. A platform will be installed at this location in accordance with the plans provided in **Appendix C**.	
PH12: The trail exits the tree island onto the lower section of Lovers Leap ski run.	

PH13: The trail traverses the lower part of Lovers Leap ski run below the proposed Alpine Coaster track and heads into a berm at the bottom of the vegetation island between Lovers Leap and Lower Sundance ski runs. The trail alignment has been designed with consideration of the Alpine Coaster infrastructure within the locality to ensure safety of the public / riders.	
PH14: The trail exits the berm at the base of the vegetation island and heads southwest over the Alpine Coaster Tunnel infrastructure to the base of Snowgums chairlift / Valley Terminal. The trail alignment has been designed with consideration of the Alpine Coaster infrastructure within the locality to ensure safety of the public / riders.	

3.3 Trail Design and Construction Techniques

3.3.1 Preliminary Site Assessment

A preliminary site assessment was undertaken by key Project personnel (i.e. Project Manager, MTB trail designers, Environmental Officer) to identify potential constraints (e.g. ecological and construction) of the proposed trail alignment and to allow for appropriate controls to be incorporated into the design. During this assessment stage, several walkthroughs of the proposed trail alignment were undertaken to ensure the trail objectives are met whilst minimising the impacts on the natural environment as much as practicable.

This was then followed by a joint inspection with both DPE and NPWS on Wednesday 11 October 2023. On Monday 23 October 2023, NPWS provided the following comments via email on the Development:

- *The Statement of Environmental Effects (SEE) should clearly identify why the bypass is required and any decommissioning and rehabilitation aspects of the works.*

- *The Flora and Fauna Report needs to assess possible impacts to the Eastern Pygmy Possum and provide suitable impact minimisation measures such as the checking of trees by a suitably qualified/experienced person before felling.*
- *A Wombat Management Plan should be prepared and endorsed by NPWS.*

3.3.2 MTB Trail Design and Construction Techniques

The MTB trail design and construction techniques have been developed with consideration of the following:

- Criteria outlined in Chapter 4 of the *Guidelines for a Quality Trail Experience: Mountain Bike Trail Guidelines* (IMBA 2018) (IMBA MTB Guidelines);
- Sections 6 and 7 of the *Trail Difficult Rating System – Build* (IMBA 2012);
- *Guidelines for trail planning, design and management: a toolkit for state and local government agencies, community groups and investors on how to plan, manage and market exceptional trail experiences* (TRC Tourism 2015); and
- Design principles applied to the construction of existing trails within the resort, including: trails for everyone, recreation versus competition, one-way trails, trail difficulty ratings, trail names and minimise environmental impacts.

3.3.2.1 MTB Trail Design

A summary of the trail design is provided in **Table 3**. Examples of trail design elements are provided in **Appendix B**.

Table 3: Trail Design

Element	Details
Trail length	Flow Trail Diversion = 400 m (355 m diversion + 45 m Woody's link). Wombat Walk Connector = 693 m (343 m existing Wombat Walk track + 152 m extension into Village Loop + 198 m link off Home Run)
Trail difficulty rating	In accordance with the IMBA Trail Difficulty Rating System (IMBA 2012), the trail difficulty rating is Intermediate.
Trail tread width	The tread refers to the actual surface of the trail upon which users travel. The average trail tread width will be 600 mm which is in accordance with the Trail Difficulty Rating System Land Managers Guide (IMBA 2012) (**Appendix A**).
Trail corridor width	The trail corridor refers to the full dimensions of the trail, including the area on either side of the tread and the space overhead that needs to be cleared of brush and obstacles. The trail corridor is generally double the width of the tread, dependent upon the slope. The greater the slope, the wider the corridor due to the extent of the upper and lower batters. *Flexible trail corridor* A 20 m wide corridor is required to provide flexibility for the trail builders to respond to any unforeseen construction constraints (e.g. during excavation the uncovering of a large amount of rock just beneath the surface).
Trail type	One-way (descending) – This design component is a key risk management technique to minimise the likelihood of head-on collisions between riders.
Tread surface	The trail surface will be predominately natural soil, with local crushed granodiorite used where required. The surface will comprise possible sections of rocky or loose tread.

Natural Obstacles and Technical Trail Features (TTFs)	The trail will likely include unavoidable, rollable obstacles to 200 mm high. Avoidable, rollable obstacles up to 600 mm may also be present on the trail. Note, short sections may exceed the criteria.
Average trail grade	The climbs and descents will be mostly moderate gradients but may include steep sections. The average trail grade will be 10 % or less (IMBA 2012) (**Appendix A**).
Maximum trail grade	The trail grade will be a maximum of 20 % or greater (IMBA 2012) (**Appendix A**).
Trail Signage	Trail signage is installed to clearly mark the trail, inform users of their responsibilities, aid in navigation and provide key information. *Decision Point Signs* Decision point signs generally comprise posts with information in relation to important departure and destination locations along the trail. The signs generally include the following information: • name of the new trail departing from that point; • difficulty symbol (e.g. green circle, blue square, black diamond – the number on this symbol correlates to the trail descriptions on the Thredbo Mountain Bike Park Map; • trail type (e.g. flow, technical, shared, permitted/prohibited use); • arrow indicating the direction of the new trail; and • trail network logo. The signs are 400 mm wide x 200 mm high and attached to a 50 mm round post which is 1,800 mm high. Decision point signs will be located at the following locations along the trail: • start of the trail; and • junctions with existing trails. Standard signage plans are provided in **Appendix C**.

3.3.2.2 MTB Trail Construction Techniques

A summary of the construction techniques to be used for the Project is provided in **Table 4**. Examples of construction techniques are provided in **Appendix B**.

Table 4: Summary of Construction Techniques

Construction Technique	Details
Follow the contours	The trail should be built on a side slope, aligned along the contours of the hillside (as demonstrated in **Appendix B**). The most sustainable trails are those that have a low overall grade (<10 % or a one in 10 change in elevation) and frequent undulations, which will ensure water flows across and not along the trail.
Partial or full bench-cut construction	Trails built on sloping ground require excavation to achieve a partial or full bench construction. Partial bench tread involves using some of the excavated soil to construct the downhill side of the tread. This technique is prone to slipping and is not recommended, except in specific circumstances in which it must be supported by a retaining wall. Full bench tread involves excavating down and into the hillside and puts the entire tread width on mineral soil, thereby maximising stability and minimising ongoing maintenance.

Outslope	A method of tread construction that leaves the outside edge of a hillside trail lower than the inside, in order to shed water in sheet flow (refer **Appendix B**). The trail should slope gently (no greater than 5 %) down towards the lower, outside edge. It is noted that completely outsloping trails will not provide enjoyable and safe trails.
Rock armouring	Rock / tread armouring is used to harden the trail to create an elevated trail tread above wet or soft terrain and to harden the trail tread against potential erosion from trail users. Although armouring hardens the trail tread, all the principles of sustainable trail design still apply as it is essential that water is prevented from following down or under that section of trail (refer **Appendix B** for example).
Half rule	A trail's grade shouldn't exceed half the grade of the sideslope (e.g. if the gradient of the side slope is 20 %, the maximum allowable trail gradient would be 10 %). This will assist the sheeting of water across the trail. If the trail grade is steeper than half the grade of the side-slope, it is considered a fall-line trail (IMBA 2012).
10 % rule – average trail grade guideline	Generally, an average trail grade of 10 % or less is the most sustainable (IMBA 2012).
Grade dips and reversals	A reverse in the trail grade, usually a short dip followed by a rise, creating a small watershed and forcing the water off the trail. Grade reversals make trails more enjoyable and provide excellent drainage solutions. A grade reversal is the change in trail tread grade from up to down as the trail moves across the side slope. Grade reversals allow water to leave the trail at the low point of the grade reversal, before it can gain enough speed and volume to cause erosion. Grade reversals divide the trail into continuous small watersheds. This means the drainage feature of one part of the trail won't affect another section, which reduces erosion (AusCycling 2019).
Rolling grade and knicks	A knick is a shaved down section of trail, semicircular in shape and about 3 m in diameter, with the centre of the knick outsloped at about 15 % to draw the water off the trail. Rolling grade dips build on the knick feature. The knick is built and followed by a long gentle soil ramp. Rolling grade dips require little maintenance and create effective drainage (AusCycling 2019).
Trail demarcation and anchors	Marking trail boundaries with rocks or vegetation to discourage users from cutting corners or from the desired path. Trail users will often cut corners through turns or around technical trail features. This can negatively affect the sustainability of a trail. Demarcation or anchors are a subtle way of keeping riders on the intended line. This is achieved by placing natural elements such as existing vegetation, rocks, logs or other natural landform or onsite materials. Strategically selected and placed demarcations or anchors prevent trail widening and can offer a more advanced features for more experienced riders (AusCycling 2019). This technique is only possible in vegetated areas and not on disturbed ski runs as no natural anchors or demarcation is available.
Trail Flow	Correct trail flow manages the riders speed and momentum through trail design and construction. Consistent flow can minimise soil disturbance and displacement by reducing the need for users to exert more downwards or sideways force to stay on the trail. The goal of this element of trail design is to avoid abrupt changes and corners that are likely to make riders brake excessively or skid, which can result in braking bumps and trail widening.
Berms or insloped Turns	A bermed corner has a banked outer edge that runs the entire length of the corner, allowing the rider to maintain a faster speed. Berms improve trail flow and reduce soil movement on corners. Berms help riders maintain speed without sliding out of the turn. Berms in conjunction with effective grade reversals provide effective drainage outlets.
Drainage crossings	Drainage crossings are a critical element of trail design and construction in areas which may have the greatest impact on water quality and the site where water has the greatest potential to damage the trail.

3.3.3 MTB Operational Activities

The trails and tracks will be operational during the Thredbo mountain biking season (generally end of November to end of April each year).

During operation, ongoing monitoring and maintenance of the trail is critical to ensure effective and sustainable trail management. A maintenance and monitoring program will be implemented as part of the overarching *Thredbo Mountain Bike Trail Management Plan*. The plan sets out the management requirements and guides the maintenance works required to sustainably manage the Thredbo MTB Trail Network, as well as the monitoring and reporting requirements to effectively monitor the environmental condition of trails and their impact on the surrounding environment.

A summary of the trail maintenance and monitoring programs are provided below.

3.3.3.1 MTB Trail Maintenance

The trail maintenance program includes (but 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.

The MTB trail maintenance program is outlined in Section 3.5.1 of the Thredbo Mountain Bike Trail Management Plan.

3.3.3.2 MTB Trail Monitoring

The trail monitoring program comprises four (4) main components:

1) operational safety monitoring;
2) environmental monitoring;
3) pre and post seasonal monitoring; and
4) annual monitoring.

Daily operational monitoring is primarily focused on rider safety and recording of any major environmental concerns.

Monthly environmental monitoring is used to direct maintenance works required to ensure minimal environmental impact is sustained from ongoing trail use.

Annual monitoring is carried in spring each year using the baseline data as reference points which is reported to NPWS.

The trail monitoring program is detailed in Section 4 of the of the Thredbo Mountain Bike Trail Management Plan. The plan will be updated to incorporate the proposed trail.

3.4 Construction Activities

Pre-construction activities will comprise:

- establishment of site boundary;
- marking significant vegetation to be retained and no-go zones;
- erection of site signage and traffic controls;
- flagging exact trail alignment using pin flags to mark the edges of the trail for construction; and
- mobilisation of machinery, equipment and construction materials to site.

Construction activities will comprise:

- vegetation clearing (50 m increments) within the trail corridor to expose bare earth
    - excess cut vegetation to be spread into the surrounding heath and used for rehabilitation of exposed soil on the trail edges
    - topsoil and vegetation sods are to be stockpiled close to the trail tread;
- cut into the slope using a mini excavator and excavate the soil to achieve the appropriate depth of bench;
- remove loose rocks, roots and compact the trail;
- back slope the batter, ensuring outslope and appropriate drainage;
- define the trail line using rocks, logs and other obstacles;
- installation of platforms where required; and
- re-instate the verge areas, topsoil and preserved vegetation sods.

Post-construction activities will comprise:

- rehabilitation in accordance with the *Detailed Rehabilitation and Monitoring Plan*;
- demobilisation of plant and machinery; and
- site clean-up.

3.5 Project Timing

Construction is planned for February 2024 during the resort “summer construction period” (generally after the October long weekend and end no later than 30 April the following year), with finishing of rehabilitation and stabilisation works up until 30 May, or as otherwise approved.

3.6 Construction Management Details

Construction management details, including project management, site access, waste management, vehicles, machinery and equipment, stockpiling and material storage areas etc. are provided in the Site Environmental Management Plan (SEMP).

3.7 Operational Access

Once operational, riders will be able to access sections of the Development from the following trails:

- Kosciuszko Flow – Riders on the Kosciuszko Flow Trail will have the option to take the Little Beauty Jumps bypass instead of riding the jumps park to continue onto the Kosciusko Flow trail to the base of the mountain.

- Woody's – Riders on Woody's will be able to access the lower section of the Kosciusko Flow Trail realignment via the new section below the Little Beauty Jumps Park.
- Home Run – Riders on Home Run will have the option to take the new section of Wombat Walk Connector to the base of Snowgums chairlift instead of heading west to the base of Kosciuszko Express chairlift.

Refer to the SEMP for details and controls regarding construction access.

4 Legislative Context

A review of key legislation and planning instruments applicable to the Project is provided in **Table 5**.

Table 5: Legislative Review

Acts & Planning Instruments	Summary
Commonwealth	
Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)	The EPBC Act provides a legal framework to protect and manage nationally and internationally important aspects of the Australian environment. The EPBC Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW). Under Part 3 of the EPBC Act, a person must not undertake an action (e.g. a development) that will have, or is likely to have, a significant impact on a protected matter listed under the EPBC Act without approval from the Australian Government for the Environment. Refer to **Section 6.4** for details.
State	
Environmental Planning and Assessment Act 1979 (EP&A Act) Environmental Planning and Assessment Regulation 2021 (EP&A Regulation)	The EP&A Act is the primary piece of legislation governing development within NSW. DPE assesses development proposals within NSW alpine resort areas where the Minister for Planning is the consent authority under Part 4 of the EP&A Act. This SEE has been prepared in accordance with the requirements of the EP&A Regulation. Throughout the planning and design phases of the Development, KT has considered the principles of ESD.
National Parks and Wildlife Act 1974 (NPW Act) *National Parks and Wildlife Regulation 2019*	The objects of the NPW Act include: • the conservation of nature; • the conservation of objects, places or features (including biological diversity) of cultural value within the landscape; • fostering public appreciation, understanding and enjoyment of nature and cultural heritage and their conservation; and • providing for the management of land reserved under the Act in accordance with the management principles applicable for each type of reservation. As detailed in this report, appropriate environmental mitigation and management measures are proposed to ensure the Project results in acceptable environmental impacts. The NPW Act provides that a person who exercises due diligence in determining that their actions will not harm Aboriginal objects has a defence against

	prosecution if they later unknowingly harm an object without an Aboriginal heritage impact permit. A due diligence assessment has been undertaken in **Section 6.8.**
Biodiversity Conservation Act 2016 (BC Act) Biodiversity Conservation Regulation 2017 (BC Regulation)	The purpose of the BC Act is to maintain a healthy, productive and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ESD. The Development is consistent with principles of ESD, as demonstrated in the subsequent sections of this report. The BC Regulation sets out threshold levels for when the Biodiversity Offsets Scheme (BOS) will be triggered. The threshold has two elements: • whether the amount of native vegetation being cleared exceeds the area threshold; and • whether the impacts occur on an area mapped on the Biodiversity Values Map (BVM). If clearing and other impacts, including biodiversity impacts prescribed by Clause 6.1 of the BC Regulation, exceed either trigger, the BOS applies. The BOS also applies when: • the 'test of significance' in section 7.3 of the BC Act identifies that the development or activity is likely to significantly effect threatened species or ecological communities, or their habitats; or • the works are carried out on a declared area of outstanding biodiversity value. The Development does not trigger the BOS. A Flora and Fauna Assessment is provided in the appendices.
Water Management Act 2000 (WM Act) *Water Management (General) Regulation 2018* (WM (General) Regulation)	Controlled activities carried out in, on, or under waterfront land are regulated by the WM Act. Waterfront land includes the bed and bank of any river, lake or estuary and all land within 40 m of the highest bank of the river, lake or estuary. The NSW Department of Planning and Environment – Water (DPE – Water) administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure minimal harm to waterfront land as a consequence of carrying out the controlled activity. As such, a controlled activity approval must be obtained before commencing the controlled activity, unless an exemption applies under the WM (General) Regulation. A short section of the Development is located within waterfront land, refer **Section 6.2.2** for details.
Environmental Planning Instruments	
State Environmental Planning Policy (Precincts – Regional) 2021 (Precincts – Regional SEPP)	The aim and objectives of the Policy for Kosciuszko National Park and alpine resorts (Chapter 4) are: • to encourage the carrying out of a range of development in the alpine resorts that do not result in adverse environmental, social or economic impacts on the natural or cultural environment; • provide planning controls to encourage ESD; and • minimise the risk of community exposure to environmental hazards within the alpine resort areas. Development in NSW alpine resort areas are governed by the Precincts – Regional SEPP. Key requirements are addressed below.

4.1 Planning Framework

An assessment against the relevant matters of the EP&A Act and relevant environment planning instruments, policies and plans is provided in this section.

4.1.1 Environmental Planning and Assessment Act 1979

Pursuant to Section 4.15 of the EP&A Act, the consent authority is to consider the matters outlined below.

(1) Matters for consideration – General	**Consideration**
the provisions of—	
(i) any environmental planning instrument	The Precincts – Regional SEPP is the only environmental planning instrument which applies to the site for this proposal. An assessment against the relevant sections of the Precincts – Regional SEPP have been addressed in **Section 4.2.2**.
(ii) any proposed instrument that is or has been the subject of public consultation under this Act and that has been notified to the consent authority (unless the Planning Secretary has notified the consent authority that the making of the proposed instrument has been deferred indefinitely or has not been approved)	Not applicable to the Development.
(iii) any development control plan	Not applicable to the Development.
(iiia) any planning agreement that has been entered into under section 7.4, or any draft planning agreement that a developer has offered to enter into under section 7.4	Not applicable to the Development.
(iv) the regulations (to the extent that they prescribe matters for the purposes of this paragraph)	The DA and supporting information has been prepared in accordance with the requirements of the EP&A Regulation.
(a) the likely impacts of that development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	The likely impacts of the Development on the natural and built environment, and social and economic impacts in the locality have been assessed in **Section 6**.
(b) the suitability of the site for the development	The site suitability is assessed in **Section 2.5**.
(c) any submissions made in accordance with this Act or the regulations	KT will consider submissions made through the DA process.
(d) the public interest.	The Development is considered to be within the public interest for the following reasons: • The Development is consistent with the aim and objectives of the Precincts – Regional SEPP. • The Development is compatible with the site. • The Development will not have any significant adverse environmental impacts.

	• The Development is consistent with the principles of ESD. • The Development will contribute to tourism and recreation opportunities in Thredbo resort.

4.1.2 Precincts – Regional SEPP

The relevant sections of Chapter 4 (Kosciuszko National Park and alpine resorts) of the Precincts – Regional SEPP are addressed in this section.

4.1.2.1 Section 4.1 – Aims and objectives of Chapter

Section 4.1, Aims and objectives of Chapter	Consideration
(1) The aim of this Chapter is to protect and enhance the Alpine Region by ensuring development is managed with regard to the principles of ecologically sustainable development, including the conservation and restoration of ecological processes, natural systems and biodiversity.	
(2) The objectives of this Chapter are as follows— (a) to encourage the carrying out of a range of development to support sustainable tourism in the Alpine Region all year round, if the development does not result in adverse environmental, social or economic impacts on the natural or cultural environment of the Alpine Region, including cumulative impacts on the environment from development and resource use,	The Development will provide a realignment of the existing Kosciuszko Flow Trail and a new connecting trail which predominately utilises an existing access track and other highly disturbed areas. The Development has been designed to minimise environmental impacts whilst improving the rider experience and operational outcomes. Parts of the existing Kosciuszko Flow Trail on the Milk Run and Lower Supertrail ski runs that are subject to erosion issues will be closed and rehabilitated. The Development will contribute to the sustainable tourism offerings in Thredbo. This SEE has considered the potential environmental, social, economic and cultural impacts of the Development, and concludes the Development is unlikely to result in any significant adverse impacts.
(b) to establish planning controls that— (i) contribute to and facilitate the carrying out of ecologically sustainable development in the Alpine Region, and (ii) recognise the Alpine Region's significant contribution to recreation and the tourism economy in the State,	The Development has been planned and designed with consideration of the planning controls outlined in this Chapter.
(c) to minimise the risk to the community of exposure to environmental hazards, particularly geotechnical hazards, bush fires and flooding, by— (i) generally requiring development consent on land in the Alpine Region, and (ii) establishing planning controls for buildings to ensure the safety of persons using the buildings if there is a fire.	The Development has considered the potential risks of environmental hazards. A section of the Wombat Walk Connector requires a platform over a drainage line, therefore a Form 4 and site classification report has been prepared, refer **Appendix G**.

4.1.2.2 Section 4.7 – Land Use Table (Thredbo Alpine Resort)

Pursuant to the Land Use Table in Section 4.7 of the Precincts – Regional SEPP, 'recreation infrastructure' is permissible with consent within the Thredbo Alpine Resort. Recreation infrastructure is defined in Schedule 4A Dictionary – Chapter 4 as: '*infrastructure provided for the purposes of active or passive recreation for tourists and visitors, including walking trails,* ***mountain bike trails****, directional signage, cross-country ski trails and oversnow routes, but does not include ski slopes'.* Accordingly, the Development is permissible with consent.

4.1.2.3 Section 4.24 Flood planning

Section 4.24 Flood Planning	**Consideration**
(1) The objectives of this section are as follows— (a) to minimise the flood risk to life and property associated with the use of land, (b) to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change, (c) to avoid adverse or cumulative impacts on flood behaviour and the environment, (d) to enable the safe occupation and efficient evacuation of people if there is a flood.	
(2) Development consent must not be granted to development on land in the Alpine Region the consent authority considers to be in the flood planning area unless the consent authority is satisfied the development— (a) is compatible with the flood function and behaviour on the land, and (b) will not adversely impact flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and (c) will not adversely impact the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area if there is a flood, and (d) incorporates appropriate measures to manage risk to life if there is a flood, and (e) will not adversely impact the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.	Under the Precincts – Regional SEPP there is no reference to any adopted flood planning area mapping, no defined flood planning area or flood planning level.
(3) In deciding whether to grant development consent on land the consent authority considers to be in the flood planning area, the consent authority must consider the following matters— (a) the impact of the development on projected changes to flood behaviour as a result of climate change, (b) the intended design and scale of buildings resulting from the development, (c) whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people if there is a flood, (d) the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding or coastal erosion.	

(4) Words used in this section have the same meaning as in the Considering Flooding in Land Use Planning Guideline, published on the Department's website on 14 July 2021, unless otherwise defined.

4.1.2.4 Section 4.25 Earthworks

Section 4.25 Earthworks	Consideration
(1) The objective of this section is to ensure that earthworks for which development consent is required will not have a detrimental impact on environmental functions and processes, neighbouring uses, cultural or heritage items or features of the surrounding land.	The Development is consistent with the objectives of this section.
(2) Development consent is required for earthworks in the Alpine Region unless— (a) the earthworks are exempt development under this Chapter or another environmental planning instrument, or (b) the earthworks are ancillary to— (i) development permitted without consent under this Chapter, or (ii) development for which development consent has been given.	Earthworks form part of this application seeking Development Consent.
(3) In deciding whether to grant development consent for earthworks, or for development involving ancillary earthworks, the consent authority must consider the following matters— (a) the likely disruption of, or adverse impact on, drainage patterns and soil stability in the locality of the development, (b) the effect of the development on the likely future use or redevelopment of the land, (c) the quality of the fill or the soil to be excavated, or both, (d) the effect of the development on the existing and likely amenity of adjoining properties, (e) the source of any fill material and the destination of any excavated material, (f) the likelihood of disturbing relics, (g) the proximity to, and potential for adverse impacts on, a waterway, drinking water catchment or environmentally sensitive area, (h) appropriate measures proposed to avoid, minimise or mitigate the impacts of the development.	a) Unlikely, refer to **Sections 6.1** and **6.2**. b) The Development is not anticipated to adversely impact upon the redevelopment of the site. c) The excavated material will be reused onsite. The quality of the material is not expected to change. d) The majority of adjoining land comprises of ski slopes, lifting infrastructure and mountain bike trails, therefore the Development is not expected to have any significant impacts on the amenity of adjoining land, refer to **Section 6.5.** e) No fill material is proposed. In the event fill material is required, it will be sourced in accordance with the requirements outlined in the SEMP (**Appendix F**). f) Unlikely, refer **Section 6.4.2.** g) Impacts unlikely, refer **Section 6.2.** h) Refer **Section 7** for proposed mitigation measures.

4.1.2.5 Section 4.28 – Consideration of master plans and other documents

Matters for consideration	Consideration

(1) In deciding whether to grant development consent to development in the Alpine Region, the consent authority must consider the following—	
(a) the aim and objectives of this Chapter set out in section 4.1,	The Development is consistent with the objectives of Chapter 4, as demonstrated in this report.
(b) a draft development control plan that is intended to apply to the land and has been published on the NSW planning portal,	Not applicable.
(c) a conservation agreement under the Environment Protection and Biodiversity Conservation Act 1999 of the Commonwealth that applies to the land,	Not applicable.
(d) the Geotechnical Policy —Kosciuszko Alpine Resorts published by the Department in November 2003,	
(e) for development in the Perisher Range Alpine Resort— (i) the Perisher Range Resorts Master Plan, published by the National Parks and Wildlife Service in November 2001, and (ii) the Perisher Blue Ski Resort Ski Slope Master Plan adopted by the National Parks and Wildlife Service in May 2002.	Not applicable to the Development.
(2) In deciding whether to grant development consent to development in the Alpine Region, the consent authority must consider—	
(a) a master plan approved by the Minister under section 4.26 that applies to the land, or	Refer to **Section 4.4.2**.
(b) if a master plan has not been approved—a draft master plan prepared under section 4.26 that is intended to apply to the land and has been published on the NSW planning portal.	Master Plan has been approved, see above.

4.1.2.6 Section 4.29 – Consideration of environmental, geotechnical and other matters

Matters for consideration	**Consideration**
(1) In deciding whether to grant development consent to development in the Alpine Region, the consent authority must consider the following— (a) measures proposed to address geotechnical issues relating to the development, (b) the extent to which the development will achieve an appropriate balance between— (i) the conservation of the natural environment, and (ii) taking measures to mitigate environmental hazards, including geotechnical hazards, bush fires and flooding, (c) the visual impact of the proposed development, particularly when viewed from the land identified as the Main Range Management	(a) Not applicable. (b) The Development does not require environmental controls to mitigate environmental hazards that would impact upon the conservation of the natural environment. c) The Development is not anticipated to result in any significant visual impacts. The trail is not visible from the Main Range Management Unit.

Unit in the Kosciuszko National Park Plan of Management,	
(d) the cumulative impacts of development and resource use on the environment of the Alpine Subregion in which the development is carried out,	There is no framework to assess cumulative impacts within the Alpine Subregion. The impacts of the Development are addressed in **Section 7**. With the implementation of appropriate environmental controls during construction and operation, the Development is not anticipated to result in any significant adverse impacts on identified environmental values of the site and surrounds.
(e) the capacity of existing infrastructure and services for transport to and within the Alpine Region to deal with additional usage generated by the development, including in peak periods,	The Development will not impact upon the capacity of existing infrastructure and services for transport to deal with additional usage generated by the Development.
(f) the capacity of existing waste or resource management facilities to deal with additional waste generated by the development, including in peak periods.	The Development will not adversely impact upon the capacity of existing waste or resource management facilities. Waste generation from the Development is expected to be minimal.
(2) For development involving earthworks or stormwater draining works, the consent authority must also consider measures to mitigate adverse impacts associated with the works.	Earthworks are proposed. Temporary drainage, erosion and sediment control measures will be implemented during construction to mitigate potential adverse impacts associated with earthworks (refer to the SEMP, **Appendix F**).
(3) For development the consent authority considers will significantly alter the character of an Alpine Subregion, the consent authority must also consider— (a) the existing character of the site and immediate surroundings, and (b) how the development will relate to the Alpine Subregion.	a) The Development will not alter the alpine resort character. The trails will form part of the existing mountain bike trail network. b) The Development will improve the rider experience, and therefore positively contribute to tourism in the Alpine Subregion.

4.2 Integrated Development

A review of the Development referrals guide (DPE 2022) confirmed the Development is integrated development requiring referral to DPE-Water under the WM Act.

4.3 Plans, Policies and Guidelines

4.3.1 Snowy Mountains Special Activation Precinct Master Plan

The Snowy SAP Master Plan sets out the vision, principles, and precinct-wide performance criteria to support the planning controls in three Environmental Planning Instruments (EPIs).

The protection of the natural, cultural and social values of KNP is a primary focus of the Snowy Mountains Special Activation Precinct. As demonstrated in this SEE, the Development will not result in any significant adverse impacts on natural values. The Project has been designed to first avoid impacts on biodiversity, then minimise and mitigate impacts through a range of mitigation measures implemented during construction and operation. Where unavoidable impacts native vegetation and conservation significant species are proposed, offsets have been provided.

The Development will not adversely impact on any cultural values. The Development will contribute to the social values of KNP as it will enhance Thredbo's MTB trail offerings.

4.3.2 Kosciuszko National Park Plan of Management

The KNP POM outlines objectives and management strategies to guide the long-term management of values within specific areas of KNP. The KNP POM includes several management zones, which comprise of seven management units that contain places and values of exceptional significance. Thredbo is included in the Thredbo Management Unit, considered an area of exceptional recreational significance. As such, the management provisions in Section 10 of the KNP POM applicable to this unit apply.

Section 8.11 of the KNP POM also recognises a range of cycling opportunities exist to encourage visitors to appreciate the values of KNP in ways that minimise adverse impacts, including permitting cycling on management trails, purpose-built cycling tracks, shared-use tracks and multiple-use trails within the Visitor Services Zone (including Thredbo Management Unit) subject to risk and environmental assessments and approval.

The cycling management objective in Section 8.11.1 of the KNP POM is to provide a range of cycling opportunities that encourages visitors to appreciate the values of the park in ways that minimise adverse impacts. The Development is a purpose-built cycling track which has undergone a comprehensive environmental impact assessment to avoid, minimise and mitigate adverse impacts on existing environmental values. As such, the Development is consistent with the cycling management objective.

4.3.3 Kosciuszko National Park Cycling Strategy 2017

The *Kosciuszko National Park Cycling Strategy* (OEH 2017) (KNP Cycling Strategy) was prepared for the management of cycling (on-road and off-road) within KNP and aims to achieve the following outcomes:

- increased contribution towards conservation of park values through growth in new markets that enjoy and value national parks;
- environmentally sustainable, fit-for-purpose cycling opportunities that enhance or protect conservation, recreational, social and cultural values;
- increased visitation including overnight stays to the Kosciuszko National Park and surrounding region; and
- transparent and consistent assessment of new proposals to ensure they achieve the outcomes above.

The Development is considered consistent with the KNP Cycling Strategy.

5 Assessment Method

The assessment for the Development consisted of a desktop review of publicly available data sources and information. The desktop review was followed by a preliminary site assessment and subsequent field surveys carried out within the Project area to describe the environmental values present on the site and to aid the evaluation of potential impacts of the Project to those values. A summary of the assessment methods is provided in the following sections.

5.1 Desktop Assessment Method

A desktop assessment was carried out to identify relevant environmental values, that potentially occur within the Project area. Database and information sources that were utilised in the assessment include:

- NSW Planning Portal Spatial Viewer (NSW Government 2023a);
- Biodiversity Values Map and Threshold Tool (NSW Government 2023b);
- NSW BioNet (NSW Government 2023c);
- Water Management (General) Regulation 2018 hydroline spatial data 1.0 (NSW Government 2023d);
- Protected Matters Search Tool (DAWE 2023); and
- Aboriginal Heritage Information Management System Web Services (Heritage NSW).

5.2 Technical Assessments

5.2.1 Flora and Fauna Assessment

A Flora and Fauna Assessment was undertaken by Eco Logical Australia Pty Ltd (ELA), refer to **Appendix E** for a copy of the report.

5.2.2 Aboriginal Cultural Heritage Due Diligence Assessment

Past Traces Pty Ltd (Past Traces) were engaged to undertake a Cultural Heritage Due Diligence Assessment for the Development. A copy of the assessment is provided in **Appendix F**.

5.2.3 Geotechnical Assessment

ACT Geotechnical Engineers Pty Ltd were engaged to undertake a geotechnical investigation of the proposed platform. A copy of the assessment and Form 4 is provided in **Appendix G**.

6 Environmental Impact Assessment

6.1 Land

6.1.1 Topography

The Flow realignment ranges from approximately 1,475 m Australian Height Datum (AHD) to 1,430 m AHD. The Wombat Walk Connector ranges from approximately 1,461 m – 1,370 m AHD.

6.1.2 Geotechnical Considerations

The Development is considered minor construction works which present “minimal or no geotechnical impact” on the site as determined by the Geotechnical Assessment and attached Form 4 (**Appendix F**).

6.1.3 Soils and Disturbance

To create the trail form, earthworks comprising cut and fill are required using a mini excavator. The disturbance corridor will range from 2-3 m in width, containing the upper and lower batters and the trail surface when the trail is traversing across moderate to steep slopes. On gentler slopes the disturbance corridor will be closer to 1.5 m. The average disturbance width is expected to be 2.5 m.

Due to the nature of the works, the final trail alignment will not be rehabilitated. However, the Development will be constructed to effectively manage erosion and run-off in accordance with best practice environmentally sustainable trail design outlined in the IMBA Guidelines.

The construction of the trail will incorporate key sustainable trail design concepts and construction techniques such as rolling contours, outslope, the half rule and 10% average guideline and use of frequent grade reversals (refer **Table 3** and **Table 4**) to minimise erosion and soil stability risks.

Where areas of disturbance do not form part of the final trail alignment, they will be stabilised and/or revegetated in accordance with the rehabilitation plan which will assist in achieving an erosion resistant state.

6.1.4 Land Use

The Development is consistent with the surrounding land uses. The expansion of MTB trails within Thredbo does not introduce any land uses which are not permitted under the head lease.

6.1.5 Bush Fire Prone Land

The Development is located on bush fire prone land (NSW RFS 2023).

6.2 Water

6.2.1 Existing Environment

A review of the *Water Management (General) Regulation 2018 Hydro Line spatial data* (NSW Government 2018) and the *State Environmental Planning Policy (Kosciuszko National Park – Alpine Resort) 2007 Thredbo Alpine Resort, Sheet 1 of 5* (DoP 2006) confirms the Flow Trail Realignment is located within 40 m of a mapped watercourse. It is noted the mapped watercourse alignments for both datasets are not entirely accurate. The Wombat Walk Connector is not located within 40m of a mapped watercourse, refer **Figure 7**.

The lower section of the Wombat Walk Connector will traverse a wet area / drainage line below the existing Home Run trail platform located northeast of the Snowgums Chairlift bottom station, refer **Plate 3**.

Figure 7: Waterfront Land Review

6.2.2 Waterfront Land Assessment

Two short sections of the Flow Trail Realignment, approximately 65.90 m (36.60m + 29.30m) are located within 40 m of a mapped watercourse (**Figure 8**). Therefore, an assessment has been carried out in accordance with the *DPE Fact Sheet: Controlled Activities – Guidelines for riparian corridors on waterfront land*.

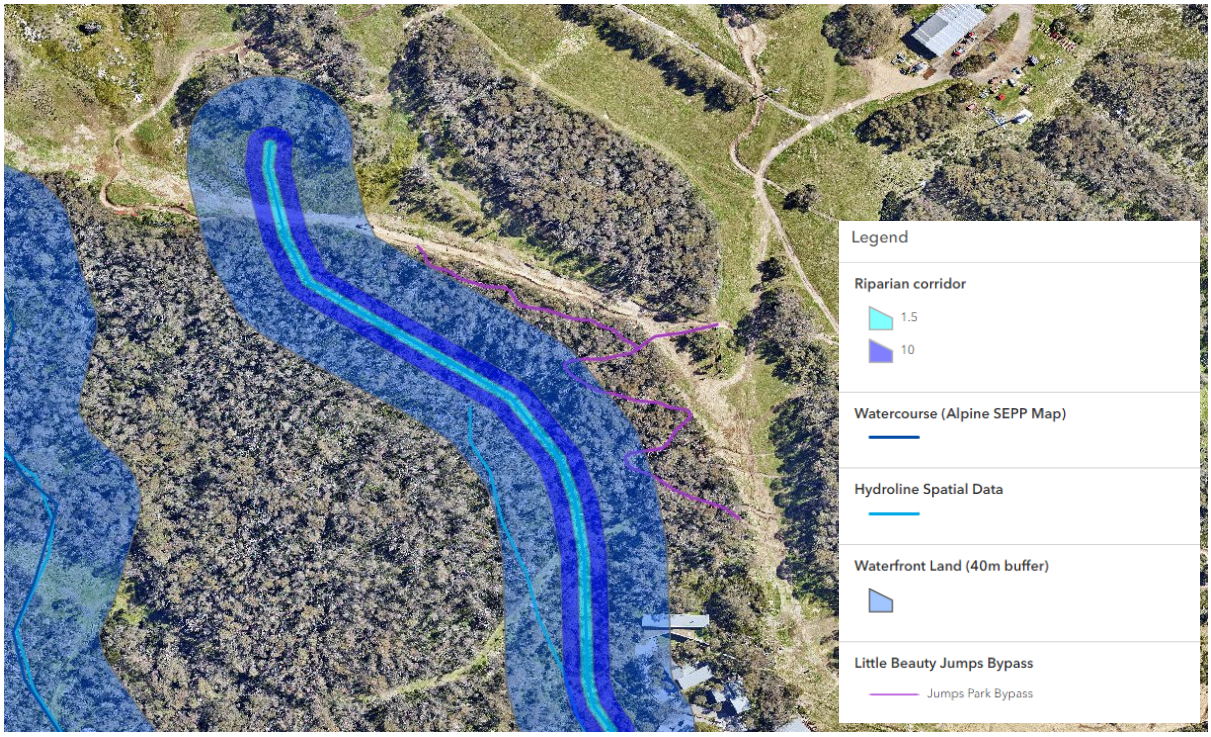

Figure 8: Riparian Corridor Assessment

Plate 3: Wet Area / Drainage Line – Platform Location

6.2.2.1 Watercourse order

The watercourse is classified as a first order stream under the Strahler system. The channel width ranges from approximately 1.2-1.5 m wide along the length of the site. For the purposes of this assessment the channel stream width depicted on **Figure 8** is 1.5 m for the entire length. Photos of the minor watercourse for context are provided in **Plate 4** and **Plate 5**.

Plate 4: First order watercourse within 40 m of the Development (facing upstream)

Plate 5: First order watercourse within 40 m of site (facing downstream)

6.2.2.2 Riparian corridor width

The recommended width of the Vegetation Riparian Zone (VRZ) (each side of the watercourse) for a first order watercourse is 10 m. The channel width of the watercourse upstream and downstream of the Development ranges from approximately 1.2-1.5 m. Therefore, the total riparian corridor of the watercourse has been assessed as 21.5 m (20 m + channel width).

6.2.2.3 Works within waterfront land (outside of riparian corridor)

The average trail corridor width for a mountain bike trail is 2.5 m, and must not exceed 3 m in any locations. The trail construction may result in up to 165 m^2 of disturbance within waterfront land, however the disturbance will occur outside of the riparian corridor as demonstrated in **Figure 8**.

No impacts to the watercourse and its associated riparian vegetation are anticipated given the following:

- No new infrastructure is proposed within the defined riparian corridor of the watercourse.
- Appropriate environmental controls will be implemented during construction in accordance with the SEMP to mitigate potential environmental impacts.
- The trail will be designed and constructed in accordance with IMBA Guidelines to ensure the ongoing sustainability of the trail, including the management of surface water runoff and erosion to ensure no adverse impacts to the watercourse and associated corridor during operation.

6.2.3 Surface water management

Surface water diversion is an important component of trail construction. If not managed appropriately, water run-off could result in erosion of the trail surface and pooling of water resulting in soft boggy conditions for riders.

During construction appropriate drainage controls will be implemented to divert and/or manage stormwater run-off entering and leaving the site.

The incorporation of rolling contours, grade reversals and outsloping the trail will minimise the potential impacts associated with surface water run-off during operation of the trail.

With the implementation of appropriate controls during controls and incorporation of sustainable trail design principles, no adverse impacts to the first order watercourse are anticipated.

A platform will be installed across the wet area / drainage line on Wombat Walk to minimise environmental impacts in the locality. The platform will be similar to the existing platform uphill of the site which forms part of the Home Run MTB trail.

6.3 Biodiversity

Approximately 0.13 ha of Subalpine Woodland is expected to be affected by the Development. The potential impacts of the Development on biodiversity have been assessed in the Flora and Fauna Assessment provided in the appendices.

The Development will not trigger the Biodiversity Offsets Scheme (BOS), as it will not encroach on any area of land identified on the Biodiversity Values map, and the total clearing of native vegetation is significantly less than the 1 ha threshold at which the BOS is triggered.

An assessment of the effects of the Development on threatened species, populations and ecological communities which may be directly or indirectly affected by the Development was undertaken by test of significance outlined in Section 7.3 of the Biodiversity Conservation Act 2016. This assessment concluded that the Development is unlikely to have a significant effect on threatened species, populations or ecological communities or their habitats (ELA 2023).

Following consideration of the administrative guidelines for determining significance under the EPBC Act, ELA (2023) concluded that the Development is unlikely to have a significant impact on matters of National Environmental Significance or Commonwealth land, and a referral to the Commonwealth Environment Minister is not necessary.

6.4 Matters of National Environmental Significance

A search of the EPBC Act Protected Matters Search Tool (PMST) (DCCEEW 2023) (records within a 5 km buffer of the site was undertaken on 15 September 2023 to determine whether any MNES are likely to occur within the Development area (**Appendix D**). A summary is provided in **Table 6**.

Table 6: Summary of MNES

MNES Categories	Comment
National Heritage Places	The Development is located within KNP which forms part of the Australian Alps National Parks and Reserves (AANP), refer **Section 6.4.1**.
Wetlands of International Importance	No Wetlands of International Importance are considered relevant to the Development, no further assessment is required.
Listed Threatened Ecological Communities (TECs)	The Flora and Fauna Assessment concluded no significant impacts to any MNES are proposed, refer **Appendix E**.
Listed Threatened Species	
Listed Migratory Species	

*While based on some species records, the PMST relies on predictive modelling of suitable habitats and does not necessarily reflect an actual record of the species/community for a particular location.

The assessment of impacts to MNES concluded the Development will not result in any significant impacts on MNES, nor will it directly or indirectly affect Commonwealth Land. No referral to the Australian Government Minister for the Environment is required under the EPBC Act.

6.4.1 National Heritage Places – Australian Alps National Parks and Reserves

Approval under the EPBC Act is required for any action occurring within, or outside, a National Heritage place that has, will have, or is likely to have a significant impact on the National Heritage values of the National Heritage place.

The Australian Alps National Parks and Reserves (AANP) were included on the National Heritage List on 7 November 2008 for their –

1) course or pattern of Australia's natural or cultural history;
2) possession of uncommon, rare or endangered aspects of Australia's natural or cultural history;
3) importance in demonstrating the principal characteristics of: (i) a class of Australia's natural or cultural places, or (ii) a class of Australia's natural or cultural environment

4) importance in exhibiting particular aesthetic characteristics valued by a community or cultural group;
5) strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; and
6) special association with the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.

In total, three reserves, seven national parks and one wilderness area comprise the National Heritage Place. The Project site is located in KNP, within the Australian Alps.

To determine whether a referral and formal assessment is required for the Development, an assessment against the significant impact criteria in the *Matters of National Environmental Significance: Significant Impact Guidelines 1.1* (DEE 2013) has been undertaken in **Table 7**.

Criteria: An action is likely to have a significant impact on the National Heritage values of a National Heritage place if there is a real chance or possibility that it will cause:

- *one or more of the National Heritage values to be lost,*
- *one or more of the National Heritage values to be degraded or damaged, or*
- *one or more of the National Heritage values to be notably altered, modified, obscured or diminished.*

Table 7: Significant Impact Assessment – Australian Alps National Parks and Reserves

	National Heritage Values of the Australian Alps National Parks and Reserves	Significant Impact Assessment
1)	The AANP are of outstanding landscape value and are important in the pattern of Australia's natural history, containing glacial and periglacial features, fossils, karst, biological heritage, moth feasting, transhumant grazing, scientific research, water harvesting and recreation. The AANP have outstanding heritage value for the longevity and diversity of its recreational use (Commonwealth of Australia 2008).	The Development will not have an adverse impact on these values. The Development will provide direct benefits for summer tourism, whilst supporting economic investment in the resort.
2)	The high altitude peaks and plateaus, glacial lakes and alpine and sub-alpine ecosystems of the alps are rare in Australia's mostly flat, dry and hot continent. The AANP contain a vast range of mountain environments and plant communities adapted to cold climates including tall, wet, fern-filled forests to snowgum woodlands and open expanses of alpine meadows. The alps also contain landforms created by glaciers, remarkable fish fossils and unique fauna including Mountain Pygmy Possum (*Burramys parvus*) and Bogong moth (*Agrotis infusa*) (Commonwealth of Australia 2008; DAWE 2021).	The Development will result in minimal impacts to the overall landscape of the Australian Alps.
3)	The AANP are listed for the north-east Kosciuszko pastoral landscape values which demonstrate the use of mountain resources, namely the summer grasses and herb fields. The landscape demonstrates the past grazing leases which convey the principal characteristics of transhumance and permanent pastoralism in a remote environment (Commonwealth of Australia 2008). The	The Development is not located within the north-eastern area of KNP, therefore it will not impact on these landscape values.

	area contains stockman's huts, homestead complexes, stock yards and stock routes which reflect 150 years of summer grazing on the alpine high plains (DAWE 2021).	
4)	The AANP is a powerful, spectacular and distinctive landscape and natural beauty. The mountain vistas, alpine streams and rivers, lakes, snow-covered eucalypts, high plain grasslands, summer alpine wildflowers, forests and natural sounds are highly valued by community groups (Commonwealth of Australia 2008; DAWE 2021).	The Development will not directly impact on any of these values.
5)	The AANP have a strong association with Australia's pioneering history, while the snowfields and national parks have long been popular recreation areas. Many community groups have a strong association with the alps for social and cultural reasons. The pioneering history of the high country is valued as an important part of the construction of the Australian identity featuring in myths, legends and literature. The mountain huts constructed for grazing, mining and recreation are valued by communities as physical expression of the cultural history of the region (Commonwealth of Australia 2008; DAWE 2021).	The Development will not have an adverse impact on these values. The Development will expand Thredbo's MTB Trail Network, therefore enhancing the recreation and social values.
6)	There is a long history of scientific research and endeavour in the AANP and its associated with the life or works of highly recognised persons such as Baron Ferdinand von Mueller (botanist), Eugen Von Guerard (artist), and writers/poets, Andrew Barton 'Banjo' Paterson, Elyne Mitchell and David Campbell (Commonwealth of Australia 2008; DAWE 2021).	The Development will not impact on the life or works of a person, or group of persons, of importance in Australia's natural or cultural history.

