Proposed Lower All Mountain Trail Diversion, Thredbo Alpine Resort
Biodiversity Development Assessment Report

Kosciuszko Thredbo Pty Ltd

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A TETRA TECH COMPANY

1300 646 131
www.ecoaus.com.au

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Project Manager	Ryan Smithers
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Prepared by	Ryan Smithers
Reviewed by	Frank Lemckert
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Template 2.8.1

Executive Summary

Eco Logical Australia Pty Ltd was engaged by Kosciuszko Thredbo Pty Ltd to prepare a BDAR for the proposed construction of a new mountain bike trail and associated works in the Cruiser ski area and associated Cruiser Chairlift, within Thredbo Alpine Resort.

This report has been prepared to meet the requirements of the Biodiversity Assessment Method 2020 established under Section 6.7 of the NSW *Biodiversity Conservation Act 2016* (BC Act). A portion of the native vegetation within the development site is mapped on the Biodiversity Values map.

The proposed development has been located to take advantage of existing disturbed areas and minimize the required clearing. As a result, it is anticipated that the proposal will involve the clearing or further modification of only 0.1 ha of vegetation. The proposal will require the clearing of understorey and groundcovers only, and will not result in the removal of any mature trees, or any associated fauna habitats such as hollows.

The development footprint supports one Plant Community Type (PCT) PCT 645 Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion in two condition states; good and low. PCT 645 does not conform to any Endangered Ecological Communities (EEC) listed under the NSW BC Act or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Targeted surveys within the development site and immediate surrounds identified one threatened fauna species, *Mastacomys fuscus* (Broad-toothed Rat), and one threatened flora *species Ranunculus anemoneus* (Anemone Buttercup), as occurring within the development site. A number of other threatened fauna species are known to occur in adjoining habitats and/or have the potential to occur within the development site, such as *Petroica phoenicea* (Flame Robin). *Cyclodomorphus praealtus* (Alpine She-oak Skink) has been assumed to be present within the development site. Whilst The Alpine She-oak Skink was not detected within the development site and is not a candidate Serious and Irreversible Impact (SAII) species, offsets for the species have been provided.

This BDAR outlines the measures taken to avoid, minimise and mitigate impacts to the vegetation and habitats present within the development footprint during the design, construction and operation of the development. The residual unavoidable impacts of the proposed development were calculated in accordance with the BAM by utilising the Biodiversity Assessment Method Credit Calculator. A total of two ecosystem credits and 16 species credits are required to offset the unavoidable impacts to the vegetation and habitats present within the development footprint.

Serious and Irreversible Impact (SAII) values have been considered as part of this assessment. The proposal will not result in any SAII.

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

Contents

1. Introduction 1

1.1. General description of the development site 1
1.2. Brief description of the proposal 1
1.3. Development site footprint 4
1.4. Sources of information used 4
1.5. Legislative context 4

2. Landscape features 9
3. Native Vegetation 10

3.1. Survey Effort 10
3.2. Native vegetation extent within the development site 10
3.3. Plant Community Types present 10

3.3.1. Plant Community Type selection justification 10

3.4. Threatened Ecological Communities 11
3.5. Vegetation integrity assessment 11

3.5.1. Vegetation zones 11
3.5.2. Patch size 11
3.5.3. Assessing vegetation integrity 11

3.6. Use of local data 18

4. Threatened species 19

4.1. Ecosystem credit species 19
4.2. Species credit species 19

4.2.1. Identification of species credit species 19
4.2.2. Assessment of habitat constraints and vagrant species 20
4.2.3. Candidate species requiring further assessment 20