As identified in **Table 7** the Development will not cause any of the heritage values of the Australian Alps to be lost, degraded, damaged or to be notably altered, modified, obscured or diminished. Therefore, a referral to the Australian Government Minister for the Environment is not required.

6.5 Landscape Character and Visual Amenity

The existing site and surrounds comprise native vegetation, ski runs and associated infrastructure, MTB trails and access tracks.

The Development will not alter the character of the resort as it will form part of the existing Thredbo MTB Trail Network. The tread of the trail is shaped using natural materials (rocks and soil) to provide features that blend within the existing landscape. It is not anticipated the Development will negatively impact on the landscape character or visual amenity of the resort.

6.6 Air and Noise

The nearest sensitive receptor (tourist accommodation) is located more than 50 m away from the Development, refer **Figure 9**.

Figure 9: Review of sensitive receptors within the locality

6.6.1 Air Quality

Dust can be a nuisance and decrease the amenity value of an area. Dust may be generated during construction activities such as vegetation clearing, earthworks and vehicle movements. With the implementation of appropriate controls during construction, no adverse dust impacts are proposed. Refer to the SEMP for air quality controls that will be implemented.

6.6.2 Noise

It is proposed construction hours of works will be undertaken during standard working hours. This includes 7:00am – 6:00pm Monday to Friday, 8:00am – 1:00pm Saturdays, and no work on Sundays or public holidays. Out-of-hours works are not anticipated.

The site and surrounds comprise existing recreational infrastructure including mountain bike trails, walking tracks and ski runs. The Development is consistent with the existing recreational land uses and is not anticipated to create any significant adverse noise impacts.

Refer to the SEMP for noise and vibration controls that will be implemented.

6.7 Heritage

A review of the Precincts – Regional SEPP, NSW historic inventory and the Thredbo Alpine Village Conservation Plan, Vol.2 Inventory (Clive Lucas, Stapleton and Partners 1997) confirmed no heritage items are located within the Development site or within close proximity. No further assessment is required.

6.8 Aboriginal Cultural Heritage

To establish due diligence for the Development, an assessment against the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW 2010) has been undertaken by Past Traces (refer **Appendix F**). A summary of the assessment is provided below.

6.8.1 Desktop Results

Based on a review of previous reports and an Aboriginal Heritage Information Management Systems (AHIMS) search, no heritage sites and no areas of Potential Archaeological Deposit (PAD) were identified within the Development area (Past Traces 2023).

6.8.2 Field Survey Results

The field survey identified no Aboriginal heritage sites or areas of potential due to the steepness of the landforms, located on low potential landforms and the high degree of previous impacts along the trail routes (Past Traces 2023).

6.8.3 Recommendations

The assessment concluded there are no heritage constraints on the Development, and Past Traces (2023) recommends the following for the Development:

- Recommendation 1: Works to proceed without further heritage assessment with caution.
    - The proposed works can proceed without further assessment as no Aboriginal or historical heritage sites (objects or places) have been identified within the project area. The potential for impacting on unrecorded heritage sites within the project area is assessed as extremely low, based on landform analysis and field survey.
- Recommendation 2: Discovery of Unidentified Aboriginal cultural material during works.
    - Under the NPW Act 1977 all Aboriginal places and objects are protected from harm, even if they have not been previously identified during the assessment process. If Aboriginal material is discovered during works then the steps as outlined below should be followed:
        - All work must cease in the vicinity of the find and project manager notified immediately.
        - A buffer zone of 10m should be fenced in all direction of the find and construction personnel made aware of the 'no go' zone.
        - NSW Heritage must be notified of the find and advice sought on the proper steps to be undertaken.
        - After confirmation with NSW Heritage a heritage consultation should be engaged to undertake assessment of the find and provide appropriate management recommendations to the proponent.
- Recommendation 3: Alteration of impact footprint.
    - Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. Implementation of the above management recommendations will result in low potential for the project to impact on heritage values or result in damage to heritage sites.

6.9 Social and Economic

KT have been developing mountain bike trails within the resort since the 1990s. Consequently, the level of understanding of the existing landscape and industry will ensure that the trail is designed and constructed to comply with best-practice environmentally trail design principles; and provides targeted mountain biking objectives and difficulty with consideration of the natural, social and operational setting.

Whilst the Development will result in ongoing trail maintenance costs, the economic impacts will be largely positive as the trail will contribute to improved economic stability for the resort through the provision of an enhanced trail network which will cater to a broader range of mountain bikers and boost summer visitation. The Development will also result in construction and ongoing operational jobs.

7 Mitigation and Management Measures

Recommended mitigation and management measures to reduce potential impacts on the key values of the natural, built and human environment within the site and surrounds are provided in **Table 8**.

Table 8: Recommended Mitigation and Management Measures

	Mitigation and Management Measures	Timing
General		
1	Prepare and implement Site Environmental Management Plan (SEMP).	Prior to and during construction
2	Prepare and implement Thredbo Mountain Bike Trail Management Plan, including trail maintenance and monitoring programs.	Prior to operation
3	All Project staff and contractors should undergo a site-specific induction which will cover environmental awareness training, environmental obligations and compliance requirements (e.g. limit of disturbance footprint and other environmental safeguards), emergency and incident response, reporting, and relevant procedures.	Prior to construction
4	The construction corridor will be temporarily fenced, roped or flagged to clearly delineate the construction area and no-go zones.	Prior to and during construction
Land and Water		
1	Appropriate drainage, erosion and sediment controls will be implemented at the site to minimise impacts to the water quality of run-off and the potential for sediment to leave the site and impact on the surrounding environment during construction and operational use. Erosion and sediment controls to be inspected and maintained in accordance with the SEMP.	During and post-construction, operation
2	All stockpiles will be managed in accordance with the Soil Stockpile Guidelines.	During construction
3	All storage of petroleum products, oils or chemicals to be in accordance with Australian Standards.	During construction
4	Refuelling procedures to be implemented to minimise spills of fuel products.	During construction
5	Progressive rehabilitation of disturbed areas to reduce erosion risks in accordance with the *Rehabilitation Guidelines for the Resort Areas of*	Post-construction

	Kosciuszko National Park (DECC 2007) (Rehabilitation Guidelines) and *Detailed Rehabilitation and Monitoring Plan.*	
6	New signs to be located in disturbed areas.	During construction
7	The incorporation of sustainable design principles will minimise erosion during operation of the trail.	During construction, operation
Flora and Fauna		
1	All disturbance should be kept to the minimum required to achieve the proposal.	During construction
2	The proposed trail and associated works should be at least 15 m from the outer limit of the Subalpine Riparian Scrub (ELA 2023). These "no-go" areas are identified on the site plans in the SEMP.	Marking out trail, during construction
3	All machinery to be used during the construction phase should be limited to the existing disturbed areas and access tracks and the proposed trail alignments as far as is possible.	During construction
4	All trees with the potential to provide hollows and habitat for the Eastern Pygmy Possum are to be inspected by the Environmental Officer prior to felling (NPWS 2024).	Vegetation clearing, during construction
5	If any wombat burrows need to be impacted by the proposal a wombat management plan should be developed for the proposal in consultation with NPWS (ELA 2023).	Prior to and during construction
6	Prior to the commencement of construction works, all relevant weed species identified within the construction corridor are to be treated in accordance with best practice methods to ensure these weeks are not spread further within the site or throughout KNP. Relevant weed species include those listed in the *Regional Pest Management Strategy 2012-17, Southern Ranges Region: a new approach for reducing impacts on native species and park neighbours* (OEH 2012). Any Blackberry or other problematic weeds detected within the study area should be controlled (ELA 2023).	Prior to construction
7	All equipment, machinery and vehicles used during construction of the Development must be cleaned prior to entry into the Park and prior to Subject site mobilisation to ensure they are free of mud and vegetative propagules.	Prior to and during construction
8	Equipment, machinery, and vehicles must be regularly maintained and manoeuvred to prevent the spread of exotic vegetation. Storage of equipment, machinery, vehicles and material is to be restricted to existing disturbed areas and not be stored on native vegetation.	During construction
9	Disposal and storage of putrescible wastes must be undertaken appropriately to deter feral from the site.	During construction
10	Rehabilitation of all disturbed areas (excluding the trail tread) is to be undertaken in accordance with the Rehabilitation Guidelines and *Detailed Rehabilitation and Monitoring Plan.*	Post-construction
Transport		
1	Traffic and construction vehicle access will be managed as per regular daily operation in the resort.	During construction
2	All vehicle and plant operators will be licensed and trained.	During construction

3	Appropriate signage will be installed to ensure the safety of road users, cyclists and pedestrians during construction and operation.	Prior to and during construction, operation
Air Quality		
1	Reasonable and practicable measures (e.g. water sprays, vehicles carrying rubble must be covered) will be implemented to prevent dirt and dust from affecting the amenity or the surrounding environment during construction. Measures will be detailed in the SEMP.	During construction
2	In the event a complaint is received in relation to air quality/dust nuisance, the source of the complaint will be investigated, and if required corrective actions will be implemented to minimise or avoid impacts.	During construction
Noise and Vibration		
1	Construction works and operation of plant will comply with Australian Standard *AS 2436-2010 Guide to noise and vibration control on construction, demolition and maintenance sites* and the *Interim Construction Noise Guideline* (DECC 2009) e.g. ensure plant is regularly maintained, and repair or replace equipment that becomes noisy, keep drivers informed of designated vehicle routes and parking locations	During construction
2	Construction works will be conducted during standard hours stipulated in the conditions of approval.	During construction
3	In the event a noise complaint is received, the source of the complaint will be investigated, and if required corrective actions will be implemented to minimise or avoid noise impacts.	During construction
Cultural Heritage		
1	Where unexpected items of potential archaeological, built or Aboriginal cultural heritage significance are discovered, works will follow the process outlined by Past Traces (2023) in **Section 6.8.3**.	During construction
Waste		
1	Waste to be managed in accordance with the waste hierarchy – avoid and reduce → reuse waste→ recycle waste → recover energy→ treat waste→ dispose of waste.	During construction
2	All construction waste and litter to be minimised and contained within appropriate receptacles. All receptacles will be in good condition.	During construction
3	All waste to be managed and disposed of in accordance with legislative requirements and relevant standards.	During construction
4	All waste transportation vehicles should be covered appropriately to ensure waste cannot spill, leak or escape onto the road or wash into stormwater drains.	During construction

8 Conclusion

The Development is seeking approval for the realignment of the Kosciuszko Flow Trail at the Little Beauty Jumps Park and to provide a connecting trail from the western side of the trail network to the base of Snowgums chairlift. The Development will include the following works:

- Vegetation clearing;
- Construction of mountain bike trail, including earthworks and installation of platform; and
- Rehabilitation works.

In accordance with the requirements of the EP&A Act, EP&A Regulations and Precincts – Regional SEPP, this SEE has assessed the potential impacts of the Development on the human, built and natural environment of the Development site and surrounds.

Approximately 0.13 ha of Subalpine Woodland is expected to be affected by the Development. The Development will not trigger the Biodiversity Offsets Scheme (BOS). The Flora and Fauna Assessment concluded that the Development is unlikely to have a significant effect on threatened species, populations or ecological communities or their habitats (ELA 2023). Following consideration of the administrative guidelines for determining significance under the EPBC Act, it is concluded that the Development is unlikely to have a significant impact on matters of National Environmental Significance or Commonwealth land, and a referral to the Commonwealth Environment Minister is not necessary.

The Development is considered minor construction works which present “minimal or no geotechnical impact” on the site as determined by the attached Form 4.

There are no known heritage sites or areas of PAD within the project area. There are no heritage constraints on the Development (Past Traces 2023).

The Development will not cause any significant adverse impacts to the surrounding landscape characteristics or visual amenity. The Development will have positive impacts on the existing socio-economic environment through the provision of sustainable trails that can be experienced by a range of mountain bikers of varying ability.

The impacts of the Development are considered to be largely positive, and no significant adverse environmental impacts are proposed. With the implementation of appropriate mitigation and management measures during construction and operation, the environmental impacts are considered acceptable. Therefore, the Development is considered suitable for the site and within the public interest.

9 References

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10 Acronyms and Abbreviations

Acronyms and Abbreviations	
AHD	Australian Height Datum
AHIP	Aboriginal heritage impact permit
BC Act	*Biodiversity Conservation Act 2016*
BCA	Building Code of Australia
BVP	Biodiversity Values Map
BC Regulation	Biodiversity Conservation Regulation 2017
DA	Development Application
DAWE	Department of Agriculture, Water and the Environment (now DCCEEW)
DCCEEW	Department of Climate Change, Energy, the Environment and Water (formerly DAWE)
DPE	NSW Department of Planning and Environment
EP&A Act	*Environmental Planning and Assessment Act 1979*
EP&A Regulation	*Environmental Planning and Assessment Regulation 2021*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
IMBA Guidelines	*Guidelines for a Quality Trail Experience: Mountain Bike Trail Guidelines* (IMBA 2018)
KNP	Kosciuszko National Park
KNP Cycling Strategy	Kosciuszko National Park Cycling Strategy 2017
KNP POM	Kosciusko National Park Plan of Management 2006
km	kilometres
OEH	Office of Environment and Heritage (NSW)
m	metres
m^2	square metres
mm	millimetres
NPW Act	*National Parks and Wildlife Act 1974*
NPWS	National Parks and Wildlife Service
NSW	New South Wales
Precincts – Regional SEPP	*State Environmental Planning Policy (Precincts—Regional) 2021*
Soil Stockpile Guidelines	*Soil Stockpile Guidelines for the Resort Areas of Kosciuszko National Park, version 1.0* (OEH 2017)
SEE	Statement of Environmental Effects
Thredbo	Thredbo Alpine Resort

11 Appendices

Appendix A IMBA Trail Difficulty Rating System

8.0 Trail Difficulty Rating System Land Managers Guide

	Very easy White Circle	Easy Green Circle	Intermediate Blue Square	Difficult Single Black Diamond	Extreme Double Black Diamond
Description	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 obstacles. Short sections may exceed these criteria. Frequent encounters are likely with other cyclists, walkers, runners and horse riders.	Likely to be a single trail with moderate gradients, variable surface and obstacles. Dual use or preferred use Optional lines desirable	Likely to be a challenging single trail with steep gradients, variable surface and many obstacles. Single use and direction Optional lines XC, DH or trials	Extremely difficult trails will incorporate very steep gradients, highly variable surface and unavoidable, severe obstacles. Single use and direction Optional lines XC, DH or trials
Trail Width	2100mm plus or minus 900mm	900mm plus or minus 300mm for tread or bridges.	600mm plus or minus 300mm for tread or bridges.	300mm plus or minus 150mm for tread and bridges. Structures can vary.	150mm plus or minus 100mm for tread or bridges. Structures can vary.
Trail Surface	Hardened or smooth.	Mostly firm and stable.	Possible sections of rocky or loose tread.	Variable and challenging.	Widely variable and unpredictable.
Average Trail Grade	Climbs and descents are mostly shallow. Less than 5% average.	Climbs and descents are mostly shallow, but may include some moderately steep sections. 7% or less average.	Mostly moderate gradients but may include steep sections. 10% or less average.	Contains steeper descents or climbs. 20% or less average.	Expect prolonged steep, loose and rocky descents or climbs. 20% or greater average
Maximum Trail Grade	Max 10%	Max 15%	Max 20% or greater	Max 20% or greater	Max 40% or greater
Level of Trail Exposure	Firm and level fall zone to either side of trail corridor	Exposure to either side of trail corridor includes downward slopes of up to 10%	Exposure to either side of trail corridor includes downward slopes of up to 20%	Exposure to either side of trail corridor includes steep downward slopes or freefall	Exposure to either side of trail corridor includes steep downward slopes or freefall

Natural Obstacles and Technical Trail Features (TTFs)	No obstacles.	Unavoidable obstacles to 50mm (2") high, such as logs, roots and rocks. Avoidable, rollable obstacles may be present. Unavoidable bridges 900mm wide. Short sections may exceed criteria.	Unavoidable, rollable obstacles to 200mm (8") high, such as logs, roots and rocks. Avoidable obstacles to 600mm may be present. Unavoidable bridges 600mm wide. Width of deck is half the height. Short sections may exceed criteria.	Unavoidable obstacles to 380mm (15") high, such as logs, roots, rocks, drop-offs or constructed obstacles. Avoidable obstacles to 1200mm may be present. Unavoidable bridges 600mm wide. Width of deck is half the height. Short sections may exceed criteria.	Large, committing and unavoidable obstacles to 380mm (15") high. Avoidable obstacles to1200mm may be present. Unavoidable bridges 600mm or narrower. Width of bridges is unpredictable. Short sections may exceed criteria.

Source: Section 8.0 Trail Difficulty Rating System Land Managers Guide of (IMBA 2012, p.10).

Appendix B Trail Design and Construction Techniques

Trail Design Elements and Construction Techniques	
Berm	
Decision point sign	
Partial and full bench	 **Hillside before trail:** Vegetation keeps water sheeting slowly downhill **Incomplete Full Bench:** Left with unfinished vertical cut, soil will slough off, making tread narrower. Obtrusive back cut also forces rider to outside of tread. **Full Bench Cut:** Entire tread width is cut into firm mineral soil. Tread compacts uniformly and is sustainable. 5% outslope ensures water sheets across tread. Back cut is blended into back slope. Proper back slope, out slope and full bench cut minimize maintenance.

	Source: IMBA 2001
Outslope	
Rock armour	
Natural feature	

Half rule		
Grade reversals		
Drainage		

Appendix C Plans

Modular Bridge

Various Locations, Thredbo

DESIGN LOAD ALLOWANCES

Design loads have been allowed for in accordance with the relevant sections of AS/NZS 1170. Loads are based upon the occupancy types shown on the architectural drawings.

Superimposed Dead Load
Bridge..... Nil

Floor Live Loads
Access..... 5.0 kPa

Wind Loads
Vdes = 60m/s.

Snow Loads
Snow loads are accounted for in accordance with AS/NZS 1170.3 (Alpine, Sg = 15.8 kPa).

GENERAL

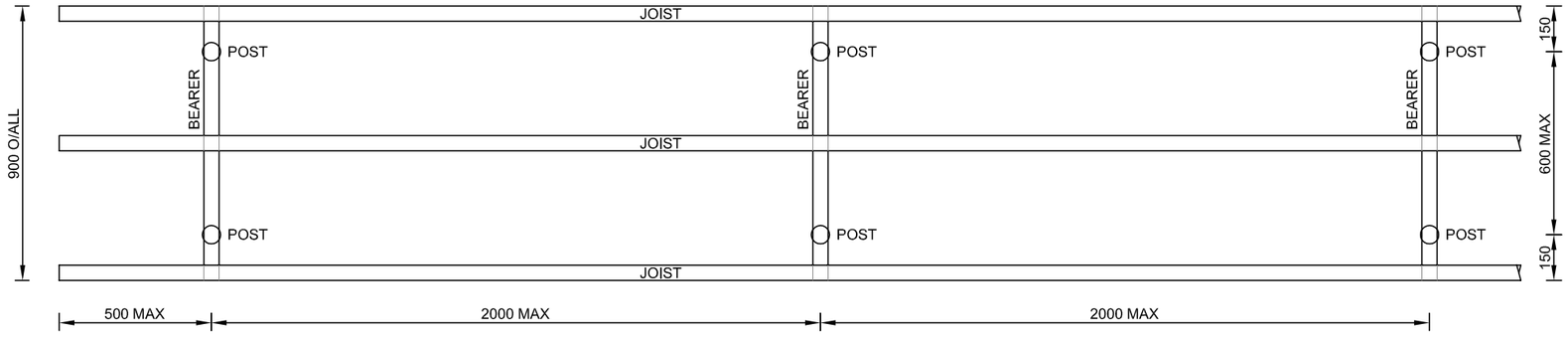
1. These structural drawings are to be used for structural works purposes only. They are to be read in conjunction with all other project disciplines drawings. No other trade or architectural details are to be inferred from these drawings.
2. The drawn details are to be read in conjunction with all notes provided herein and all text which accompanies such detail. Any discrepancy between notes, text and/or details must be referred to the engineer for clarification.
3. All works related to these drawings are to be carried out in accordance with the relevant building codes and Australian standards as required by the certifying authority.
4. Any dimensions, whether scaled or written, are provided for information only. Works dimensional set out is not to be carried out according to these drawings and should be based on architectural information. The builder is to coordinate these drawings with architectural set out and report any discrepancies to both architect and engineer.
5. The drawings are provided showing the works in a completed state only. No inference is to be made regards construction methods. The builder retains sole responsibility for all construction methods and techniques which are employed.
6. The structural design depicted in these drawings has been carried out with due regard to construction risk mitigation. As the builder is responsible for all construction methods and techniques, it remains the builders responsibility to ensure risk and safety management is practised onsite.

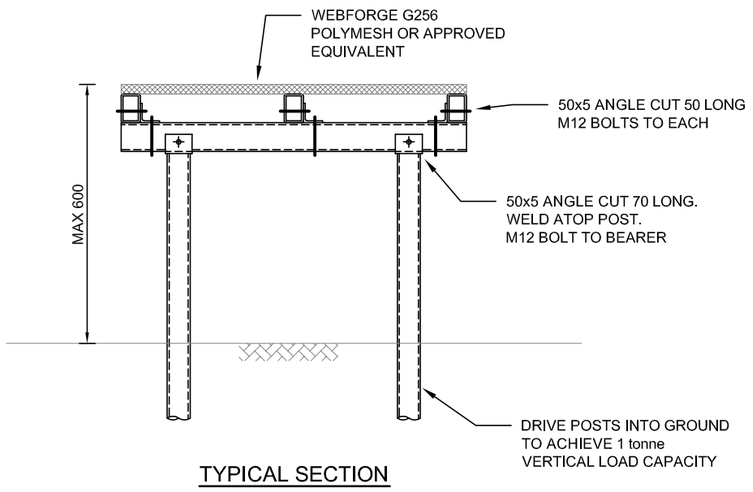
TEMPORARY BRACING

1. The structure shown in these drawings has been detailed as stable in its final built condition.
2. During construction, and at every stage until completion, the structure shown in these drawings does not possess the stability required to be self supporting.
3. It remains the responsibility of the builder to provide temporary bracing to all building elements during the construction process. This bracing must be installed such that all elements remain in a stable state and experience no overstress.

WORKS INSPECTIONS

1. Inspections will likely be required to allow as-built certification of the works by the engineer. The builder is to obtain such certification requirements through liaison with the certifying authority and engineer.
2. Where inspections are required, the builder shall give a minimum two working days notice to the contract engineer.
3. Any engineer inspection is carried out with the sole intent to ensure that the structural construction works generally comply with the structural design. Inspections, the results of, and any associated documentation in no way relieves the builder of their full responsibility to ensure complete and detailed works compliance with the structural design. The engineer takes no responsibility for any other job aspects observed during the course of an inspection.
4. Where required inspections are not organised by the builder, the engineer takes no responsibility for any inability to certify completed works.





TYPICAL SECTION

MEMBER SCHEDULE	
POSTS	- Ø60.3 x 2.9 CHS
BEARERS	- 75x50x3.0 RHS
JOISTS	- 75x50x3.0 RHS

DESIGN CREDIT

REPRODUCTION OF ORIGINAL UNMODIFIED DESIGN PROVIDED BY G.O. ENGINEERING CONSULTANTS (07.01.2014).

MADE CURRENT FOR SOLE PURPOSE OF A RENEWED CERTIFICATION AT REQUEST OF KOZCIUSZKO THREDBO.

NO RENUMERATION RECEIVED.

Rev	Issued For	Date
A	Issued for Construction	14 NOV 23

Camstruct Consulting Pty Ltd
0400 233 638
cameron@camstructconsulting.com.au

Typical Modular Bridge
Modular Bridge @ Various Locations, Thredbo
Kosciuszko Thredbo
Not to Scale
23045-S01 A

PRELIMINARY
NOT FOR CONSTRUCTION

Modular Bridge Handrail

Various Locations, Thredbo

DESIGN LOAD ALLOWANCES

Design loads have been allowed for in accordance with the relevant sections of AS/NZS 1170. Loads are based upon the occupancy types shown on the architectural drawings.

Superimposed Dead Load
Bridge..... Nil

Floor Live Loads
Access..... 5.0 kPa

Wind Loads
Vdes = 60m/s.

Snow Loads
Snow loads are accounted for in accordance with AS/NZS 1170.3 (Alpine, Sg = 15.8 kPa).

GENERAL

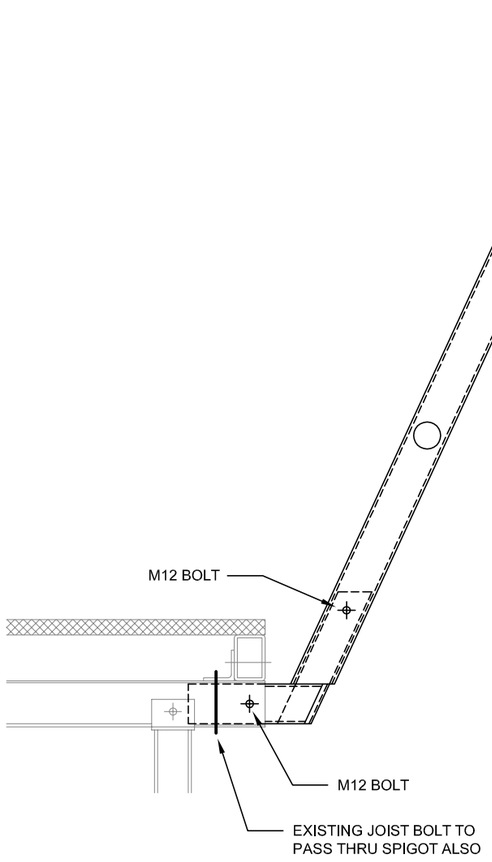
1. These structural drawings are to be used for structural works purposes only. They are to be read in conjunction with all other project disciplines drawings. No other trade or architectural details are to be inferred from these drawings.
2. The drawn details are to be read in conjunction with all notes provided herein and all text which accompanies such detail. Any discrepancy between notes, text and/or details must be referred to the engineer for clarification.
3. All works related to these drawings are to be carried out in accordance with the relevant building codes and Australian standards as required by the certifying authority.
4. Any dimensions, whether scaled or written, are provided for information only. Works dimensional set out is not to be carried out according to these drawings and should be based on architectural information. The builder is to coordinate these drawings with architectural set out and report any discrepancies to both architect and engineer.
5. The drawings are provided showing the works in a completed state only. No inference is to be made regards construction methods. The builder retains sole responsibility for all construction methods and techniques which are employed.
6. The structural design depicted in these drawings has been carried out with due regard to construction risk mitigation. As the builder is responsible for all construction methods and techniques, it remains the builders responsibility to ensure risk and safety management is practised onsite.

TEMPORARY BRACING

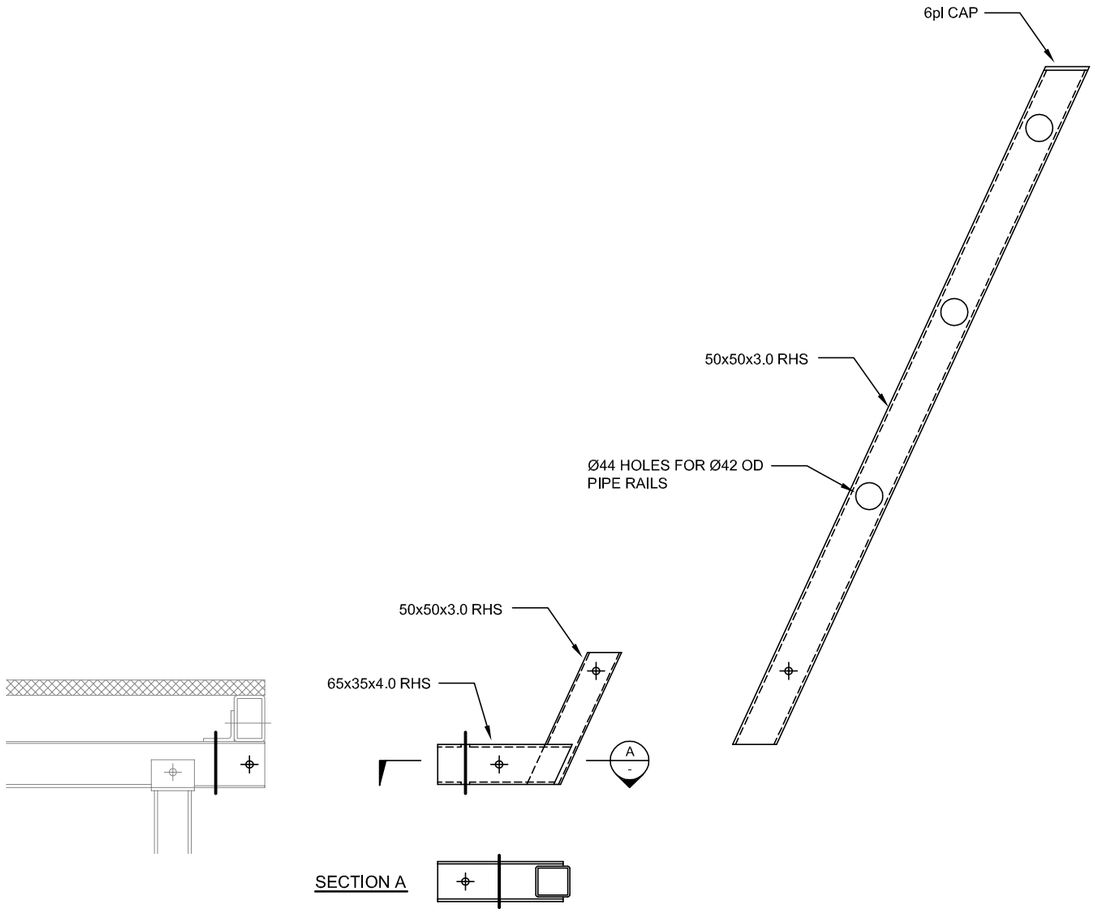
1. The structure shown in these drawings has been detailed as stable in its final built condition.
2. During construction, and at every stage until completion, the structure shown in these drawings does not possess the stability required to be self supporting.
3. It remains the responsibility of the builder to provide temporary bracing to all building elements during the construction process. This bracing must be installed such that all elements remain in a stable state and experience no overstress.

WORKS INSPECTIONS

1. Inspections will likely be required to allow as-built certification of the works by the engineer. The builder is to obtain such certification requirements through liaison with the certifying authority and engineer.
2. Where inspections are required, the builder shall give a minimum two working days notice to the contract engineer.
3. Any engineer inspection is carried out with the sole intent to ensure that the structural construction works generally comply with the structural design. Inspections, the results of, and any associated documentation in no way relieves the builder of their full responsibility to ensure complete and detailed works compliance with the structural design. The engineer takes no responsibility for any other job aspects observed during the course of an inspection.
4. Where required inspections are not organised by the builder, the engineer takes no responsibility for any inability to certify completed works.



AS CONSTRUCTED



BROKEN DOWN

Rev	Issued For	Date
1	Preliminary for Comment	14 NOV 23

Camstruct Consulting Pty Ltd
0400 233 638
cameron@camstructconsulting.com.au

Typical Modular Bridge Handrail	
Modular Bridge @ Various Locations, Thredbo	
Kosciuszko Thredbo	23045-S02 1
Not to Scale	

Decision Point Sign

200 mm

400 mm

Date: 14/06/2022 Revision: 0 Kosciuszko Thredbo Pty Ltd **Not to scale**	**Standard Signage Plans** **Project: Lower All Mountain MTB Trail Diversion**	THREDBO

Appendix D Desktop Search Results

EPBC Act Protected Matters Report

This report provides general guidance on matters of national environmental significance and other matters protected by the EPBC Act in the area you have selected. Please see the caveat for interpretation of information provided here.

Report created: 15-Sep-2023

Summary

Matters of National Environment Significance

This part of the report summarises the matters of national environmental significance that may occur in, or may relate to, the area you nominated. Further information is available in the detail part of the report, which can be accessed by scrolling or following the links below. If you are proposing to undertake an activity that may have a significant impact on one or more matters of national environmental significance then you should consider the Administrative Guidelines on Significance.

World Heritage Properties:	None
National Heritage Places:	2
Wetlands of International Importance (Ramsar	8
Great Barrier Reef Marine Park:	None
Commonwealth Marine Area:	None
Listed Threatened Ecological Communities:	2
Listed Threatened Species:	44
Listed Migratory Species:	11

Other Matters Protected by the EPBC Act

This part of the report summarises other matters protected under the Act that may relate to the area you nominated. Approval may be required for a proposed activity that significantly affects the environment on Commonwealth land, when the action is outside the Commonwealth land, or the environment anywhere when the action is taken on Commonwealth land. Approval may also be required for the Commonwealth or Commonwealth agencies proposing to take an action that is likely to have a significant impact on the environment anywhere.

The EPBC Act protects the environment on Commonwealth land, the environment from the actions taken on Commonwealth land, and the environment from actions taken by Commonwealth agencies. As heritage values of a place are part of the 'environment', these aspects of the EPBC Act protect the Commonwealth Heritage values of a Commonwealth Heritage place. Information on the new heritage laws can be found at https://www.dcceew.gov.au/parks-heritage/heritage

A permit may be required for activities in or on a Commonwealth area that may affect a member of a listed threatened species or ecological community, a member of a listed migratory species, whales and other cetaceans, or a member of a listed marine species.

Commonwealth Lands:	None
Commonwealth Heritage Places:	None
Listed Marine Species:	16
Whales and Other Cetaceans:	None
Critical Habitats:	None
Commonwealth Reserves Terrestrial:	None
Australian Marine Parks:	None
Habitat Critical to the Survival of Marine Turtles:	None

Extra Information

This part of the report provides information that may also be relevant to the area you have

State and Territory Reserves:	1
Regional Forest Agreements:	1
Nationally Important Wetlands:	None
EPBC Act Referrals:	4
Key Ecological Features (Marine):	None
Biologically Important Areas:	None
Bioregional Assessments:	None
Geological and Bioregional Assessments:	None

Details

Matters of National Environmental Significance

National Heritage Places [Resource Information]

Name	State	Legal Status	Buffer Status
Historic			
Snowy Mountains Scheme	NSW	Listed place	In feature area
Natural			
Australian Alps National Parks and Reserves	ACT	Listed place	In feature area

Wetlands of International Importance (Ramsar Wetlands) [Resource Information]

Ramsar Site Name	Proximity	Buffer Status
Banrock station wetland complex	700 - 800km upstream from Ramsar site	In buffer area only
Barmah forest	200 - 300km upstream from Ramsar site	In buffer area only
Blue lake	Within 10km of Ramsar site	In feature area
Gunbower forest	300 - 400km upstream from Ramsar site	In buffer area only
Hattah-kulkyne lakes	500 - 600km upstream from Ramsar site	In buffer area only
Nsw central murray state forests	200 - 300km upstream from Ramsar site	In buffer area only
Riverland	700 - 800km upstream from Ramsar site	In buffer area only
The coorong, and lakes alexandrina and albert wetland	700 - 800km upstream from Ramsar site	In buffer area only

Listed Threatened Ecological Communities [Resource Information]

For threatened ecological communities where the distribution is well known, maps are derived from recovery plans, State vegetation maps, remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.
Status of Vulnerable, Disallowed and Ineligible are not MNES under the EPBC Act.

Community Name	Threatened Category	Presence Text	Buffer Status

Community Name	Threatened Category	Presence Text	Buffer Status
Alpine Sphagnum Bogs and Associated Fens	Endangered	Community known to occur within area	In feature area
Natural Temperate Grassland of the South Eastern Highlands	Critically Endangered	Community may occur within area	In feature area

Listed Threatened Species [Resource Information]

Status of Conservation Dependent and Extinct are not MNES under the EPBC Act.
Number is the current name ID.

Scientific Name	Threatened Category	Presence Text	Buffer Status
BIRD			
Calidris ferruginea Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Callocephalon fimbriatum Gang-gang Cockatoo [768]	Endangered	Species or species habitat known to occur within area	In feature area
Climacteris picumnus victoriae Brown Treecreeper (south-eastern) [67062]	Vulnerable	Species or species habitat may occur within area	In feature area
Falco hypoleucos Grey Falcon [929]	Vulnerable	Species or species habitat may occur within area	In buffer area only
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Pycnoptilus floccosus Pilotbird [525]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rostratula australis Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
[Stagonopleura guttata](#) Diamond Firetail [59398]	Vulnerable	Species or species habitat known to occur within area	In feature area
CRUSTACEAN			
[Euastacus rieki](#) Riek's Crayfish [83155]	Endangered	Species or species habitat likely to occur within area	In feature area
FISH			
[Galaxias supremus](#) Kosciuszko Galaxias [87878]	Critically Endangered	Species or species habitat known to occur within area	In buffer area only
[Galaxias terenasus](#) Roundsnout Galaxias [87175]	Endangered	Species or species habitat likely to occur within area	In buffer area only
[Maccullochella peelii](#) Murray Cod [66633]	Vulnerable	Species or species habitat may occur within area	In buffer area only
[Macquaria australasica](#) Macquarie Perch [66632]	Endangered	Species or species habitat may occur within area	In buffer area only
[Prototroctes maraena](#) Australian Grayling [26179]	Vulnerable	Species or species habitat may occur within area	In feature area
FROG			
[Litoria spenceri](#) Spotted Tree Frog [25959]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
[Litoria verreauxii alpina](#) Alpine Tree Frog, Verreaux's Alpine Tree Frog [66669]	Vulnerable	Species or species habitat known to occur within area	In buffer area only
MAMMAL			
[Burramys parvus](#) Mountain Pygmy-possum [267]	Endangered	Species or species habitat likely to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Dasyurus maculatus maculatus (SE mainland population)			
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population) [75184]	Endangered	Species or species habitat known to occur within area	In feature area
Mastacomys fuscus mordicus			
Broad-toothed Rat (mainland), Tooarrana [87617]	Vulnerable	Species or species habitat known to occur within area	In feature area
Petauroides volans			
Greater Glider (southern and central) [254]	Endangered	Species or species habitat may occur within area	In buffer area only
Petaurus australis australis			
Yellow-bellied Glider (south-eastern) [87600]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Phascolarctos cinereus (combined populations of Qld, NSW and the ACT)			
Koala (combined populations of Queensland, New South Wales and the Australian Capital Territory) [85104]	Endangered	Species or species habitat likely to occur within area	In buffer area only
Pseudomys fumeus			
Smoky Mouse, Konoom [88]	Endangered	Species or species habitat known to occur within area	In feature area
Pteropus poliocephalus			
Grey-headed Flying-fox [186]	Vulnerable	Foraging, feeding or related behaviour may occur within area	In buffer area only
PLANT			
Argyrotegium nitidulum			
Shining Cudweed [82043]	Vulnerable	Species or species habitat known to occur within area	In feature area
Calotis glandulosa			
Mauve Burr-daisy [7842]	Vulnerable	Species or species habitat may occur within area	In feature area
Colobanthus curtisiae			
Curtis' Colobanth [23961]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Glycine latrobeana			
Clover Glycine, Purple Clover [13910]	Vulnerable	Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Leucochrysum albicans subsp. tricolor Hoary Sunray, Grassland Paper-daisy [89104]	Endangered	Species or species habitat may occur within area	In feature area
Pimelea bracteata [8125]	Critically Endangered	Species or species habitat may occur within area	In feature area
Prasophyllum bagoense Bago Leek-orchid [84276]	Critically Endangered	Species or species habitat may occur within area	In buffer area only
Prasophyllum petilum Tarengo Leek Orchid [55144]	Endangered	Species or species habitat may occur within area	In feature area
Pterostylis oreophila Blue-tongued Orchid, Kiandra Greenhood [22903]	Critically Endangered	Species or species habitat likely to occur within area	In feature area
Ranunculus anemoneus Anemone Buttercup [14889]	Vulnerable	Species or species habitat known to occur within area	In feature area
Rytidosperma pumilum Feldmark Grass [66716]	Vulnerable	Species or species habitat likely to occur within area	In buffer area only
Thesium australe Austral Toadflax, Toadflax [15202]	Vulnerable	Species or species habitat likely to occur within area	In feature area
Viola improcera Dwarf Violet [3879]	Endangered	Species or species habitat may occur within area	In feature area
Xerochrysum palustre Swamp Everlasting, Swamp Paper Daisy [76215]	Vulnerable	Species or species habitat likely to occur within area	In feature area
REPTILE			
Cyclodomorphus praealtus Alpine She-oak Skink [64721]	Endangered	Species or species habitat known to occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Liopholis guthega			
Guthega Skink [83079]	Endangered	Species or species habitat known to occur within area	In feature area
Liopholis montana			
Mountain Skink [87162]	Endangered	Species or species habitat likely to occur within area	In feature area
Pseudemoia cryodroma			
Alpine Bog Skink, Alpine Bog-skink [84408]	Endangered	Species or species habitat known to occur within area	In feature area

Listed Migratory Species

[Resource Information]

Scientific Name	Threatened Category	Presence Text	Buffer Status
Migratory Marine Birds			
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area	In feature area
Migratory Terrestrial Species			
Hirundapus caudacutus			
White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area	In feature area
Motacilla flava			
Yellow Wagtail [644]		Species or species habitat may occur within area	In feature area
Myiagra cyanoleuca			
Satin Flycatcher [612]		Species or species habitat known to occur within area	In feature area
Rhipidura rufifrons			
Rufous Fantail [592]		Species or species habitat known to occur within area	In feature area
Migratory Wetlands Species			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area	In feature area
Calidris melanotos			
Pectoral Sandpiper [858]		Species or species habitat may occur within area	In feature area
Gallinago hardwickii			
Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area	In feature area
Numenius madagascariensis			
Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area

Other Matters Protected by the EPBC Act

Listed Marine Species			[Resource Information]
Scientific Name	Threatened Category	Presence Text	Buffer Status
Bird			
Actitis hypoleucos			
Common Sandpiper [59309]		Species or species habitat may occur within area	In feature area
Apus pacificus			
Fork-tailed Swift [678]		Species or species habitat likely to occur within area overfly marine area	In feature area
Bubulcus ibis as Ardea ibis			
Cattle Egret [66521]		Species or species habitat may occur within area overfly marine area	In feature area
Calidris acuminata			
Sharp-tailed Sandpiper [874]		Species or species habitat may occur within area	In feature area
Calidris ferruginea			
Curlew Sandpiper [856]	Critically Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Calidris melanotos Pectoral Sandpiper [858]		Species or species habitat may occur within area overfly marine area	In feature area
Gallinago hardwickii Latham's Snipe, Japanese Snipe [863]		Species or species habitat likely to occur within area overfly marine area	In feature area
Haliaeetus leucogaster White-bellied Sea-Eagle [943]		Species or species habitat may occur within area	In feature area
Hirundapus caudacutus White-throated Needletail [682]	Vulnerable	Species or species habitat known to occur within area overfly marine area	In feature area
Merops ornatus Rainbow Bee-eater [670]		Species or species habitat may occur within area overfly marine area	In feature area
Motacilla flava Yellow Wagtail [644]		Species or species habitat may occur within area overfly marine area	In feature area
Myiagra cyanoleuca Satin Flycatcher [612]		Species or species habitat known to occur within area overfly marine area	In feature area
Neophema chrysostoma Blue-winged Parrot [726]	Vulnerable	Species or species habitat likely to occur within area overfly marine area	In feature area
Numenius madagascariensis Eastern Curlew, Far Eastern Curlew [847]	Critically Endangered	Species or species habitat may occur within area	In feature area
Rhipidura rufifrons Rufous Fantail [592]		Species or species habitat known to occur within area overfly marine area	In feature area

Scientific Name	Threatened Category	Presence Text	Buffer Status
Rostratula australis as Rostratula benghalensis (sensu lato)			
Australian Painted Snipe [77037]	Endangered	Species or species habitat may occur within area overfly marine area	In feature area

Extra Information

State and Territory Reserves			[Resource Information]
Protected Area Name	Reserve Type	State	Buffer Status
Kosciuszko	National Park	NSW	In feature area

Regional Forest Agreements			[Resource Information]

Note that all areas with completed RFAs have been included. Please see the associated resource information for specific caveats and use limitations associated with RFA boundary information.

RFA Name	State	Buffer Status
Southern RFA	New South Wales	In feature area

EPBC Act Referrals				[Resource Information]
Title of referral	Reference	Referral Outcome	Assessment Status	Buffer Status
Not controlled action				
Improving rabbit biocontrol: releasing another strain of RHDV, sthrn two thirds of Australia	2015/7522	Not Controlled Action	Completed	In feature area
INDIGO Central Submarine Telecommunications Cable	2017/8127	Not Controlled Action	Completed	In feature area
Not controlled action (particular manner)				
Aerial baiting for wild dog control	2006/2713	Not Controlled Action (Particular Manner)	Post-Approval	In feature area
INDIGO Marine Cable Route Survey (INDIGO)	2017/7996	Not Controlled Action (Particular Manner)	Post-Approval	In feature area

Caveat

1 PURPOSE

This report is designed to assist in identifying the location of matters of national environmental significance (MNES) and other matters protected by the Environment Protection and Biodiversity Conservation Act 1999 (Cth) (EPBC Act) which may be relevant in determining obligations and requirements under the EPBC Act.

The report contains the mapped locations of:

- World and National Heritage properties;
- Wetlands of International and National Importance;
- Commonwealth and State/Territory reserves;
- distribution of listed threatened, migratory and marine species;
- listed threatened ecological communities; and
- other information that may be useful as an indicator of potential habitat value.

2 DISCLAIMER

This report is not intended to be exhaustive and should only be relied upon as a general guide as mapped data is not available for all species or ecological communities listed under the EPBC Act (see below). Persons seeking to use the information contained in this report to inform the referral of a proposed action under the EPBC Act should consider the limitations noted below and whether additional information is required to determine the existence and location of MNES and other protected matters.

Where data are available to inform the mapping of protected species, the presence type (e.g. known, likely or may occur) that can be determined from the data is indicated in general terms. It is the responsibility of any person using or relying on the information in this report to ensure that it is suitable for the circumstances of any proposed use. The Commonwealth cannot accept responsibility for the consequences of any use of the report or any part thereof. To the maximum extent allowed under governing law, the Commonwealth will not be liable for any loss or damage that may be occasioned directly or indirectly through the use of, or reliance

3 DATA SOURCES

Threatened ecological communities

For threatened ecological communities where the distribution is well known, maps are generated based on information contained in recovery plans, State vegetation maps and remote sensing imagery and other sources. Where threatened ecological community distributions are less well known, existing vegetation maps and point location data are used to produce indicative distribution maps.