4.3. Targeted surveys 21

4.3.1. Species credit species included in the assessment 22

4.4. Identification of prescribed additional biodiversity impact entities 22

5. Avoiding and Minimising Impacts on Biodiversity Values 24

5.1. Locating a project to avoid and minimise impacts on biodiversity values 24

5.1.1. Direct and indirect impacts 24
5.1.2. Prescribed biodiversity impacts 24

5.2. Designing a project to avoid and minimise impacts on biodiversity values 24

5.2.1. Direct and indirect impacts 24
5.2.2. Prescribed biodiversity impacts 24

6. Assessment of Impacts 25

6.1. Direct impacts 25
6.2. Change in vegetation integrity 25
6.3. Indirect impacts 25
6.4. Prescribed biodiversity impacts 25
6.5. Mitigating and managing direct and indirect impacts 29
6.6. Mitigating prescribed impacts 29
6.7. Adaptive management strategy 29

7. Impact summary 32

7.1. Serious and Irreversible Impacts (SAII) 32
7.2. Impacts requiring offsets 32
7.3. Impacts not requiring offsets 32
7.4. Areas not requiring assessment 32
7.5. Credit summary 35

8. Consistency with legislation and policy 36

8.1. Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* 36

9. Recommendations 37
10. Conclusion 38
11. References 39

List of Figures

Figure 1: Location Map 6
Figure 2: Site Map 7
Figure 3: The proposal 8
Figure 4: Plant Community Types 15
Figure 5: Vegetation Zones and Plots 16
Figure 6: Threatened ecological communities 17
Figure 7: Species polygons 23
Figure 8: Indirect impact zones 26
Figure 9: Impacts requiring offset 33
Figure 10: Impacts not requiring offset 34

List of Tables

Table 1: Legislative context 5
Table 2: Landscape features 9
Table 3: Full-floristic PCT identification plots 10
Table 4: Plant Community Types 10
Table 5: Potential PCTs 11
Table 6: Threatened Ecological Communities 11
Table 7: Vegetation zones and vegetation integrity survey plots collected on the development site 12
Table 8: Zone 1 PCT 645 Good Condition 13
Table 9: Zone 2 PCT 645 Low Condition 14
Table 10: Vegetation integrity scores 18
Table 11: Predicted ecosystem credit species 19
Table 12: Candidate species credit species 20
Table 13: Justification for exclusion of candidate species credit species 20
Table 14: Targeted surveys 21
Table 15: Weather conditions 21
Table 16: Survey effort 21
Table 17: Species credit species included in the assessment 22
Table 18: Direct impacts to native vegetation 25
Table 19: Direct impacts on threatened species and threatened species habitat 25
Table 20: Change in vegetation integrity 25
Table 21: Indirect impacts 27
Table 22: Measures proposed to mitigate and manage impacts 30
Table 23: Impacts to native vegetation that require offsets 32
Table 24: Impacts on threatened species and threatened species habitat that require offsets 32
Table 25: Ecosystem credits required 35
Table 26: Species credit summary 35
Table 27: Species recorded in the plots and incidentally elsewhere within the development site or immediate surrounds. 44
Table 28: Plot location data 47
Table 29: Vegetation integrity data (composition) 47
Table 30: Vegetation integrity data (Structure) 47
Table 31: Vegetation integrity data (Function) 47

Abbreviations

Abbreviation	Description
BAM	Biodiversity Assessment Method
BAMC	Biodiversity Assessment Method Credit Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
CEEC	Critically Endangered Ecological Community
DAWE	Commonwealth Department of Agriculture, Water and the Environment
DPIE	NSW Department of Planning, Industry 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*
GIS	Geographic Information System
GPS	Global Positioning System
IBRA	Interim Biogeographic Regionalisation for Australia
LGA	Local Government Area
NSW	New South Wales
NOW	NSW Office of Water
PCT	Plant Community Type
SEPP	State Environmental Planning Policy
TEC	Threatened Ecological Community
VIS	Vegetation Information System

1. Introduction

This Biodiversity Development Assessment Report (BDAR) has been prepared by Ryan Smithers, an Accredited Person (BAAS17061) to apply the Biodiversity Assessment Method (BAM) under the NSW *Biodiversity Conservation Act 2016* (BC Act). All credit calculations have been undertaken using the BAM Calculator (BAMC) version 2020 in case number 33789. Consistent with the BAM, the streamlined (small area) assessment module has been used for this assessment.