Threatened, migratory and marine species

Threatened, migratory and marine species distributions have been discerned through a variety of methods. Where distributions are well known and if time permits, distributions are inferred from either thematic spatial data (i.e. vegetation, soils, geology, elevation, aspect, terrain, etc.) together with point locations and described habitat; or modelled (MAXENT or BIOCLIM habitat modelling) using

Where little information is available for a species or large number of maps are required in a short time-frame, maps are derived either from 0.04 or 0.02 decimal degree cells; by an automated process using polygon capture techniques (static two kilometre grid cells, alpha-hull and convex hull); or captured manually or by using topographic features (national park boundaries, islands, etc.).

In the early stages of the distribution mapping process (1999-early 2000s) distributions were defined by degree blocks, 100K or 250K map sheets to rapidly create distribution maps. More detailed distribution mapping methods are used to update these distributions

4 LIMITATIONS

The following species and ecological communities have not been mapped and do not appear in this report:

- threatened species listed as extinct or considered vagrants;
- some recently listed species and ecological communities;
- some listed migratory and listed marine species, which are not listed as threatened species; and
- migratory species that are very widespread, vagrant, or only occur in Australia in small numbers.

The following groups have been mapped, but may not cover the complete distribution of the species:

- listed migratory and/or listed marine seabirds, which are not listed as threatened, have only been mapped for recorded
- seals which have only been mapped for breeding sites near the Australian continent

The breeding sites may be important for the protection of the Commonwealth Marine environment.

Refer to the metadata for the feature group (using the Resource Information link) for the currency of the information.

Acknowledgements

This database has been compiled from a range of data sources. The department acknowledges the following custodians who have contributed valuable data and advice:

-Office of Environment and Heritage, New South Wales
-Department of Environment and Primary Industries, Victoria
-Department of Primary Industries, Parks, Water and Environment, Tasmania
-Department of Environment, Water and Natural Resources, South Australia
-Department of Land and Resource Management, Northern Territory
-Department of Environmental and Heritage Protection, Queensland
-Department of Parks and Wildlife, Western Australia
-Environment and Planning Directorate, ACT
-Birdlife Australia
-Australian Bird and Bat Banding Scheme
-Australian National Wildlife Collection
-Natural history museums of Australia
-Museum Victoria
-Australian Museum
-South Australian Museum
-Queensland Museum
-Online Zoological Collections of Australian Museums
-Queensland Herbarium
-National Herbarium of NSW
-Royal Botanic Gardens and National Herbarium of Victoria
-Tasmanian Herbarium
-State Herbarium of South Australia
-Northern Territory Herbarium
-Western Australian Herbarium
-Australian National Herbarium, Canberra
-University of New England
-Ocean Biogeographic Information System
-Australian Government, Department of Defence
Forestry Corporation, NSW
-Geoscience Australia
-CSIRO
-Australian Tropical Herbarium, Cairns
-eBird Australia
-Australian Government – Australian Antarctic Data Centre
-Museum and Art Gallery of the Northern Territory
-Australian Government National Environmental Science Program
-Australian Institute of Marine Science
-Reef Life Survey Australia
-American Museum of Natural History
-Queen Victoria Museum and Art Gallery, Inveresk, Tasmania
-Tasmanian Museum and Art Gallery, Hobart, Tasmania
-Other groups and individuals

The Department is extremely grateful to the many organisations and individuals who provided expert advice and information on numerous draft distributions.

Please feel free to provide feedback via the Contact us page.

Department of Climate Change, Energy, the Environment and Water
GPO Box 3090
Canberra ACT 2601 Australia
+61 2 6274 1111

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : Jumps bypass & Wombat Wal

Client Service ID : 820246

Kosciuszko Thredbo Pty Ltd

Po Box 92
Thredbo New South Wales 2625

Attention: Chloe Chalk

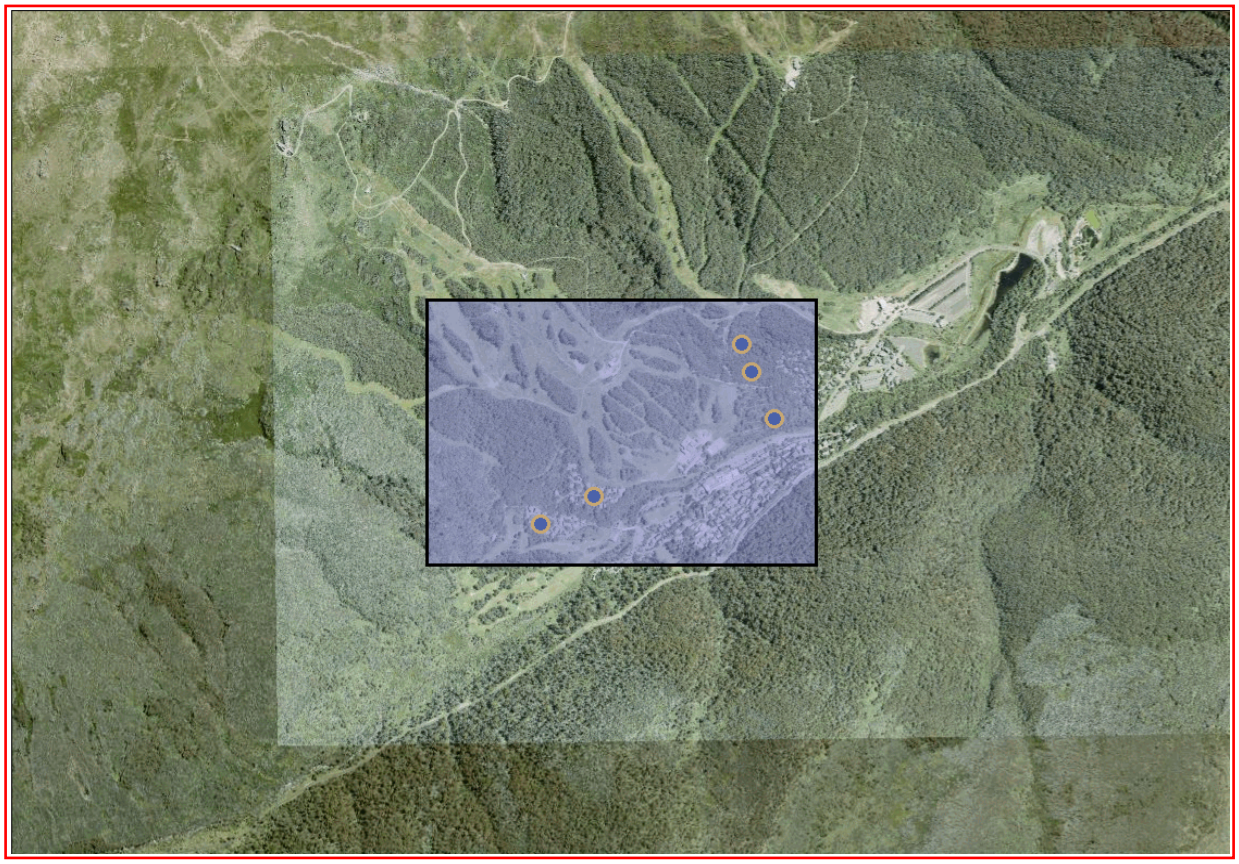
Email: chloe_chalk@evt.com

Date: 15 September 2023

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -36.5073, 148.2932 - Lat, Long To : -36.4987, 148.3086, conducted by Chloe Chalk on 15 September 2023.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.



A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

5	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

Appendix E Flora and Fauna Assessment

Kosciuszko Flow Trail Realignment – Little Beauty Jumps Park Bypass and Wombat Walk Connection – Thredbo Alpine Resort – Flora and Fauna Assessment

Kosciuszko Thredbo Pty Ltd

ecological AUSTRALIA
A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

DOCUMENT TRACKING

Project Name	Kosciuszko Flow Trail Realignment – Little Beauty Jumps Park Bypass and Wombat Walk Connection – Thredbo Alpine Resort – Flora and Fauna Assessment
Project Number	23NAR6616
Project Manager	Ryan Smithers
Prepared by	Ryan Smithers
Reviewed by	Dave Coombes
Approved by	Ryan Smithers
Status	Final
Version Number	2
Last saved on	21 November 2023

This report should be cited as 'Eco Logical Australia 2023. *Kosciuszko Flow Trail Realignment – Little Beauty Jumps Park Bypass and Wombat Walk Connection – Thredbo Alpine Resort – Flora and Fauna Assessment*. Prepared for Kosciuszko Thredbo Pty Ltd.'

ACKNOWLEDGEMENTS

This document has been prepared by Eco Logical Australia Pty Ltd with support from Kosciuszko Thredbo Pty Ltd

Template 2.8.1

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Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BC Act	*NSW Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DoCCEEW	Department of Climate Change, Energy, the Environment and Water
DPE	NSW Department of Planning and Environment
EEC	Endangered Ecological Community
ELA	Eco Logical Australia Pty Ltd
EP&A Act	*NSW Environmental Planning and Assessment Act 1979*
EPBC Act	*Commonwealth Environment Protection and Biodiversity Conservation Act 1999*
FM Act	*NSW Fisheries Management Act 1994*
FFA	Flora and Fauna Assessment
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
SSD	State Significant Development
SSI	State Significant Infrastructure
TEC	Threatened Ecological Community
VIS	Vegetation Information System
WM Act	*NSW Water Management Act 2000*

Executive Summary

This report describes the biological environment and assesses the potential effects on threatened and migratory species, endangered populations and ecological communities of a proposal to construct the Little Beauty Jumps Park Bypass and the Wombat Walk Connector mountain bike trails at Thredbo Alpine Resort.

The construction of the proposed trail will require the clearing of small trees, shrubs and groundcovers in a 2.5 m wide corridor where the trail traverses remnant native vegetation. The trail design and construction incorporates a range of measures to minimize and mitigate the impacts on vegetation communities and fauna habitats, and on the environment generally. The alignment has been chosen to avoid locations that are particularly sensitive i.e. Subalpine Riparian Scrub.

The proposal will not trigger the Biodiversity Offsets Scheme (BOS), as it will not encroach on any area of land identified on the Biodiversity Values map, and the total clearing of native vegetation is significantly less than the 1 ha threshold at which the BOS is triggered.

The study area and immediate surrounds was found to support two native vegetation communities; Subalpine Woodland and Subalpine Riparian Scrub, with parts of the study area also comprising Exotic Grassland or other heavily disturbed vegetation. No threatened flora species were recorded within the study area during the survey period and none are considered likely to occur there given the general absence of suitable habitats. The study area does not support any endangered ecological communities. Only approximately 0.13 ha of Subalpine Woodland is expected to be affected in association with the proposal. Whilst this comprises an adverse impact, it is considered acceptable given the very small proportion of the extant extent of the community within the Thredbo Resort Area, and within the locality, that will be affected.

Whilst the study area provides a small amount of potential habitat for threatened fauna species such as the Broad-toothed Rat, Eastern Pygmy-possum, Gang-gang Cockatoo, Olive Whistler, Pink Robin, Scarlet Robin, and Flame Robin, similar habitats are extensive in the locality and the habitats to be affected are small in the context of the extent of similar habitats contiguous with the study area. Furthermore, the proposal will not affect any potentially important habitats for threatened fauna species. The proposal will not sever any linkages between habitats or otherwise permanently restrict fauna movement.

An assessment of the effects of the proposal on threatened species, populations and ecological communities which may be directly or indirectly affected by the proposal was undertaken by applying the five factors from Section 7.3 of the *Biodiversity Conservation Act 2016*. This assessment concluded that the proposal is unlikely to have a significant effect on threatened species, populations or ecological communities or their habitats.

Following consideration of the administrative guidelines for determining significance under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*, it is concluded that the proposal is unlikely to have a significant impact on matters of National Environmental Significance or Commonwealth land, and a referral to the Commonwealth Environment Minister is not necessary.

Notwithstanding the relatively minor impacts associated with the proposal, a number of impact mitigation and amelioration measures have been recommended to be incorporated into the proposal, as identified in Section 5.

1. Introduction

Eco Logical Australia Pty Ltd (ELA) was engaged by Kosciuszko Thredbo Pty Ltd to prepare a flora and fauna assessment to accompany a proposal to construct mountain bike trails, at Thredbo Alpine Resort. This flora and fauna assessment provides the findings of a review of relevant literature, database searches and field survey. It also addresses relevant statutory considerations and makes recommendations to ameliorate the potential impacts of the proposal on vegetation and habitats.

The aim of this investigation was to assess the ecological impacts of the proposal on flora, fauna and habitats within the study area. The objectives of this investigation were:

- To identify and describe the flora species and vegetation communities present in the study area, their condition and conservation significance.
- To identify and describe the fauna habitats present in the study area and their condition.
- To identify the fauna species which are present or likely to occur in the study area, and describe their conservation significance.
- To assess the impacts of the proposal on vegetation, fauna, habitats, and other environmental features as necessary.
- To make recommendations regarding any environmental management and impact mitigation/amelioration measures, which can be implemented to limit the effects of the proposal on vegetation, fauna, habitats, and other environmental features as necessary.

1.1 The proposal

The Development is for the realignment the existing Flow trail and to provide a beginner connecting trail to the base of Snowgums chairlift. The Flow trail realignment commences at the top of the Little Beauty Jumps Park and traverses the native vegetation adjacent to the jumps park. The realignment also includes a short linking trail from Woody's trail to enable riders on Woody's to access the Flow Trail.

The purpose of the Flow trail realignment is to enable the closure and rehabilitation of sections of the existing Flow trail that are located on the groomed ski runs (Milk Run and Lower Supertrail). The sections being rehabilitated have to be knocked down and rebuilt each season. The new trail will improve rideability by using natural terrain and features within the native vegetation.

The Wombat Walk Connector commences on the skiers left of the Milk Run ski run, follows the existing Wombat Walk access track onto the Village Loop and Home Run trails, then down to the base of Snowgums chairlift at Valley Terminal via the lower section of Lovers Leap and Sundance ski runs.

The purpose of the Wombat Walk Connector is to provide riders a trail that connects the western side of the trail network to the eastern side. With the planned upgrade of Snowgums Chairlift to a new 6-seat mountain bike compatible lift, a linking trail from the western side of the trail network will allow riders direct access to the Snowgums bottom station. This will help to alleviate the rider traffic and congestion often experienced at the bottom of the Kosciuszko Express chairlift during peak visitation periods.

The proposed trail will result in an expected average disturbance footprint width of 2.5 m. The proposed works are expected to affect 0.13 ha of native vegetation.

The impacts of the proposed trail can be summarized as follows:

- The clearing of shrubs and groundcovers in a 2-3 m wide corridor where the trail traverses native vegetation. The disturbance corridor is required to contain the upper and lower batters and the trail surface when the trail is traversing across moderate to steep slopes. On gentler slopes the disturbance corridor will be closer to 1.5 m. The average disturbance width is expected to be 2.5 m. The clearing will be undertaken with a mix of hand tools i.e. chainsaws and brush-cutters, and machinery i.e. mini-excavator.
- In general, it is possible to align the trail to avoid tree removal, however there will be some areas where the removal of some saplings is likely to be unavoidable.
- Earthworks (cut and fill) to create the trail form. This will be undertaken with a mini-excavator.
- Importation of some decomposed granite for the track surface.

An overview of the proposal is shown in Figures 1-3 and further identified in Photos 1-10. A more detailed description of the proposal is also provided in the Statement of Environmental Effects for the proposal (Kosciuszko Thredbo 2023).

1.2 Direct and indirect impacts

Direct impacts on flora and fauna arising from the proposal will predominantly comprise the removal or further disturbance to approximately 1300 m^2 of native vegetation (predominantly Subalpine Woodland).

Indirect impacts associated with the proposal are expected to be minor as:

- The footprint of the proposed direct impacts is relatively small.
- A significant proportion of the areas affected are already disturbed or are on the margins of disturbed areas.
- The proposal will be implemented using low impact methods and with appropriate safeguards.

The proposal is not anticipated to result in any substantial changes in surface or subsurface hydrology which may lead to the loss or adverse modification of vegetation communities or associated habitats. Similar impacts throughout the resort and elsewhere within Kosciuszko National Park have had negligible impact on surface and subsurface hydrology, aquatic ecosystems or vegetation communities beyond the immediate footprint.

Whilst the proposal will result in increased noise and human activity whilst in operation, these increases will occur in areas that are already subject these impacts in association with chairlifts, skiing, mountain biking and resort operations. The proposal is not expected to have any substantial adverse impacts on habitat connectivity as the disruptions to existing connectivity will be minor, and only up to 3 m in width.

1.3 Subject site, study area and locality

The “subject site” comprises those areas, as described in Section 1.1 and Figures 1-3, which will be directly impacted by the proposal. The “study area” extends approximately 10 m beyond the limits of the subject site given the indirect impacts anticipated beyond the development footprint, as shown in Figure 4.

The locality for the purposes of this report is the area of land within a 5 km radius of the study area.

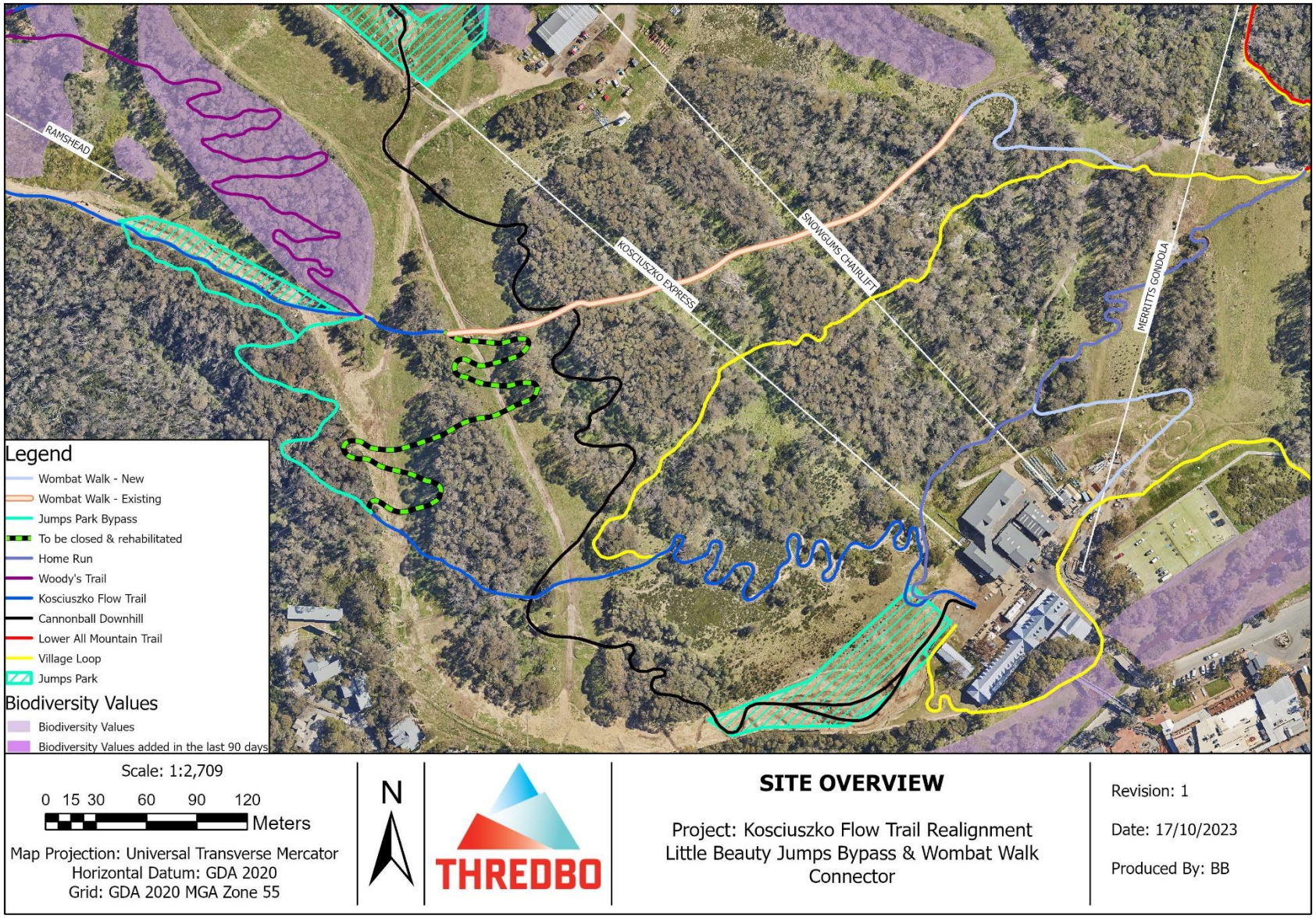

Figure 1: The proposal overview.

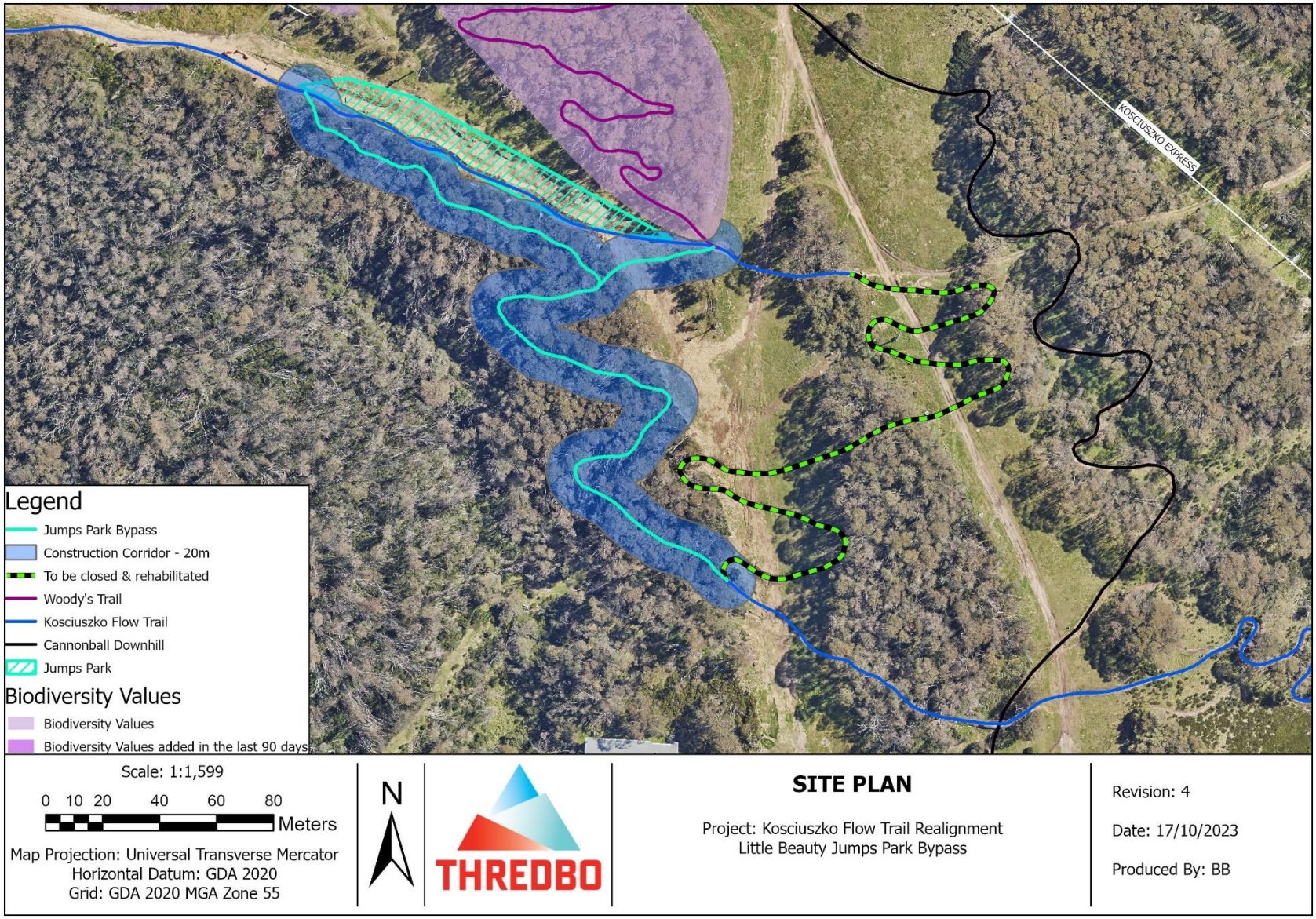

Figure 2: Flow Trail Realignment and Little Beauty Jumps Park Bypass Site Plan.

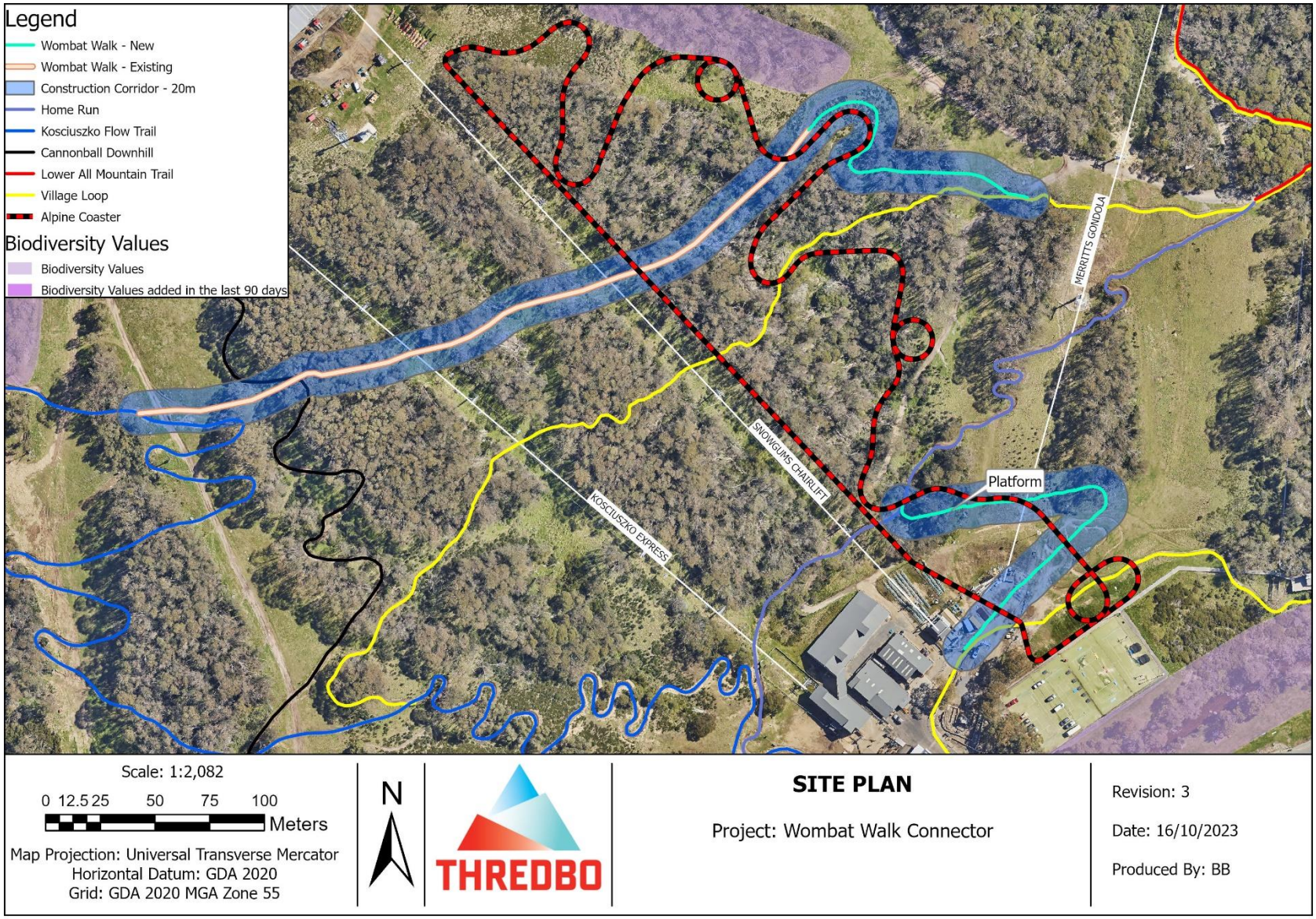

Figure 3: Wombat Walk Connector Site Plan.

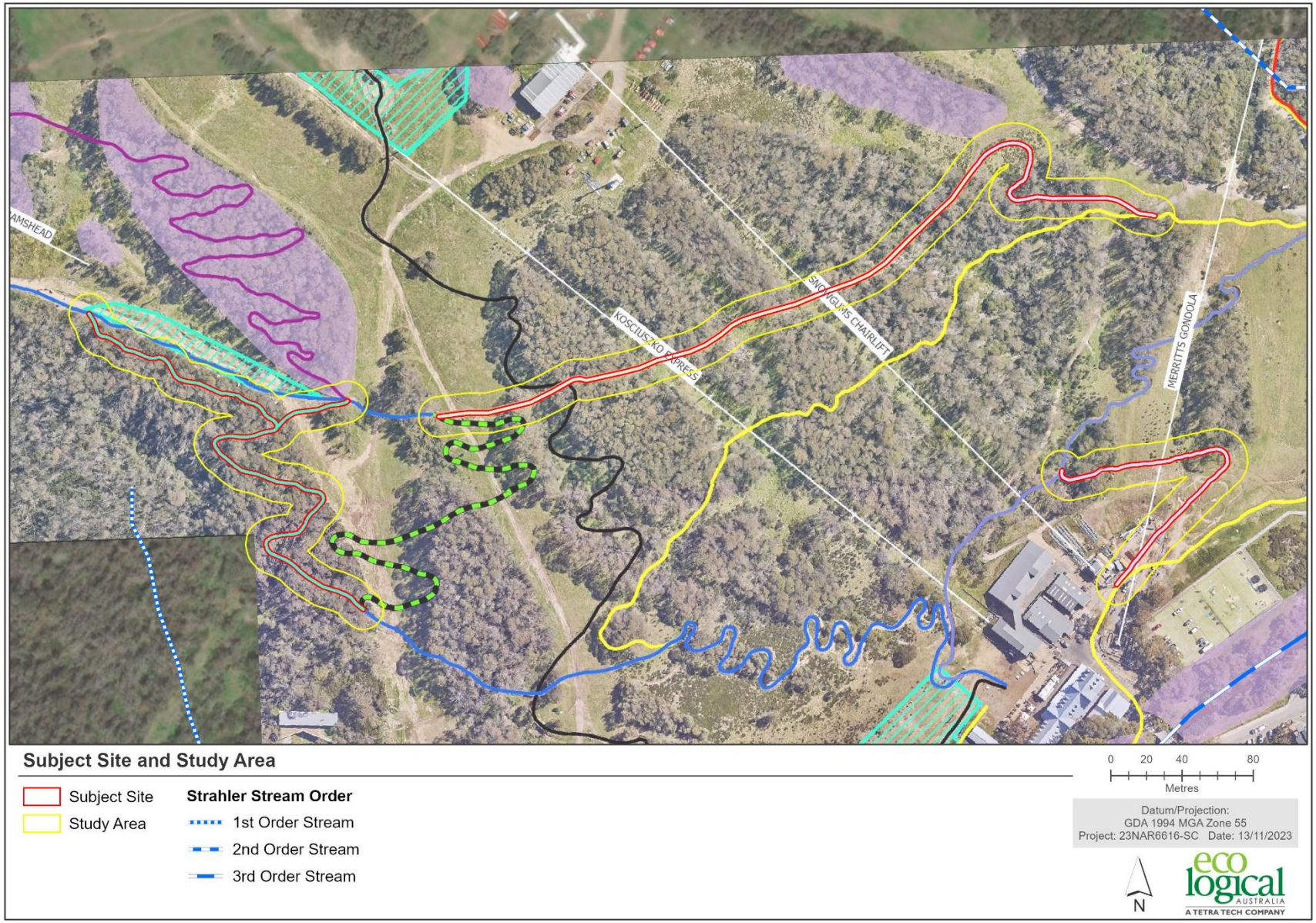

Figure 4: The subject site and study area.

Photo 1: Where the proposed Jumps Park Bypass trail will divert from the existing Flow trail before running parallel to the existing ski run for approxximately 100 m.

Photo 2: The alignment of the proposed trail traverses typical Subalpine Woodland.

Photo 3: The stays well above the Subalpine Riparian Scrub which is associated with the watercourse to the south of the proposed trail.

Photo 4: A connector trail from the Jumps Park Bypass will cross the existing ski slope to connect to the existing Flow Trail and then the existing Wombat Walk trail.

Photo 5: The existing Wombat Walk trail.

Photo 6: The new Wombat Walk will go around the Alpine Coaster (currently under construction) before traversing a patch of Subalpine woodland.

Photo 7: The new Wombat Walk trail alignment traverses a patch of Subalpine Woodland before crossing the Lovers Leap ski run and merging with the Village Loop trail.

Photo 8: Wombat Walk merging with the Village Loop trail.

Photo 9: The lower section of the new Wombat Walk trail traverses and small patch of Subalpine Woodland before emerging onto the existing ski slope and linking up with the Village Loop trail at Valley Terminal.

Photo 10: The lower part of the new Wombat Walk will include a platform where it traverses a minor watercourse.

1.4 Biodiversity Offset Scheme

The proposal does not trigger the NSW Biodiversity Offset Scheme (BOS) as:

- The proposal will not affect any land mapped within the Biodiversity Values Map as defined in the NSW Biodiversity Conservation Regulation 2017 (BC Reg), as shown in Figure 1.
- The area of native vegetation affected will be approximately 0.13 ha, which is well below the threshold (1 ha) trigger for the BOS.
- The proposal will not result in a significant impact on any threatened species, populations or communities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act).

1.5 Topography, geology and soils

The study area occupies moderately sloping east facing slopes at an altitude of between approximately 1600 m and 1365 m Australian Height Datum (AHD). The study area is underlain by Silurian granodiorite (Ecology Australia 2002). Soils are likely to comprise a mix of alpine humus soils, comprising sandy clay loams. The proposed trail is within the catchment of several minor tributaries of the Thredbo River but will not traverse any mapped watercourses, as shown in Figure 4.

1.6 Disturbances

Parts of the study area have already been disturbed in association with the existing ski runs. These disturbed areas are generally dominated by introduced grasses such as *Festuca rubra* (Red Fescue) and *Agrostis capillaris* (Browntop Bent), and a range of exotic herbs including *Acetosella vulgaris* (Sheep Sorrel), *Trifolium repens* (White Clover), *Taraxacum officinale* (Dandelion), and *Hypochaeris radicata* (Flatweed). The areas of remnant forest to be affected by the proposal are generally relatively undisturbed with only minor occurrences of cosmopolitan exotic grasses and herbs and scattered occurrences of other weeds, particularly *Rubus* spp. (Blackberry).

1.7 Planning and legislation

It is not the intention of this assessment to document all the legislation and planning instruments that are relevant to the proposal. A detailed analysis of the statutory environment is provided in the Statement of Environmental Effects for the proposal (Kosciuszko Thredbo 2023). However, the legislation and planning instruments which are relevant to the assessment of potential impacts on terrestrial flora and fauna are discussed in brief below.

1.7.1 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EPA Act) is the principal planning legislation for NSW, providing a framework for the overall environmental planning and assessment of development proposals. This proposal is to be assessed under Part 4 of the EPA Act. The EPA Act places a duty on the determining authority to adequately address a range of environmental matters including the maintenance of biodiversity and the likely impact to threatened species, populations and communities.

1.7.2 Biodiversity Conservation Act 2016

The *Biodiversity Conservation Act 2016* (BC Act) introduces a mandatory framework for addressing impacts on biodiversity from development and clearing, including the Biodiversity Offsets Scheme (BOS) and Biodiversity Assessment Method (BAM). The proposal will not trigger the BOS, as it will not affect any land identified on the Biodiversity Values map and the total clearing of native vegetation associated with the proposal will not exceed the 1 ha threshold which applies to the Thredbo Resort Area. As such,

a Biodiversity Development Assessment Report (BDAR) is not required and a flora and fauna assessment has been prepared. The impacts of the proposed development will be subject to a test of significance with respect to the Section 7.3 of the BC Act.

1.7.3 State Environmental Planning Policy (Precincts—Regional) 2021

State Environmental Planning Policy (Precincts—Regional) 2021 (Precincts-Regional SEPP) facilitates a planning framework for Special Activation Precincts (Precinct/s) in regional NSW, streamlining planning processes and guiding the delivery of the precincts. Chapter 4 Kosciuszko National Park and Alpine Resorts (SEPP Precincts-Regional 2021) identifies the Minister for Planning as the determining authority for development within the NSW Alpine Resorts. Precincts-Regional SEPP requires the Minister for Planning to refer for comment any development application in the Alpine Resorts to the Director General of the NSW Department of Environment and Heritage.

1.7.4 Environment Protection and Biodiversity Conservation Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a national scheme for protecting the environment and conserving biodiversity values. Approval from the Commonwealth Minister is required under the EPBC Act if the action will, or is likely to, have a significant impact on matters considered to be of national environmental significance (MNES). MNES relevant to the proposal include species and ecological communities that are listed under the Act. The EPBC Act does not define significant impact but identifies matters that are necessary to take into consideration.

2. Methods

2.1 Database and literature review

Data gathered during all field studies and the literature review was analysed and interpreted in accordance with the provisions of legislation and planning controls pertaining to flora and fauna. Threatened and migratory species, threatened populations and threatened ecological communities (TECs) that have been recorded, or have the potential to occur within the locality have been assessed for their likelihood to inhabit the study area (Appendix A).

2.2 Field surveys

ELA conducted flora and fauna surveys within the study area and surrounds on 19 October 2023.

2.2.1 Flora surveys

A botanical survey was conducted in the study area by ELA Principal Ecologist Ryan Smithers on 19 October 2023.

2.2.1.1 Community identification and floristic audit

The study area was surveyed to document the flora species present, including those of conservation significance, and the location and extent of vegetation communities including any TECs encountered. A description of the vegetation was then prepared with general observations made of the wider area. The vegetation was assessed according to the floristic and structural classifications of Ecology Australia (2002) and classified to Plant Community Types (PCT).

2.2.1.2 Targeted searches

Specific searches for plant species of conservation significance known from the locality were conducted targeting areas of potential habitat.

2.2.1.3 Limitations

The floristic audit undertaken recorded as many species as possible and provides a comprehensive but not definitive species list. More species would probably be recorded during a longer survey over more seasons and years. Nevertheless, the techniques used in this investigation are considered adequate to gather the data necessary to identify potential ecological constraints to the proposal.

2.2.1.4 Flora survey effort

The flora survey effort employed a total of two person-hours.

2.2.2 Fauna surveys

Field investigations for fauna were conducted in conjunction with the flora surveys on 19 October 2023.

2.2.2.1 Habitat analysis

A description of the fauna habitats in the study area was prepared because the type of habitat in an area influences which animals occur there, as well as diversity and abundance. This habitat assessment also has an important role in predicting threatened fauna likely to occur in an area. The information collected usually includes the type of vegetation present, the presence/absence of rock habitats, tree hollows, ponds, streams, wetlands, foraging substrates and other features likely to attract threatened fauna. The study area and immediate surrounds were traversed to identify habitat components, which were recorded and described.

2.2.2.2 Diurnal surveys

Specific searches were conducted for habitats or resources of relevance for those threatened fauna species known from subalpine and montane areas, and which might be anticipated to occur given the vegetation communities and habitats present. In particular, searches were undertaken for evidence of *Mastacomys fuscus* (Broad-toothed Rat) and for hollow-bearing trees and wombat burrows.

Opportunistic fauna surveys involved observations of animal activity, habitat surveys and searches for indirect evidence of fauna. Diurnal mammal searches were conducted in areas of potential habitat across the study area, with emphasis on searches for scats, tracks, burrows, diggings and scratchings.

2.2.2.3 Limitations

The results of fauna surveys can be optimised by conducting investigations over a long period to compensate for the effect of unfavourable weather, seasonal changes and climatic variation. In general, the longer the survey the more species will be detected. Results can also be improved by using a wide range of techniques, since some species are more likely to be detected by a particular method.

However, surveys are subject to constraints that determine the amount of time allocated, the methods used and the timing of the work. Thus, the results should be viewed in the light of these limitations. The fauna detected during the survey period are a guide to the native fauna present, but are by no means a definitive list of the species occurring in the study area. Nevertheless, the techniques used in this investigation are considered adequate to gather the data necessary to identify potential ecological constraints to the proposal.

2.2.2.4 Survey effort

The fauna survey effort employed a total of two person-hours.

3. Results

3.1 Database and literature review

Appendix A provides a list of threatened and migratory species and TECs that have been recorded from database searches within a 5 km radius of the study area. The potential for each of these species to occur in the study area and the importance of the habitats within the study area are also discussed in Appendix A, and a decision made regarding the need for further assessment in this report. Some species which are not known from montane habitats have been excluded from Appendix A.

3.2 Flora

The vegetation within the study area has been typed with reference to the classifications of Ecology Australia (2002) and into PCTs using the revised PCTs in eastern NSW, which are part of the State Vegetation Type Map (SVTM). The study area supports two native vegetation communities; Subalpine Woodland and Subalpine Riparian Scrub, with Exotic Grassland and Disturbed Vegetation on the ski slopes, as shown in Figure 5.

3.2.1 Subalpine Woodland

Subalpine Woodland dominates the study area, as shown in Figure 5. It is the most dominant community within the Thredbo Resort area covering an estimated 443 ha (Ecology Australia 2002). The community does not correlate well with any PCT, however is closest to PCT 3381 - *Kosciuszko Alpine Sally Woodland* and 3307 - *Kosciuszko-Namadgi Alpine Ash Moist Grassy Forest*.

The canopy is dominated by dense regrowth *Eucalyptus pauciflora* (Snow Gum) to a height of approximately 14-20 m and percent foliage cover (PFC) of up to 60%. There is a very sparse sub-canopy in places of *Acacia obliquinervia* (Mountain Hickory) to a height of 4 m and PFC of less than 1%. The understorey is dominated by *Bossiaea foliosa* (Leafy Bossiaea) to a height of up to 2.5 m with PFC of 70-90%. Other understorey shrubs which occur less frequently include *Olearia phlogopappa* (Dusty Daisy-bush), *Tasmannia xerophila* subsp. *xerophila* (Alpine Pepperbush), *Ozothamnus secundiflorus* (Cascade Everlasting), *Podocarpus lawrencei* (Mountain Plum Pine), and *Olearia megalophylla* (Large-leaf Daisy Bush).

The groundcover is typically sparse given the density of the understorey and includes patches of species such as *Poa ensiformis* (Purple-sheathed Tussock-grass), *Poa fawcettiae* (Smooth Blue Snowgrass), *Asperula gunnii* (Mountain Woodruff), *Senecio gunnii*, *Stellaria pungens*, *Dianella tasmanica* (Tasman Flax-lily), *Geranium potentilloides* var. *potentilloides*, *Acaena novae-zelandiae* (Bidgee Widgee), *Goodenia hederacea* subsp. *alpestris, Oxalis exilis, Hydrocotyle algida* and *Polystichum proliferum* (Mother Shield Fern). *Poa helmsii* (Broad-leaved Snowgrass) occurs where drainage is impeded.

Parts of the study area comprise a shrubland and or grassland that is derived from the clearing of Subalpine Woodland, as shown in Figure 5 and Photo 6 and Photo 7. The proposal will result in the further disturbance of approximately 0.015 ha of this derived shrubland / grassland.

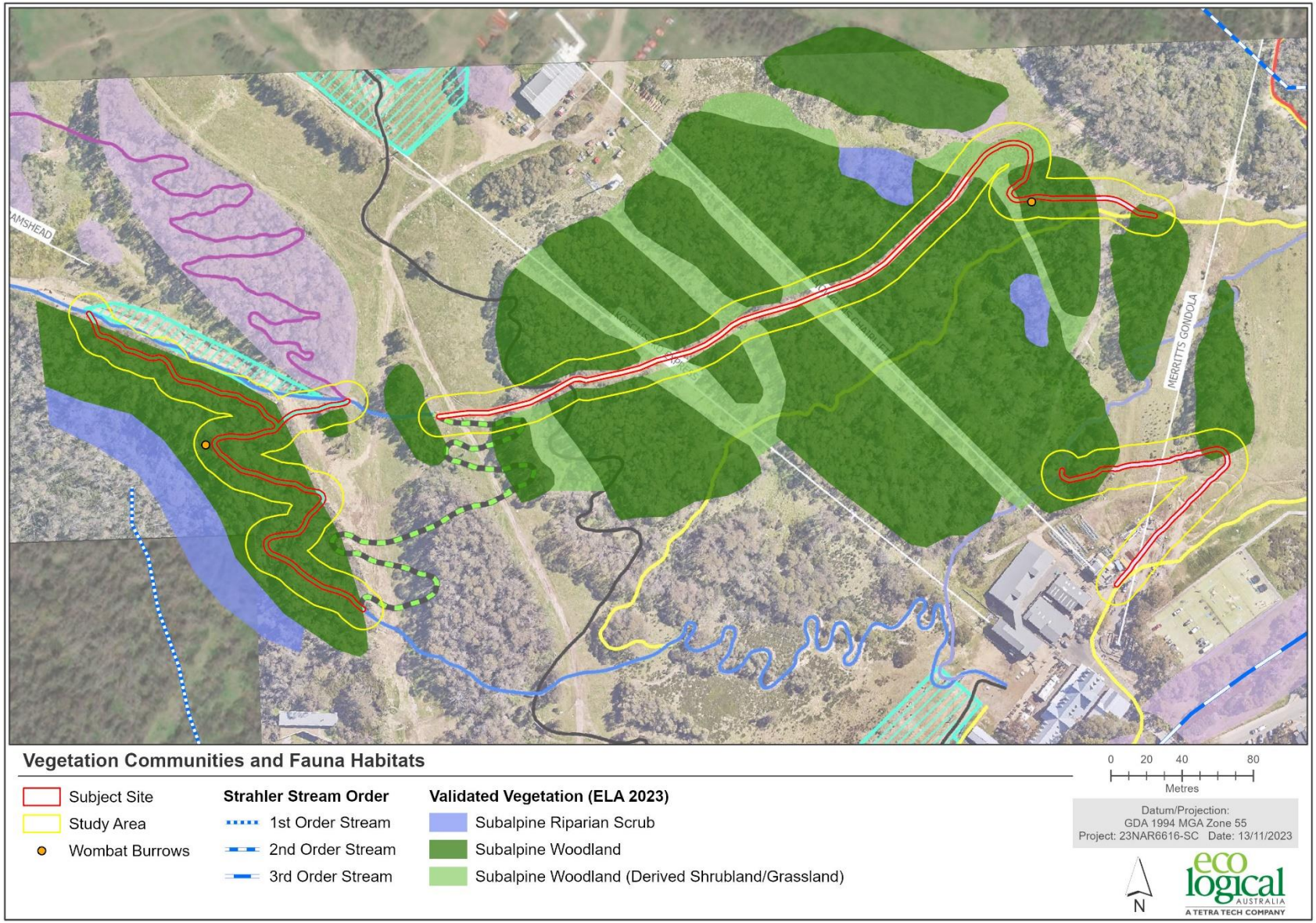

Figure 5: Vegetation communities and fauna habitats within the study area.

Photo 11: A band of Subalpine Riparian Scrub occurs in association with the watercourse to the south (downslope) of the proposed Jumps Park Bypass trail.

3.2.2 Subalpine Riparian Scrub

Subalpine Riparian Scrub occurs downslope of the proposed Jumps Park Bypass trail in association with a tributary of the Thredbo River. There are also two small patches in proximity to the proposed new Wombat Walk trail. Subalpine Riparian Scrub equates with PCT 3296 - *Kosciuszko Flanks Moist Gully Forest*. It will not be impacted by the proposed trails.

The community is characterised by a closed sub-canopy of *Leptospermum grandifolium* (Mountain Tea-tree) to a height of approximately 8-10 m and PFC of up to 90%, beneath a canopy dominated by *Eucalyptus pauciflora*. A patchy and typically sparse understorey of species more typically associated with the surrounding Subalpine Woodland occurs on the margins of the community and includes species such as *Bossiaea foliosa*, *Olearia phlogopappa*, *Tasmannia xerophila*, *Ozothamnus secundiflorus* and *Polyscias sambucifolia* subsp. *leptophylla*. The patchy groundcover includes patches of species such as *Poa ensiformis*, *Blechnum penna-marina* subsp. *alpine* (Alpine Water Fern), *Polystichum proliferum, Dianella tasmanica*, *Senecio gunnii*, *Stellaria pungens*, *Geranium potentilloides* var. *potentilloides*, *Acaena novae-zelandiae*, *Ranunculus graniticola* (Granite Buttercup), and *Hydrocotyle algida*.

3.2.3 Exotic Grassland and Disturbed Ski Slopes

The most heavily disturbed parts of the study area, i.e. the ski slopes, support exotic grassland, with occasional patches of native shrubs, grasses, and forbs. These areas are characterised by an abundance of exotic grasses and herbs, the most common species comprising *Festuca rubra, Agrostis capillaris*, and a range of exotic herbs including *Hypochaeris radicata*, *Acetosella vulgaris*, and *Achillea millefolium*.

3.3 Fauna

3.3.1 Fauna habitats

The study area contains a limited range of fauna habitats given its narrow linear nature and the dominance of the Subalpine Woodland vegetation community. However, the study area is surrounded by extensive areas of native vegetation and as such, a relatively diverse range of native fauna are likely to occur there from time to time.

The Subalpine Woodland which dominates the study area provides habitat for native birds, terrestrial and arboreal mammals, microchiropteran bats and invertebrates. In particular, it provides foraging value for birds such as *Callocephalon fimbriatum* (Gang-gang Cockatoo) and sheltering and nesting habitat for species such as *Acanthiza pusilla* (Brown Thornbill). Other threatened birds which may forage within the study area from time to time include *Petroica phoenicea* (Flame Robin), *Petroica boodang* (Scarlet Robin), *Petroica rodinogaster* (Pink Robin) and *Pachycephala olivacea* (Olive Whistler), all of which are known from the Thredbo Resort area, and in the case of the Flame Robin and Olive Whistler, are common within the Resort Area during the summer.

The Pink Robin is known to breed in the Mountain Ash Forests within the Thredbo Valley, including the patches of Mountain Ash Forest associated with the gullies to the north and south of the High Noon ski run. However, given the Pink Robin's fidelity with the Mountain Ash Forests (MGP 1986), it is unlikely that it would breed within the study area although it may forage there. The Olive Whistler is more likely to breed and forage within the study area, given its preference for dense understorey cover.

The Subalpine Woodlands in the Thredbo Valley are regrowth from catastrophic wildfires in 1925/26 (Banks 1986 in MGP 1996). The subsequent paucity of older or hollow-bearing trees limits sheltering habitats for hollow-dependent fauna species. No hollow-bearing trees or other nesting, breeding or roosting habitats for hollow-dependent fauna species were observed within the study area. However, some very small hollows and cavities may be present in some of the larger trees, and these may be used as shelter sites by skinks, and as nesting sites by small birds.

The study area provides a small amount of potential foraging and sheltering habitat for the Broad-toothed Rat, which is likely to be relatively widespread in the Thredbo Resort area (TAV 1997 and Green 2002). Other small mammal species such as *Cercartetus nanus* (Eastern Pygmy-possum), *Antechinus swainsonii* (Dusky Antechinus) and *Rattus fuscipes* (Southern Bush Rat) may also occur within the study area. The study area provides habitat for *Vombatus ursinus* (Common Wombat) and evidence of the species was observed in a number of locations, as shown in Figure 5.

The rock habitats, logs and dead trees within the study area provide a limited basking and foraging resource for reptiles, however given the predominance of a dense understorey, habitats for reptiles within the study area are generally relatively poor.

The limited water habitats within the study area provide a small foraging and breeding resource for frogs such as *Crinia signifera* (Common Eastern Froglet) and possibly other species, although no frogs were calling during the survey period. The Exotic Grasslands are likely to be utilised by exotic species such as *Lepus timidus* (Brown Hare), *Oryctolagus cuniculus* (Rabbits) and *Cervus unicolour* (Sambar Deer).

4. Impact assessment

4.1 Impacts on vegetation communities

4.1.1 Subalpine Woodland

The proposal will result in the removal of approximately 1300 m^2 of the Subalpine Woodland vegetation community, including derived shrubland, in association with the clearing of the 2.5 m wide alignment where the trail traverses intact patches of the community.

Ecology Australia (2002) estimate that there is approximately 443 ha of Subalpine Woodland within the Thredbo Resort area, and a further 184 ha within the Perisher Resort area, 183 ha at Mount Selwyn, and 5.7 ha at Charlotte Pass. The SVTM PCT map estimates that 69,187 ha or approximately 99% of the original extent of the *Kosciuszko Alpine Sally Woodland* is still extant. Furthermore, the vast majority of the occurrence of the community in NSW is within conservation reserves and in particular with Kosciuszko National Park.

In this context the loss of approximately 1300 m^2 of Subalpine Woodland (<0.01% of the extent of the community with the Thredbo Resort area) is a relatively minor and acceptable impact.

4.1.2 Subalpine Riparian Scrub

The proposal will not result in any direct impacts on the Subalpine Riparian Scrub vegetation community, with the proposed trail alignment remaining more than 8 m away from the community.

Ecology Australia (2002) estimate that there is approximately 11 ha of the community within the Thredbo Resort area and another 3.5 ha at Bullocks Flat (Ecology Australia 2002). However, significant stands of the community within the Thredbo Resort area do not appear to have been mapped by Ecology Australia (2002), including both the stands within the study area. Gellie (2006) does not appear to describe the community. Limited reconnaissance undertaken by ELA has identified unmapped occurrences of the community in a number of locations within the Thredbo Resort area and along a number of tributaries of the Thredbo River, between Thredbo Village and Bullocks Flat. The vast majority of the community in NSW is likely to be within conservation reserves, and in particular, within Kosciuszko National Park. The SVTM PCT map estimates that 13,435 ha or approximately 97.5% of the original extent of the *Kosciuszko Flanks Moist Gully Forest* is still extant.

In this context, any indirect impacts on the Subalpine Riparian Scrub associated with the proposal are considered a minor and acceptable impact.

4.2 Impacts on threatened ecological communities

The study area does not support any threatened ecological communities.

4.3 Impacts on flora species of conservation significance

No threatened flora species, or flora species identified on the schedules of the Kosciuszko National Park Plan of Management (KNPPOM) (DEC 2006), were recorded within the study area during the survey period and none are expected to occur there. The study area does support individuals of *Podocarpus lawrencei* (Mountain Plum Pine) which is considered to be of conservation significance, particularly where it occurs as a shrubland (DEC 2006) or closed heath, and where it is associated with, and a major foraging resource for *Burramys parvus* (Mountain Pygmy-possum) populations. However, *Podocarpus lawrencei* is common in the subalpine and montane woodlands and forests in the Thredbo Valley (Hogg 1987 in ENFAC 2008). The proposal may result in the loss of a few scattered smaller *Podocarpus lawrencei* shrubs, however, it will not affect any Mountain Plum Pine Closed Heath, or other potentially significant stands of the species, as it has been designed to avoid all larger, older Mountain Plum Pine plants. The impacts of the proposal on *Podocarpus lawrencei* are negligible in the context of the abundance of the species within the Thredbo Resort area and elsewhere in the locality.

4.4 Impacts on fauna habitats

Whilst the study area provides a small amount of known or potential habitat for a range of native fauna species, including threatened species, such as Broad-toothed Rat, Gang-gang Cockatoo, Olive Whistler, Pink Robin, Scarlet Robin, and Flame Robin, similar habitats are widespread in adjacent areas, and elsewhere within the locality, and will continue to be available to these species. The impacts associated with the proposal are limited to the removal or modification of a relatively small amount of native vegetation (approximately 0.13 ha), and a few rocks, none of which provide important fauna habitats. Some sheltering and foraging habitat will be affected. However, this is a very small proportion of the sheltering and foraging habitat available in the areas immediately surrounding the study area, and the loss or modification of this habitat is not likely to adversely impact on fauna generally, or any threatened species.

The proposal will not affect any known Broad-toothed Rat nests or other important habitats for the species. No concentrations of scats or other evidence of nesting activity was detected during the survey period. Evidence of Broad-toothed Rat is widespread in the locality, and it is unlikely that a development such as proposed, would impact adversely of any individual or local population of the species. Impacts on the Eastern Pygmy-possum, if it does occur within the study area, would be minor given the narrow linear nature of the proposed vegetation clearing and the extensive surrounding forests and woodlands.

The proposal will not adversely affect the Gang-gang Cockatoo, Olive Whistler, Scarlet Robin or Flame Robin given the highly mobile nature of these species and the very small area of habitat affected relatively to the extent of similar habitat in the locality. Similarly, there will be no adverse impacts on the Pink Robin as the proposal will not affect any potential breeding habitat for the species and will affect only a very small amount of marginal potential foraging habitat.

The proposed works will be in close proximity to a number of wombat burrows. However, given the minor footprint of the trail it is unlikely that any wombat burrows will need to be removed or excavated or that any wombats will need to be relocated. Recommendations are provided in Section 5 to minimise impacts on wombats in association with the proposal.

Under these circumstances, the impacts of the proposal on fauna habitats are relatively minor and acceptable.

4.5 Threatened species likelihood of occurrence

As a result of database searches and field surveys, the threatened species and communities identified in Table 1 are known or considered to have the potential to occur within the study area or immediate surrounds (Appendix A). The potential impact of the proposal on these entities has been assessed (Appendix C) pursuant to relevant statutory assessments.

Table 1: Threatened species with the potential to be affected by the proposal

Scientific Name	Common Name	FM Act	BC Act	EPBC Act	Occurrence
Fauna					
Mastacomys fuscus	Broad-toothed Rat	—	V	V	Potential
Cercartetus nanus	Eastern Pygmy-possum	—	V	—	Potential
Callocephalon fimbriatum	Gang-gang Cockatoo	—	V	E	Potential
Petroica boodang	Scarlet Robin	—	V	—	Potential
Petroica phoenicea	Flame Robin	—	V	—	Potential
Petroica rodinogaster	Pink Robin	—	V	—	Potential
Pachycephala olivacea	Olive Whistler	—	V	—	Potential

V = Vulnerable, E = Endangered

4.6 Conclusion of Assessment of Significance

A test of significance under Section 7.3 of the BC Act was undertaken for those threatened species known within the study area and immediate surrounds or with potential to occur there (Table 1). The outcome of the assessment was that it is highly unlikely that the proposal would significantly impact on those threatened entities assessed (Appendix B).

Recommendations have been provided in Section 5 to further ameliorate the potential impacts of the proposal.

4.7 Conclusion of EPBC assessment

An impact assessment under the EPBC Act was undertaken on threatened species known within the study area and immediate surrounds or with potential to occur there (Table 1).

The outcome of this assessment was that it is highly unlikely that the development would significantly impact on the threatened entities assessed (Appendix C). A referral to the Commonwealth under the EPBC Act is not recommended.

5. Recommendations

To further mitigate the potential impacts of the proposal, the following recommendations for impact mitigation and amelioration are suggested.

Vegetation and habitat management

1. All disturbance should be kept to the minimum required to achieve the proposal.
2. The proposed trail and associated works should be at least 15 m from the outer limit of the Subalpine Riparian Scrub.
3. All machinery to be used during the construction phase should be limited to the existing disturbed areas and access tracks and the proposed trail alignments as far as is possible.
4. Appropriate safeguards should be in place during the proposed works to limit the potential for invasive plants or pathogens, chemicals or any other pollutants to enter the environment in association with the proposed development.
5. If any trees with a diameter at breast height (dbh) of greater than 200 mm are to be felled, then the tree must be inspected prior to felling by the KT Environmental Coordinator for any potential hollows or fissures that could potentially be used for sheltering by the Eastern Pygmy-possum.
6. If any wombat burrows need to be impacted by the proposal a wombat management plan should be developed for the proposal in consultation with NPWS.
7. Any Blackberry or other problematic weeds detected within the study area should be controlled.

Sediment control

8. Appropriate sediment control measures should be implemented prior to any construction work for the proposal and retained in place until exposed areas of soil or vegetation are stabilised and/or revegetated.
9. Drainage management and sediment control measures are to have particular regard to the prevention of any sedimentation of watercourses or vegetation communities adjoining the study area.

Rehabilitation

10. Rehabilitation activities should be consistent with the resort areas rehabilitation guidelines (NGH Environmental 2007).
11. Only weed-free straw or natural thatch/litter should be used in sediment control activities.

6. Conclusion

This report describes the biological environment and assesses the potential effects on threatened and migratory species, endangered populations and ecological communities of a proposal to construct the Little Beauty Jumps Park Bypass and the Wombat Walk Connector mountain bike trails at Thredbo Alpine Resort.

The study area and immediate surrounds was found to support two native vegetation communities; Subalpine Woodland, and Subalpine Riparian Scrub, with parts of the study area also comprising Exotic Grassland or other heavily disturbed vegetation. No threatened flora species were recorded within the study area during the survey period and none are considered likely to occur there given the general absence of suitable habitats. The study area does not support any endangered ecological communities. Only approximately 0.13 ha of Subalpine Woodland and is expected to be removed in association with the proposal.

Whilst the study area provides a small amount of potential habitat for threatened fauna species such as the Broad-toothed Rat, Eastern Pygmy-possum, Gang-gang Cockatoo, Olive Whistler, Pink Robin, Scarlet Robin and Flame Robin, similar habitats are extensive in the locality and the habitats to be affected are small in the context of the extent of similar habitats contiguous with the study area. Furthermore, the proposal will not affect any potentially important habitats for threatened fauna species. The proposal will not sever any linkages between habitats or otherwise permanently restrict fauna movement.

An assessment of the effects of the proposal on threatened species, populations and ecological communities which may be directly or indirectly affected by the proposal was undertaken by applying the five factors from Section 7.3 of the *Biodiversity Conservation Act 2016*. This assessment concluded that the proposal is unlikely to have a significant effect on threatened species, populations or ecological communities or their habitats.

Following consideration of the administrative guidelines for determining significance under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999*, it is concluded that the proposal is unlikely to have a significant impact on matters of National Environmental Significance or Commonwealth land, and a referral to the Commonwealth Environment Minister is not necessary.

Notwithstanding the relatively minor impacts on vegetation and fauna habitats associated with the proposal, the impact mitigation measures described in Section 5 are also recommended to be incorporated into the proposal.

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Appendix A: Likelihood of occurrence

Summary of initial assessment to determine the likelihood of occurrence of threatened species, populations and ecological communities in the proposal site.

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Additional flora species have been added where the study area is considered to provide potential habitat and additional fauna species that may inhabit the study area have also been included by correlating species habitat requirements with the existing environment. Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the study area, results of the field survey and professional judgement.

The terms for likelihood of occurrence are defined below:

- "yes" = the species was or has been observed on the site
- "likely" = a medium to high probability that a species uses the site
- "potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur
- "unlikely" = a very low to low probability that a species uses the site
- "no" = habitat on site and in the vicinity is unsuitable for the species.

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
FLORA						
Argyrotegium nitidulum *syn. Euchiton nitidulus*	Shining Cudweed	-	V	V	A mat-forming silver-leaved perennial daisy growing in tall alpine herbfield or open heathland above or close to the treeline. The species is known in NSW only from the high alpine area in the vicinity of Mt Kosciuszko. The species was not observed within the study area despite good survey coverage. There is no suitable habitat for the species within the study area.	No
Calotis glandulosa	Mauve Burr Daisy	-	V	V	This species appears to be a coloniser of bare patches and occurs, often on roadsides, in the subalpine habitats of the Australian Alps. The species is also known from montane grasslands dominated by Poa species, Natural Temperate Grassland dominated by Kangaroo Grass, and Snow Gum Woodlands in the Monaro and Shoalhaven regions. Locally it is known from the Moonbah area. There is no suitable habitat for the species within the study area.	No
Carex archeri	Archer's Carex	-	E	-	This species is associated with alpine herbfield, sod tussock grassland or alpine heathland and is known in NSW only from the Club Lake and upper Thredbo River areas. There is no suitable habitat for the species within the study area.	No
Carex raleighii	Raleigh Sedge	-	E	-	This species is associated with alpine herbfield, sod tussock grassland or alpine heathland. There is no suitable habitat for the species within the study area.	No
Colobanthus curtisiae	Curtis' Colobanth	-	-	V	Curtis' Colobanth is a small perennial herb growing to 40 mm high. It requires bare ground for recruitment from seed and responds well to some disturbance such as grazing. The species flowers from November to February and is largely self-pollinated. In New South Wales, the species is endemic to Kosciusko National Park where it occurs in subalpine / montane treeless zone below 1800 m altitude. There is no habitat for the species within the study area.	No
Glycine latrobeana	Clover Glycine	-	CE	V	Clover Glycine is found across south-eastern Australia in native grasslands, dry sclerophyll forests, woodlands and low open woodlands with a grassy ground layer. There is no suitable habitat for the species within the study area.	No

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Haloragis exalata subsp. *exalata*	Square Raspwort	-	-	V	The Square Raspwort appears to be a post-disturbance coloniser, based on observations of large numbers of plants on disturbed roadsides, cleared power-line easements, and recently burnt or flooded areas. The nearest populations are in the Geehi Valley. There is no suitable habitat for the species within the study area.	No
Leucochrysum albicans subsp. *tricolor*	Hoary Sunray	-	-	E	In NSW the Hoary Sunray occurs at relatively high elevations in woodland and open forest communities, in an area roughly bounded by Goulburn, Albury and Bega. The species has been recorded in the Yass Valley, Tumut, Upper Lachlan, Snowy River and Galong. The species is known from the South Eastern Highlands, Australian Alps and Sydney Basin bioregions. Herbarium records indicate that the taxa once occurred more widely in inland NSW, near Cobar, Dubbo, Lithgow, Moss Vale and Delegate. There is no suitable habitat for the species within the study area.	No
Prasophyllum bagoense	Bago Leek-orchid	-	E	CE	The Bago Leek-orchid is endemic to NSW, and is currently known from a single population at McPhersons Plain, east of Tumbarumba in the Southern Tablelands. There is no suitable habitat within study area.	No
Prasophyllum petilum	Tarengo Leek Orchid	-	E	E	Tarengo Leek Orchid reaches to 35 cm tall. This species can be distinguished from the more common onion orchids (Microtis spp.) that grow in its habitat by the pinkish-purple base to the leaf. The flowering time for this species varies from north to south. Populations around Muswellbrook and Ilford tend to flower in September, with the Boorowa and Hall populations flowering in October and the Queanbeyan area and Delegate populations in December. Annual abundance varies significantly depending on winter and early spring rainfall, biomass and potentially other variables including the severity of winter frosts. Natural populations are known from a total of five sites in NSW. These are near Boorowa, Queanbeyan area, Ilford, Delegate and a newly recognised population c.10 km west of Muswellbrook. It also occurs at Hall in the Australian Capital Territory. Grows in open sites within Natural Temperate Grassland at the Boorowa and Delegate sites. Also grows in grassy woodland in association with River Tussock *Poa labillardieri*, Black Gum *Eucalyptus aggregata* and tea-trees *Leptospermum* spp. near	Unlikely

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
					Queanbeyan and within the grassy groundlayer dominated by Kanagroo Grass under Box-Gum Woodland at Ilford (and Hall, ACT).	
Pterostylis oreophila	Blue-tongued Orchid	-	CE	CE	In New South Wales, the Blue-tongued Greenhood is known from a few small populations within Kosciuszko National Park and a population of about 40 plants (possibly now extinct) in Bago State Forest and adjoining Crown Leases south of Tumut. It grows along sub-alpine watercourses under more open thickets of Mountain Tea-tree in muddy ground very close to water. It less commonly grows in peaty soils and sphagnum mounds. It flowers from November to January.	Unlikely
Ranunculus anemoneus	Anemone Buttercup	-	V	V	This perennial forb of the alpine and upper alpine zones tends to occur in areas where snow persists late into the warm season. The species is relatively common in the higher subalpine and alpine areas in the locality. This species was not observed within the study area despite good survey coverage.	No
Rytidosperma pumilum	Feldmark Grass	-	V	V	Felmark Grass is limited to a tiny area of feldmark - about 3ha - of the Main Range of Kosciuszko National Park between Mt Northcote and Mt Lee. There is no suitable habitat for the species within the study area.	No
Rytidosperma vickeryae	Perisher Wallaby Grass	-	E	-	This perennial grass is associated with treeless subalpine streamside vegetation and has been recorded from Perisher, Betts, and Spencers Creeks and tributaries, and Happy Jacks Plain. It is associated with bogs and sphagnum mounds. There is no suitable habitat for the species within the study area.	No
Thesium australe	Austral Toadflax	-	V	V	This species is semi-parasitic on roots of a range of grass species, mainly Kangaroo Grass.	No
Xerochrysum palustre	Swamp Everlasting	-	-	V	Grows in swamps and bogs which are often dominated by heaths. Also grows at the edges of bog margins on peaty soils with a cover of shrubs or grasses. Found in Kosciuszko National Park and the eastern escarpment south of Badja. Flowers appear from November to March. There is no suitable habitat for the species within the study area.	Unlikely

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
ENDANGERED ECOLOGICAL COMMUNITIES						
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps		-	EEC	-	The plant community characterizing this EEC is associated with accumulated peaty or organic-mineral sediments on poorly drained flats in the headwaters of streams. It occurs on undulating tablelands and plateaus, above 400-500 m elevation, generally in catchments with basic volcanic or fine-grained sedimentary substrates or, occasionally, granite. The vegetation communities within the study area do not comprise this community.	No
Alpine Sphagnum Bogs and Associated Fens		-	-	EEC	This EEC is typically found in alpine, subalpine and montane environments. It can usually be defined by the presence of sphagnum moss, even though it may sometimes only be a minor component. It is dominated by shrubs or species such as Empodisma minus and is found in permanently wet areas, such as along streams, valley edges, valley floors where soils are waterlogged. The vegetation communities within the study area do not comprise this community.	No
Natural Temperate Grassland of the Southern Tablelands (NSW and ACT)		-	CEEC	EEC	This community is associated with valleys influenced by cold air drainage and open plains in the Southern Tablelands. The vegetation communities within the study area do not comprise this community.	No
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland		-	EEC	EEC	Box Gum Woodland occurs where rainfall is between 400 and 1200 mm per annum, on moderate to highly fertile soils at altitudes of 170 m to 1200 m. It occurs in an arc along the western slopes and tablelands of the Great Dividing Range from Southern Queensland through NSW to central Victoria	No
Snowy River Aquatic Ecological Community		EEC	-	-	The bed, banks, floodplains and associated vegetation of the Snowy River and all its tributaries potentially comprise part of this EEC. The ephemeral watercourse within the study area does not comprise this EEC.	No

Disclaimer: Data extracted from the Atlas of NSW Wildlife and EPBC Act Protected Matters Report are only indicative and cannot be considered a comprehensive inventory.

CE = Critically Endangered; E = Endangered; EEC = Endangered Ecological Community; V = Vulnerable

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
FISH						
Maccullochella peelii	Murray Cod	-	-	V	The Murray Cod utilises a diverse range of habitats from clear rocky streams, such as those found in the upper western slopes of NSW (including the ACT), to slow-flowing, turbid lowland rivers and billabongs. There is no suitable habitat within the study area.	No
Macquaria australasica	Macquarie Perch	-	-	E	The Macquarie Perch is a riverine, schooling species. It prefers clear water and deep, rocky holes with lots of cover. As well as aquatic vegetation, additional cover may comprise of large boulders, debris and overhanging banks (. Spawning occurs just above riffles (shallow running water). The Macquarie Perch was once widespread through the cooler upper reaches of the southern tributaries of the Murray-Darling river system in Victoria and New South Wales (Anonymous 1974; McDowall 1996), however its distribution did not usually extend to the sources of these rivers. There is no suitable habitat within the study area.	No
Prototroctes maraena	Australian Grayling	-	E	V	Currently, the Australian Grayling occurs in streams and rivers on the eastern and southern flanks of the Great Dividing Range, from Sydney, southwards to the Otway Ranges of Victoria and in Tasmania. The species is found in fresh and brackish waters of coastal lagoons, from Shoalhaven River in NSW to Ewan Ponds in South Australia. It is absent from the inland Murray-Darling system (DPI 2006; McDowall 1980b). There is no suitable habitat within the study area.	No
MAMMALS						
Burramys parvus	Mountain Pygmy-possum		E	E	This species lives only in the alpine and subalpine areas of the highest mountains of Victoria and NSW. It lives in rocky areas where boulders have accumulated below mountain peaks and is frequently associated with alpine heathlands dominated by Mountain Plum Pine. The nearest core habitats for the species are at Charlotte Pass. Given the absence of preferred sheltering or foraging habitat within the study area it is considered unlikely that the species would occur there.	Unlikely
Cercartetus nanus	Eastern Pygmy-possum		V	-	The Eastern Pygmy-possum is found in wet and dry eucalypt forest, subalpine woodland, coastal banksia woodland and wet heath. Pygmy-	Potential

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
					Possums feed mostly on the pollen and nectar from Banksias, Eucalypts and understorey plants and will also eat insects, seeds and fruit. The presence of Banksia sp. and Leptospermum sp. are an important habitat feature. Small tree hollows are favoured as day nesting sites, but nests have also been found under bark, in old bird nests and in the branch forks of tea-trees. The Eastern Pygmy-possum appears to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. They are mainly nocturnal. The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes.	
Dasyurus maculatus	Spotted-tailed Quoll		V	E	The species prefers moist forest types and is often associated with escarpments. There is no denning habitat for the species within the study are and the potential foraging habitat within the study area would form only a small proportion of the home range of the species, which has been estimated at between 800 ha and 2000 ha.	Unlikely
Mastacomys fuscus	Broad-toothed Rat		V	V	This species occurs in two widely separated areas in NSW, the Barrington Tops area and the wet alpine and subalpine heaths and woodlands of the Kosciuszko NP and adjacent areas. The species lives in a complex of runways through dense vegetation of wet grass, sedge or heath and under the snow in winter.	Potential
Petauroides volans	Greater Glider		-	V	This species is associated with tall moist forests. It is considered unlikely that it would occur within the study area.	Unlikely
Petrogale penicillata	Brush-tailed Rock-wallaby		E	V	This species prefers rocky habitats, including loose boulder-piles, rocky outcrops, steep rocky slopes, cliffs, gorges and isolated rock stacks. The nearest known population is more than 50 km southeast of the study area.	No
Phascolarctos cinereus	Koala		V	E	Associated with both wet and dry Eucalypt forest and woodland that contains a canopy cover of approximately 10 to 70% with acceptable Eucalypt food trees. It is highly unlikely that the species would ever occur in the study area and would not be resident there.	No

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Pseudomys fumeus	Smoky Mouse		E	E	Occurs in heath on ridge tops and slopes in sclerophyll forests, heathland and open forest along the coast and inland to sub-alpine regions. Occasionally occurs in ferny gullies. It is considered highly unlikely that the species would occur within the study area or immediate surrounds give its rarity and the nature of the habitats there.	Unlikely
Pteropus poliocephalus	Grey-headed Flying-Fox		V	V	Inhabits a wide range of habitats including rainforest, mangroves, paperbark forests, wet and dry sclerophyll forests and cultivated areas. Camps are often located in gullies, typically close to water, in vegetation with a dense canopy. There are no camps in the locality and the species would not occur within the study area.	No
AMPHIBIANS						
Litoria spenceri	Spotted Tree Frog		CE	E	The Spotted Tree Frog is associated with a range of vegetation communities from montane forest at high altitudes to wet and dry forest at moderate to low altitudes respectively. It occurs along sections of streams with steep banks, invariably in steeply dissected country or gorges with numerous rapids and waterfalls. It is restricted to riffle and cascade stream sections with exposed rock banks, resulting in a highly patchy distribution along most streams. Adults and juveniles most likely remain in the vicinity of the stream, rarely venturing far from the riparian zone. Tadpoles occur predominantly in slow-flowing sections of streams. There is no suitable habitat within the study area.	No
Litoria raniformis	Southern Bell Frog		E	V	This species is usually found in or around permanent or ephemeral Black Box/Lignum/Nitre Goosefoot swamps, Lignum/Typha swamps and River Red Gum swamps or billabongs along floodplains and river valleys and in irrigated rice crops, particularly where there is no available natural habitat. There is no suitable habitat within the study area.	No
Litoria verreauxii alpina	Alpine Tree Frog		E	V	This species occurs in the alpine and subalpine zones of south-eastern NSW and Victoria. It is found in a wide variety of habitats including woodland, heath, grassland and herbfields. It breeds in natural and artificial wetlands including ponds, bogs, fens, streamside pools, dams and drainage channels that are still or slow flowing. The species has disappeared from much of its former range in the last 20 years and is restricted to a few breeding sites in	Unlikely

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
					murky ponds. There is no suitable breeding habitat for the species within the study area and it is highly unlikely that it would occur there.	
Pseudophryne corroboree	Southern Corroboree Frog		CE	CE	The Southern Corroboree Frog is limited to sphagnum bogs of the northern Snowy Mountains, in a strip from the Maragle Range in the northwest, through Mt Jagungal to Smiggin Holes in the south. Its range is entirely within Kosciuszko National Park. This species is all but extinct in the wild. It is no longer present at its former southern limit at Smiggin Holes.	No
REPTILES						
Aprasia parapulchella	Pink-tailed Worm Lizard		V	V	Inhabits sloping, open woodland areas with predominantly native grassy ground layers, particularly those dominated by Kangaroo Grass. Sites are typically well-drained, with rocky outcrops or scattered, partially-buried rocks. Appear to spend considerable time in burrows below rocks; the burrows have been constructed by and are often still inhabited by small black ants and termites. The study area does not support suitable habitat for the species. The nearest records of the species are more than 50 km away at Cooma.	No
Cyclodomorphus praealtus	Alpine She-oak Skink		E	E	In NSW, the species is known from open alpine heath and tussock grassland within the Kosciuszko region, preferring treeless or lightly treed areas. The study area does not include any suitable habitat for this species and it is considered unlikely that it would occur there.	Unlikely
Liopholis guthega	Guthega Skink		E	E	This species is known from the Snowy Mountains and the Bogong High Plains and is associated with rocky areas in a range of alpine and subalpine vegetation communities. The species lives in extensive colonies associated with a deep burrow network that is constructed in eroded granite and humus soils beneath boulders and shrubs. The species is not associated with Subalpine Woodland and is highly unlikely to occur within the study area.	No
BIRDS						
Anthochaera phrygia	Regent Honeyeater		CE	CE, M	Associated with temperate eucalypt woodland and open forest including forest edges, wooded farmland and urban areas with mature eucalypts, and riparian forests of River Oak (Casuarina cunninghamiana). The Regent Honeyeater primarily feeds on nectar from box and ironbark eucalypts and	No

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
					occasionally from banksias and mistletoes. As such it is reliant on locally abundant nectar sources with different flowering times to provide a reliable supply of nectar. The species would not occur within the study area.	
Artamus cyanopterus cyanopterus	Dusky Woodswallow		V	-	Dusky woodswallows are widespread in eastern, southern and south western Australia. The species occurs throughout most of New South Wales, but is sparsely scattered in, or largely absent from, much of the upper western region. Most breeding activity occurs on the western slopes of the Great Dividing Range. They primarily inhabit dry, open eucalypt forests and woodlands, including mallee associations, with an open or sparse understorey of eucalypt saplings, acacias and other shrubs, and ground-cover of grasses or sedges and fallen woody debris. It has also been recorded in shrublands, heathlands and very occasionally in moist forest or rainforest. Also found in farmland, usually at the edges of forest or woodland.	Unlikely
Botaurus poiciloptilus	Australasian Bittern		V	E	This species favours permanent freshwater wetlands with tall, dense vegetation, particularly bulrushes and spikerushes. It hides during the day amongst dense reeds and feeds at night. It breeds during summer with nest built in secluded places in densely vegetated wetlands on a platform of reeds. There is no habitat for the species within the study area.	No
Callocephalon fimbriatum	Gang-gang Cockatoo		V	E	Gang-gang Cockatoos live as pairs inhabiting woodlands of south-eastern Australia. The species feeds primarily on the seeds of eucalypts and acacias and breeds in tree hollows. The species is typically associated with taller montane forests in the region but is sometimes observed foraging in Snow Gums and on the side of roads. It's likely that the species would forage within the study area from time to time.	Potential
Daphoenositta chrysoptera	Varied Sittella		V	—	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands, with a nearly continuous distribution in NSW from the coast to the far west. It inhabits eucalypt forests and woodlands, especially rough-barked species and mature smooth-barked gums with dead branches, mallee and Acacia woodland. It is considered unlikely that the species would occur within the study area.	Unlikely
Falco hypoleucos	Grey Falcon		E	-	The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing	No

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
					Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW. The Grey Falcon is sparsely distributed in NSW, chiefly throughout the Murray-Darling Basin, with the occasional vagrant east of the Great Dividing Range. The breeding range has contracted since the 1950s with most breeding now confined to arid parts of the range. There are possibly less than 5000 individuals left. Population trends are unclear, though it is believed to be extinct in areas with more than 500mm rainfall in NSW.	
Grantiella picta	Painted Honeyeater		V	V	The Painted Honeyeater is a nomadic species that occurs predominantly on the inland slopes of the Great Dividing Range. It inhabits Boree (Acacia pendula), Brigalow (A. harpophylla) and Box-Gum Woodlands and Box-Ironbark Forests. It is a specialist feeder on the fruits of mistletoes growing on woodland eucalypts and acacias, preferring mistletoes of the genus Amyema. Nesting occurs from spring to autumn in a small, delicate nest hanging within the outer canopy of drooping Eucalyptus spp., Allocasuarina and Casuarina spp. (Sheoaks), Melaleuca sp. (Paperbark) or Mistletoe branches. It is highly unlikely that the species would occur within the study area.	Unlikely
Lathamus discolor	Swift Parrot		CE	CE	Breeds in Tasmania between September and January. Migrates to mainland in autumn, where it forages on profuse flowering Eucalypts. Hence, in this region, autumn and winter flowering eucalypts are important for this species. Favoured feed trees include winter flowering species such as Swamp Mahogany (Eucalyptus robusta), Spotted Gum (Corymbia maculata), Red Bloodwood (C. gummifera), Mugga Ironbark (E. sideroxylon), and White Box (E. albens). It is considered highly unlikely that the species would occur within the study area.	Unlikely
Neophema chrysogaster	Orange-bellied Parrot		E	CE, M	Breeds only in coastal south-west Tasmania and spends the winter in coastal Victoria and South Australia. It nests in hollows in eucalypt trees which grow adjacent to its feeding plains. In early October the birds arrive in the south west and depart after the breeding season usually in March and April. It feeds on the seeds of several sedges and heath plants, including buttongrass.	No

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
					Its main food preferences are found in sedgelands which have not been burned for between 3-15 years. Also included in the diet are seeds of three Boronia species and the everlasting daisy (Helichrysum pumilum). After breeding, migrating birds move gradually northwards up the west coast, through the Hunter Group and King Island in Bass Strait and on to the mainland. On the journey the birds usually feed on beach-front vegetation including salt tolerant species such as sea rocket (Cakile maritima). They also eat various coastal native and introduced grasses. There is no habitat for the species within the study area.	
Pachycephala olivacea	Olive Whistler		V	-	This species is usually associated with moist tall forests at high elevations but has been occasionally recorded at lower altitudes. Breeding occurs above 300m within habitats providing both a thick understorey and moderate canopy. In the alps the species is more typically associated with subalpine woodlands with a heathy understorey. It is likely that the species would occur within the study area from time to time.	Potential
Petroica rodinogaster	Pink Robin		V	-	The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. It inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. In the alps the species is more typically associated with subalpine woodlands with a heathy understorey and Montane Forests rather than alpine heaths. The species may forage within the study area from time to time.	Potential
Petroica boodang	Scarlet Robin		V	-	This species is found in south-eastern Australia and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes. The Scarlet Robin breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. The habitat for the species within the study area is marginal however the species is recorded within the Thredbo Valley from time to time and has been recorded by the author in similar habitats to those within the study area.	Potential

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Petroica phoenicea	Flame Robin		V	-	The Flame Robin is found in south-eastern Australia (Queensland border to Tasmania, western Victoria and south-east South Australia). In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. The species is well known from the locality and would likely use the more open habitats within the study area from time to time for foraging.	Potential
Rostratula australis	Australian Painted Snipe		E	E	In NSW, records of the Painted Snipe are from the Murray-Darling Basin, including the Paroo wetlands, Lake Cowal, Macquarie Marshes, Fivebough Swamp, and swamps near Balldale and Wanganella. Other important locations with recent records include wetlands on the Hawkesbury River and the Clarence and lower Hunter Valleys. It prefers the fringes of swamps, dams and nearby marshy areas, where there is a cover of grasses, Lignum, low scrub or open timber. It nests on the ground amongst tall vegetation, such as grasses, tussocks or reeds. There is no suitable habitat for the species within the study area.	No
MIGRATORY TERRESTRIAL AND WETLAND SPECIES LISTED UNDER EPBC ACT						
Hirundapus caudacutus	White-throated Needletail		—	V, M	Forages aerially over a variety of habitats usually over coastal and mountain areas, most likely with a preference for wooded areas. Has been observed roosting in dense foliage of canopy trees, and may seek refuge in tree hollows in inclement weather.	Unlikely
Merops ornatus	Rainbow Bee-eater		—	M	Resident in coastal and subcoastal northern Australia; regular breeding migrant in southern Australia, arriving September to October, departing February to March, some occasionally present April to May. Occurs in open country, chiefly at suitable breeding places in areas of sandy or loamy soil: sand-ridges, riverbanks, road-cuttings, sand-pits, occasionally coastal cliffs (ibid). Nest is a chamber at the end of a burrow, up to 1.6 m long, tunnelled in flat or sloping ground, sandy back or cutting (ibid). The species would not occur within the study area.	No

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
Monarcha melanopsis	Black-faced Monarch		—	M	This migratory species is known to breed in damp forest types and forage in rainforest and eucalypt forest. The species would not occur within the study area.	No
Myiagra cyanoleuca	Satin Flycatcher		—	M	This species inhabits lowland eucalypt forests. It is known to nest in dense gully vegetation. The species would not occur within the study area.	No
Neophema chrysogaster	Orange-bellied Parrot		E	E, M	SEE DIURNAL BIRDS ABOVE	No
Rhipidura rufifrons	Rufous Fantail		—	M	This migratory species forages by catching flying insects and is known to utilise the aerial foraging space above the dense understorey in damp forests or beside rivers. The species would not occur within the study area.	No
Xanthomyza phrygia	Regent Honeyeater		E	E, M	SEE DIURNAL BIRDS ABOVE	No
Gallinago hardwickii	Latham's Snipe		E	M	Resides in swamps, dams and nearby marshy areas that contain grasses, lignum, low scrub or open timber that provides cover. It is considered highly unlikely that the species would occur within the study area.	Unlikely
Motacilla flava	Yellow Wagtail		—	M	Frequents open wetlands along the bare shores of freshwater swamps, crops and bare bore drains, as well as short-grassed fields and rocky coasts. It is considered highly unlikely that the species would occur within the study area.	Unlikely

Disclaimer: Data extracted from the Atlas of NSW Wildlife and EPBC Act Protected Matters Report are only indicative and cannot be considered a comprehensive inventory. 'Migratory marine species' and 'listed marine species' listed on the EPBC Act (and listed on the protected matters report) have not been included in this table, since they are considered unlikely to occur within the study area due to the absence of marine and wetland habitats.

CE = Critically Endangered; E = Endangered; V = Vulnerable; M = Migratory

Appendix B: Test of significance

Test of significance pursuant to section 7.3 of the BC Act: Five-part test

An assessment of the effects of the proposal on threatened species, populations and ecological communities which may be directly or indirectly affected by the proposal may be carried out by applying the five factors from Section 7.3 of the BC Act.

This test of significance is presented below for the threatened fauna species:

- *Mastacomys fuscus* (Broad-toothed Rat)
- *Cercartetus nanus* (Eastern Pygmy-possum)
- *Callocephalon fimbriatum* (Gang-gang Cockatoo)
- *Petroica phoenicea* (Flame Robin)
- *Petroica boodang* (Scarlet Robin)
- *Petroica rodinogaster* (Pink Robin)
- *Pachycephala olivacea* (Olive Whistler)

(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Vulnerable Species

Fauna

Broad-toothed Rat Mastacomys *fuscus* (potential occurrence).
The Broad-toothed Rat generally occurs in two widely separated areas in NSW, the Barrington Tops area and the wet alpine and subalpine heaths and woodlands of the Kosciuszko NP and adjacent areas. The species lives in a complex of runways through dense vegetation of wet grass, sedge or heath and under the snow in winter. Home range size is thought to range between approximately 0.1 ha and 0.27 ha. Individuals nest alone over summer but congregate in communal nests during winter. The species is thought to be locally common in the alpine and high subalpine tracts of the Snowy Mountains area (Green 2002), where suitable habitats are present.

The study area provides a small amount of marginal potential foraging and sheltering habitat for the Broad-toothed Rat. Whilst no evidence of the species was observed within the study area, it has been observed nearby, and it is possible that the species occurs within the study area from time to time.

The proposed development will affect only a very small amount of the potential habitat for the species in the Thredbo Resort area and will not affect any key resources for the species. As such, the proposed development is unlikely to adversely affect a significant proportion of the home range of one or more Broad-toothed Rat individuals.

The proposed development will not result in habitat fragmentation which could isolate individuals or a population of the Broad-toothed Rat, given the narrowness of the clearing required. Under these circumstances, the proposed development is considered unlikely to disrupt the life cycle of the Broad-toothed Rat such that a viable local population is likely to be placed at risk of extinction.

Eastern Pygmy-possum *Cercartetus nanus* (potential occurrence).

The Eastern Pygmy-possum is found in wet and dry eucalypt forest, subalpine woodland, coastal banksia woodland and wet heath. Pygmy-Possums feed mostly on the pollen and nectar from Banksias, Eucalypts and understorey plants and will also eat insects, seeds and fruit. The presence of Banksia sp. and Leptospermum sp. are an important habitat feature. Small tree hollows are favoured as day nesting sites, but nests have also been found under bark, in old bird nests and in the branch forks of tea-trees. The Eastern Pygmy-possum appears to be mainly solitary, each individual using several nests, with males having non-exclusive home-ranges of about 0.68 hectares and females about 0.35 hectares. They are mainly nocturnal. The Eastern Pygmy-possum is found in south-eastern Australia, from southern Queensland to eastern South Australia and in Tasmania. In NSW it extends from the coast inland as far as the Pilliga, Dubbo, Parkes and Wagga Wagga on the western slopes.

There are a few records of the species from Kosciuszko National Park, mainly from lower altitudes, however the species has been recorded at 1,800 m. It is likely that the Eastern Pygmy-possum occurs in the subalpine and montane habitats of the Thredbo Resort.

The proposal is unlikely to adversely affect a significant proportion of the home range of any individual Eastern Pygmy-possum given that it comprises a narrow linear development. It is unlikely that any individual Eastern Pygmy-possum would be directly affected by the proposed trail given the relatively small area to be affected during the construction phase, the fact that no hollow-bearing trees will be removed and that the disturbances during construction are likely to encourage any individuals that may be within the disturbance corridor, to move away. Direct impacts during the use of the trail are unlikely given that the species is primarily nocturnal.

The proposal is highly unlikely to disrupt the life cycle of the Eastern Pygmy-possum such that a viable local population of the species is likely to be placed at risk of extinction.

Gang-gang Cockatoo *Callocephalon fimbriatum* (potential occurrence).

In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the central and southern tablelands and south-west slopes. In summer, this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, the Gang-gang Cockatoo may occur at lower altitudes in drier more open eucalypt forests and woodlands, and is often found in urban areas. It may also occur in sub-alpine Snow Gum woodland and occasionally in temperate rainforests.

The species is regularly observed at Thredbo in montane and subalpine areas. Whilst the species may forage within the study area, it would not breed there given the absence of suitable nesting habitat. Given the extensive forests within the locality, breeding and roosting habitat is likely to be relatively abundant.

The study area provides a very small area of suitable foraging resources for the species. The foraging resources (generally eucalypt trees) to be removed in association with the proposed development would not be important for the species, given the extent of foraging resources in the Thredbo Resort area.

Under these circumstances, the proposed development will not disrupt the life cycle of the Gang-gang Cockatoo such that a viable local population of the species is likely to be placed at risk of extinction.

Flame Robin *Petroica phoenicea* (potential occurrence).

The Flame Robin is found in south-eastern Australia (Queensland border to Tasmania, western Victoria and south-east South Australia). In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. There are numerous records of the species throughout the NSW Alps, and the species was observed in the study area during the survey period. It is well known from the Thredbo Resort area and is one of the most common birds of open habitats outside of the winter period.

The proposal will affect a very small amount of potential nesting and foraging habitat for the species. This is negligible in the context of the extensive areas of similar habitat within the Thredbo Resort area that will not be affected by the proposed development and which will continue to be available to the species. The species is not sedentary and undertakes substantial seasonal migrations, reducing the species dependence on any specific area of known or potential habitat.

Under these circumstances, the proposed development is unlikely to disrupt the life cycle of the Flame Robin such that a viable local population of the species is likely to be placed at risk of extinction.

Scarlet Robin *Petroica boodang* (potential occurrence).

This Scarlet Robin is found in south-eastern Australia and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes. The Scarlet Robin breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. The habitat for the species within the study area is marginal however the species is recorded within the Thredbo Valley from time to time.

The proposal will affect a very small amount of potential nesting and foraging habitat for the species. This is negligible in the context of the extensive areas of similar habitat within the Thredbo Resort area that will not be affected by the proposed development and which will continue to be available to the species. The species is not sedentary and undertakes substantial seasonal migrations, reducing the species dependence on any specific area of known or potential habitat.

Under these circumstances, the proposed development is unlikely to disrupt the life cycle of the Scarlet Robin such that a viable local population of the species is likely to be placed at risk of extinction.

Pink Robin *Petroica rodinogaster* (potential occurrence).

The Pink Robin is common in Tasmania, uncommon in Victoria and rare in NSW. It is known to breed in low numbers in Kosciuszko National Park, including in a small patch of Mountain Ash forest which occurs approximately 160 m upstream of the study area (MGP 1996). During the non-breeding period the species has been observed in more open areas including trees on the edge of Thredbo golf course.