Definitions of terminology used throughout this report are presented in Appendix A.

1.1. General description of the development site

The development site comprises existing ski slopes and remnant native vegetation on the edges or in the middle of the ski slopes in the Cruiser ski area, within Thredbo Alpine Resort. Parts of the development site are already heavily modified in association with existing ski slopes and associated infrastructure.

This report includes two base maps, the Location Map (Figure 1) and the Site Map (Figure 2).

1.2. Brief description of the proposal

The proposed development comprises an intermediate flow style mountain bike trail that commences off the existing All Mountain Trail to the east of the Gunbarrel Chairlift top station and descends over approximately 500 m of trail downhill to connect back into the existing All Mountain Trail. The proposed trail will result in an expected average disturbance footprint of 2.5 m. The proposed works are expected to affect 0.1 ha of native vegetation, most of which is already highly modified.

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.

The proposal is further identified in Figure 3 and Photo 1 – Photo 5.

Photo 1: The proposed trail initially traverses the "super-groomed" "Ballroom" ski run which comprises exotic grassland.

Photo 2: Much of the trail traverses existing ski runs that support a mix of exotic and native groundcovers derived from the clearing of Alpine Snow Gum shrubby open woodland. It will also traverse two "tree islands" approximately 20 m wide which separates the "Valley View" and "Ballroom" ski runs. One of these tree islands are shown in the background of Photo 2.

Photo 3: Approximately 90 m of the trail will extend into the large patch of Alpine Snow Gum shrubby open woodland that extends to the south of the Cruiser area.

Photo 4: The trail alignment has been designed to avoid wet heath and bog including this small patch of bog on the edge of the Ballroom Ski Run.

Photo 5: The trail will join the existing All Mountain Trail near this point, approximately 150 m below (in a direct line) its commencement.

1.3. Development site footprint

It is anticipated that the proposed development will result in the removal or modification of 0.1 ha of native vegetation, parts of which are already heavily modified. Approximately 0.01 ha of exotic grassland, on Ballroom Ski Run, will also be disturbed in association with the proposed trail.

The development site footprint is identified in Figure 2. The proposal is identified in Figure 3.

1.4. Sources of information used

The following data sources were reviewed as part of this report:

- BioNet Vegetation Classification
- BioNet Atlas Database
- Threatened Biodiversity Data Collection
- Additional GIS datasets including cadastre, contours, imagery and drainage.

1.5. Legislative context

Legislation relevant to the development site is outlined in Table 1.

Table 1: Legislative context

Name	Relevance to the project	Report Section
Commonwealth		
Environment Protection and Biodiversity Conservation Act 1999	Matters of national Environmental Significance (MNES) have been identified on or near the development site. This report assesses impacts to MNES and concludes that the development is unlikely to have a significant impact on MNES.	Appendix D
State		
Environmental Planning and Assessment Act 1979	The proposed development requires consent and is to be assessed under Part 4 of the EP&A Act. The EP&A 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.	-
Biodiversity Conservation Act 2016	The proposed development involves clearing of vegetation identified as high conservation value on the Biodiversity Values Land Map and thus requires submission of a Biodiversity Development Assessment Report.	-
Environmental Planning Instruments		
Precincts - Regional SEPP 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. The Precincts-Regional SEPP 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 Climate Change (DECC).	-
Snowy River Shire Local Environment Plan 2013	The subject site is zoned C1 National Parks and Nature Reserves under the Snowy River Shire Local Environment Plan 2013.	-