Surveys for Pink Robins within the Thredbo Lease area in 1986 and 1987 (Margules Partners 1987) demonstrated the high fidelity of Pink Robins with deep sheltered gullies supporting Mountain Ash forest in that each of the three nests detected occurred in such habitats, and no Pink Robins were observed more than 150 m from these habitats during the breeding season.

Whilst the proposed will affect a small amount of potential foraging habitat for the species, it is highly unlikely to affect breeding given the species demonstrated high fidelity with preferred breeding habitats.

Under these circumstances, the proposal is considered unlikely to disrupt the life cycle of the Pink Robin such that a viable local population of the species is likely to be placed at risk of extinction.

Olive Whistler *Pachycephala olivacea* (potential occurrence).

The Olive Whistler is found in south-eastern Australia (Queensland border to Tasmania, western Victoria and south-east South Australia). In the NSW Alps, it is associated with areas of tall dense heath, particularly riparian Tea-tree scrubs. It breeds in the thick understorey of moist eucalypt forests and subalpine woodlands. It migrates in winter to lowland habitats. There are numerous records of the species throughout the NSW Alps including within the Thredbo Resort area where it is considered a common resident. The species was not recorded within the study area during the survey period however it is likely to occur there from time to time.

The proposed development will result in the loss of a small amount of potential foraging and breeding habitat for the Olive Whistler. Whilst this comprises an adverse impact on the species, the habitat to be removed is very small relative to the extensive areas of similar habitat which occurs within the Thredbo Resort area and elsewhere in the locality. Extensive areas of potential habitat for the species is contiguous with the study area in the extensive Subalpine Woodland and Subalpine Riparian Scrub within the Thredbo Valley. The species is highly mobile and considered to be common within the Thredbo Valley and the Thredbo Valley population is considered to be contiguous with other populations to the north and south (MGP 1996).

Under these circumstances it is considered unlikely that the proposed development would affect the life cycle of the Olive Whistler such that a viable local population of the species is likely to be placed at risk of extinction.

(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

There are no endangered or critically endangered ecological communities within the study area.

(c) in relation to the habitat of a threatened species or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and

The proposed development will impact on only a very small area (0.13 ha) of potential habitat for the Broad-toothed Rat and Eastern Pygmy-possum and will not affect any known Broad-toothed Rat communal nesting or likely breeding sites for either species. The proposed development will result in the modification of a very small amount of potential foraging and breeding habitat (0.13 ha) for the

Flame Robin, Scarlet Robin and Olive Whistler, and only a very small amount of potential foraging habitat for the Gang-gang Cockatoo and Pink Robin.

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed development or activity, and

The proposed development primarily involves a narrow band of clearing of understorey and groundcover vegetation. The proposed clearing will not sever connectivity between the fauna habitats within the study area and contiguous habitats, or isolate any fauna populations which may occur within the study area. The disruptions to connectivity between fauna habitats will be minor, typically 2.5 m in width. This is considered highly unlikely to sever connectivity between habitats even for relatively immobile species with small home ranges such as some small mammals and reptiles.

The effects of the action proposed on habitat connectivity will be minor and the native fauna which may occur within the study area from time to time, will continue to be able to traverse the study area.

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species or ecological community in the locality,

The potential Broad-toothed Rat habitats to be affected comprise a small area of marginal habitat relative to the extensive areas of similar and superior habitats provided by contiguous vegetation. The alpine, subalpine and montane heaths in the locality provide superior habitat for the species than the habitats within the study area. No evidence of any important communal nesting sites was observed within the study area. Under these circumstances, the habitats to be affected are not considered to be particularly important for Broad-toothed Rat.

The habitat to be removed by the proposal is highly unlikely to be important to the long-term survival of the Eastern Pygmy-possum in the locality given that it comprises only a relatively small amount of potential habitat for the species relative to the extensive areas of remnant forest, woodland and heath within the locality.

In the context of the extent of similar habitat available for the Gang-gang Cockatoo, Olive Whistler, Pink Robin, Scarlet Robin and Flame Robin in the Thredbo Resort area and elsewhere in the locality, the habitats within the study area are not considered to be important.

d) whether the proposed development or activity is likely to have an adverse effect on any declared area of outstanding biodiversity value (either directly or indirectly),

The proposed development will not affect any area of outstanding biodiversity value.

(e) whether the proposed development or activity is or is part of a key threatening process or is likely to increase the impact of a key threatening process.

The proposed development will remove 0.13 ha of remnant native vegetation. Whilst this constitutes the Key Threatening Process 'Clearing of native vegetation', the contribution to this key threatening process is relatively minor considering the extent of remnant forest in the locality and the extant extent of the vegetation communities that will be affected.

Appendix C: EPBC Act Significant Impact Criteria

The EPBC Act Administrative Guidelines on Significance set out **'Significant Impact Criteria'** that are to be used to assist in determining whether a proposed action is likely to have a significant impact on matters of national environmental significance. Matters listed under the EPBC Act as being of national environmental significance include:

- Listed threatened species and ecological communities;
- Listed migratory species;
- Wetlands of International Importance;
- The Commonwealth marine environment;
- World Heritage properties;
- National Heritage places;
- Nuclear actions; and
- Great Barrier Reef.

Specific **'Significant Impact Criteria'** are provided for each matter of national environmental significance except for threatened species and ecological communities in which case separate criteria are provided for species listed as endangered and vulnerable under the EPBC Act.

Threatened and migratory species listed under the EPBC Act that are considered likely or potentially to occur within the study area are given in **Appendix A** of the Report. The only Commonwealth listed species which are considered to have the potential to occur within the study area are the Broad-toothed Rat and the Gang-gang Cockatoo.

The relevant Significant Impact Criteria have been applied to determine the significance of impacts associated with the proposal.

Matters to be addressed	Impact
(a) any environmental impact on a World Heritage Property or National Heritage Places;	No. The proposal does not impact on a World Heritage Property or a National Heritage Place as addressed in the SEE. (listed natural: Australian Alpine National Parks and Reserves; nominated historic: Snowy Mountains Scheme NSW).
(b) any environmental impact on Wetlands of International Importance;	No. The proposal will not affect any part of Ramsar wetland.
(c) any impact on Commonwealth Listed Critically Endangered or Endangered Species;	Yes. The study area provides potential habitat for one Commonwealth listed endangered species: the Gang-gang Cockatoo. The significant impact criteria for endangered species are discussed below: a. lead to a long-term decrease in the size a population of a species,

Matters to be addressed	Impact
	The proposed action will only affect a very small amount of foraging habitat for the species in the context of the extent of potential habitat in the locality. The proposal will not affect any breeding or roosting habitat or otherwise adversely impact the species. Under these circumstances, it is considered highly unlikely that the proposed action will lead to a long-term decrease in the size of the Gang-gang Cockatoo population. b. reduce the area of occupancy of the species The proposed action will be limited to the loss or further modification of 0.13 ha of native vegetation which is a small amount of habitat in the context of the extent of similar habitats in the locality generally. The proposed works will not affect any key habitat resources for the Gang-gang Cockatoo; nor affect the species ability to access habitats within or beyond the study area. Under these circumstances, the proposed action is highly unlikely to reduce the area of occupancy of the local population of the Gang-gang Cockatoo. c. fragment an existing population into two or more populations The proposed action will be limited to the loss or further modification of 0.13 ha of native vegetation which is a small amount of habitat in the context of the extent of similar habitats in the locality generally. The proposed works will not affect any key habitat resources for the Gang-gang Cockatoo; nor affect the species ability to access habitats within or beyond the study area. Under these circumstances, the proposed action will not fragment an existing population of the Gang-gang Cockatoo into two or more populations. d. adversely affect habitat critical to the survival of a species No habitat within the development site is considered likely to be critical to the survival of the Gang-gang Cockatoo. There are thousands of hectares of similar habitats in the alpine and subalpine zones of the Australian alps, including elsewhere within the Thredbo Resort area. The Gang-gang Cockatoo continues to occur within the Thredbo Resort Area despite a long history of similar and more extensive disturbances. e. disrupt the breeding cycle of a population It is considered highly unlikely that the Gang-gang Cockatoo would breed within the study area given the absence of hollow-bearing trees. Under these circumstances, the proposed action will not disrupt the breeding cycle of a population of the Gang-gang Cockatoo. f. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline The proposed action will modify a very small area of habitat for the Gang-gang Cockatoo, but this area is unlikely to be important to the species in the context of the extent of potential habitat in the locality. Under these circumstances it is highly unlikely that the proposed action would modify- destroy- remove or isolate or decrease the availability or quality of habitat to the extent that the Gang-gang Cockatoo is likely to decline. g. result in invasive species that are harmful to an endangered species becoming established in the endangered or critically endangered species' habitat The proposed action is unlikely to result in invasive species that are harmful becoming established in potential habitat of the Gang-gang Cockatoo. Species such as cats or foxes are already present in the landscape and are subject to control programs within the resort.

Matters to be addressed	Impact
	h. introduce disease that may cause the species to decline The proposed action is unlikely to introduce disease that may cause the Gang-gang Cockatoo to decline. i. interfere substantially with the recovery of the species. As the proposed action is not considered to decrease or fragment any existing populations the recovery of the Gang-gang Cockatoo is unlikely to be adversely impacted.
(d) any impact on Commonwealth Listed Vulnerable Species;	Yes. The study area provides potential habitat for one Commonwealth listed vulnerable species: the Broad-toothed Rat. The significant impact criteria in terms of the vulnerable species are discussed below: *a. lead to a long-term decrease in the size of an important population of a species*. Whilst the proposed action will affect some potential habitat for the Broad-toothed Rat, it will affect only a very small amount of marginal potential habitat for the species. As such, the proposal is considered highly unlikely to adversely affect a significant proportion of the home range of one or more Broad-toothed Rat individuals and will not result in habitat fragmentation which could isolate individuals or a population of the Broad-toothed Rat. The noise and vibration associated with the proposal is likely to temporarily deter any Broad-toothed Rat individuals that may be near the affected areas. As such, it is unlikely that any individuals would be unintentionally killed during the implementation of the proposed action. Under these circumstances the proposed action will not lead to a long-term decrease in the size of an important population of the Broad-toothed Rat. *b. reduce the area of occupancy of an important population* It is highly likely that the Broad-toothed Rat will continue to occur within the study area after the implementation of the proposed action. The species continues to be locally common in the Thredbo Resort Area where there have been many similar and larger developments over many decades. As such, the proposed action is highly unlikely to reduce the area of occupancy of the Broad-toothed Rat. *c. fragment an existing important population into two or more populations* The proposed action will not fragment an existing important population of the Broad-toothed Rat into two or more populations. *d. adversely affect habitat critical to the survival of a species* No habitat within the study area is considered to be critical to the survival of the Broad-toothed Rat. *e. disrupt the breeding cycle of an important population* The proposed action and affected area is too small to disrupt the breeding cycle of a population of the Broad-toothed Rat. *f. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline* The proposed action will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Broad-toothed Rat is likely to decline.

Matters to be addressed	Impact
	g. result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat The proposed action will not result in invasive species that are harmful becoming established in habitat for the Broad-toothed Rat. *h. interferes substantially with the recovery of the species.* Whilst there have been documented declines in some Broad-toothed Rat populations within the Snowy Mountains, these declines have been attributed to environmental factors such as major bushfire events and early snow thaws, and not impacts of the nature of those proposed. In any case, the local population of the Broad-toothed Rat appears to continue to be relatively large on the basis of the abundance of the species scat throughout the Thredbo Resort Area. The species continues to occur in suitable habitats within the Thredbo Resort Area, including within the village. As such, it is considered highly unlikely that proposed action will substantially interfere with the recovery of the Broad-toothed Rat.
(e) Any impact on a Commonwealth Endangered Ecological Community	No. The proposal will not impact any Commonwealth listed endangered ecological communities.
(f) any environmental impact on Commonwealth Listed Migratory Species;	No. The proposal will not have any adverse impacts on any listed migratory species.
(g) does any part of the Proposal involve a Nuclear Action;	No. The project does not include a Nuclear Action.
(h) any environmental impact on a Commonwealth Marine Area;	No. There are no Commonwealth Marine Areas within the study area.
(i) In addition, any direct or indirect impact on Commonwealth lands	No. The project does not directly or indirectly affect Commonwealth land.

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Appendix F Aboriginal Cultural Heritage Due Diligence Assessment

PastTraces Heritage Consultants

Aboriginal Cultural Heritage Due Diligence Assessment

Kosciuszko Flow Trail Realignment and Wombat Walk Connector

Report Prepared for Kosciuszko Thredbo Pty Ltd

9 November 2023

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Document Control

Revision	Date	Author	Reviewed
V1.0	27/10/2023	N. Cracknell/L. O'Brien	Kosciusko Thredbo
V1.1	09/11/2023	L. O'Brien - incorporating comments	

Disclaimer

Past Traces Pty Ltd has undertaken this assessment in accordance with the relevant Federal, State and Local Government legislation. Past Traces accepts no liability for any damages or loss incurred as a result of use for any purpose other than that for which it was commissioned.

Restricted Information

Information contained within this report is culturally sensitive and should not be made publically available. The information that is restricted includes (but is not limited to):

- Maps, Mapping Grid Reference Co-ordinates or images for Aboriginal heritage sites, places and objects.
- Location or detailed information regarding places of Aboriginal cultural significance, as expressed or directed by Representative Aboriginal Organisations, Aboriginal elders, or members of the wider Aboriginal community.
- Other culturally appropriate restricted information as advised by Aboriginal representatives and traditional knowledge holders.

Information in the report covered by the above categories should be redacted before being made available to the general public. This information should only be made available to those persons with a just and reasonable need for access.

CONTENTS

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EXECUTIVE SUMMARY

Kosciuszko Thredbo Pty Ltd are seeking to construct two mountain bike trails at the Thredbo Alpine Resort, the Flow Trail Realignment Little Beauty Jumps Bypass and the Wombat Walk Connector. The project area is located within the larger Lot 876 DP1243112 and consists of the hillslopes between and including several existing trails, ski runs, overhead cable runs and vehicle access tracks.

Construction activities would involve the following impacts:

- Clearing of vegetation to trail width.
- Construction and maintenance of ground surface for use as a mountain biking trail including earthworks and installation of platform on Wombat Walk.
- Rehabilitation works.

This report provides Aboriginal heritage due diligence advice for the upgrade of two trails, the Flow Trail Realignment Little Beauty Jumps Bypass and the Wombat Walk Connector. The study area is shown in Figure 1 and the proposed footprint for the two trails in Figure 2.

This Due Diligence heritage assessment has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) to provide Kosciuszko Thredbo Pty Ltd with information on heritage constraints to inform the development process.

Based on a review of previous reports and an Aboriginal Heritage Information Management Systems (AHIMS) search, no heritage sites and no areas of Potential Archaeological Deposit (PAD) were identified within the project area.

Field survey was undertaken across the project area in accordance with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW 2010b). The field survey covered the two trail alignments, with particular focus on areas of previous impacts, landforms with potential and the proposed construction footprint.

Ground visibility was low at the time of field survey, due to the majority of the project area being heavily vegetated and situated on moderate to steep gradient terrain. Areas of exposure with high visibility were in the majority along the existing vehicle tracks and foot tracks and in areas of slope erosion. Sections of the Little Beauty Bypass Trail due to extensive tee tree scrub and fallen tree limbs had effective nil visibility. Mountain bike trails and access tracks also crossed through the project area providing long linear areas of high visibility.

The field survey identified no Aboriginal heritage sites or areas of potential due to the steepness of the landforms, located on low potential landforms and the high degree of previous impacts along the trail routes.

As a result of the desktop review and field inspection the following recommendations have been developed:

- There are no known heritage sites or areas of PAD within the project area. There are no heritage constraints on the project.
- It is an offence to disturb an Aboriginal site without an AHIP as all Aboriginal objects are protected under the NSW National Parks and Wildlife Act 1974. Should any Aboriginal objects be encountered during works then works must cease and a heritage professional contacted to assess the find. Works may not recommence until cleared by NSW Heritage.
- Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. This would include further field survey.

1 INTRODUCTION

EXECUTIVE SUMMARY

Kosciuszko Thredbo Pty Ltd are seeking to construct two mountain bike trails at the Thredbo Alpine Resort, the Flow Trail Realignment Little Beauty Jumps Bypass and the Wombat Walk Connector. The project area is located within the larger Lot 876 DP1243112 and consists of the hillslopes between and including several existing trails, ski runs, overhead cable runs and vehicle access tracks.

Construction activities would involve the following impacts:

- Clearing of vegetation to trail width.
- Construction and maintenance of ground surface for use as a mountain biking trail including earthworks and installation of platform on Wombat Walk.
- Rehabilitation works.

The study area is shown in Figure 1 and the proposed track alignments in Figure 2.

The proposed construction of the two trails are considered works of limited areas of high impact and would have a negative impact on any Aboriginal heritage located within the project boundary. Aboriginal heritage sites may be located on the surface or subsurface in areas of high potential for the preservation of archaeological remains of past usage by Aboriginal groups.

To assess the potential impacts of the proposed works on Aboriginal heritage this Due Diligence Heritage Assessment has been undertaken.

This Due Diligence heritage assessment has been undertaken in accordance with the *Due Diligence Code of Practice for the Protection of Aboriginal Objects in NSW* (DECCW 2010a) to provide Kosciuszko Thredbo Pty Ltd with information on heritage constraints to inform the development process.

1.1 PROJECT OBJECTIVES

The due diligence assessment is being undertaken to complete the following objectives:

1. Review of the NSW Heritage, Aboriginal Heritage Information Management System (AHIMS), to identify any recorded heritage sites within the project area.
2. Review of historic registers to identify any historic heritage.
3. Review of previous reports in area to develop predictive model of site location
4. Assess landforms present in project area against predictive model to determine potential for heritage sites and determine level of disturbance

5. Complete site visit to visually inspect impact areas or areas assessed as holding potential based on predictive model and record any identified heritage sites. The site visit will also document levels of disturbance within project area.
6. Complete due diligence report with management recommendations to avoid or minimise impacts within the project area.

1.2 ABORIGINAL CONSULTATION

No consultation with the local Aboriginal community has been undertaken to inform this report. Consultation with the Aboriginal community is not a requirement of the Due Diligence Code of assessment, which is undertaken at the preliminary planning stage of the project.

If the assessment finds that impacts to Aboriginal heritage will occur as a result of the development then consultation will be undertaken with the relevant Local Aboriginal Land Council (LALC) and the wider Aboriginal community, in accordance with the consultation guidelines required by NSW Heritage.

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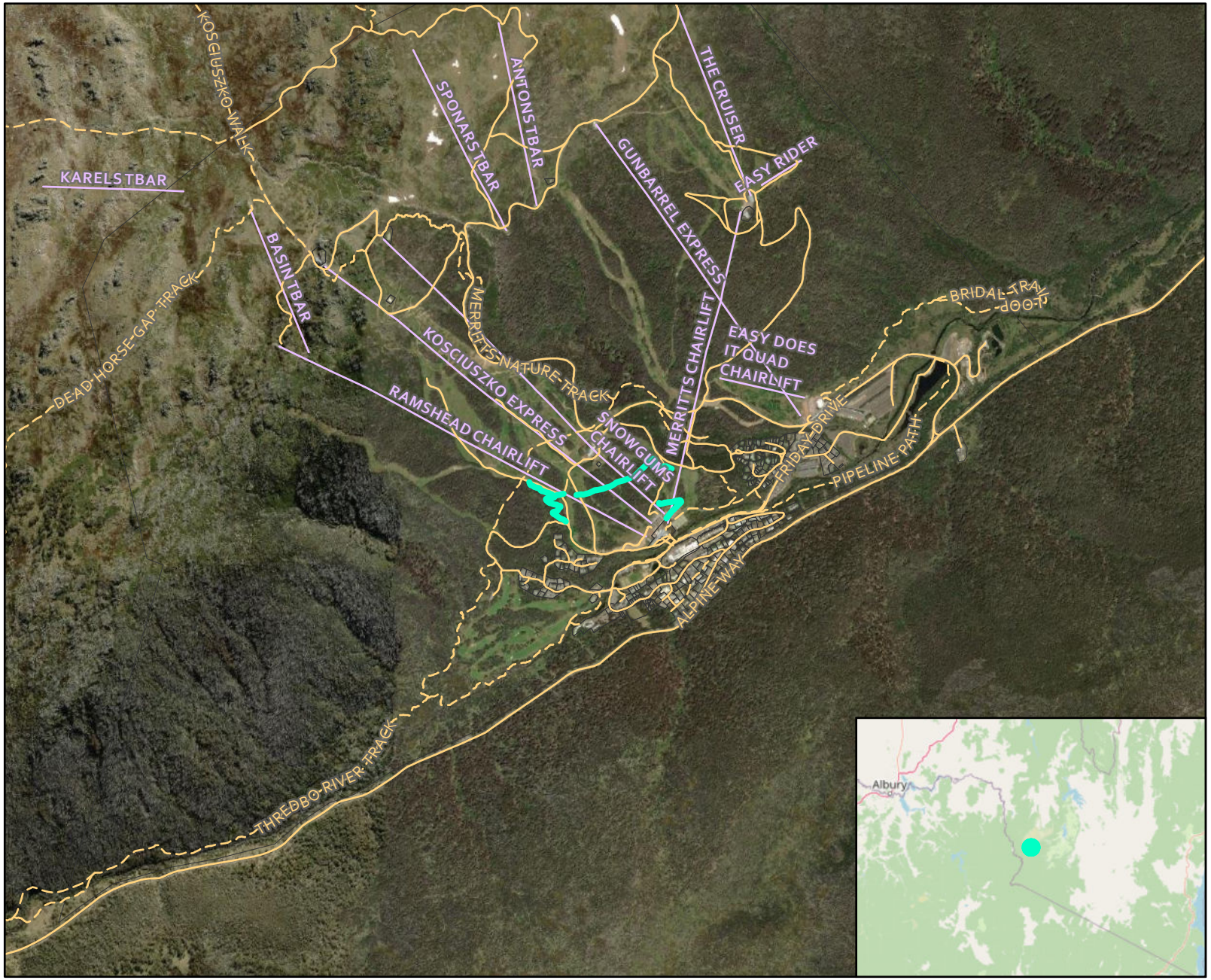

Figure 1: Regional Context

Legend

- Proposed Trails
- Path
- Road
- Chairlift
- Cadastre

N

1:24,000

0 290 580 1,160

Meters

Coordinate System:
GDA 1994 MGA Zone 55

Imagery: © Nearmap

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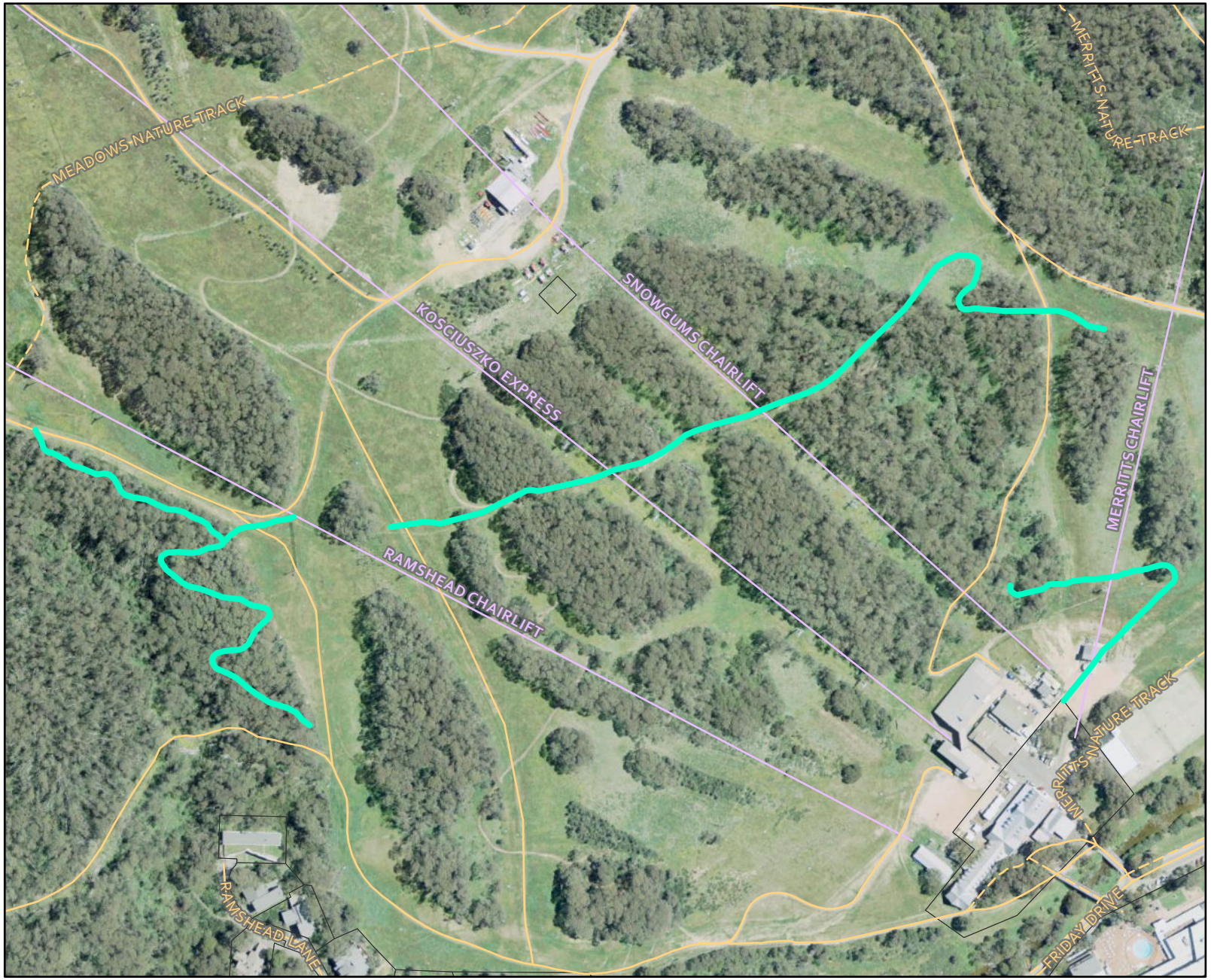

Figure 2: Project Area

Legend

- Proposed Trails
- Path
- Road
- Chairlift
- Cadastre

N

1:3,200

0 37.5 75 150

Meters

Coordinate System:
GDA 1994 MGA Zone 55

Imagery: © Nearmap

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Figure 2a: Project Area
Jump Bypass

Legend

- Proposed Trails
- Path
- Road
- Chairlift
- Cadastre

N

1:1,200

0 15 30 60

Meters

Coordinate System:
GDA 1994 MGA Zone 55

Imagery: © Nearmap

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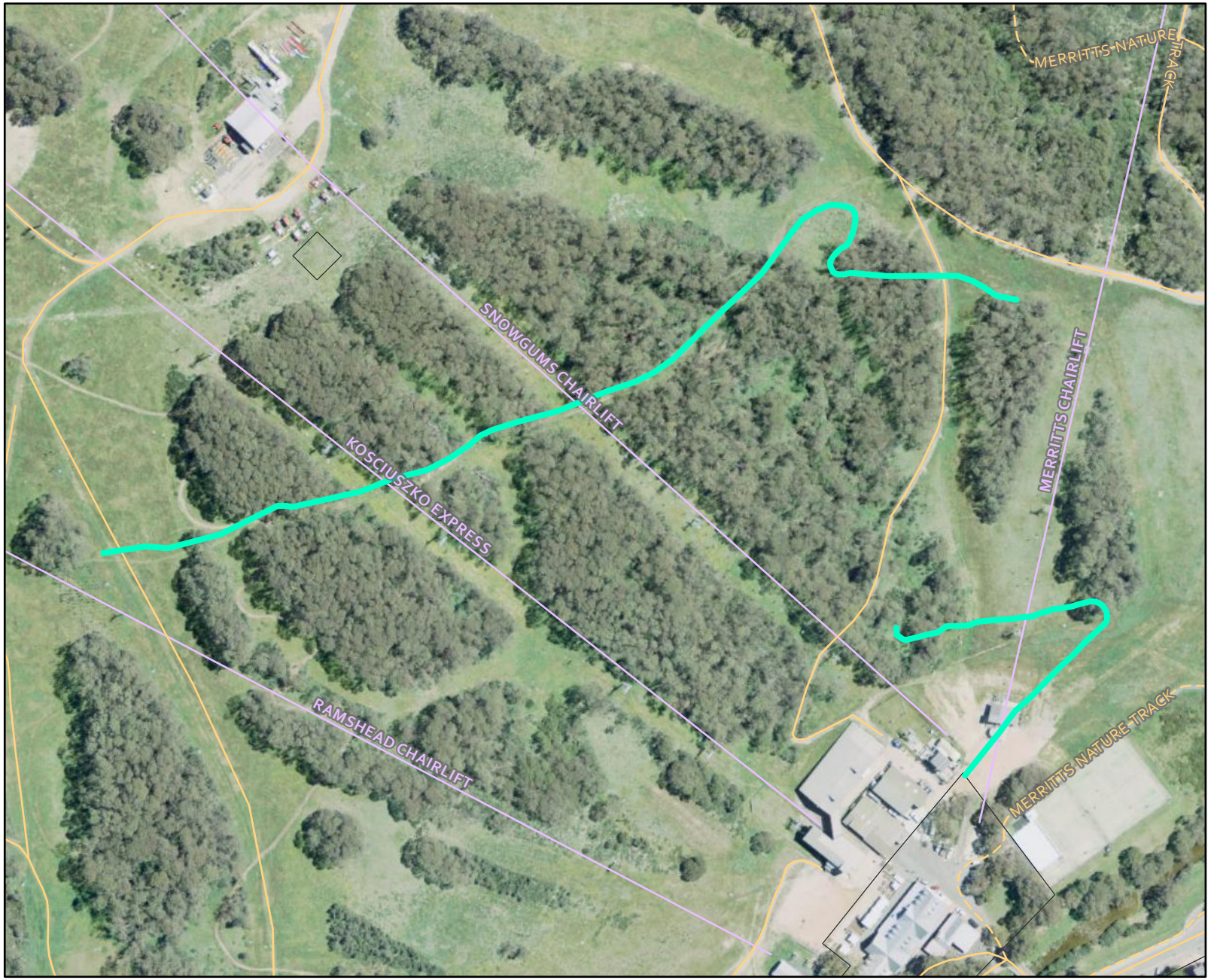

Figure 2b: Project Area
Wombat Walk

Legend

- Proposed Trails
- Path
- Road
- Chairlift
- Cadastre

N

1:2,500

0 30 60 120

Meters

Coordinate System:
GDA 1994 MGA Zone 55

Imagery: © Nearmap

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2 DESKTOP ASSESSMENT RESULTS

2.1 ABORIGINAL HERITAGE INFORMATION MANAGEMENT SYSTEM (AHIMS) SEARCH

A search of the NSW Heritage AHIMS database was undertaken on the 10th October 2023 covering the approximate 1km surrounding area centred on the project area. The extensive search revealed ten previously recorded heritage sites nearby the project area. No previous heritage site has been located within the Project Area.

The sites located in this area are provided in Table 1 and consist of isolated finds, artefact scatters, one area of PAD and several identified campsites and conform to the wider site predictive model for the Thredbo Valley/Kosciusko area (NOHC 2000, Grinsbergs 2008, Ironbark 2013). This model predicts a site location model of small sites located on level ground in proximity to water sources, or on level areas of spur lines, saddles and ridge crests amongst mountainous areas. This predictive model is discussed in more detail in Section 2.2. The location of previously recorded sites is shown in Figure 3.

Table 1. AHIMS Site Types

Site Type	Number	Percentage
Isolated find	3	30%
Open camp site	6	60%
PAD	1	10%

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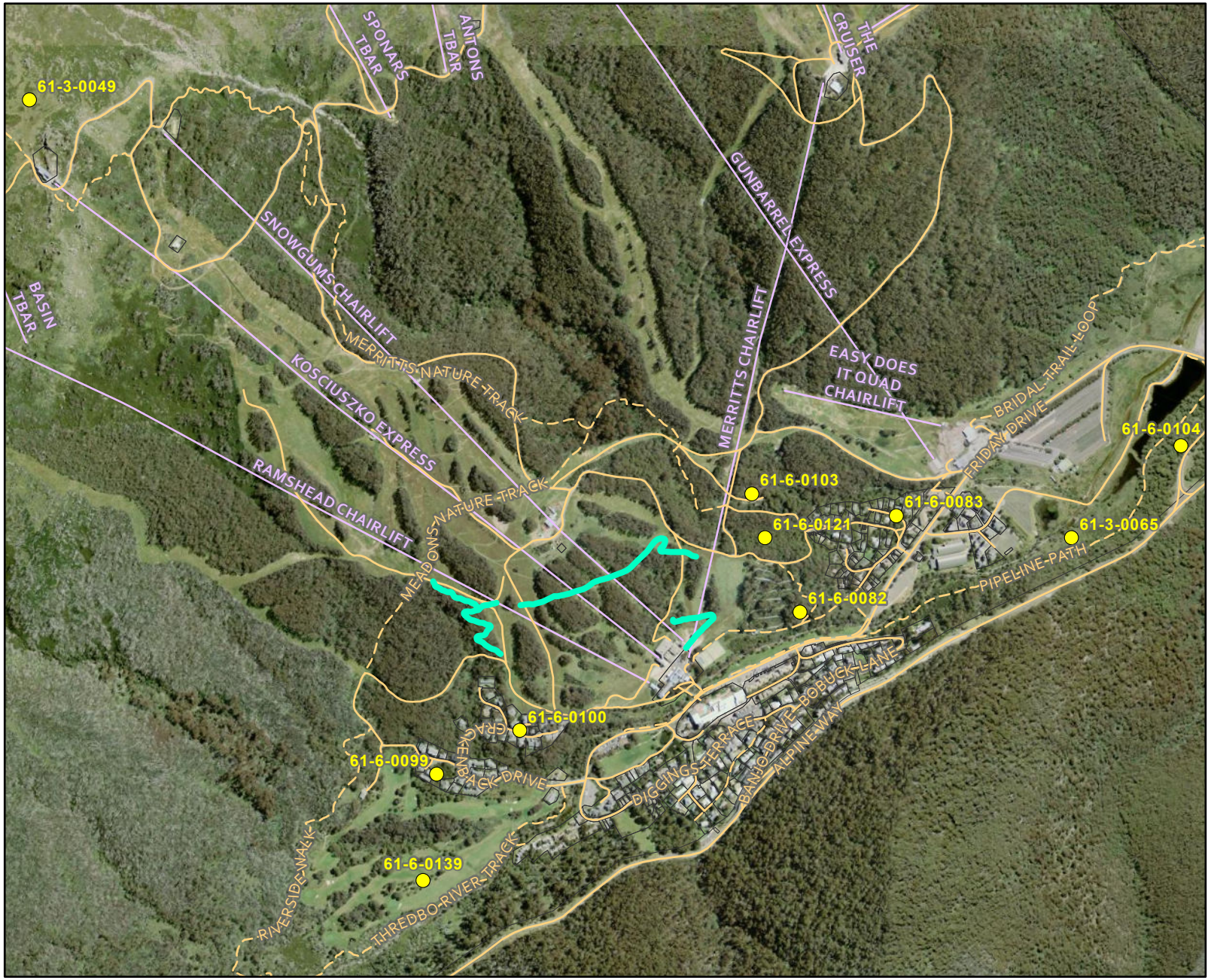

Figure 3: AHIMS

Legend

- AHIMS Site
- Proposed Trails
- Path
- Road
- Chairlift
- Cadastre

N

1:13,000

0 162.5 325 650

Meters

Coordinate System:
GDA 1994 MGA Zone 55

Imagery: © Nearmap

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2.2 PREVIOUS HERITAGE STUDIES

An extensive number of heritage studies have been undertaken in the immediate area of the Thredbo Valley. These have been mainly small scale and development focused. Studies covering a larger area and generating models of occupation have been undertaken in the Perisher Valley (NOHC 2000) and Thredbo (Ironbark 2013). A review of this large body of work has been undertaken to provide context and site location modelling for the project area. The most relevant reports for the current project are summarised below from this large body of work.

Geering (1983) undertook field survey and assessment of the Bullocks Flat area for the Skitube development. The assessment recorded twelve isolated artefacts and three artefact scatters. Paton (1984) completed a further assessment including excavation of test pits in areas of high potential and in areas based on modelling considered to hold low potential, such as steeper slopes. None of the test pits revealed any artefacts and Paton concluded that the modelling based on areas of level ground near creek lines (Flood 1980) was correct in this location.

Paton (1985) completed a survey along the Thredbo River valley between the Ranger Station and Dead Horse Gap for the Alpine Way upgrade. This survey covered a range of differing landforms located on site on area of level ground amongst spur line. A locational model of site location on level areas was theorised.

Walkington (1988) completed a survey for a proposed 33kV powerline from Bullocks Flat to Thredbo identifying 11 artefact scatters and two isolated finds. Almost all of the sites found were situated on gently sloping ground such as spurs elevated above the river.

Paton (1988) surveyed the Thredbo Valley for a fibre optic cable route again crossing differing topographies in the area. Paton located a further two site during this assessment which supported his earlier location model.

Fuller (1988) completed a survey of the proposed development areas in Thredbo Village recording seven archaeological sites all consisting of isolated finds or small artefact scatters. The sites were located on level areas on basal and midslopes. Fuller concludes that all of the sites are typical of high-altitude sites in being low-density artefact scatters (1988:7).

Navin and Officer completed two surveys of the Thredbo valley, one for the Alpine Way in 1992 and the other for the Thredbo Alpine Village in 1994. A number of small sites were located, conforming to the site models being isolated finds or small artefact scatters located on level areas or gradual slopes within basal contexts.

Dearling (1997) surveyed a 2 hectare area, for a proposed ski run at Thredbo. He located one site (#61-6-103), which consisted of five artefacts. It was situated on a cleared service road on the crest of a spur in a minor saddle with Merritt's Creek to the south and an unnamed creek to the north. The level location and proximity to creek lines again conform to the modelling for the region. This site is the closest to the current project area but well outside of any area of impact.

NOHC in 2000 completed a large scale and extensive field surveys and subsurface testing of landforms for the Perisher Blue Ski Resort. This study resulted in the development of a site location model which is equally applicable to the Thredbo region as similar topography and landscape features are present. Navin Officer Heritage Consultants concluded that the strongest site determinants were:

- Relatively level, well drained ground
- Shelter from prevailing weather patterns (mainly from the west and northwest)
- Avoidance of cold air drainage contexts
- Preference for terrain which facilitates pedestrian access and through travel
- Proximity to exploitable resources such as open woodland, grassland and herb fields and Bogong moth aestivation sites (2000:41).
- Majority of sites would be small artefact scatters of less than 15 artefacts, found throughout landscape
- Larger sites (minority) would be located on crests of ridges and major spur lines or more commonly on basal valley slopes. The larger sites decreased in artefact density the higher the location from the basal slopes (NOHC 2000:41).

Dibden (2003) completed a survey of proposed upgrade works for Antons and Sponnars T-bars at Thredbo. No sites were found, due to previous disturbance from clearing, land modification for grooming of ski slopes and the fact that the study corridor was located on steep, mid to upper slopes with low archaeological potential (2003:1).

Aecom (Formerly HLA) throughout 2004 and 2005 completed a series of survey and excavations for a proposed works depot at Friday Flat, located on level basal slopes and within a recorded site location (NOHC 1992). The excavations were placed in six differing locations and recovered 99 artefacts.

Grinsbergs (2008) completed a survey for the proposed multi-use trail from Bullocks Flat to Thredbo along the Thredbo Valley floor, which identified 21 sites, comprising 11 artefact scatters, nine isolated artefacts and a grinding groove as well as two areas of potential archaeological deposit. Based on the site locations Grinbergs concludes that general model of site location with sites on level areas in basal contexts and not located on slopes was applicable.

Ironbark Heritage (2013) completed a due diligence assessment for the Thredbo Mountain Bike Trails which included the development of a GIS Slope analysis model. This assessment showed slopes of more than 10 degrees as not being conducive to Aboriginal usage and holding low potential for sites and subsurface deposits. This study included the current project area through which the trail passes.

NGH (2017) completed an Aboriginal heritage due diligence assessment for the Thredbo Mountain Bike Trails covering three new trail locations. The terrain features within the project area were mostly steep slopes, with few potential areas of sensitive landforms. No sites or areas of potential were identified, and the study concluded that the potential for the presence of Aboriginal sites is low due to the level of disturbance associated with previous ski slope work and the general steepness of the terrain.

Past Traces Pty Ltd (2018) completed three heritage assessment for the Thredbo Alpine Resort in regard to the upgrade and redevelopment of the Merritt's Mountain House Restaurant Thredbo NSW, the extension of visitor car park facilities at Friday Flat at Thredbo and the demolition and construction of a new building complex (retail/hospitality) on the site of the Thredboland building. All these three assessments did not locate any Aboriginal heritage sites or areas of Potential Archaeological Deposit (PAD) within the area.

Past Traces Pty Ltd (2020) undertook two heritage assessments for the installation of snow making infrastructure along the Leichardt Chairlift route in Centre Valley, Perisher and the replacement of the Mt Perisher chairlift with associated upgrade works. The first field survey could not relocate previously Aboriginal heritage sites identified and it did not identify any further surface artefacts or heritage sites. Due to the high level of disturbance, no areas of high or moderate potential for subsurface deposits were present within the area. The second field survey for the replacement of the Mt Perisher chairlift did not locate any Aboriginal heritage sites or areas of Potential Archaeological Deposit (PAD) within the area.

Past Traces Pty Ltd (2022) completed a heritage assessment for the subdivision and redesign of the Thredbo Golf course located at 2/4 Crackenback Drive, Thredbo, New South Wales 2625, Lot 876/DP1243112. The survey located one Aboriginal heritage sites with an associated area of potential archaeological deposit (PAD). Subsurface testing showed no deposits with the surface artefacts, consisting of quartz flakes being in a secondary location due to the land forming resulting from the golf course construction.

Past Traces in 2023 conducted an assessment for the proposed upgrade to the Snowgums Chairlift to provide increased capacity and quality infrastructure. The project area was located predominately within the existing impacted Snowgums Chairlift corridor, at Thredbo, NSW on steep slopes. Based on the models of Ironbark(2013) and NGH (2017) this assessment did not identify any new heritage sites or areas of PAD.

2.2.1 Predictive Model

This site prediction model is based on:

- Site distribution in relation to landscape features within the project area
- Consideration of site type and densities likely to be present within the project area
- Slope gradients based on Ironbark (2013) and NOHC (2000).

Table 2 Site Prediction Model

Probability	Site Type	Definition	Landform
Low	Isolated finds and surface scatters of stone artefacts	Stone artefacts ranging from single artefact to high numbers	Creek lines, spur crests and saddles – Project area is located on moderate to steep slopes.

Probability	Site Type	Definition	Landform
Low	Potential Archaeological Deposits (PADS)	Area considered on landform to hold higher potential for unidentified subsurface deposits	On creek flats or level areas of saddles or crests. Project area mainly confined to slopes – potential for saddle locations
Nil	Culturally Modified Trees (CMTs)	Trees which have been modified by scarring, marking or branch twining	Alpine species not applicable.
Nil	Rock Engravings	Images engraved on flat rock surfaces	Escarpments, rock platforms or rock shelters - not present
Nil	Stone arrangements	Arrangements of stones by human intention, including circles lines or patterns.	Crest lines or large ceremonial areas on creekflats, - not present
Nil	Stone quarries/Ochre sources	Quarry sites where resources have been mined.	Any landform that has not been disturbed – not present
Nil	Axe grinding grooves	Grooves in stone caused by the grinding of stone axes	Usually in creek lines, as water is used as abrasive with sand - not present

2.3 LANDFORM AND DISTURBANCE LEVEL ASSESSMENT

The project area consists of moderate to steep amorphous terrain descending from upper slopes to lower slopes. Based on the predictive model developed by Ironbark (2013) these slopes hold low potential for Aboriginal heritage sites. The majority of the proposed track locations are heavily disturbed from previous construction, landscaping and ongoing use of the area. This high level of disturbance further reduces heritage potential. Sections of the Little Beauty Jumps Bypass Track through dense eucalypt scrub appear to have little previous impact but are on steep gradient slopes.

Review of topographic maps and aerial photography show a high level of impact along the existing trails consisting of vegetation clearance, vehicle tracks and ongoing maintenance.

In summary, based on the desktop assessment, the project area is considered to hold low potential for heritage sites. Previous assessments by Ironbark (2013) for the Mountain Bike Trails included the current project area with no areas of PAD or heritage sites recorded within the project area.

Confirmation of this finding of low potential and high impact are the main aims of the visual inspection (field survey) of the project area detailed in the following section.

3 FIELD SURVEY RESULTS

A field survey of the project area was undertaken on the 11th October 2023, to verify the findings of the desktop review of landforms and disturbance. The aim of the investigation was to identify heritage objects or places of potential archaeological Deposit (PAD). Based upon the background research, known Aboriginal site patterning, and current aerial photography, both of the proposed trail alignments were inspected.

All surveyed areas and items of interest were recorded on a topographic map of the study area (using a GPS and GDA 94 coordinates), along with levels of visibility, erosion, soil conditions, and evidence of land disturbance.

Ground surface visibility (GSV) is the percentage of ground surface that is visible during the field inspection. GSV increases in areas of exposures such as access roads, cleared areas, mountain bike trails, and along areas of erosion. As a result, surveys undertaken in areas with high exposure rates result in a more effective survey coverage.

The site visit resulted in the following findings.

3.1 LITTLE BEAUTY JUMPS BYPASS

The proposed area of the Little Beauty Jumps Bypass begins at an intersection with the Kosciuszko Flow Trail, winds through an area of young forest before rejoining the Flow Trail. The areas surrounding the Kosciuszko Flow Trail have been heavily impacted by landscaping and ongoing use. The area of the Flow Trail and vehicle track alignments have been totally cleared of trees, with the remaining forest being all younger regrowth.

The alignment is located on steep gradient landforms amid young Eucalyptus forest that is heavily overgrown with scrub, with any more gentle gradients being the result of prior landscaping, cutting into the slope and creating a bench feature.

Due to the high level of disturbance and the slope gradient the area of the proposed trail has been assessed as holding low potential. No heritage sites or areas of potential were identified. Exposures are present along the proposed alignment as erosion and vehicle impacts and at a rate of 15%, with approximately 80% visibility within them. The general GSV along the trail was considered nil at 0%, as the proposed route was completely overgrown.

The conditions at the time of the field survey are shown in plates 1 to 5.

Plate 1. Edge of forest area cleared of vegetation

Plate 2. Young Eucalypts in forest area

Plate 3. Heavily overgrown scrub

Plate 4. View of steep gradient

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Plate 5. Intersecting vehicle track exposure at south

3.2 WOMBAT WALK CONNECTOR

The proposed area of the Wombat Walk Connector mainly follows the alignment of an existing vehicle track. The existing route has been previously cut through the vegetation, with parallel exposures apparent across most of the proposed route. The alignment also crosses two chairlift corridors (Kosciuszko Express & Snowgums Chairlift). The chairlift and vehicle track alignments have been totally cleared of trees, with the remaining forest being all younger regrowth.

The alignment is located on moderate to steep gradient landforms, with any gentle gradients being the result of prior landscaping, cutting the vehicle track into the slope and creating a bench feature.

Due to the high level of disturbance and the slope gradient the area has been assessed as holding low potential. No heritage sites or areas of potential were identified. Exposures are present along the proposed alignment as erosion and vehicle impacts and at a rate of 15%, with approximately 80% visibility within them. The general GSV along the trail was considered low to moderate at 35%. The Wombat Walk route is depicted in Plates 6 to 11.

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Plate 6. Benched landform with linear exposure

Plate 7. Slope erosion present, with erosion reduction measures installed

Plate 8. Ruts of a vehicle track

Plate 9. Linear exposure cut into slope

Plate 10. Steep gradient slope

Plate 11. Steep slope (ski run) completely cleared of trees

3.3 RESULTS - ABORIGINAL HERITAGE SITES

Modelling of landforms within the Thredbo region (NOHC 2000, Ironbark 2013) have clearly identified slope gradient as a major determinant of site location. Simple moderate to steep gradient slopes are not conducive to utilisation and are considered to hold low potential. These findings have also been confirmed by the numerous surveys undertaken in the region and listed in Section 2.2. NGH (2017) undertook a large survey for Mountain Bike Trails in the region confirming the earlier modelling.

As a result, the gradients along these alignments do not hold high potential and the locations of current vehicle tracks and surrounds have been highly impacted by previous works, landscaping and continued use.

GSV at the time of the field survey was considered to be moderate and highly effective for field survey of the Wombat Walk routes. Sections of the Little Beauty Jumps Bypass are overgrown with low levels of effective visual survey.

No areas of Aboriginal potential or heritage sites were identified by the field survey of the Little Beauty Jumps Bypass and Wombat Walk routes and the project is considered to hold low potential to impact on unrecorded Aboriginal heritage sites.

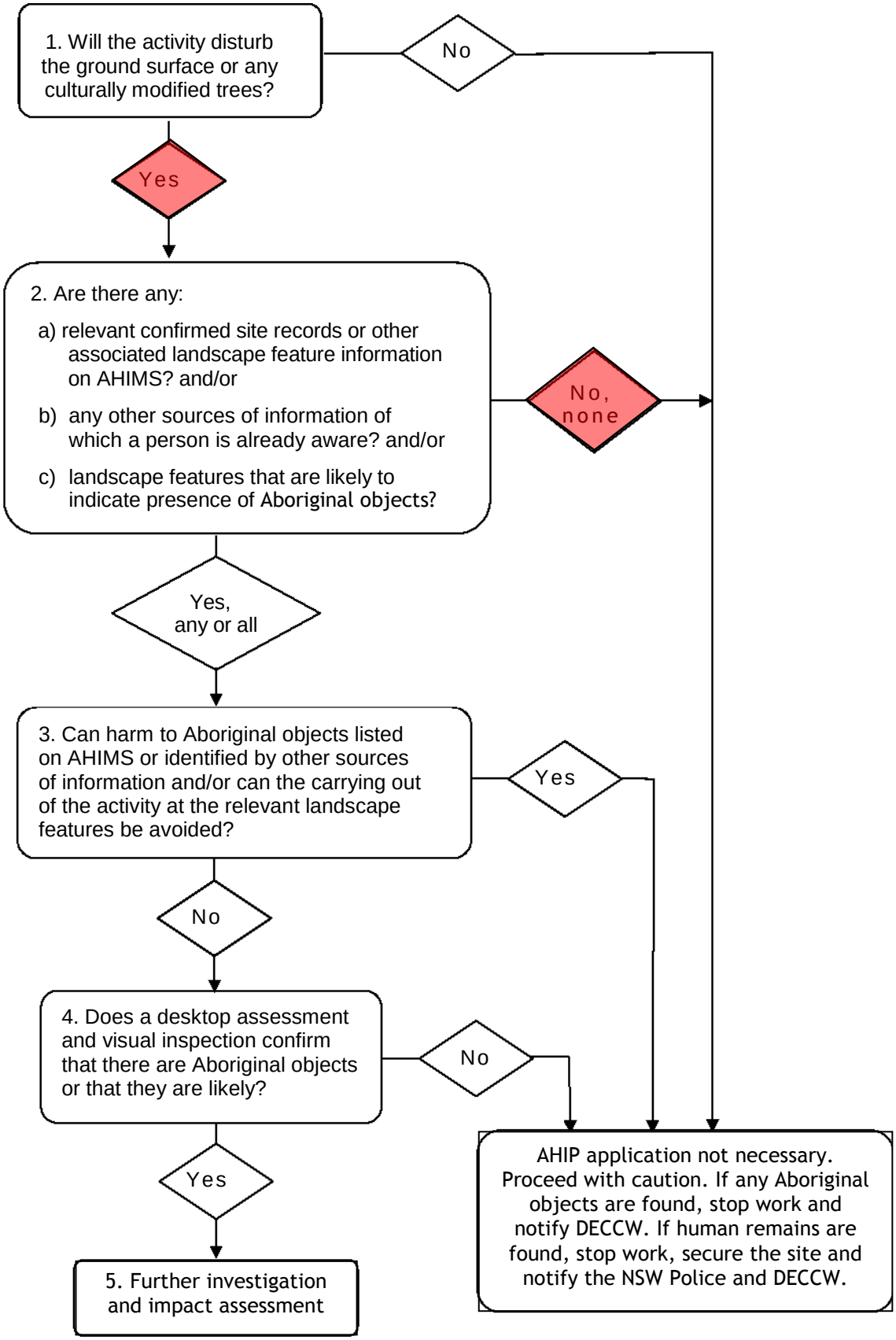
Based on the assessment the impacts from the project are as follows:

- No known Aboriginal objects or places are present in the project area

- No known Historical sites or places are present in the project area.
- No areas of high potential to contain unrecorded Aboriginal or historical objects or places are present in the project area.

The Aboriginal Due Diligence Code provides a flowchart of five questions to identify the presence of and potential harm to Aboriginal heritage. These questions and their applicability to the project are shown in Figure 4. The responses to these questions determine if further heritage investigations are required.

Figure 4. Due Diligence Flow Diagram (OEH 2010:10 – Due Diligence Code of Practice)



4 RECOMMENDATIONS

Based on this due diligence assessment the following actions are recommended for the project:

Recommendation 1: Works to proceed without further heritage assessment with caution.

The proposed works can proceed without further assessment as no Aboriginal or historical heritage sites (objects or places) have been identified within the project area. The potential for impacting on unrecorded heritage sites within the project area is assessed as extremely low, based on landform analysis and field survey.

Recommendation 2: Discovery of Unidentified Aboriginal cultural material during works.

Under the *NPW Act 1977* all Aboriginal places and objects are protected from harm, even if they have not been previously identified during the assessment process. If Aboriginal material is discovered during works then the steps as outlined below should be followed:

- All work must cease in the vicinity of the find and project manager notified immediately.
- A buffer zone of 10m should be fenced in all direction of the find and construction personnel made aware of the 'no go' zone.
- NSW Heritage must be notified of the find and advice sought on the proper steps to be undertaken.
- After confirmation with NSW Heritage a heritage consultation should be engaged to undertake assessment of the find and provide appropriate management recommendations to the proponent.

Recommendation 3: Alteration of impact footprint

Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation.

Implementation of the above management recommendations will result in low potential for the project to impact on heritage values or result in damage to heritage sites.

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Appendix G Geotechnical Assessment

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20 Decemeber 2023
Our ref: AS/C14767.2

Thredbo Resort
via email: chloe_chalk@evt.com.au

Attention: Chloe Chalk

PROPOSED WOMBAT WALK CONNECTOR
THREDBO, NSW

GEOTECHNICAL INVESTIGATION REPORT

We are pleased to present our geotechnical investigation report for proposed Wombat Walk Connector bike trail, in Thredbo, NSW.

The report outlines the methods and results of exploration, describes site subsurface conditions and provides recommendations for excavation conditions, stability of cut and fill batters, and site drainage advice.

Should you require any further information regarding this report, please do not hesitate to contact our office.

Yours faithfully,

ACT Geotechnical Engineers Pty Ltd

Andrei Stepunin
Geotechnical Engineer & Geologist

Reviewed by:

Jeremy Murray
Senior Geotechnical Engineer | Director
FIEAust CPEng Eng Exec NER RPEQ APEC Engineer IntPE(Aust)
Registered Professional Engineer of Queensland (RPEQ) #19719
NSW Professional Engineer Registration #PRE0001487

THREDBO RESORT

PROPOSED WOMBAT WALK CONNECTOR
THREDBO, NSW

GEOTECHNICAL INVESTIGATION REPORT

NOVEMBER 2023

THREDBO RESORT

PROPOSED WOMBAT WALK CONNECTOR
THREDBO, NSW

GEOTECHNICAL INVESTIGATION REPORT

TABLE OF CONTENTS

THREDBO RESORT

PROPOSED WOMBAT WALK CONNECTOR
THREDBO, NSW

GEOTECHNICAL INVESTIGATION REPORT

1 INTRODUCTION

At the request of Thredbo Resort, ACT Geotechnical Engineers Pty Ltd carried out a geotechnical investigation for proposed Wombat Walk Connector mountain bike trail in Thredbo, NSW.

The development site is located within the designated "G" area on the geotechnical maps supporting the Geotechnical Policy Kosciuszko Alpine Resorts, requiring a geotechnical report. However, in accordance with Section 3.1 (e) of the Policy, the development is considered minor construction works which present "minimal or no geotechnical impact" on the site as determined by the attached Form 4. Therefore, a geotechnical investigation report is not considered necessary.

The construction of the MTB trail will comprise minor earthworks not involving excavations or fill in excess of one metre in vertical height. Low impact construction methods will be utilised to form the trail including hand tools and a mini excavator. The trail corridor will be a maximum of 3m wide, with the average 2.5m. The Project will require minor vegetation clearing, removal of loose rocks, compaction of the trail tread and trail demarcation using logs, rocks etc., installation of signage and site stabilisation and rehabilitation works.

An elevated platform will be installed in one location on the trail where it crosses a drainage line downslope of the existing Home Run trail platform.

The aim of the investigation was to:

(i) Identify subsurface conditions including the extent and nature of any fill materials, soil strata, bedrock type and depth, and groundwater presence.

(ii) Provide the site classification to AS2870 "Residential Slabs & Footings".

(iii) Advise on excavation conditions and suitability of excavated material for use as structural fill.

(iv) Advice for construction of building platforms.

(v) Drainage and other geotechnical advice.

2 SITE DESCRIPTION & GEOLOGY

The mountain bike (MTB) trail commences on the skiers left of Milk Run ski run, follows the existing Wombat Walk access track and terminates at the base of Snowgums Chairlift at Valley Terminal. The trail will require the installation of an elevated platform over the drainage line below the existing Home Run platform.

Local geology maps indicate the site to be underlain by Silurian age Bullenbalong Supersuite bedrock, part of the Mowambah Granodiorite, which includes granodiorite and granite.

3 INVESTIGATION METHODS

The site investigation was conducted on 1 October 2023, comprising three push-tube boreholes spread over the area of the proposed bike trail and drilled to ~2m depth, or shallower refusal in bedrock.

The subsurface profiles were logged in accordance with AS1726-2017. The locations of the boreholes are shown on Figure 2, and the detailed logs are included in Appendix A.

Definitions of geotechnical engineering terms used in the report on the borehole logs, including a copy of the USCS chart, are provided in Appendix B.

4 INVESTIGATION RESULTS

4.1 Subsurface Conditions

The subsurface conditions of the proposed development were investigated by three boreholes designated BH6 to BH8. The excavation logs in Appendix A can be referred to for more detail. Investigation pits found the subsurface profile to comprise:

Geological Profile	Typical Depth Interval	Description
TOPSOIL	0.0m to 0.2m/0.3m	SILTY SAND; low plasticity fines, fine to coarse sand, brown, grass roots, dry to moist, loose.
FILL	0.25m/0.3m to 0.6m/0.7m	Gravelly Clayey SAND; fine to coarse sand, low plasticity fines, sub-angular granite fine to coarse gravel, brown some sub-angular granite cobbles to 100mm size, trace of organic debris, dry to moist, loose to medium dense. Not encountered in BH8.
COLLUVIAL AND ALLUVIAL SOILS	0.2m/0.7m to 1.3m/>1.75m	Gravelly Clayey SAND; fine to coarse sand, low to medium plasticity fines, sub-angular granite fine to coarse gravel, brown, some sub-angular granite cobbles to 100mm size, dry to moist, loose to medium dense.
BEDROCK	Below 1.3m/>1.75m	Extremely to Highly Weathered (XW/HW) GRANODIORITE; fine to coarse grained, fine to coarse sub-angular gravel, grey, white, dry to moist, extremely weak to very weak strong rock. Potentially large boulders. Not encountered in BH7.

4.2 Groundwater

Groundwater was not encountered in the boreholes and the soil was mostly dry to moist. However, temporary, perched seepages could be encountered following rainfall within the more pervious soils. It is expected that intermittent groundwater would be present within the soils overlying the weathered granite.

5 DISCUSSION & RECOMMENDATIONS

5.1 Site Classification

Due to the presence of uncontrolled fill materials exceeding 0.4m depth, the presence of mature trees within the influence distance of the proposed structure and encountered ground conditions and gradient of the slope, the site is designated as a Class "P" (problem) site in accordance with AS2870. If the fill is removed, or if footings are founded in the colluvial/alluvial soil or weathered material below, a Class "S" (slightly reactive) category can be used in design of new footings. The characteristic ground surface movement "ys", as defined by AS2870 for the range of normal soil moisture conditions is estimated to be between 10mm to 20mm for the encountered subsurface profile described in Section 2.

Whilst the design method in AS2870-2011 Appendix H attempts to account for the effect of trees, due to the complexity of tree root geometry, variable moisture extraction by the trees and the difficultly in predicting tree growth, a precise assessment for the effects of trees is not possible.

Should earthworks (cut or fill) be undertaken on the site, or other activities which may cause abnormal moisture conditions to impact the soils within or near the building envelope beyond those addressed herein, the site classification shall be reassessed.

5.2 Footings

As the site has been classified as Class P, footing design for the platform shall be undertaken in accordance with engineering principles, based upon the requirements on AS2870 (Reference 2) and the characteristic ground surface movement estimate of 10mm to 20mm.

Proposed Wombat Walk modular bike bridge, piers/drive posts extending to granite bedrock below ~1.7m should be used. Bored piers, if extended to below alluvial perched seepages that perched above the regional unconfined aquifer in local depressions, may require liners, as pier holes could collapse below groundwater level. Therefore, CFA (Continuous flights auger), screw in piers or concrete/steel driven piles may be more practical.

For other structures founded at existing grade, footings, including thickened sections of slabs forming footings should be founded below any topsoil or uncontrolled fill soils in the medium dense colluvial/alluvial soils or weathered bedrock below 0.5m/0.7m depth or in newly placed controlled fill (Section 5.5).

Footings should be inspected by a geotechnical or structural engineer to confirm the ground conditions. Alternatively, footings could be founded in newly placed controlled fill (Section 5.6) or on bored piers/drive posts extending to weathered bedrock.

If designing footings based on engineering principles, recommended allowable end-bearing pressures for various footing systems and likely foundation materials are provided in Table 1.

TABLE 1. Recommended Allowable Bearing Pressures for Footings

Foundation Material Type	Depth Below Existing Surface	Allowable End-Bearing Pressure		
		Strips	Pads	Bored Piers / Driven Piles[1]
Newly Constructed Controlled Fill (Section 5.5)	-	100kPa	125kPa	N/A
Medium Dense or better Colluvial/Alluvial Soil	Below 0.5m/0.7m	100 kPa	125 kPa	200kPa
XW/HW Bedrock	Below 1.3m/>1.75m	600kPa	750kPa	1000kPa

[1]Assumes a minimum embedment depth of 4 pile diameters

Note: Ultimate bearing capacities would be 3 times the allowable values.

5.3 Excavation Conditions & Use of Excavated Material

Proposed earth works for the platform and minor cut-to-fill excavations for the MTB tracks will be through topsoil, existing fill, colluvial/alluvial soils, and possibly into Extremely to Highly Weathered (XW/HW) bedrock which are readily diggable by backhoe or medium sized excavator up to ~1m/>1.75m depth.

A high quality crushed rock or stabilised sand subgrade is advisable for general backfill under mountain road crossings, to prevent post-construction settlement. However, a properly compacted ordinary backfill of available low and medium plasticity sandy existing fill and colluvial/alluvial soils could provide a satisfactory, less expensive alternative.

The low/medium plasticity alluvial/colluvial soils can be used in controlled fill construction of building platforms if required, although rock particles should be broken down to <75mm size. Any medium to high plasticity soil, and silty topsoil/alluvial material are not typically used in controlled fill construction, but the topsoil could be used in non-structural applications such as landscaping.

If imported fill is required, a suitable select fill material would include a low or medium plasticity soil such as clayey sand or gravelly clayey sand, containing between 25% and 50% fines less than 0.075mm size (silt and clay), and no particles greater than 75mm size.

5.4 Stable Excavation Batters

The client advised that excavation batters won't be necessary due to the scope of works. However, if necessary, temporary site excavations to 1.5m depth can be formed near vertical, although loose fill should be cut back at 1(H):1(V). If required and space allows, deeper temporary cuts can be formed at 1(H):1(V) or benched at 1.5m intervals in soils, and 0.5(H):1(V) in weak rock.

Permanent cut & fill batter slopes should be formed at no steeper than 2(H):1(V) in soil and EW/HW bedrock and be protected against erosion by suitable methods.

5.5 Site Drainage

Suitable surface drainage should be provided to ensure that rainfall run-off or other surface water cannot pond against the trail tread and platform. Subsoil drains should be provided as required on the upslope sides of the trail tread.

REFERENCES

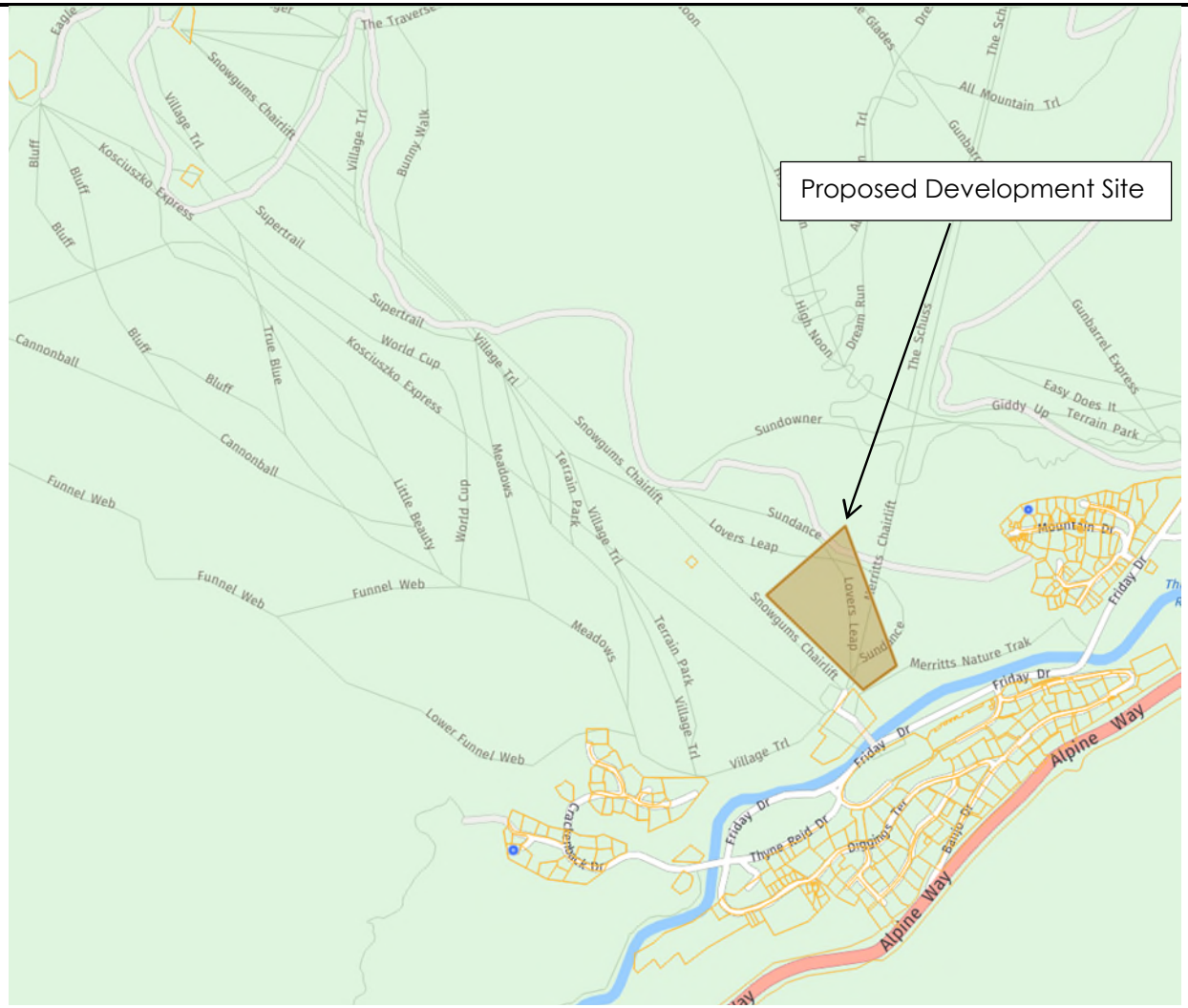
Reference 1 Geological Survey of NSW, "Monaro – 1:500,000 Geological Sheet", 1971.

Reference 2 Standards Australia, "AS2870 - Residential slabs and footings - Construction", 2011.

Reference 3 Standards Australia, "AS3798 - Guidelines on Earthworks for Commercial & Residential Developments", 1996.

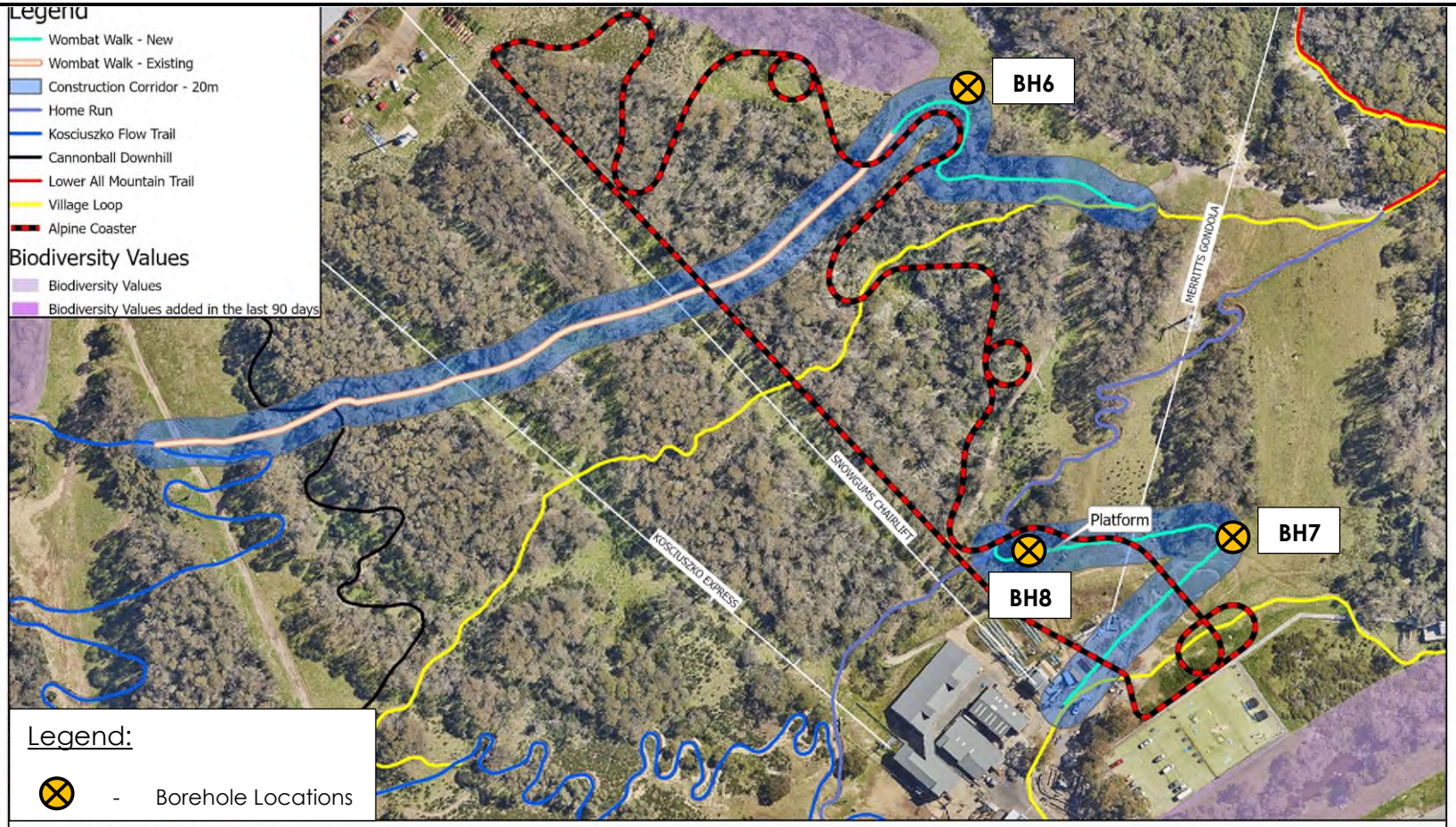
Reference 4 Geoscience Australia - http://www.ga.gov.au/darwin-view/hazards.xhtml# 13 July 2017.

Reference 5 Standards Australia, "AS1170.4 - 1993 - Minimum Design Loads on Structures Part 4: Earthquake Loads".



THREDBO RESORT
PROPOSED WOMBAT WALK CONNECTOR
THREDBO, NSW
SITE LOCALITY

ACT Geotechnical Engineers Pty Ltd	**C14767.2**	**FIGURE 1**



THREDBO RESORT
PROPOSED WOMBAT WALK CONNECTOR
THREDBO, NSW
AERIAL PHOTOGRAPH & BOREHOLE LOCATIONS

APPENDIX A
Borehole Log BH6 to BH8

Borehole Log

Borehole No.	**BH6**
Sheet	1 of 1
Job No.	C14767

CLIENT: Thredbo Resort

PROJECT: PROPOSED BIKE TRAIL & SNOWMAKING SYSTEM THREDBO, NSW

Location :

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : Pushtube
Hole Diameter : 50mm

Samples	Casing	Depth (Metres)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Consistency or Relative Density	Field Test Results	Geological Profile
				SM	SILTY SAND; low plasticity fines, fine to coarse sand, brown, grass roots, dry to moist.	LOOSE		TOPSOIL FILL
		0.25		SP-SC	Gravely Clayey SAND; fine to coarse sand, low plasticity fines, sub-angular granite fine to coarse gravel, brown, some sub-angular granite cobbles to 100mm size, trace of organic debris, dry to moist.	MEDIUM DENSE		FILL
		0.6		GC	Gravely Clayey SAND; fine to coarse sand, low to medium plasticity fines, sub-angular granite fine to coarse gravel, brown, some sub-angular granite cobbles to 100mm size, dry to moist.	DENSE		COLLUVIAL SOIL
		1.0						
		1.3			Extremely to Highly Weathered (XW/HW) GRANODIORITE; fine to coarse grained, fine to coarse sub-angular gravel, grey, white, dry to moist, extremely weak to very weak strong rock. Potentially large boulder refusal.			BEDROCK
		1.65			BOREHOLE TERMINATED AT 1.65m			
		2.0						
		2.4						

Logged By : AS Date : 11/3/23 | Checked By : JM Date :

BOREHOLE/EXCAVATION LOG C14767.GPJ ACT GEO.GDT 5/12/23

ACT Geotechnical Engineers

Act Geo Engineers

Borehole Log

Borehole No.	**BH7**
Sheet	1 of 1
Job No.	C14767

CLIENT: Thredbo Resort

PROJECT: PROPOSED BIKE TRAIL & SNOWMAKING SYSTEM THREDBO, NSW

Location :

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : Pushtube
Hole Diameter : 50mm

Samples	Casing	Depth (Metres)	Graphic Log	U.S.C.S.	Material Description, Structure Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure	Consistency or Relative Density	Field Test Results	Geological Profile
				SM	SILTY SAND; low plasticity fines, fine to coarse sand, brown, grass roots, dry to moist.	LOOSE		TOPSOIL FILL
		0.3		SP-SC	Gravely Clayey SAND; fine to coarse sand, low plasticity fines, sub-angular granite fine to coarse gravel, brown, some sub-angular granite cobbles to 100mm size, trace of organic debris, dry to moist.	MEDIUM DENSE		FILL
		0.7		GC	Gravely Clayey SAND; fine to coarse sand, low to medium plasticity fines, sub-angular granite fine to coarse gravel, brown, some sub-angular granite cobbles to 100mm size, dry to moist.	DENSE		COLLUVIAL SOIL
		1.0						
		1.75			BOREHOLE TERMINATED AT 1.75m			
		2.0						
		2.4						

Logged By : AS Date : 11/3/23 Checked By : JM Date :

BOREHOLE/EXCAVATION LOG C14767.GPJ ACT GEO.GDT 5/12/23

ACT Geotechnical Engineers

Act Geo Engineers

Borehole Log

Borehole No.	BH8
Sheet	1 of 1
Job No.	C14767

CLIENT: Thredbo Resort

PROJECT: PROPOSED BIKE TRAIL & SNOWMAKING SYSTEM THREDBO, NSW

Location :

Collar Level : Not Known
Angle From Vertical : 0°
Bearing : N.A.

Equipment Type : Pushtube
Hole Diameter : 50mm

Samples	Casing	Depth (Metres)	Graphic Log	U.S.C.S.	Material Description, Structure (Soil Type: Plasticity or Particle Characteristics, Colour, Secondary and Minor Components, Moisture, Structure)	Consistency or Relative Density	Field Test Results (Dynamic Cone Penetrometer Test, Results in Blows per 100mm)	Geological Profile
		0.2		SM	SILTY SAND; low plasticity fines, fine to coarse sand, brown, grass roots, dry to moist.	LOOSE	DCP 0 0	TOPSOIL
				GC	Gravely Clayey SAND; fine to coarse sand, low to medium plasticity fines, sub-rounded granite fine to coarse gravel, brown, some sub-rounded granite cobbles to 200mm size, moist to wet.	LOOSE TO MEDIUM DENSE	0 1 2 1 1 2 3 3 3 3 6 6 6 8 10	COLLUVIAL AND ALLUVIAL SOILS
		1.0						
		1.7			Extremely to Highly Weathered (XW/HW) GRANODIORITE; fine to coarse grained, fine to coarse sub-angular gravel, grey, white, moist, extremely weak to very weak strong rock. Potentially large boulder refusal.		15	BEDROCK
		1.8					12 15	
		2.0					23 25 28	
		2.4			BOREHOLE TERMINATED AT 2.3m			

Logged By : AS Date : 11/3/23 Checked By : JM Date :

BOREHOLE/EXCAVATION LOG C14767.GPJ ACT GEO.GDT 5/12/23

ACT Geotechnical Engineers

Act Geo Engineers

APENDIX B

DEFINITIONS OF GEOTECHNICAL ENGINEERING TERMS

DESCRIPTION AND CLASSIFICATION OF SOILS

The methods of description and classification of soils used in this report are based on the Australian Standard 1726 – 1993, Geotechnical site investigations. In general, descriptions cover the following properties – soil type, colour, secondary grain size, structure, inclusions, strength or density and geological description.

Soil types are described according to the predominating particle size, qualified by the grading of other particles present (e.g. sandy clay) on the following basis:

Classification	**Particle Size**
Clay	Less than 0.002mm
Silt	0.002mm to 0.06mm
Sand	0.06mm to 2.00mm
Gravel	2.00mm to 60.00mm
Cobbles	60mm (63mm) to 200mm
Boulders	>200mm

Soils are also classified according to the Unified Soil Classifications System which is included in this Appendix. Rock types are classified by their geological names.

Cohesive soils are classified on the basis of strength either by laboratory testing or engineering examination. The terms are defined as follows:

Consistency	**Shear Strength su(kPa) (Representative Undrained Shear)**	
Very soft	< 12	<2 (~SPT "N")
Soft	12 - 25	2-4
Firm	25 - 50	4-8
Stiff	50 – 100	8-15
Very Stiff	100 – 200	15-30
Hard	> 200	>30

Non-cohesive soils are classified on the basis of relative density, generally from the results of in-situ standard penetration tests as below:

Term	**Relative Density (%)**	**SPT Blows/300mm 'N'**
Very loose	< 15	<4
Loose	15-35	4-10
Medium dense	35-65	10-30
Dense	65-85	30-50
Very Dense	>85	>50

SAMPLING

Sampling is carried out during drilling to allow engineering examination (and laboratory testing where required) of soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are generally taken by one of two methods:

1. Driving or pushing a thin walled sample tube into the soil and withdrawing with a sample of soil in a relatively undisturbed state.

2. Core drilling using a retractable inner tube (R.I.T.) core barrel.

Such samples yield information on structure and strength in additions to that obtained from disturbed samples and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling are given in the report.

PENETRATION TESTING

The relative density of non-cohesive soils is generally assessed by in-situ penetration tests, the most common of which is the standard penetration test. The test procedure is described in Australian Standard 1289 “Testing Soils for Engineering Purposes” Testing Soils for Engineering Purposes” – Test No. F3.1.

The standard penetration test is carried out by driving a 50mm diameter split tube penetrometer of standard dimensions under the impact of a 63 kg hammer having a free fall of 750mm.

The “N” value is determined as the number of blows to achieve 300mm of penetration (generally after disregarding the first 150mm penetration through possibly disturbed material). The results of these tests can be related empirically to the engineering properties of the soil.

The test is also used to provide useful information in cohesive soils under certain conditions, a good quality disturbed sample being recovered with each test. Other forms of in situ testing are used under certain conditions and where this occurs, details are given in the report.

DEFINITIONS OF ROCK, SOIL, AND DEGREES OF CHEMICAL WEATHERING

GENERAL DEFINITIONS – ROCK AND SOIL

ROCK In engineering usage, rock is a natural aggregate of minerals connected by strong and permanent cohesive forces.

Note: Since "strong" and "permanent" are subject to different interpretations, the boundary between rock and soil is necessarily an arbitrary one.

SOIL In engineering usage, soil is a natural aggregate of mineral grains which can be separated by such gentle mechanical means as agitation in water, can be remoulded and can be classified according to the Unified Soil Classification System. Three principal classes of soil recognized are:

Residual soils: soils which have been formed in-situ by the chemical weathering of parent rock. Residual soil may retain evidence of the original rock texture or fabric or, when mature, the original rock texture may be destroyed.

Transported soils: soils which have been moved from their places of origin and deposited elsewhere. The principal agents of erosion, transport and deposition are water, wind and gravity. Two important types of transported soil in engineering geology and materials investigations are:

Colluvium – a soil, often including angular rock fragments and boulders, which has been transported downslope predominantly under the action of gravity assisted by water. The principle forming process is that of soil creep in which the soil moves after it has been weakened by saturation. It may be water borne for short distances.

Alluvium – a soil which has been transported and deposited by running water. The larger particles (sand and gravel size) are water worn.

Lateritic soils: soils which have formed in situ under the effects of tropical weathering include all reddish residual and non residual soils which genetically form a chain of material ranging from decomposed rock through clay to sesqui-oxide rich crusts. The term does not necessarily imply any compositional, textural or morphological definition; all distinctions useful for engineering purposes are based on the differences in geotechnical characteristics.

ROCK WEATHERING DEFINITIONS

Extremely Weathered (EW)	Rock substance affected by weathering to the extent that the rock exhibits soil properties, i.e. it can be remoulded and can be classified according to the Unified Classification System, but the texture of the original rock is still evident.
Highly Weathered (HW)	Rock substance affected by weathering to the extent that limonite staining or bleaching affects the whole of the rock substance and other signs of the chemical or physical decomposition are evident. Porosity and strength may be increased or decreased compared to the fresh rock usually as a result of iron leaching or deposition. The colour and strength of the original fresh rock substance is no longer recognisable.
Moderately Weathered (MW)	Rock substance affected by weathering to the extent that staining extends throughout the whole of the rock substance and the original colour of the fresh rock is no longer recognisable.
Slightly Weathered (SW)	Rock substance affected by weathering to the extent that partial staining or discolouration of the rock substance, usually by limonite, has taken place. The colour and texture of the fresh rock is recognisable.
Fresh (Fr)	Rock substance unaffected by weathering.

The degrees of rock weathering may be gradational. Intermediate stages are described by dual symbols with the prominent degree of weathering first (e.g. EW-HW).

The various degrees of weathering do not necessarily define strength parameters as some rocks are weak, even when fresh, to the extent that they can be broken by hand across the fabric, and some rocks may increase in strength during the weathering process.

Fresh drill cores of some rock types, such as basalt and shale may disintegrate after exposure to the atmosphere due to slaking, desiccation, expansion or contraction, stress relief or a combination of any of these factors.

AN ENGINEERING CLASSIFICATION OF SEDIMENTARY ROCKS

This classification system provides a standardised terminology for the engineering description of the sandstone and shales in the Sydney area, but the terms and definitions may be used elsewhere when applicable. Where other rock types are encountered, such as in dykes, standard geological descriptions are used for rock types and the same descriptions as below are used for strength, fracturing and weathering.

Under this system rocks are classified by Rock Type, Strength, Stratification Spacing, Degree of Fracturing and Degree of Weathering. These terms do not cover the full range of engineering properties. Descriptions of rock may also need to refer to other properties (e.g. durability, abrasiveness, etc) where these are relevant.

ROCK TYPE DEFINITIONS

ROCK TYPE	DEFINITION
Conglomerate:	More than 50% of the rock consists of gravel sized (greater than 2mm) fragments.
Sandstone:	More than 50% of the rock consists of sand sized (0.06 to 2mm) grains.
Siltstone:	More than 50% of the rock consists of silt-sized (less than 0.06mm) granular particles and the rock is not laminated.
Claystone:	More than 50% of the rock consists of silt or clay sized particles and the rock is not laminated.
Shale:	More than 50% of the rock consists of silt or clay sized particles and the rock is laminated.

Rocks possessing characteristics of two groups are described by their predominant particle size with reference also to the minor constituents, e.g. clayey sandstone, sandy shale.

STRATIFICATION SPACING

Term	Separation of Stratification Planes
Thinly Laminated	< 6mm
Laminated	6mm to 20mm
Very thinly bedded	20mm to 60mm
Thinly bedded	60mm to 0.2m
Medium bedded	0.2m to 0.6m
Thickly bedded	0.6m to 2m
Very thickly bedded	> 2m

DEGREE OF FRACTURING

This classification applies to diamond drill cores and refers to the spacing of all types of natural fractures along which the core is discontinuous. These include bedding plane partings, joints and other rock defects, but exclude known artificial fractures such as drilling breaks.

Term	Description
Fragmented:	The core is comprised primarily of fragments of length less than 20mm, and mostly of width less than the core diameter
Highly Fractured:	Core lengths are generally less than 20mm – 40mm with occasional fragments.
Fractured:	Core lengths are mainly 30mm – 100mm with occasional shorter and longer section.
Slightly Fractured:	Core lengths are generally 300mm – 1000mm with occasional longer sections and occasional sections of 100mm – 300mm.
Unbroken:	The core does not contain any fracture.

ROCK STRENGTH

Rock strength is defined by the Point Load Strength Index (Is 50) and refers to the strength of the rock substance in the direction normal to the bedding. The test procedure is described by the International Society of Rock Mechanics.

Term	Point Load Index Is(50) MPa	Field Guide	Approx qu MPa*
Extremely Weak:	0.03	Easily remoulded by hand to a material with soil properties.	0.7
Very Weak:	0.1	May be crumbled in the hand. Sandstone is “sugary” and friable.	2.4
Weak:	0.3	A piece of core 150mm long x 50mm dia. May be broken by hand and easily scored with a knife. Sharp edges of core may be friable and break during handling.	7
Medium Strong:	1	A piece of core 150mm long x 50mm dia. can be broken by hand with considerable difficulty. Readily scored with knife.	24
Strong: (SW)	3	A piece of core 150mm long x 50mm dia. core cannot be broken by unaided hands, can be slightly scratched or scored with knife.	70
Very Strong (SW)	10	A piece of core 150mm long x 50mm dia. may be broken readily with hand held hammer. Cannot be scratched with pen knife.	240
Extremely Strong (Fr)	>10	A piece of core 150mm long x 50mm dia. is difficult to break with hand held hammer. Rings when struck with a hammer.	>240

The approximate unconfined compressive strength (qu) shown in the table is based on an assumed ration to the point load index of 24:1. This ratio may vary widely.

Unified Soil Classification System (Metricated)
Data for Description Indentification and Classification of Soils

MAJOR DIVISIONS				DESCRIPTION				FIELD IDENTIFICATION						LABORATORY CLASSIFICATION					
				Group Symbol	Graphic Symbol	TYPICAL NAME	DESCRIPTIVE DATA			GRAVELS AND SANDS			Group Symbol		% [2] < 0.06mm	PLASTICITY OF FINE FRACTION			NOTES
										GRADATIONS		NATURE OF FINES	DRY STRENGTH						
COARSE GRAINED SOILS	More than 50% by dry mass, less than 60mm is greater than 0.06mm.	GRAVELS	More than 50% of coarse grains are greater than 2.0mm	GW		Well graded gravels and gravel-sand mixtures, little or no fines	Give typical name, indicate approximate percentages of sand and gravel, maximum size, angularity, surface condition and hardness of the coarse grains, local or geological name and other perfinent descriptive information, symbols in parenthesis. For undisturbed soils add information on stratification, degree of compactness, cementation, moisture conditions and drainage characteristics. EXAMPLE: Silty Sand, gravelly, about 20% hard, angular gravel particles, 10mm maximum size, rounded and sub angular sand grains coarse to fine, about 15% non-plastic fines with low dry strength, well compacted and moist in place, light brown alluvial sand, (SM)			GOOD	Wide range in grain size	"Clean" materials (not enough fines to band coarse grains)	None	GW		0-5	-	>4	Between 1 and 3	1. Identify Fines by the method given for fine grained soils. 2. Borderline classifications occur when the percentage of fines (fraction smaller than 0.06mm size) is greater than 5% and less than 12%. Borderline classifications require the use of dual symbols eg SP-SM GW-GC
				GP		Poorly graded gravels and gravel-sand mixtures, little or no fines				POOR	Predominantly one size or range of sizes			GP		0-5	-	Fails to comply with above	
		GRAVELLY SOILS		GM		Silty gravels, gravel-sand-silt mixtures				GOOD TO FAIR	"Dirty" materials (Excess of fines)	Fines are non-plastic (1)	None to medium	GM		12-50	Below 'A' line and Ip >7	-	-
				GC		Clayey gravels gravel-sand-clay mixtures						Fines are plastic (1)		GC		12-50	Above 'A' line and Ip > 7	-	-
		SANDS	More than 50% of coarse grains are greater than 2.0mm	SW		Well graded sands and gravelly sands, little or no fines				GOOD	Wide range in grain size	"Clean" materials (not enough fines to band coarse grains)	None	SW		0-5	-	>6	between 1 and 3
				SP		Poorly graded sands and gravelly sands, little or no fines				POOR	Predominantly one size or range of sizes			SP		0-5	-	Fails to comply with above	
		SANDY SOILS		SM		Silty sand, sand-silt mixtures				GOOD TO FAIR	"Dirty" materials (Excess of fines)	Fines are non-plastic (1)	None to medium	SM		12-50	Below 'A' line or Ip < 4	-	-
				SC		Clayey sands, sand-clay mixtures						Fines are plastic (1)		SC		12-50	Above 'A' line and Ip > 7	-	-
FINE GRAINED SOILS	More than 50% by dry mass, less than 60mm is less than 0.06mm	Liquid Limit less than 50%		ML		Inorganic silts, very fine sands, rock flour, silty or clayey fine sands.	Give typical name, indicate degree and character of plasticity, amount and maximum size of coarse grains, colour in wet condition, odour if any, local or geological name and r pertinent descriptive information, symbols in parenthesis. For undisturbed soil add information on structure, stratification, consistancy in undisturbed and remoulded states, moisture and drainage conditions. EXAMPLE Clayey Silt, brown, low plasticity, small percentage of fine sand, numerous vertical root-holes, firm and dry in place, fill, (ML).			SILT AND CLAY FRACTION								
										Fraction smaller than 0 20mm AS sieve size									
										DRY STRENGTH	DILATANCY	TOUGHNESS							
				CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.				None to low	Quick to slow	None		ML		Below 'A' line			
				OL		Organic silts and organic silty clays of low plasticity				Medium to high	None to very slow	Medium		CL		Above 'A' line			
		Liquid Limit more than 50%		MH		Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts.				Low to medium	Slow	Low		OL		Below 'A' line			
				CH		Inorganic clays of high plasticity, fat clays.				Low to medium	Slow to none	Low to medium		MH		Below 'A' line			
				OH		Organic clays of medium to high plasticity.				High to very high	None	High		CH		Above 'A' line			
										Medium to high	None to very slow	Low to medium		OH		Below 'A' line			
				Pt		Peat muck and other highly organic soils.				Readily identified by colour, odour, spongy feel and generally by fibrous texture				Pt*					

Determine approximate percentages of material over 60mm size, maximum size, shape, surface texture, hardness of material, geological description identify on estimated percentage mass of the various fractions.

COARSE GRAINED SOILS — More than half of the material less than 60mm is larger than 0.06mm

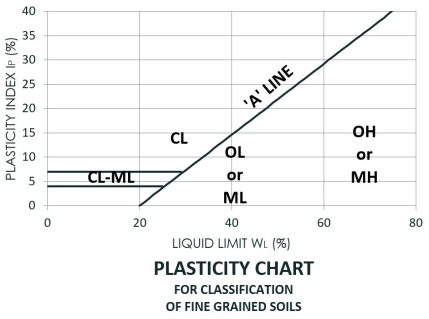
FINE GRAINED SOILS — More than half of the material less than 50mm is less than 0.06mm

0.06mm is about the smallest particle visible to the naked eye

Use the gradation curve of material passing 60mm for classification of fractions according to criteria given under 'Major Division'.

More than 50% passing 0.06mm

*Effervescence with H2O2



PLASTICITY CHART
FOR CLASSIFICATION OF FINE GRAINED SOILS

ACT Geotechnical Engineers

ACT Geotechnical Engineers Pty Lt
ACN 063 673 530

5/9 Beaconsfield Street, Fyshwick ACT 2609
PO Box 9225, Deakin ACT 2600
Ph: (02) 6285 1547

Limitations in the Use and Interpretation of this Geotechnical Report

Our Professional services were performed, our findings obtained, and our recommendations prepared in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties, either expressed or implied.