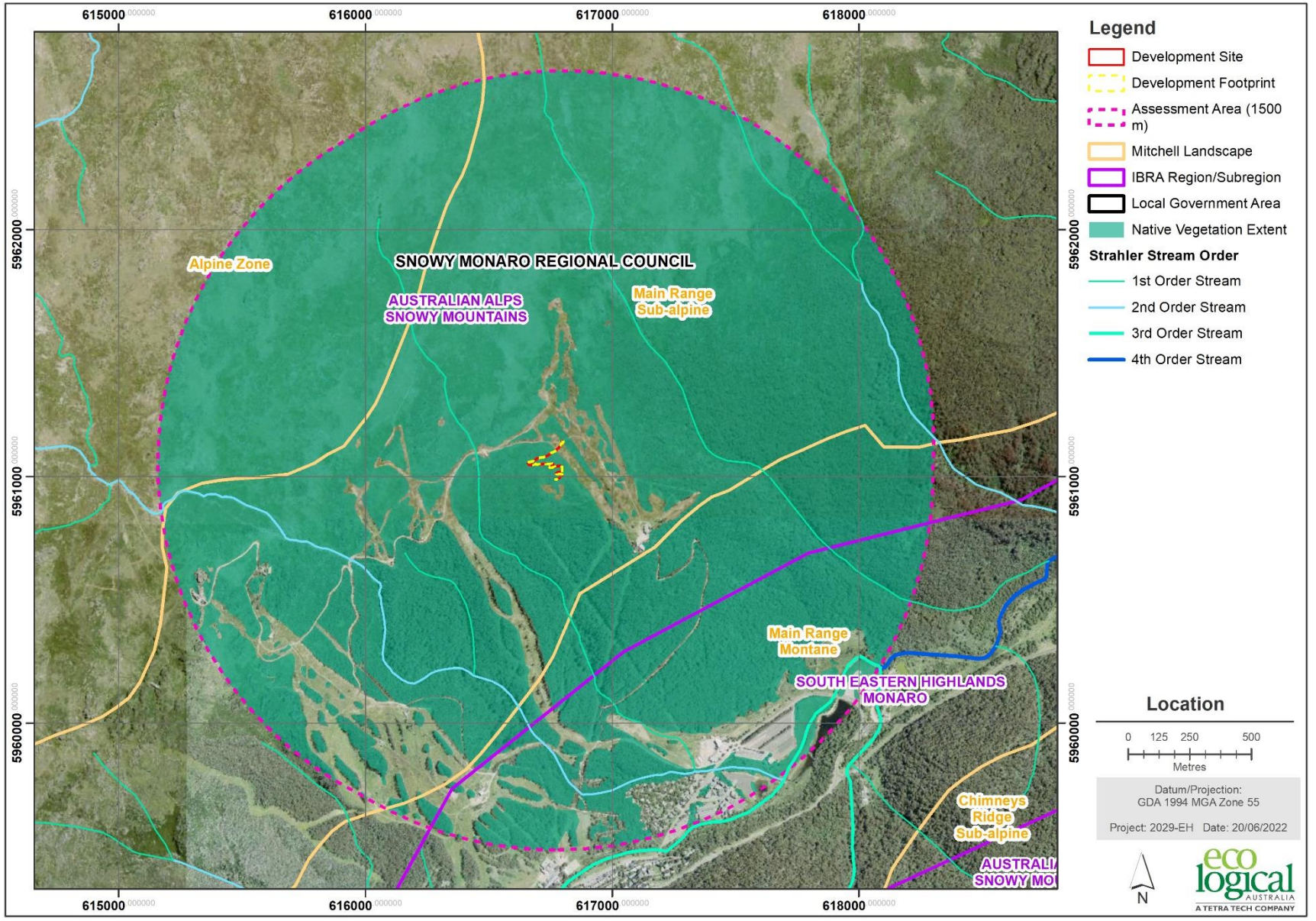

Figure 1: Location Map