The geotechnical report was prepared for the use of the Owner in the design of the subject development and should be made available to potential contractors and/or the Contractor for information on factual data only. This report should not be used for contractual purposes as a warranty of interpreted subsurface conditions such as those indicated by the interpretive borehole and test pit logs, cross- sections, or discussion of subsurface conditions contained herein.

The analyses, conclusions and recommendations contained in the report are based on site conditions as they presently exist and assume that the exploratory bore holes, test pits, and/or probes are representative of the subsurface conditions of the site. If, during construction, subsurface conditions are found which are significantly different from those observed in the exploratory bore holes and test pits, or assumed to exist in the excavations, we should be advised at once so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between conducting this investigation and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, this report should be reviewed to determine the applicability of the conclusions and the recommendations considering the changed conditions and time lapse.

The summary bore hole and test pit logs are our opinion of the subsurface conditions revealed by periodic sampling of the ground as the test holes progressed. The soil descriptions and interfaces between strata are interpretive and actual changes may be gradual.

The bore hole and test pit logs and related information depict subsurface conditions only at the specific locations and at the particular time designated on the logs. Soil conditions at the other locations may differ from conditions occurring at these bore hole and test pit locations. Also, the passage of time may result in a change in the soil conditions at these test locations.

Groundwater levels often vary seasonally. Groundwater levels reported on the boring logs or in the body of the report are factual data only for the dates shown.

Unanticipated soil conditions are commonly encountered on construction sites and cannot be fully anticipated by merely taking soil samples, bore holes or test pits. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. It is recommended that the Owner consider providing a contingency fund to accommodate such potential extra costs.

This firm cannot be responsible for any deviation from the intent of this report including, but not restricted to, any changes to the scheduled time of construction, the nature of the project or the specific construction methods or means indicated in this report: nor can our company be responsible for any construction activity on sites other than the specific site referred to in this report.

Form 4 – Minimal Impact Certification

DA Number: _____

This form may be used where minor construction works which present minimal or no geotechnical impact on the site or related land are proposed to be erected within the "G" line area of the geotechnical maps.

A geotechnical engineer or engineering geologist must inspect the site and/or review the proposed development documentation to determine if the proposed development requires a geotechnical report to be prepared to accompany the development application. Where the geotechnical engineer determines that such a report is not required then they must complete this form and attach design recommendations where required. A copy of Form 4 with design recommendation, if required, must be submitted with the development application.

Please contact the Alpine Resorts Team in Jindabyne for further information - phone 02 6456 1733.

To complete this form, please place a cross in the appropriate boxes ☐ and complete all sections.

1. Declaration made by geotechnical engineer or engineering geologist in relation to a nil or minimal geotechnical impact assessment and site classification

I,

Mr ☑ Ms ☐ Mrs ☐ Dr ☐ Other ☐

First Name	Family Name
Jeremy	Murray

OF

Company/organisation

ACT Geotechnical Engineers

certify that I am a geotechnical engineer /engineering geologist as defined by the "Policy" and I have inspected the site and reviewed the proposed development known as

Wombat Walk Connector bike trail - Thredbo

As a result of my site inspection and review of the following documentation

(List of documentation reviewed)

Thredbo Resort - Wombat Walk Connector - Site Plan

I have determined that;

☑ the current load-bearing capacity of the existing building will not be exceeded or adversely impacted by the proposed development, and

☑ the proposed works are of such a minor nature that the requirement for geotechnical advice in the form of a geotechnical report, prepared in accordance with the "Policy", is considered unnecessary for the adequate and safe design of the structural elements to be incorporated into the new works, and

☑ in accordance with AS 2870.1 Residential Slabs and Footings, the site is to be classified as a type

(insert classification type)

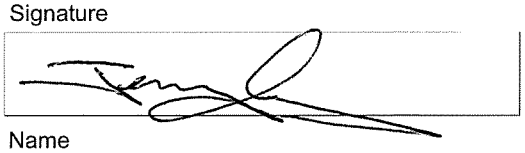
"S"

☑ I have attached design recommendations to be incorporated in the structural design in accordance with this site classification.

I am aware that this declaration shall be used by the Department as an essential component in granting development consent for a structure to be erected within the "G" line area (as identified on the geotechnical maps) of Kosciuszko Alpine Resorts without requiring the submission of a geotechnical report in support of the development application.

2. Signatures

Signature



Chartered professional status

CP Eng #2122247

Name

Jeremy Murray

Date

5/12/2023

3. Contact details

Alpine Resorts Team
Shop 5A, 19 Snowy River Avenue
P O Box 36, JINDABYNE NSW 2627
Telephone: 02 6456 1733
Facsimile: 02 6456 1736
Email: alpineresorts@planning.nsw.gov.au

Appendix H Site Environmental Management Plan

Site Environmental Management Plan

Kosciuszko Flow Trail Realignment, Little Beauty Jumps Bypass and Wombat Walk Connector Mountain Bike Trails

Thredbo Alpine Resort
Kosciuszko National Park, NSW

January 2024

Document Control

Revision	Date	Revision Type	Author	Approved by
A	21.11.2023	Draft	C.Chalk	K.Delpit
0	10.01.2024	Final	C.Chalk	K.Delpit
1	05.03.2024	Updates as per NPWS referral comments (conditions 3.3 and 3.5)	J.Best	C.Chalk

Kosciuszko Thredbo Pty Ltd
1 Friday Drive, Thredbo, New South Wales 2625
www.thredbo.com.au

Contents

Figures

Tables

1 Introduction

This Site Environmental Management Plan (SEMP) has been prepared for implementation by Kosciuszko Thredbo Pty Ltd (KT) (and its contractors) for the Kosciuszko Flow trail realignment, Little Beauty Jumps Bypass and Wombat Walk Connector mountain bike trails (the Project).

The Project will comprise:

- Vegetation clearing;
- Construction of mountain bike trail, including earthworks and installation of platform; and
- Rehabilitation works.

This SEMP outlines how construction activities for the Project are to be managed in order to maintain and protect the environmental values of the Project site and surrounds. The objectives of this SEMP are to:

- Provide mitigation measures to minimise the potential for environmental harm and/or environmental nuisance.
- Provide guidance for the development of detailed construction environmental management plans.
- Ensure all Project Personnel understand individual roles and responsibilities.
- Provide corrective actions to be implemented in the event of environmental harm and/or environmental nuisance. and
- Ensure Project personnel understand incident and emergency response procedures.

2 Reference Documentation

2.1 Legislation & Approval Requirements

The Project will be carried out in accordance with the applicable legislative requirements outlined in the following Acts and subordinate legislation:

- *Environment Protection and Biodiversity Conservation Act 1999 (Cwlth)*;
- *Biodiversity Conservation Act 2016*;
- *Environmental Planning and Assessment Act 1979*;
    - Development Consent is required under the EP&A Act
- *Environmentally Hazardous Chemicals Act 1985*;
- *Heritage Act 1977*;
- *National Parks and Wildlife Act 1974*;
- *Protection of the Environment Operations Act 1997*;
- *Waste Avoidance and Resource Recovery Act 2001;*
- *Water Management Act 2000*
    - A Controlled Activity Approval is required under the WM Act.
- *Work Health and Safety Act 2011.*

2.2 Guidelines

- Guideline for the Preparation of Environmental Management Plans (DIPNR 2004)
- Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (Landcom 2004)

- Managing Urban Stormwater: Soils and Construction, Volume 2A, Installation of services (NSW DECC 2008)
- Interim Construction Noise Guidelines (DECC 2009)
- NSW EPA Waste Classification Guidelines (NSW EPA 2014)

2.3 Procedures & Policies

The following Kosciuszko Thredbo procedures and guidelines apply to the Project:

- Construction Site Incident and Emergency Procedures Thredbo Village, version 1.1 (KT045)
- Emergency Response Spill Procedure, version 1 (KT074)
- Standard Operating Procedure: Use and Maintenance of Wash Down Bay (KT055), 2019
- Bushfire Danger Period Policy (KT021), version 2

3 Project Description

3.1 Project Location

The Project site is located within Thredbo Alpine Resort (Thredbo), Kosciuszko National Park (KNP), approximately 35 kilometres (km) south-west of Jindabyne, New South Wales (NSW). The site is within the Thredbo Head Lease Area, on land formally described as Lot 876 DP1243112.

The Flow Trail Realignment commences at the top of the Little Beauty Jumps Park and traverses the native vegetation adjacent to the jumps park and Lower Supertrail ski run.

The Wombat Walk Connector starts on the Flow trail on the edge of the tree island (skiers right) of Milk Run ski run, follows the existing Wombat Walk access track onto the Village Loop and Home Run trails, then down to the base of Snowgums chairlift at Valley Terminal via the lower section of Lovers Leap and Sundance ski runs.

4 Construction Management Details

4.1 Construction Timing

Construction is planned for January/February 2024 during the resort “summer construction period” (generally after the October long weekend and end no later than 30 April the following year), with finishing of rehabilitation and stabilisation works up until 30 May, or as otherwise approved.

Works must not commence when snow is located in the project area corridor and machinery must not be used to remove snow from areas containing native vegetation.

4.2 Work Hours

Works will be carried out in accordance with the hours specified in the Development Consent.

4.3 Site Access

During construction, the Development site will be accessible via the summer mountain access road.

No temporary diversions or closures of existing trails will be required during construction of the Development.

4.4 Vehicles, Machinery and Equipment

Machinery, plant and equipment will likely include (but not limited to):

- mini excavator;
- motorised wheelbarrows;
- quad bikes;
- dump trucks (to and from stockpile sites);
- 4 WD vehicles;
- side-by-side vehicles; and
- handtools (i.e. chainsaws and brush-cutters).

The tread width of on-ground machinery used in trail construction must not exceed 1,500 millimetres (mm).

4.5 Flexible Construction Corridor

The construction corridor for the Project comprises 10 m either side of the ground-truthed alignment, except for the areas where a separation of 15 m is required from 'no-go' areas identified on the site plans in **Appendix A**.

4.6 Trail Corridor and Disturbance

The width of the MTB trail corridor must not exceed 3 m at any location, with an average disturbance width not exceeding 2.5 m.

The trail corridor disturbance for the Flow Trail Realignment is approximately 1,000 m^2 (400 m long x 2.5 wide). The trail corridor disturbance for the Wombat Walk Connector is approximately 1,732.5 m^2 (693 m long x 2.5 wide).

The combined trail corridor disturbance for the Project is 2,732.5 m^2 (0.27 ha). The approximate area of native vegetation disturbance is 1,300 m^2 (0.13 ha).

4.7 Construction Activities

Pre-construction activities will comprise:

- establishment of site boundary;
- marking significant vegetation to be retained and no-go zones;
- erection of site signage and traffic controls;
- flagging exact trail alignment using pin flags to mark the edges of the trail for construction; and
- mobilisation of machinery, equipment and construction materials to site.

Construction activities will comprise:

- vegetation clearing (50 m increments) within the trail corridor to expose bare earth
    - excess cut vegetation to be spread into the surrounding heath and used for rehabilitation of exposed soil on the trail edges
    - topsoil and vegetation sods are to be stockpiled close to the trail tread;
- cut into the slope using a mini excavator and excavate the soil to achieve the appropriate depth of bench;
- remove loose rocks, roots and compact the trail;

- back slope the batter, ensuring outslope and appropriate drainage;
- define the trail line using rocks, logs and other obstacles;
- installation of platforms where required; and
- re-instate the verge areas, topsoil and preserved vegetation sods.

Post-construction activities will comprise:

- rehabilitation in accordance with the *Detailed Rehabilitation and Monitoring Plan*;
- demobilisation of plant and machinery; and
- site clean-up.

4.8 Adverse Weather Contingencies

Adverse weather events (e.g. high winds, thunderstorms, heavy rain, hail, snow, bushfire and high temperatures) have the potential to negatively impact upon construction activities. To ensure appropriate consideration of such events, the Project and Construction Manager will monitor weather conditions throughout the construction period. The Bureau of Meteorology (BoM) Thredbo AWS station provides daily weather observation data for the resort. The NSW Rural Fire Service website 'Fires Near Me' includes information on current bush fires and other incidents, as well as warnings for fires which may affect your location.

If adverse weather events are anticipated and/or occur during construction, contingencies will be implemented and arrangements will be made to postpone construction activities.

The Construction Manager / Site Project Manager will be responsible for notifying construction staff of any impending adverse weather, and to implement appropriate controls onsite, such as:

- Erecting wind breaks or covering stockpiles to prevent materials being blown away.
- Evaluate temporary sediment and erosion controls to ensure they are adequately installed to withstand adverse weather events.
- Discontinue use of plant and machinery.
- Secure materials and equipment.
- Protect open excavations.

4.9 Stockpiles and Material Storage Areas

4.9.1 Construction Materials

Construction materials will likely include:

- trail signs e.g. decision point signs; and
- gravel / decomposed granite for the trail surface.

4.9.2 Site Compound

No site compound is required for the Project.

4.9.3 Stockpile Sites

Temporary stockpiles will be required within the construction corridor to effectively manage excavated materials, spoil, soil and vegetation during the works. Soil will be separated so that it can be used during rehabilitation works. The main stockpile sites are identified in **Appendix B**. Excess materials from construction will be located within the main stockpile area within the resort. Access to these locations will be restricted to KT staff and contractors.

All stockpiles will be managed in accordance with the environmental controls in **Section 0** and the Erosion and Sediment Control Plan (**Appendix C**).

4.9.4 Site Facilities and Temporary Structures

There will be no site facilities or temporary structures within the construction corridor.

4.9.5 Material Storage Areas

No material storage areas are required within the construction corridor.

4.9.6 Waste

Waste generation from the Development is expected to be minimal. Waste may include general solid waste (putrescible) e.g. waste from litter bins and general solid waste (non-putrescible) e.g. plastic, paper, cardboard, construction waste. Refer to **Section 6.8** for environmental controls regarding waste.

4.10 Imported materials and stabilising agents

- NPWS requests that its authorisation is sought where it is proposed to utilise either of the following in construction or maintenance of the trail:
    - Imported gravel or fill material; or
    - soil stabilising or adhesive agents.
- KT staff (and its contractors) may obtain imported gravel or fill material from sources already assessed by NPWS as appropriate for use in KNP, being gravel or fill material from:
    - the McMahons Earthmoving quarry, located on Alpine Way, Crackenback NSW; or
    - the Kraft Earthmoving / Snowy Mountains Sand and Gravel quarry located on Kosciuszko Road, Jindabyne NSW.

5 Environmental Management

5.1 Roles and Responsibilities

The Project team structure is provided in **Figure 1**.

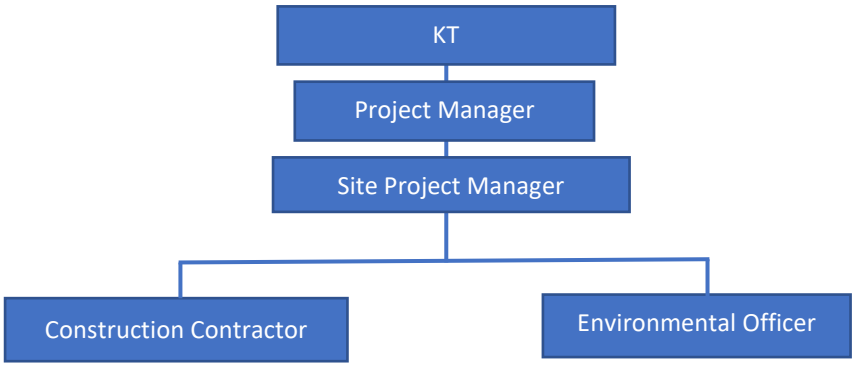


Figure 1: Project Team Structure

The roles and responsibilities are outlined in **Table 1**.

Table 1: Roles and Responsibilities

Role	Responsibilities
Project Manager	• Ensure the SEMP is made available, communicated, maintained and understood by all Project staff. • Responsible for the overall management of the construction and operation of the Project. • Ensure the SEMP is updated with applicable conditions of approval following the provision of Development Consent from Department of Planning and Environment (DPE). • Ensure that the requirements of the SEMP and sub-plans have been addressed in all contractor environmental management documentation. • Review of incidents, non-conformances and non-compliance. • Ensuring Project personnel and contractors are adequately trained and qualified to fulfil their roles.
Site Project Manager	• Implement and maintain the SEMP. • Ensure all Project personnel comply with the requirements of the SEMP. • Report any incidents, non-conformances to the Project Manager.
Environmental Officer	• Oversee all works which are part of the Project on behalf of KT. • Ensure compliance with all environmental protection measures detailed in the SEMP, supporting management plans and conditions of approval. • Ensure all environmental controls are in place and adequately functioning during construction. and • Conduct construction inspections and complete reporting requirements e.g. progress reports, environmental incidents, non-compliance, corrective action and auditing.
All Personnel	• Comply with requirements of this SEMP. • Report any actual or potential environmental incidents to the Construction Manager immediately. • Identify and report non-conforming or potentially hazardous work practices, equipment, machinery or products. • Only perform tasks for which they are trained and competent. • Assist with environmental incident investigations and applying corrective actions. • Ensure all machinery, plant and equipment are in good working order and condition prior to use.
Construction Contractor	• Comply with SEMP and legislative requirements. • Construction contractor to develop and implement management plans in accordance with this SEMP, conditions of approval and contractual obligations.

5.2 Communication and Consultation

5.2.1 Training and Awareness

All Project staff will be made aware of the site-specific environmental controls through a site induction, and pre-start meetings / toolbox talks prior to the commencement of construction.

The site induction will cover the following key aspects:

- Roles and responsibilities.
- Overview of environmental risks and specific locations of environmental and/or cultural heritage significance.

- The scope of legislative requirements and other licences and approvals.
- Communication and notification requirements e.g. procedures for notifying and reporting incidents and complaints.
- Environmental management and controls stipulated in this SEMP.
- Workplace health and safety issues.
- Emergency preparedness and response.
- Procedures for notifying and reporting incidents and complaints.

5.2.2 Key Contacts

Key contacts for the Project are provided in **Table 2**. Prior to commencement of works, contact details (name and contact number) will be provided for Project personnel.

Table 2: Key Project Personnel Contact Details

Company / Agency	Role / Reason	Contact
Department of Planning and Environment (DPE) (Alpine Resorts Team)	Development approval and compliance	(02) 6456 1733
National Parks and Wildlife Service (NPWS)	Flora, fauna, archaeology	(02) 6450 5600
Environment Protection Agency (EPA)	Water, noise, air pollution and regulation	131 555
NSW Soil Conservation Service	Soil erosion and sediment control	02 9842 8300
Thredbo Medical Centre	General medical attention	(02) 6457 6254
Fire and Rescue Thredbo, NSW	Incident / emergency	(02) 6457 6144
NSW Police	In case of fire, medical or police emergency	000
NSW Fire and Rescue		
NSW Ambulance		

5.2.3 Consultation

KT is committed to ensuring effective communication and consultation is undertaken to inform the development of this SEMP and ensure it is implemented on-site as per the Project roles and responsibilities in **Section 5.1.** Where required, communication with key external stakeholders such as DPE and NPWS will be undertaken. A summary of the key consultation activities is provided in **Table 3**.

Table 3: Summary of Consultation Activities

Consultation Activity	Communication Method	Frequency
Internal	Site inductions	Prior to commencement of works
	Pre-start meetings and toolbox talks	Daily
	Reports to Project Manager identifying project progress, any environmental incidents, and review of any complaints or enquiries	Weekly
External	Face-to-face meetings, phone and email correspondence with relevant Government Departments / Agencies	As required

	In-writing notifications to Government Departments / Agencies and relevant parties	As required

5.2.4 Notification Protocols

A summary of the key notification protocols is provided in **Table 4.** Notification requirements will be updated as required.

Table 4: Regulatory Agency Notification Protocols

Party to Notify	What to Notify	When to Notify	Responsibility to Notify Regulatory Agency
DPE	Commencement of construction	DPE will be notified in writing at least 48 hours prior to the commencement of construction.	Site Project Manager
NPWS	Details of any material suspected of being a European or Aboriginal culturally significant site, relic or artefact.	Immediately upon discovery of any archaeological/culturally significant site or relic that are encountered. NSW Police to also be notified immediately upon discovery of human remains.	Site Project Manager
NSW Environmental Protection Agency	Details of pollution incident – who, what, when, where, how, any other supporting information and evidence (e.g. photos)	Immediately upon identification of pollution incident causing or threatening material harm to the environment, in accordance with ***KT's Construction site Incident and Emergency Procedures Thredbo, version 1.1***.	KT Environmental Manager

5.2.5 Competence and Training

All Project staff will be made aware of the site-specific environmental controls through a site induction, and pre-start meetings / toolbox talks prior to the commencement of construction.

The site induction will cover the following key aspects:

- roles and responsibilities;
- overview of environmental risks and specific locations of environmental and/or cultural heritage significance;
- the scope of legislative requirements and other licences and approvals;
- communication and notification requirements e.g. procedures for notifying and reporting incidents and complaints;
- environmental management and controls stipulated in this SEMP;
- workplace health and safety issues;
- emergency preparedness and response; and
- procedures for notifying and reporting incidents and complaints.

5.3 Environmental Incident and Emergency Response

All Project personnel are required to follow KT's **Construction site Incident and Emergency Procedures Thredbo Village, version 1.1.** The procedure will be available on-site and all Project staff will be trained on their implementation through the site induction. The procedure classifies examples of emergencies and incidents and provides specific procedures for response to such events, such as:

- Serious injuries requirement urgent medical help.
- There are threats to property or life.
- Criminal activity e.g. you have witnessed a serious crime or accident.
- Sewer or water service breaks.
- Bushfire, building fire, spot fire on-site.
- Electricity service faults.
- Leaking gas.
- Fires and explosions.
- Release of pollution e.g. release of sediment into watercourse, chemical spill.

The procedure also outlines general site management principles, incident reporting and notification requirements and provides an emergency contacts list.

In the event of an environmental incident, emergency or near-miss, the following steps should be taken:

1) **STOP** works in the area and if safe to do so ensure the safety of personnel within the vicinity.
2) **NOTIFY** relevant persons e.g. emergency services or Construction Manager.
3) **ISOLATE** the risk or hazard e.g. turn off machinery/plant, implement immediate site controls, set up exclusion zone. and
4) **REPORT** and notify relevant persons (e.g. Project Manager, regulatory agencies).

Environmental incident and near-miss reporting requirements are detailed in **Section 7.3**. Contact details for key Project personnel and emergency services are provided in **Table 2**.

External contractors are required to prepare and implement an emergency and incident response procedure. The contractor will be responsible for responding to any environmental emergency caused by any action (or inaction) of the contractor's staff, including notification requirements to external parties such as EPA and Fire, Fire and Rescue NSW.

6 Environmental Controls

6.1 General

- Ensure works are conducted by suitably qualified and trained personnel.
- Ensure all site environmental management controls relevant to that stage of work are implemented in accordance with the approved plans and conditions of consent.
- Provide approved plans and relevant documentation in the site office or other suitable location so that they are easily accessible by all construction staff.
- Brief all works as to limit of disturbance footprint, "no-go" areas and other environmental safeguards prior to and during construction as required (ELA 2023).

6.1.1 Site Establishment

- Establishment of site boundary with temporary fencing, rope or flagging to clearly delineate the construction corridor and "no-go" areas.
- Erection of site signage and pedestrian/traffic controls.
- Installation of erosion and sediment controls.

6.1.2 Machinery and Storage

- All equipment, machinery and vehicles used during construction of the Project must be cleaned prior to entry into the Park and prior to site mobilisation to ensure they are free of mud and vegetative propagules.
- Equipment, machinery, and vehicles must be regularly maintained and manoeuvred to prevent the spread of exotic vegetation.
- Storage of equipment, machinery, vehicles and material is to be restricted to existing disturbed areas (i.e. at the stockpile, formed roads and within the construction corridors) and avoid undisturbed areas.
- All vehicles and machinery entering Thredbo must adhere to the **Standard Operating Procedure: Use and Maintenance of Wash Down Bay, March 2019 (KT055).**
- On-ground machinery used in vegetation removal and trail construction must adhere to the following:
    - the tread width of on-ground machinery used in trail construction must not exceed 1500 mm
    - disturbance/works must be entirely contained within the 3 m disturbance corridor.

6.2 Soil and Water Quality

Soil and Water Quality	
Objective	Minimise potential impacts to receiving water sources; and Reduce the potential for erosion and sediment moving offsite.
Mitigation Measures	**Timing**
Soil and stockpile management • All stockpiles will be constructed and managed in accordance with *Soil Stockpile Guidelines for the Resort Areas of Kosciuszko National Park* (OEH 2017). • Temporary stockpile sites within the construction corridor should adhere to the criteria outlined Appendix C. • Any excess excavated material will be removed from site and transported to the designated soil stockpiles sites in Appendix B.	Construction
• Vehicle and machinery movement should be limited to existing access tracks and the construction corridor as far as is possible.	Construction
• Implement Erosion and Sediment Control Plan. All erosion and sediment control devices will be inspected regularly (including immediately after rainfall) and will be maintained and repaired as necessary so that they remain effective for the works duration.	Construction
• Erosion and sediment controls to be inspected and maintained regularly, particularly immediately following rain events.	Construction
• Construction works should not be undertaken in periods of significant rainfall.	Construction
Performance Criteria	No significant sediment deposition observed leaving the site.

Corrective Actions	If sediment is observed leaving the site, identify the source and amend the ESCs on-site to ensure appropriate controls are in place. If required, additional ESCs to be installed.

6.3 Flora and Fauna

6.3.1 Vegetation and Habitat

Vegetation and Habitat Management	
Objective	To ensure compliance with legislative requirements and protect existing native vegetation. Minimise impacts to native vegetation.
Mitigation Measures	**Timing**
• All disturbance should be kept to the minimum required to achieve the proposal (ELA 2023).	Vegetation clearing and during construction
Marking out the trail alignment protocols • To the extent reasonably practicable, trail alignment must be adjusted to avoid the removal of mature trees, large boulders and rock outcrops. • Mature trees and rocks required to be removed must be clearly marked. • The proposed trail and associated works should be at least 15 m from the outer limit of the Subalpine Riparian Scrub (ELA 2023), refer site plans in **Appendix A**.	Marking trail alignment & construction corridor
Tree and rock removal • All clearing must occur solely within approved development corridors and to be clearly identified with flagging tape to mark no-go/no clearing zones prior to construction. • All vegetation must be checked for fauna habitats and fauna by the proponent's Environmental Officer immediately prior to felling/removal. Vegetation with active nests must not be removed until the young have left the nest. If fauna is present, then the proponent must contact NPWS to assist with mitigation actions. • To the extent reasonably practicable, trail alignment must be adjusted to avoid the removal of mature trees, large boulders and rock outcrops. Mature trees and rocks required to be removed must be clearly marked. • Any trees required to be removed must not be felled in a manner which damages surrounding vegetation. All vegetation (trees and understory) removed must either be cut into smaller pieces to be used for rehabilitation, discreetly dispersed amongst adjoining native vegetation without damaging existing native vegetation or removed from site completely if it contains any exotic vegetation species. • Removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed. • All rocks removed during the works must be placed in the surrounding landscape without damaging existing native	Vegetation clearing

vegetation, used in the trail construction (e.g. rock armouring) or removed from site completely. • To the extent reasonably practicable, any live tree roots must be protected (and not removed) within the timbered areas of the trail corridor. This could occur through rock armouring, grade reversals or other construction methods.	
• All machinery to be used during the construction phase should be limited to the existing disturbed areas and access tracks as far as is possible.	Vegetation clearing and during construction
• Progressive rehabilitation is to be undertaken in accordance with the Rehabilitation and Monitoring Plan (**Appendix E**). All rehabilitation should be undertaken in accordance with the *Rehabilitation Guidelines for the Resort Areas of Kosciuszko National Park* (DECC 2007).	Construction & post-construction
Performance Criteria	No damage to site fencing. No damage to native vegetation (including vehicle tracks) associated with unauthorised access.
Corrective Actions	Fencing to be repaired / reinstated by appointed contractor. Entry points for unauthorised access to be identified and access restricted through fencing or other appropriate barriers.

6.3.2 Native Fauna

Native Fauna Management	
Objective	To minimise potential impacts to native fauna, their breeding places and habitat.
Mitigation Measures	**Timing**
• The trail should be aligned during construction as necessary to avoid any wombat burrows that are detected in close proximity to the trail. If any wombat burrows need to be impacted by the proposal a wombat management plan should be developed for the proposal in consultation with NPWS.	Prior to vegetation clearing works & prior to construction
• NPWS should be contacted if any animals are disturbed or injured during the proposed works (ELA 2023).	
• Maintain a clean and tidy work area to ensure animals are not attracted to the site, including provision of covered bins during proposed works.	Construction
Performance Criteria	No death or injury to fauna as a result of on-site activities. No disturbance outside the approval disturbance area.
Corrective Actions	Review and implement suitable strategies to dissuade fauna from coming to site. Contact NPWS / LAOKO if injured fauna is identified as a result of site activities.

6.3.3 Exotic Species

Exotic Species Management		
Objective	To reduce the risk of introducing invasive/pest species.	
Mitigation Measures		**Timing**
• All relevant weed species identified within the construction corridor are to be treated in accordance with best practice methods to ensure these weeks are not spread further within the site or throughout KNP. Relevant weed species include those listed in the *Regional Pest Management Strategy 2012-17, Southern Ranges Region: a new approach for reducing impacts on native species and park neighbours* (OEH 2012). ○ Any Blackberry or other problematic weeds detected within the study area should be controlled (ELA 2023).		Prior to construction
• If an area of vegetation proposed for removal includes any relevant weed species then the vegetation must be removed completely from site, not spread out within the existing vegetation or used in rehabilitation and stabilisation works.		Prior to vegetation clearing & prior to construction
• All machinery and equipment used during construction must be cleaned prior to entry into KNP and prior to site mobilisation to ensure the machinery is free of mud, vegetative propagules, and pathogens. This includes machinery that may have been working in an area of the resort that contains weeds and is preparing to be redeployed in the construction corridor and associated stockpile and staging areas (ELA 2023).		Construction
• All vehicles and machinery entering Thredbo must adhere to the Standard Operating Procedure: Use and Maintenance of Wash Down Bay, March 2019 (KT055). The wash down bay is located at the Thredbo Waste Transfer Station for use by KT staff and contractors.		Construction
• All machinery and equipment must be stored on existing disturbed areas (i.e. at the stockpile and staging areas proposed on the ski slopes) and should not be stored on native vegetation.		Construction
• All machinery to be regularly maintained and manoeuvred to prevent the spread of weeds and pathogens.		Construction
Performance Criteria	No introduction of invasive species as a result of construction activities.	
Corrective Actions	Review existing biosecurity procedures (e.g. clean down procedure) and implement additional controls if required.	

6.4 Air Quality

Air Quality Management		
Objective	To minimise potential impacts on sensitive receivers from dust and other air pollution from construction activities.	
Mitigation Measures		**Timing**
• Dust generation will be managed through typical dust suppression that will include covering stockpiled spoil, minimising the extent of ground disturbance at any given time and covering loads.		Vegetation clearing & construction
• Plant and equipment to be maintained and operated in an efficient manner to reduce air pollution.		Construction

• Vehicles are to adhere to speed limits to minimise dust general and potential spill of hauled materials.	Construction
• All vehicles carrying spoil or rubble to/from site should be covered to prevent the escape of dust or other material. Covers are to be adequately secured.	Construction
Performance Criteria	No complaints received in relation to air pollution.
Corrective Actions	If complaints are received, the following steps should be taken: • Investigate specific cause of complaint. • Review site activities/processes and identify the source of air emissions. • Implement immediate corrective actions on-site e.g. water site, replace equipment deemed to be poorly maintained. • If required, implement administrative controls e.g. additional staff training, alter construction methods or timing for undertaking dust generating activities.

6.5 Noise and Vibration

Noise and Vibration Management	
Objective	To ensure that noise and vibration from construction activities does not cause environmental nuisance in the locality.
Mitigation Measures	**Timing**
• Awareness training and information will be provided to project personnel in relation to minimising noise pollution as much as practicable when in close proximity of sensitive receivers.	Site induction
• Selection of the most appropriate plant and equipment to minimise noise generation.	Prior to construction
• Construction works will be undertaken during standard work hours.	Construction
• Appropriate noise management strategies will be implemented for construction works and operation of plant in accordance with the Australian Standard AS 2436-2010 *Guide to noise and vibration control on construction, demolition and maintenance sites.*	Construction
• Regular checks are to be undertaken to ensure all equipment and vehicles are in good working order and are operated correctly.	Construction
• All plant will be maintained in accordance with the manufacturer's requirements.	Construction
Performance Criteria	No construction related noise and vibration complaints received. No unreasonable noise or vibration.
Corrective Actions	If complaints are received, the following steps should be taken: • Investigate specific cause of complaint. • Review site activities/processes and identify the source of the noise emissions. • Implement immediate corrective actions e.g. swap out noisy equipment. • If required, implement administrative controls e.g. additional staff training or change work hours to minimise noise.

6.6 Fuels, Chemicals and Hazardous Substances

Fuels, Chemicals and Hazardous Substances		
Objective	Eliminate the potential for release of fuels, chemicals and hazardous substances to the environment.	
Mitigation Measures		**Timing**
• Spill kits will be available onsite and all site personnel will be made aware of their locations in the site induction.		Construction
• In the event on an on-site spill, construction staff will follow KT's Construction Site Incident and Emergency Procedures Thredbo Village, version 1.1.		Construction
• Hazardous substances, toxic materials or dangerous goods must not be stored or processed on-site at any time without prior approval from the DPE Secretary or nominee.		Construction
• Fuel and chemicals will be appropriately stored and handled in accordance with relevant Australian Standards and Codes of Practice.		Construction
• Appropriate controls will be implemented when refuelling Project vehicles and machinery.		Construction
Performance Criteria	No fuel, chemical or hazardous substance spills.	
Corrective Actions	Corrective actions will be taken in accordance with the **Construction Site Incident and Emergency Procedures Thredbo Village, version 1.1**, including: immediate spill response, implementation of any necessary control measures as directed by authorities. Where required, an investigation will be undertaken to determine the root cause.	

6.7 Traffic and Access

Traffic and Access Management		
Objective	Minimise potential impacts on existing road network	
Mitigation Measures		**Timing**
• Traffic and construction vehicle access will be managed as per regular daily operation in the resort.		Construction
• All Project vehicles and machinery to adhere to speed limits and signage and stay within construction corridor.		Construction
• Bikers within proximity of the site will be managed though the use of signage and fencing/flagging as required.		Construction
Performance Criteria	No significant impacts to existing road network or users. No complaints in relation to traffic or vehicle operators.	
Corrective Actions	If complaints are received, traffic management procedures will be reviewed and amended (if necessary).	

6.8 Waste Management

The following waste receptacles will be provided for the storage and disposal of waste associated with the construction of the Project:

- General litter bins for waste such as food waste and non-recyclable plastic.
- Recycling bins for waste such as carboard packaging, paper, recyclable plastic.

- KT's waste transfer facility (materials to be segregated for re-use, recycling etc.).

Excess spoil from excavations will be taken off-site and placed within the resort's existing stockpile area located at the carpark adjacent to the Thredbo Waste Transfer Station for re-use within the resort.

Waste Management		
Objective	Minimise construction waste as much as practicable. Reduce the impact of waste on-site and beyond the site boundary.	
Mitigation Measures		**Timing**
• All waste will be managed and disposed of in accordance with the KT's waste management procedures.		Construction
• Where possible, construction materials will be salvaged for reuse to divert waste from landfill.		Construction
• All waste will be separated into waste streams and contained within appropriate receptacles and/or disposed of in accordance with the EPA guidelines.		Construction
• All receptacles will be in good condition.		Construction
• All waste transportation vehicles will be covered appropriately to ensure waste cannot spill, leak or escape onto the road or wash into stormwater drains.		Construction
• Ensure that the waste is being transported to a place that may be lawfully used as a waste facility.		Construction
Performance Criteria	No litter or waste material to be released from site in an uncontrolled manner.	
Corrective Actions	• Investigate cause of inappropriate waste disposal/management. • Review on-site waste handling facilities and implement corrective actions e.g. change in receptacle size and/or waste management signage. • If required, implement administrative controls e.g. additional waste management training for staff.	

6.8.1 Licenced Waste Facilities

There are two licenced waste facilities within proximity to Thredbo, including:

- Jindabyne Landfill, 6013 Kosciuszko Road, Jindabyne NSW
- Cooma Landfill, 8448 Monaro Highway, Cooma NSW.

6.9 Aboriginal Cultural Heritage

The assessment concluded there are no heritage constraints on the Project, and Past Traces (2023) recommends the following for the Project:

- Recommendation 1: Works to proceed without further heritage assessment with caution.
    - The proposed works can proceed without further assessment as no Aboriginal or historical heritage sites (objects or places) have been identified within the project area. The potential for impacting on unrecorded heritage sites within the project area is assessed as extremely low, based on landform analysis and field survey.
- Recommendation 2: Discovery of Unidentified Aboriginal cultural material during works.
    - Under the NPW Act 1977 all Aboriginal places and objects are protected from harm, even if they have not been previously identified during the assessment process. If

Aboriginal material is discovered during works then the steps as outlined below should be followed:

- All work must cease in the vicinity of the find and project manager notified immediately.
- A buffer zone of 10m should be fenced in all direction of the find and construction personnel made aware of the 'no go' zone.
- NSW Heritage must be notified of the find and advice sought on the proper steps to be undertaken.
- After confirmation with NSW Heritage a heritage consultation should be engaged to undertake assessment of the find and provide appropriate management recommendations to the proponent.

- Recommendation 3: Alteration of impact footprint.
  - Further archaeological assessment would be required if the proposal activity extends beyond the area of the current investigation. Implementation of the above management recommendations will result in low potential for the project to impact on heritage values or result in damage to heritage sites.

6.10 Bushfire Protection

The construction contractor is responsible for determining relevant requirements for the site and ensuring staff are aware of bushfire avoidance, evacuation, and management measures.

The **Construction Site Incident and Emergency Procedure, version 1.1** outlines procedures for responding to fire and bushfire incidents or emergencies. This procedure is made available to all construction staff. In the event of a bushfire, Kosciuszko Thredbo (the head lessee) would implement the resort-wide Bushfire Evacuation Plan. The plan has been designed to assist management and emergency services to protect life and property in the event of a bush fire or other emergency.

7 Monitoring and Reporting

7.1 Environmental Monitoring

The Environmental Officer will conduct monitoring during all project phases (pre-construction, during construction and post-construction) to ensure compliance with this SEMP, associated management plans and conditions of approval.

The Environmental Officer will undertake weekly inspections utilising the **Site Environmental Management Measures Report**. The report includes a checklist on the following matters:

- Administration (weekly site inspections, sub-contractor environmental management, environmental monitoring, environment incidents, complaints handling, reporting and record keeping)
- Biosecurity management
- Chemical spills / emergency response
- Vegetation management and rehabilitation
- Waste management
- Native fauna management
- Material storage and sourcing
- Water quality
- Erosion and sediment controls

- Stockpile management
- Air quality and noise and vibration
- Cultural heritage
- Safety.

7.2 Weekly Environmental Reporting

The Environmental Officer will provide copies of the **Site Environmental Management Measures Report** to the Project Manager on a weekly basis. All records will be stored within KT's files and distributed to relevant persons / regulatory authorities as required.

7.3 Environmental Incident Reporting

All incidents and near misses will be managed in accordance with KT's **Construction site Incident and Emergency Procedures Thredbo Village, version 1.1**. The document provides procedures for responding to incidents and emergences, reporting and notification requirements and emergency contacts.

The following information should be recorded:

- Time and date of the incident / near miss
- A description of the incident / near miss
- A sequence of events that led to the incident / near miss occurring
- Person/s involved in the incident / near miss (including witnesses)
- Written statements from person/s involved (as applicable)
- Details of corrective actions.

The **Environmental Incident Report Form** should be completed for all environmental incidents. All parts of the form must be completed in accordance with KT's incident procedure and following the instructions within the form. The form must be signed by the person making the report and the Project Manager/person in charge of the site/activity.

7.4 Non-conformance

A non-conformance is the failure to comply with the requirements of this SEMP and supporting management plans. Non-conformances identified via site inspection or during day to day activities will be documented on the **Site Environmental Management Measures Report** (or similar contractor's form) and closed out in subsequent inspections. The Environmental Officer is responsible for investigation and managing corrective and preventative actions in the event of non-conformance or a situation likely to cause environmental harm.

7.5 Corrective Actions

Corrective actions should be prioritised on the following hierarchy of controls:

1. **Elimination** – can activities and processes be eliminated to reduce the risk of reoccurrence?
2. **Substitution** – can activities be substituted with another activity of lesser risk?
3. **Isolation** – can you isolate the hazard from any person exposed to it?
4. **Engineering controls** – can you reduce the risk of reoccurrence through engineering changes?
5. **Administrative controls** – can a change in work practices, additional training or additional checks reduce the risk?

6. **Personal Protective Equipment (PPE)** – can PPE be worn to protect personnel from harm?

The Construction Manager will be responsible for managing the implementation of corrective actions on-site.

7.6 Complaints Management

Should complaints be received from the public in relation to the Project they will be recorded using the **Complaints Form** (or similar contractor's form). The Project Manager will be responsible for investigating, recording and closing out any complaints received. All records will be stored within KT's files and distributed to relevant persons / regulatory authorities as required.

8 Record Keeping and Review

8.1 Document Control

All Project related documentation will be maintained within KT's Project file. Documents stored within the file include (but not limited to) the following:

- Copies of relevant planning approvals and documents, licences and permits.
- All completed induction forms and visitor sign-on register.
- Records of routine environmental inspections.
- Records of any environmental incidents, complaints, non-conformances and no-compliances.

8.2 SEMP Review

This SEMP is a live document and will undergo reviews and amendments as necessary. Reviews will generally be undertaken –

- If there is a change in the scope of the Project.
- Prior to commencement of construction to ensure any relevant conditions of consent and/or other approval, licence or permit requirements are incorporated.
- If there is a need to improve environmental controls to protect environmental values.
- If there is an increase or introduction of a new environmental risk or impacts.
- At the end of a Project to allow for improvements in subsequent Projects.

9 References

Department of Environment and Climate Change (DECC) 2007, Rehabilitation Guidelines for the Resort Areas of Kosciuszko National Park, NSW Government.

Department of Environment and Climate Change (DECC) 2009, Interim Construction Noise Guideline, July 2009, https://www.epa.nsw.gov.au/-/media/epa/corporate-site/resources/noise/09265cng.pdf?la=en&hash=EF4576FD79DBB25D5AC22DFA1A883A2BADA1F77B

Department of Infrastructure, Planning and Natural Resources (DIPNR) 2004*, Guideline for the Preparation of Environmental Management Plans*, https://www.planning.nsw.gov.au/~/media/Files/DPE/Guidelines/guideline-for-the-preparation-of-environmental-management-plans-2004.ashx?la=en

Department of Planning & Environment (DPE) (2017) *What to include with your development application*, version January 2017, https://www.planning.nsw.gov.au/Policy-and-Legislation/~/media/65E2BA89886F426991525FF25707A9A9.ashx

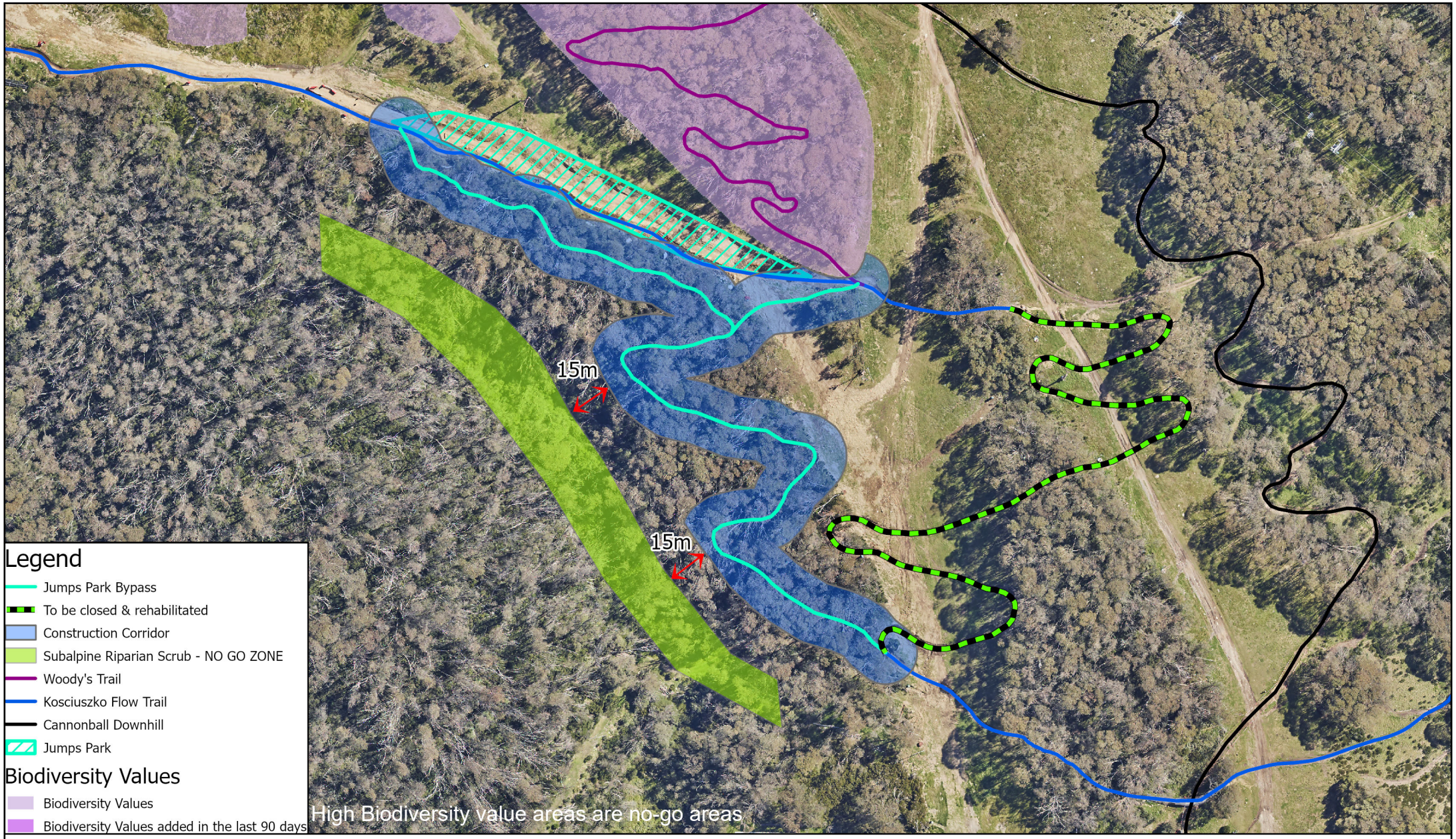
Eco Logical Australia Pty Ltd (ELA) 2023, Kosciuszko Flow Trail Realignment – Little Beauty Jumps Park Bypass and Wombat Walk Connection – Thredbo Alpine Resort – Flora and Fauna Assessment.

Office of Environment and Heritage (OEH) 2017, *Soil Stockpile Guidelines for the Resort Areas of Kosciuszko National Park, version 1.0, October 2017*, NSW National Parks and Wildlife Service.

Past Traces 2023, Aboriginal Cultural Heritage Due Diligence Assessment, Kosciuszko Flow Trail Realignment and Wombat Walk Connector.

10 Appendices

Appendix A Site Plans



Scale: 1:1,599

0 10 20 40 60 80

Meters

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 2020
Grid: GDA 2020 MGA Zone 55

N

THREDBO

SITE PLAN

Project: Kosciuszko Flow Trail Realignment
Little Beauty Jumps Park Bypass

Revision: 5

Date: 23/11/2023

Produced By: BB

Scale: 1:2,082

0 12.5 25 50 75 100

Meters

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 2020
Grid: GDA 2020 MGA Zone 55

N

THREDBO

SITE PLAN

Project: Kosciuszko Flow Trail Realignment
Wombat Walk Connector

Revision: 4

Date: 23/11/2023

Produced By: BB

Appendix B Stockpile and Material Storage Areas

0 4.5 9 18 27 36 Meters

Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 2020
Grid: GDA 2020 MGA Zone 55

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THREDBO

STOCKPILE AND MATERIAL STORAGE LOCATION WASTE TRASFER FACILITY

Revision: A

Date: 14/09/2023

Produced By: KOS

Appendix C Erosion and Sediment Control Plan

Erosion and Sediment Control Plan

Kosciuszko Flow Trail Realignment, Little Beauty Jumps Park Bypass and Wombat Walk Connector

PURPOSE

The purpose of this Erosion and Sediment Control Plan is to outline the intentions and fundamental principles that will be followed in the planning and implementation of erosion and sediment control (ESC) measures for the project during construction.

OBJECTIVES

To minimise potential impacts from construction works to receiving waters.

To reduce the potential for erosion and sediment moving offsite.

SCOPE OF THIS PLAN

This plan identifies appropriate controls specific to project activities to prevent sedimentation and pollution of receiving waters, and minimise potential impacts on vegetation communities with and adjacent to the site.

GUIDELINES

- Managing Urban Stormwater: Soils and Construction, Volume 1, 4th Edition (Landcom 2004)
- IECA Best Practice Erosion and Sediment Control
- Erosion and Sediment Control: A field Guide for Construction Site Managers (Catchments & Creeks Pty Ltd, 2012)

EROSION AND SEDIMENT CONTROLS

Implementation of appropriate controls and locations will be the responsibility of the construction contractor. Controls to be installed prior to any construction work (where required) and retain in place until exposed areas of soil or vegetation are stabilised/rehabilitated.

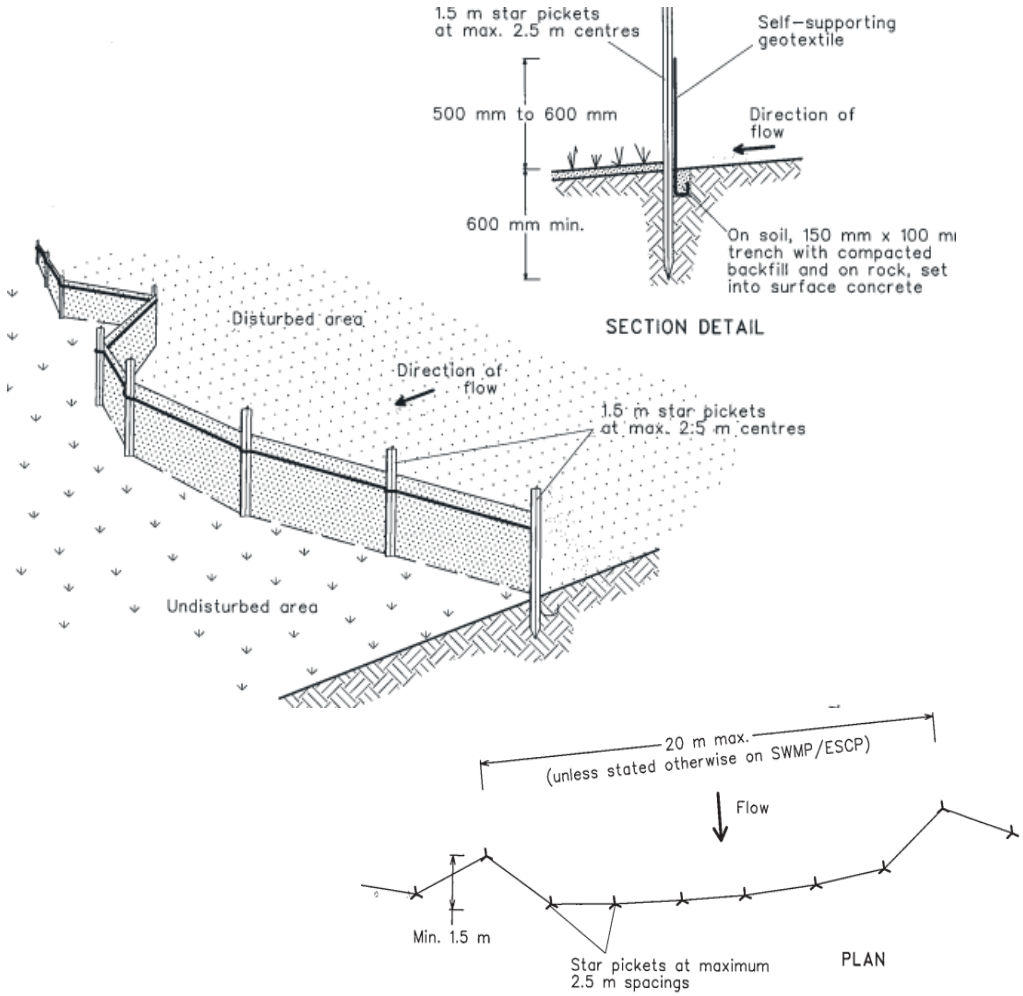
Sediment fencing and straw bale filter fencing is to be utilised during construction of the trail and stockpiling, as required. Controls are to be installed prior to works and retained in place until exposed areas of soil are stabilised.

Sediment Fence

The purpose of sediment fencing is to prevent sediment run-off and divert water around and away from disturbed areas. Sediment fencing should be used on the downslope side of works area, wetter areas and surrounding stockpiles.

Construction notes:

1) Construct sediment fences as close as possible to being parallel to the contours of the site, but with small returns to limit the catchment area of any one section. **The catchment area should be small enough to limit water flow if concentrated at one point to 50 L/s in the design storm event, usually the 10-year event.*
2) Dig a 150 mm deep trench along upslope line of fence for the bottom of the fabric to be entrenched.
3) Install 1.5 m long star pickets into ground at 2.5 m intervals (max) on the downslope edge of the trench. **Fit star pickets with safety caps.*
4) Fix geotextile to the upslope side of the posts ensuring it goes to the base of the trench.



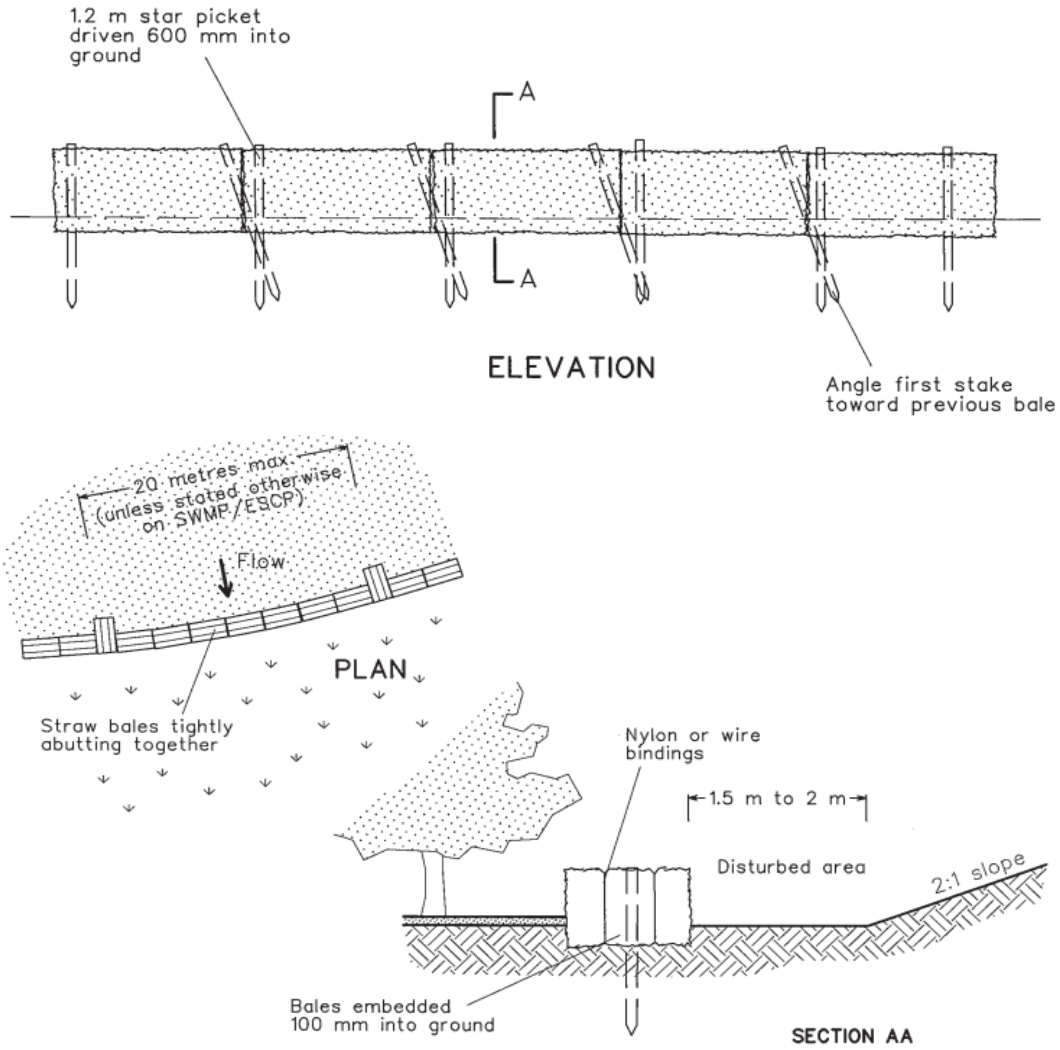
Standard Sediment Fence Installation (Source: Landcom 2004)

Straw Bale Filter Fence

Straw bales may be used to divert water around and away from disturbance areas during down-slope and cross-slope excavations. Straw bales are to be used on the uphill side of works area running cross-slope.

Construction notes:

1) Construct the straw bale filter as close as possible to being parallel to the contours of the site.
2) Place bales lengthwise in a row with ends tightly abutting (1 bale = max height of filter). Fill gaps between bales with straw and wrap with geofabric where necessary.
3) Embed each bale in the ground 75-100 mm and anchor with two 1.2 m stakes/star picket. Angle the first stake in each bale towards the previously laid bale. Stakes should be driven 600 mm into ground, sitting flush with top of bale (if possible). **If using star pickets which protrude above bales, fit with safety caps.*
4) Where a straw bale filter is constructed downslope from a disturbed batter, ensure the bales are placed 1-2 m downslope from the toe.



Standard Straw Bale Filter Installation (Source: Landcom 2004)

Cross Drainage and Sediment Barriers

The recommended spacing for cross drainage and sediment barriers is provided below.

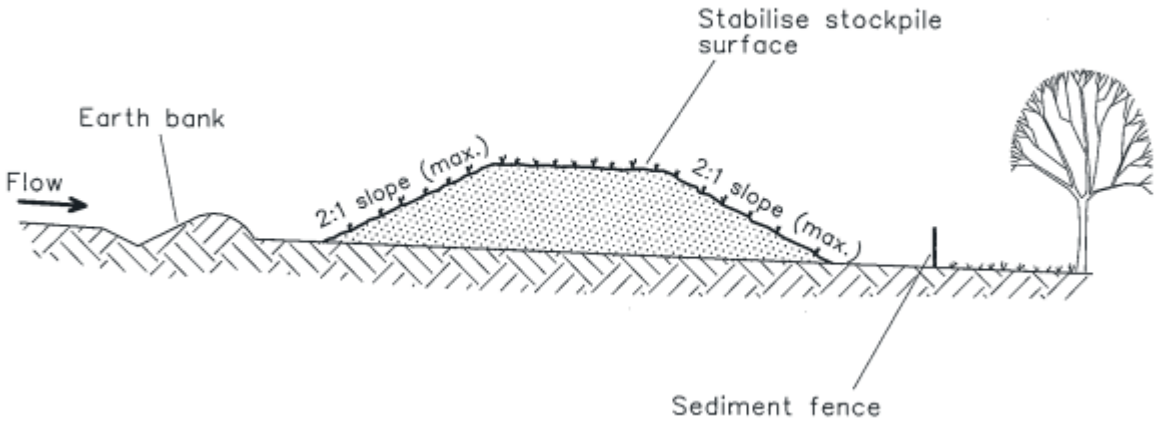
Slope Grade (%)	Cross Drain / Sediment Barrier (m)

5-10	15-20
10-15	10-15
15-25	8-10
>25	5-8

Source: NPWS 2007; Parr-Smith and Polley (1998)
Note: To calculate the grade of a slope: (rise/run) x 100 = slope grade

Soil and Stockpile Management

- All stockpiles will be constructed and managed in accordance with *Soil Stockpile Guidelines for the Resort Areas of Kosciuszko National Park* (OEH 2017).
- Temporary stockpile sites within the construction corridor should adhere to the following criteria (Landcom 2004; OEH 2007):
  - not exceed 2 m in height, have a slope <50% (26°)
  - be at least 2 m from vegetation, concentrated water flows, roads, publicly accessible areas or hazardous areas
  - avoid impacts to native vegetation and be located on disturbed areas
  - located directly adjacent to the works
  - located on relatively flat ground, where possible
  - in areas with sufficient room to accommodate the volume of material being stockpiled
  - be contained by appropriate erosion and sediment controls.
- Any excess excavated material will be removed from site and transported to the designated soil stockpiles sites.



Stockpile Management (Source: Landcom 2004)

Appendix D Environmental Schedules

THREDBO ENVIRONMENTAL SERVICES

Record of complaint

Sheet _____of_____

Project: _____ Date / Time: _____

Received by: _____ Reference Number: _____

Complainant details:	Witness details:

Nature of complaint:

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..... Complainant sign:

Action taken:

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Kosciuszko Thredbo Pty Ltd

Environmental Incident Reporting Form

Confidential document after first entry

The purpose of this form is to report any incident that may have resulted in Environmental harm on Kosciuszko Thredbo Pty Ltd premises. Remember to be succinct, stick to the facts and do not make assumptions. Only record information you know to be correct.

The only persons authorised to contact external agencies eg EPA in relation to environmental incidents are the Kosciuszko Thredbo General Manager and Environmental Services Manager or their approved delegates.

Return completed form to the Environmental Services Manager as soon as practicle, on completion of the Environmental incident.

Date of Incident:	**Time of incident:**
Reported by:	**Department:**

Location of Incident

EXACT location of the incident (include landmarks and features, nearest cross street etc to make it easier to identify later)		
Site:	Building:	Room:

Description of incident

Provide description and extent of incident: …… …… …… …… ……
Have relevant photos been taken and attached? Yes ☐ No ☐
If 'No', provide sketch and attach to the rear of this document.
What was the estimated duration of the incident?

Type of incident

☐ Spill (including fuel,oil,waste material or other polluting substance)	☐ Erosion and sedimentation incident	☐ Contaminated water discharge
☐ Noise emission/complaint	☐ Unauthorised/accidental damage to heritage item	☐ Unauthorised/accidental vegetation removal or harm
☐ Air Emission	☐ Wildlife habitat/nesting area disturbed	☐ Other (specify)

Environmental Incident Reporting Form

Level of incident

Level	Example
☐ Minor	eg. No material has escaped the site or caused material harm to the environment – it is easy to clean up without additional assistance.
☐ Major	eg. Material has escaped the site causing pollution downhill/downstream areas, which will require clean up involving other agencies and/or additional resources not available to local site management. Damage has occurred or is likely to occur to the environment.

Hazardous Material Spilt

☐ Petroleum based products/ Hydrocarbons	☐ Chemicals domestic or industrial grade
☐ Biological waste / Clinical and related waste	☐ PCB insulating liquids
☐ CFC containing equipment	☐ Paints or paint products
☐ Radioactive waste	☐ Other (specify)
Detail type/ingredient spilt: (UN, MSDS details)	
Detail concentration of material spilt:	
Detail quantity of material spilt:	

Type of Spill

☐ Spilt onto ground	☐ Spilt into stormwater drain
☐ Spilt into waterway	☐ Poured down sink
☐ Poured down sewer	☐ Released into atmosphere
☐ Caused odour	☐ Caused fire/explosion
☐ Caused infectious contamination	☐ Other (specify)

Immediate Actions

Was spill contained? Yes ☐ No ☐
Detail immediate actions/controls measures taken to rectify or contain the incident …… …… …… …… …… …… …… ……

Environmental Incident Reporting Form

Corrective Actions

Detail corrective clean up action taken

……

……

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Disposal

Detail disposal method/plans and location

……

……

……

Recommended follow up and preventative actions

Detail recommendations

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……

……

Persons present at Incident

Were there any witnesses to the accident? Yes ☐ No ☐ If 'Yes', please provide names

……

……

Declaration

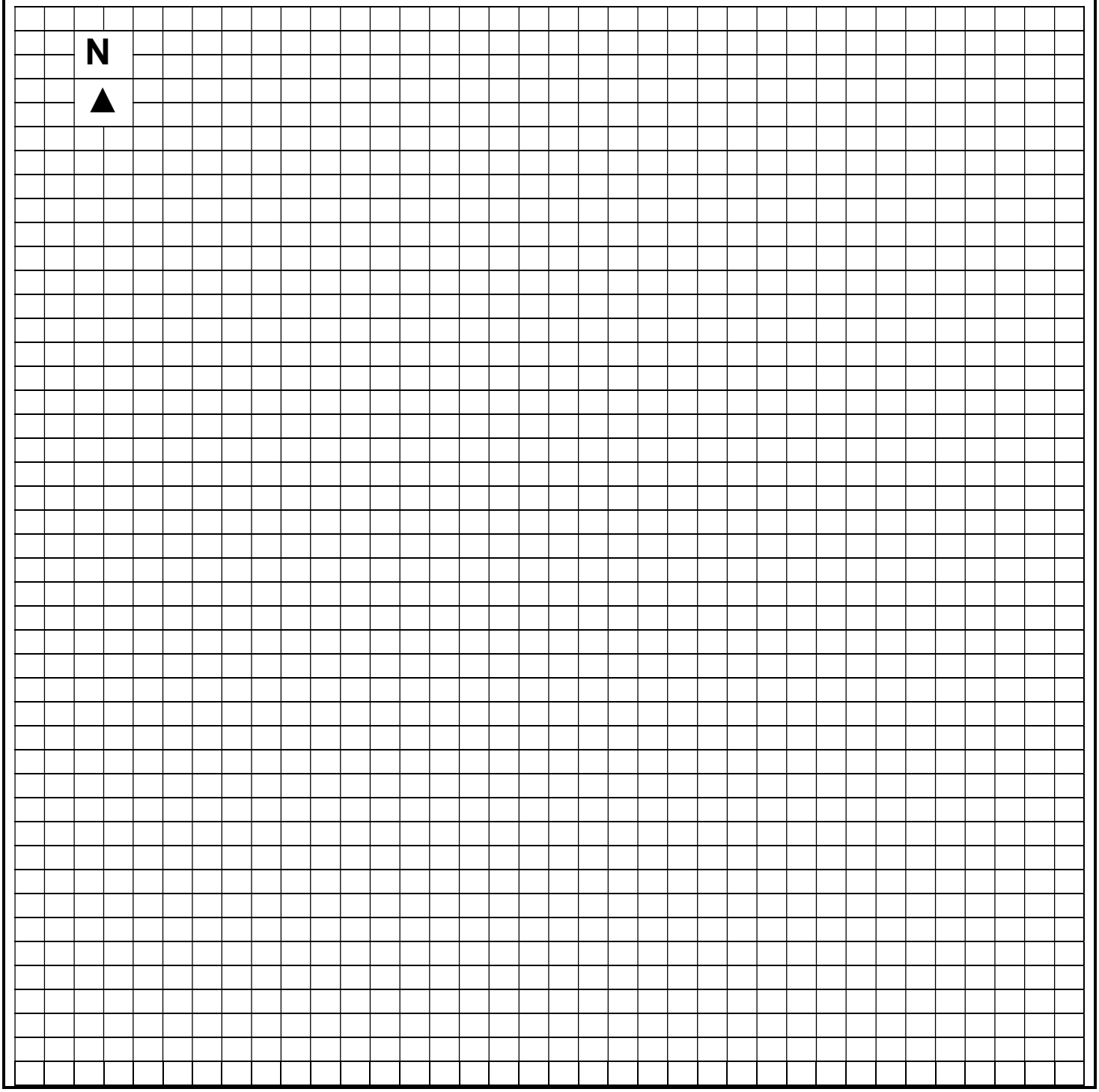
The information and answers given above are true in every detail and no information has been withheld.

Departmental Supervisors Name	
Departmental Supervisors signature	*Date*

Departmental Managers Name	
Departmental Managers signature	*Date*

Environmental Incident Reporting Form

Diagram: (do not scale)



Created By: Paul Corcoran
Created Date: 24 Mar 2009
Review Date: 24 Mar 2017
Reviewed Date: 7th January 2020, by E Diver

Appendix E Rehabilitation and Monitoring Plan

Construction of Mountain Bike Trails

Flow Trail Realignment
Little Beauty Jumps Park Bypass
& Wombat Walk Connector

Detailed Rehabilitation and Monitoring Plan

Table of Contents

1 Introduction

This rehabilitation and monitoring plan has been prepared to detail the rehabilitation required for all areas disturbed by the construction works associated with the development. The rehabilitation activities consist of trail verge stabilisation and revegetation works.

1.1 Aims and Objectives

The aim of this plan is to achieve successful rehabilitation of all areas disturbed by the works with full vegetation coverage to achieve an erosion resistant state. The objectives of this rehabilitation plan are:

- Detail the rehabilitation works required by the proposal for all disturbed areas;
- Set out the schedule for the rehabilitation activities;
- Provide information on plant species and planting ratios; and
- Dictate the maintenance and monitoring of the disturbed and rehabilitation areas.

2 Rehabilitation Program

2.1 Rehabilitation Areas

The areas to be rehabilitated consist of all areas disturbed as a component of the works. These areas include the verges of the completed trail, existing sections of trail on the Lower Supertrail and Milk Run that are to be closed and any disturbed areas adjacent to the works. The development areas are shown in Appendix 1.

2.2 Rehabilitation and Stabilisation

The rehabilitation and stabilisation works will be consistent with the Rehabilitation Guidelines for the Resort Areas of Kosciuszko National Park (NPWS). The works are to be carried out by Kosciuszko Thredbo Pty Ltd (KT) staff or suitable contractor on KT's behalf. Methods will consist of:

Timing	Procedure	Methods
Pre-construction	Establish construction corridor & trail alignment	• Flag trail alignment using pin flags and flagging tape • Mark out construction corridor to prevent damage to adjacent areas
	Treatment of weeds	• Treat weeds within disturbance area to ensure they are not spread further using methods relevant to the weed species being treated
	Identify trees to be removed	• Clearly identify any trees to be removed with flagging tape and inspect for nests / fauna • Alignment of trail is to avoid clearance of mature canopy vegetation
	Implement Site Environmental Management Measures	• Erosion & sediment controls to be put in place prior to construction where possible and during construction
	Cleaning of machinery	• Ensure all machinery to be used on construction site is cleaned at wash down bay to prevent spread of weed species in resort

	Identify "No Go" areas	• Identify & mark "No Go" areas to clearly delineate sensitive areas to be avoided
	Identify *Podocarpus lawrencei* (Mountain Plum Pine)	• Identify and mark out *Podocarpus lawrencei* • Alignment of trail is to avoid *Podocarpus lawrencei* • Ensure KT staff/contractors are able to accurately identify
	Identify *Ranunculus anemoneus* (Anemone Buttercup)	• Identify and mark out *Ranunculus anemoneus* in order to minimise and mitigate impacts during construction works • Alignment of trail is to avoid *Ranunculus anemoneus* • Ensure KT staff/contractors are able to accurately identify • Environmental Officer to GPS record location of *Ranunculus anemoneus* for on-going monitoring
	Identify set down and stockpile areas	• Identify and mark out appropriate plant & equipment set down areas for short term placement of machinery & materials avoiding areas of native vegetation • Set down areas are to be located within trail construction zone, identified stockpile site or site compound only and strictly adhered to
	Identify wombat burrows	• Identify and mark out wombat burrows within the construction corridor • Trail alignment is to avoid wombat burrows
During Construction	Minimise disturbance & stay within trail corridor	• Minimise disturbance to adjacent native vegetation • Limit movement of construction equipment to construction area and nominated set down areas
	Identify *Ranunculus anemoneus* (Anemone Buttercup)	• If *Ranunculus anemoneus* is discovered on the trail alignment during the course of construction that has not been previously identified, Environmental Officer is to be contacted immediately and works are to cease in that area • Environmental Officer and trails supervisor to determine if trail alignment can be moved within the flexible construction corridor of 20m (10m either side of the ground-truthed alignment) to avoid • If trail alignment is unable to be altered, KT is to consult NPWS regarding most appropriate action
	Regularly maintain site environmental management measures	• Conduct regular inspections and maintenance of sediment and erosion controls
	Sod cutting, collection & storage (as per Rehabilitation Guidelines for the Resort Areas of KNP)	• Native forbs and grasses are the most appropriate for sodding • Where sod collection is possible, cut sods to a depth of 10-20cm (leaving a layer of intact topsoil underneath) and to a size of 30cm^2 • Store sods collected on geofabric adjacent to the construction area

		• Sod storage time to be kept to a minimum and sods to be utilised as soon as possible after cutting and storage • Monitor sods and environmental conditions and water if necessary
	Soil removal	• Place topsoil & subsoil separately • Adhere to Soil Stockpile Guidelines for Resort Areas of KNP
	Soil replacement	• All excess soil gained from trail construction works is to be spread over the disturbed areas prior to rehabilitation • Ensure subsoil and topsoil are replaced in correct order
	Spread excess vegetation	• All excess native vegetation to be dispersed on exposed soil along the trail edge (50 cm max.), placed on batters & embankments for erosion control or carefully spread further into bushland to avoid smothering of understory vegetation communities • Any excess thatch unable to be used for the above is to be stockpiled off-site for use on other rehabilitation projects with the resort
	Management of ephemeral springs crossing marked trail alignment	• Manage water from ephemeral springs with the installation of rock armouring and/or construction of rock stormwater pits and piping of water underneath trail • Drainage pipe to discharge into rock dispersion pits to reduce water velocity and erosion
Post Construction	Direct seeding	• Areas of open ski slope adjacent to the trail tread, or trail to be closed, and dominated by EXOTIC grasses, seed using a 1:1 mix of Chewings fescue & *Poa fawcettiae* • Areas of open ski slope adjacent to the trail tread, or trail to be closed, and dominated by NATIVE species, use only 100% native *Poa* endemic to the area • Seeding rate: Slope grade <40% use 15-20g/m^2 Slope grade >40% use 20-30g/m^2 • Broadcast Dynamic Lifter @ 100g/m^2 • Weed free rice straw mulch and jute mesh to be applied over seed to protect soil and provide a favourable environment for establishment
	Sod replacement	• Utilise sod replacement in disturbed areas where possible particularly in areas of native vegetation in accordance with “Rehabilitation Guidelines for the Resort Areas of KNP” – Section C.1.4
	Stabilise disturbed areas (batters/embankments and trail to be closed)	• Spread weed free rice straw on slope grades <40% @ 1 bale per 25m^2 and weigh down using native thatch / litter gained from works. Jute mesh may be used if thatch amount insufficient • Install Jute mesh (or similar) over straw on batters & embankments >500mm height & with a slope >40% (Grade% = Rise/Run x 100)

		• Direct seed at rates listed above to stabilise disturbed areas including batters & embankments
	Planting native tube stock	• Plant tube stock on batters & embankments in areas of native vegetation • Plant shrubs at 3/m^2 • Plant grasses and forbs at 5/m^2 • Refer to Appendix 2 for suitable rehabilitation species • Water crystals & organic fertiliser may be used at label rates • *Water crystals:* 5gm pre-hydrated crystals, crystals must be hydrated for at least 2hrs prior to planting • *Fertiliser:* 1 x Typhoon Native fertiliser tablet per plant (*Poa* & shrubs) placed next to or below roots
	Watering	• If required, water rehabilitation areas to assist in seed germination, tubestock establishment and straw retention
	Weed control	• Monitor all areas disturbed by the works (including areas adjacent to the works) for signs of weed infestation • Treat weeds with methods appropriate to weed species being treated including low pressure spot spraying and hand removal techniques • Limit off-target damage by only spraying in the appropriate conditions • Weed monitoring & control is to be conducted on an on-going basis and included in annual resort weed control activities

2.3 Trail Hardening

Trail hardening during and post construction will assist in reducing surface loss from the trail tread which in turn will reduce issues such as breaking bumps, exposed roots and sub-surface rock, water channelling and undercutting and sedimentation of drains, sumps and vegetation.

Trail hardening methods will include:

- Trail grading and compaction using excavator, manual hand tools and vibrating plate;
- Watering of trail tread to aid in compaction;
- Use of rock armouring and aggregate where required;
- Trail not to be used by the general public for a minimum of 30 days following completion;
- Approved KT staff to "ride-in" trail in a steady and controlled manner to aid compaction in the preferred ride line (ride-in staff to be approved at the Mountain Managers discretion).

2.4 Rehabilitation of closed trail alignment

At the completion of the trail hardening period and once the new alignment is open, sections of trail to be closed are to be rehabilitated. Rehabilitation method is to consist of:

- "Scratch up" existing alignment with mini excavator to reduce compaction of trail tread, allow increased water infiltration and aid in plant and root establishment;
- Import topsoil from Thredbo stockpile site and place in areas of trail requiring topsoil;

- Lightly rake disturbed alignment cross-slope to form shallow furrows for seed. As fescue & *poa* seed is small, furrows should only be 1-2cm deep. Grass seed will not germinate if sown too deep;
- Apply dynamic lifter;
- Spread weed free rice straw on all exposed soil;
- Water in to prevent straw from blowing away and aid in seed germination;
- Seed, fertiliser and straw to be applied at rates listed in the Rehabilitation & Stabilisation table;
- Chewings fescue to only be used on areas of open ski slope dominated by exotic grasses;
- In areas of native vegetation, use only 100% native *Poa* endemic to the area and native shrubs as per Appendix 2 – Rehabilitation Species.

2.5 Monitoring

Weekly inspections of the construction area will be carried out by the Environmental Officer during the construction phase as per the Site Environmental Management Plan (SEMP). These inspections are to ensure that all site environmental management measures are in place and in good working order. On-going monitoring will occur as per the Rehabilitation & Monitoring schedule.

2.6 Schedule

The initial rehabilitation and stabilisation works are to be carried out as a component of the construction works during the trail finishing and closed trail rehabilitation phase. The maintenance works associated with the rehabilitation areas are to be undertaken on an on-going, as required basis throughout each summer season. The schedule for the rehabilitation works is provided in the table below. The appointed Environmental Officer for the project is responsible for ensuring that all preparation, works, monitoring and reporting are carried out to the required standard. The works will be carried out by KT staff or an appointed contractor.

Rehabilitation and monitoring schedule

AREA	PROCEDURE	TIMING
Trail verge Berms Batters Embankments Closed Trail sections	Site Preparation	During construction
	Seeding and planting tube stock	During construction and ongoing annually until adequate groundcover has been achieved
	Mulching	During construction and ongoing annually until adequate groundcover has been achieved
	Maintenance (incl. weed control & replacement planting)	Ongoing annually as required (between November and May)
	Monitoring	**Weekly** during construction as per SEMP **Monthly** post construction for the first 12 months to monitor for erosion, sediment control and plant establishment **Annually** once stabilisation has been achieved, between November & May each year up until the date 5 years after the issue of a final occupation certificate.

		At the completion of the 5 years general monitoring & maintenance will continue. **Monitoring** will be conducted by way of site inspection with triggers for action detailed in Section 2.7 - Maintenance & Mitigation

2.7 Maintenance & Mitigation

In the event that monitoring indicates initial rehabilitation efforts are not effective (minimal grass / shrub establishment, establishment of weed species or declining coverage), additional management actions may be required. Management actions will be determined following 3 consecutive months of poor establishment or declining survival rates of native species planted. If deemed necessary, this period will be brought forward to implement the additional actions required. The management actions are to consist of one or more of the following:

Area	Maintenance trigger	Action
All areas disturbed by construction works	Poor grass & shrub establishment <75% native species coverage	• Additional direct seeding in areas of open non-native vegetation • In-fill planting of native tube stock • Grazing control by use of tree guards where appropriate
	Presence of weeds	• Weeds to be controlled annually include, but not limited to, Milfoil, St John's Wort, thistle & Juncus • Spot spray using low pressure sprayer • Use of hand removal techniques where appropriate
	Identification of erosion & unstable areas	• Installation of Jute mesh, brush matting & mulching • Installation of hay bale and sediment fencing control measures • Maintenance of sediment retention pits, water bars and drains • Carry out additional planting & re-vegetation works as per Rehabilitation table
	Presence of sediment & debris	• Remove build-up of sediment from sediment retention pits and pipe inlets & outlets as required • Removal of any excess sediment from vegetation adjacent to the trail
Drains Water bars Sediment retention pits	Presence of sediment & debris Identification of damage	• Inspection of drains, water bars & sediment retention pits particularly after heavy rainfall • Removal of sediment and debris to prevent blockages / overflow and limit sedimentation of vegetation • Regular inspection to identify damage to system and maintenance

Additional planting & re-vegetation works are to be carried out as per the Rehabilitation table. If it is found that after 12 months of monitoring the rehabilitation efforts are not effective, KT will liaise with NPWS to determine the most appropriate action. The 12-month period will allow time for the rehabilitation area to establish prior to any further intervention.

3 Exotic Species

All areas disturbed by the works are to be monitored on an ongoing basis for the occurrence of any exotic flora and evidence of exotic fauna (scats and tracks). In the event of the detection of exotic species, appropriate control works are to be scheduled as required as set out below.

Exotic flora

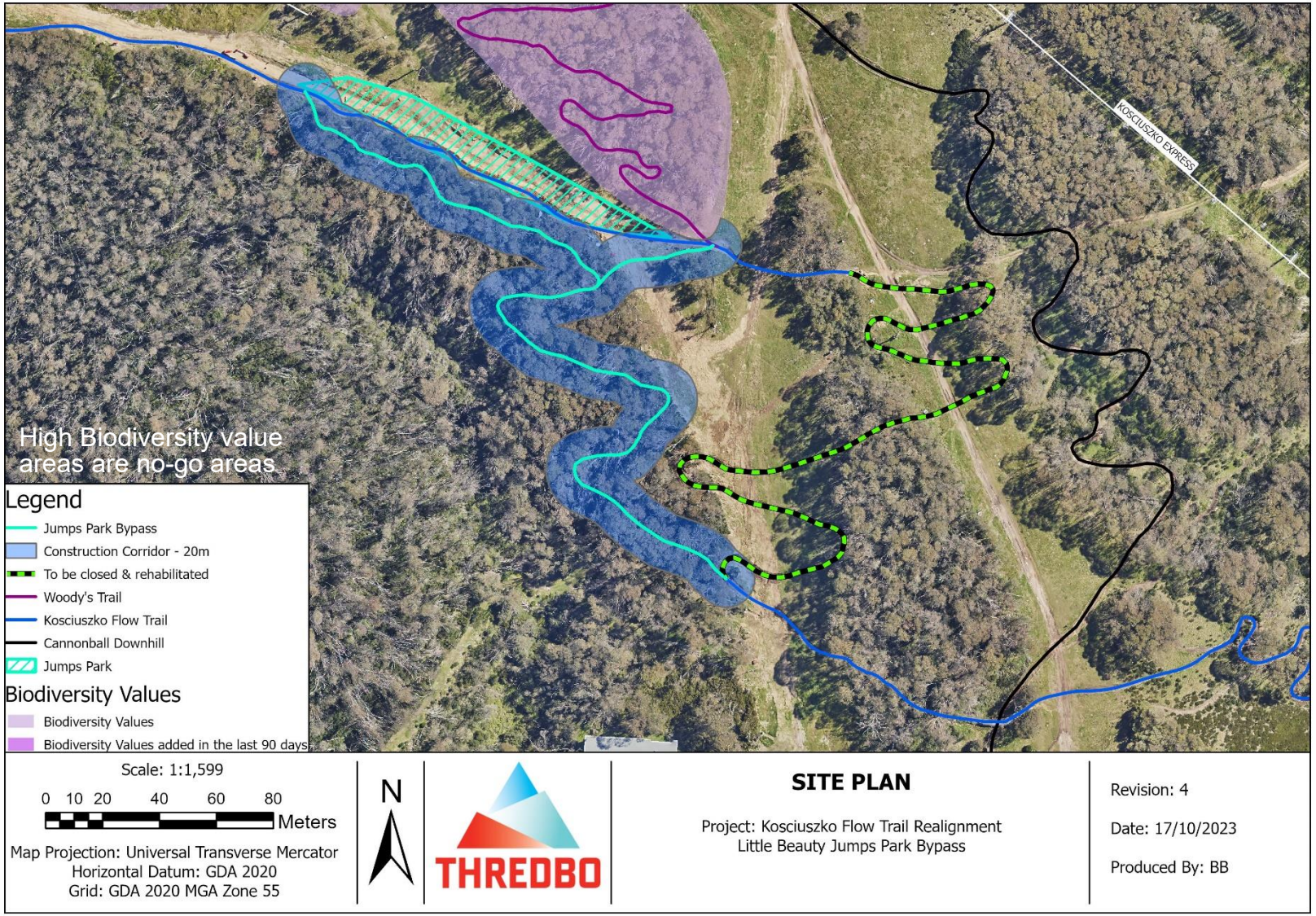
The control of exotic flora is to be undertaken using either spot spraying or hand removal techniques. The spraying activities are to be undertaken using appropriate herbicide for the species being treated and techniques for the conditions on the day. All control activities are to be undertaken prior to plant seed set.

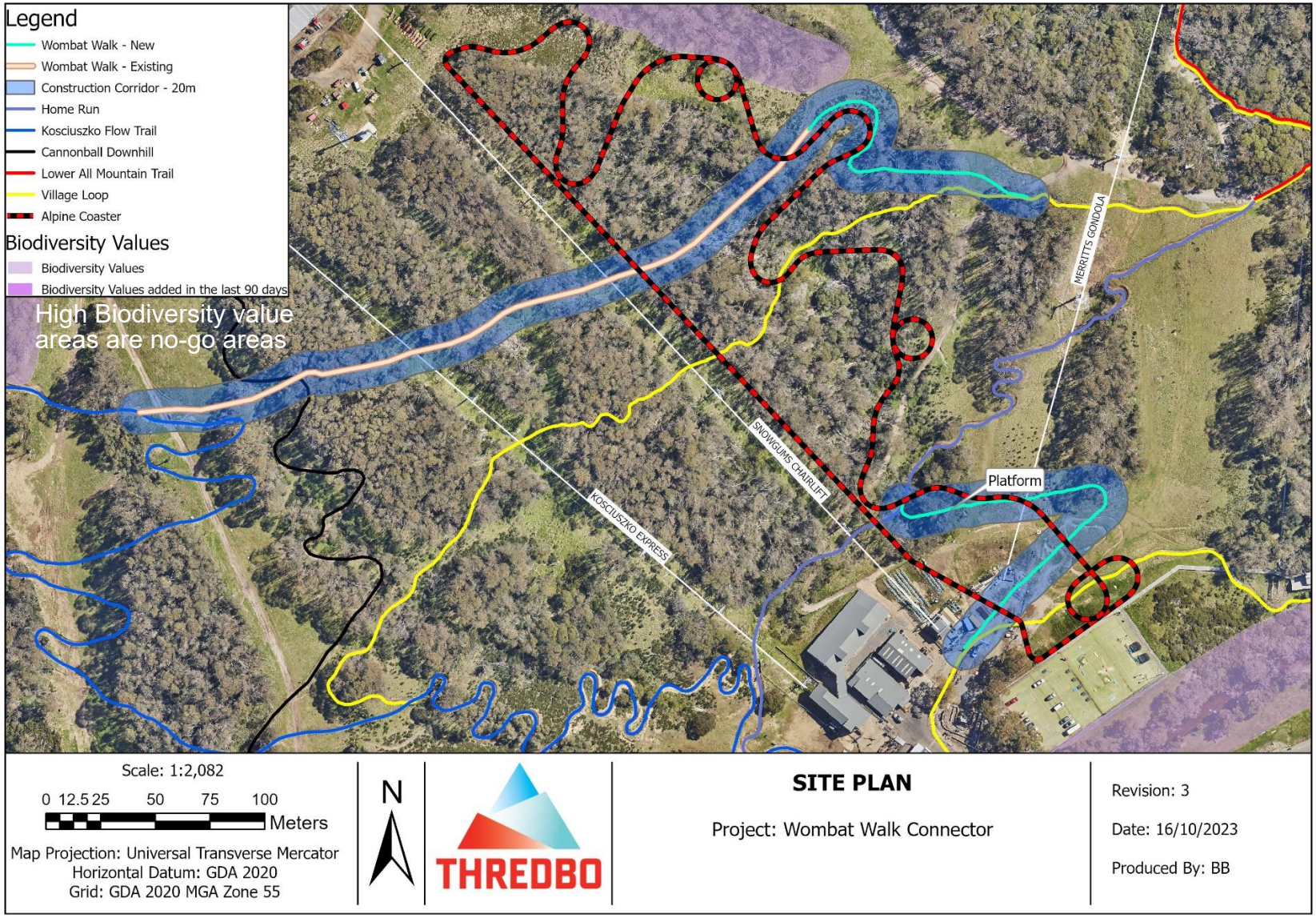
Exotic fauna

The control of exotic fauna is to be undertaken in cooperation with NPWS as a resort wide program targeting the control of cats, foxes and rabbits. The cat and fox trapping program is undertaken by KT during the winter months in the village and on the lower slopes of the resort. Rabbit control programs are conducted in autumn and spring by KT staff also targeting these areas. Feral deer, cat, fox and dog control is undertaken by NPWS outside of the KT lease area.

4 Appendices

4.1 Appendix 1 – Development Area Map




Legend
Wombat Walk - New
Wombat Walk - Existing
Construction Corridor - 20m
Home Run
Kosciuszko Flow Trail
Cannonball Downhill
Lower All Mountain Trail
Village Loop
Alpine Coaster
Biodiversity Values
Biodiversity Values
Biodiversity Values added in the last 90 days
High Biodiversity value areas are no-go areas
MERRITTS GONDOLA
SNOWGUMS CHAIRLIFT
KOSCIUSZKO EXPRESS
Platform
Scale: 1:2,082
0 12.5 25 50 75 100
Meters
Map Projection: Universal Transverse Mercator
Horizontal Datum: GDA 2020
Grid: GDA 2020 MGA Zone 55
N
THREDBO
SITE PLAN
Project: Wombat Walk Connector
Revision: 3
Date: 16/10/2023
Produced By: BB

4.2 Appendix 2 – Rehabilitation Species

The following is an extract from the publication; Rehabilitation Guidelines for the Resort Areas of Kosciuszko National Park (NPWS 2007). The table represents some of the recommended species for revegetation activities within Thredbo at the development site altitude.

Rehabilitation Species List: Thredbo & Bullocks Flat

This appendix provides a list of species known to be successful in rehabilitation, and which would be suited to the Kosciuszko resorts. It does not provide a definitive list of species found in each resort.

Form	Species	Common Name	Community	Propagation and Seed Collection Notes	Direct Seeding
Forbs					
	Craspedia jamesii	James's Billy-button	TAHa, STG	Seed or division	Y
	Craspedia lamicola	Shiny-leaf Billy-button	TAHa, STG	Seed or division	Y
	Craspedia leucantha	Pale Billy-button	SAH, TAHa	Seed or division	Y
	Craspedia maxgrayi	Woolly Billy-button	TAHa, STG	Seed or division	Y
	Helichrysum scorpioides	Button Everlasting	TAHa, W	Seed	Y
	Podolepis robusta	Alpine Podolepis	TAHa, STG	Seed	Y
	Senecio linearifolius	Fireweed Groundsel	SAH, W, SR	Seed	Y
	Stylidium graminifolium	AlpineTrigger-plant	TAHa, STG, H, B, W, SAH, SG	Seed	Y
Grasses, rushes					
	Carex hebes	Dryland Sedge	TAHa, STG	Seed or division	Y
	Poa costiniana	Prickly Snow-grass	STG, F, B, TAHa, H, SAH	Seed or division	Y
	Poa ensiformis	Sword Tussock-grass	W, SAH, SR	Seed or division	Y
	Poa fawcettiae	Smooth-blue Snow-grass	TAHa, STG	Seed or division	Y
	Poa hiemata	Soft Snow-grass	TAHa, SG	Seed or division	Y
Shrubs					
	Acacia obliquinervia	Mountain Hickory Wattle	SAH	Seed (collect in March)	Y
	Cassinia monticola	Cassinia	W, SG		
	Grevillea australis	Royal Grevillea	H, SAH	Tip cutting	
	Hakea microcarpa	Small-fruit Hakea	SAH, W		Y
	Ozothamnus ellipticum	Kerosene Bush	B, H	Soft cutting	
	Ozothamnus secundiflorus	Cascade Everlasting	H, SAH	Soft cutting	
	Podolobium alpestre	Alpine Shaggy-pea	H	Seed (collected in March)	
		Prostanthera cuneata	Alpine Mint-bush	H	Cuttings
Trees					
	Eucalyptus dalrympleana	Mountain Gum	W	Seed	Y
	Eucalyptus delegatensis	Alpine Ash	W	Seed	Y
	Eucalyptus pauciflora	Snow Gum	W	Seed (available all year). 3 weeks cold treatment at 4° recommended.	Y
	Eucalyptus stellulata	Black Sally	W	Seed (available all year). 3 weeks cold treatment at 4° recommended.	Y

Key to Communities:

TAHa	Tall Alpine Herbfield *Celmisia –Poa* alliance	H	Heath (alpine)
TAHb	Tall Alpine Herbfield *Brachyscome-Austrodanthonia* alliance	F	Fen
SAH	Short Alpine Herbfield	B	Bog
FMa	Feldmark *Epacris-Chionohebe* alliance	STG	Sod Tussock Grassland
FMb	Feldmark *Coprosma – Colobanthus* alliance	W	Woodland
		SAH	Sub-alpine heath
		SR	Subalpine Riparian and wet areas
		SG	Subalpine Grassland and dry, treeless areas