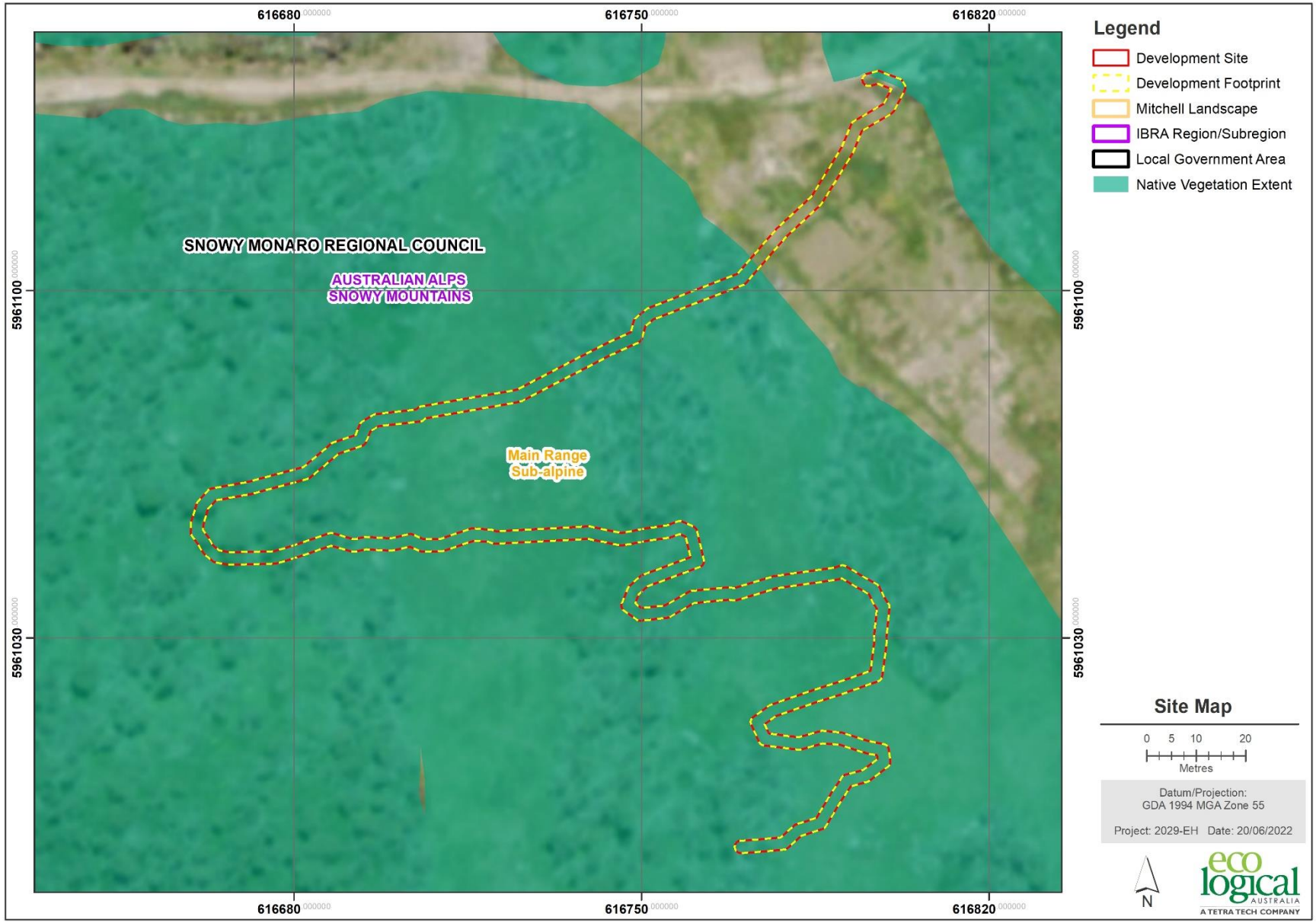

Figure 2: Site Map

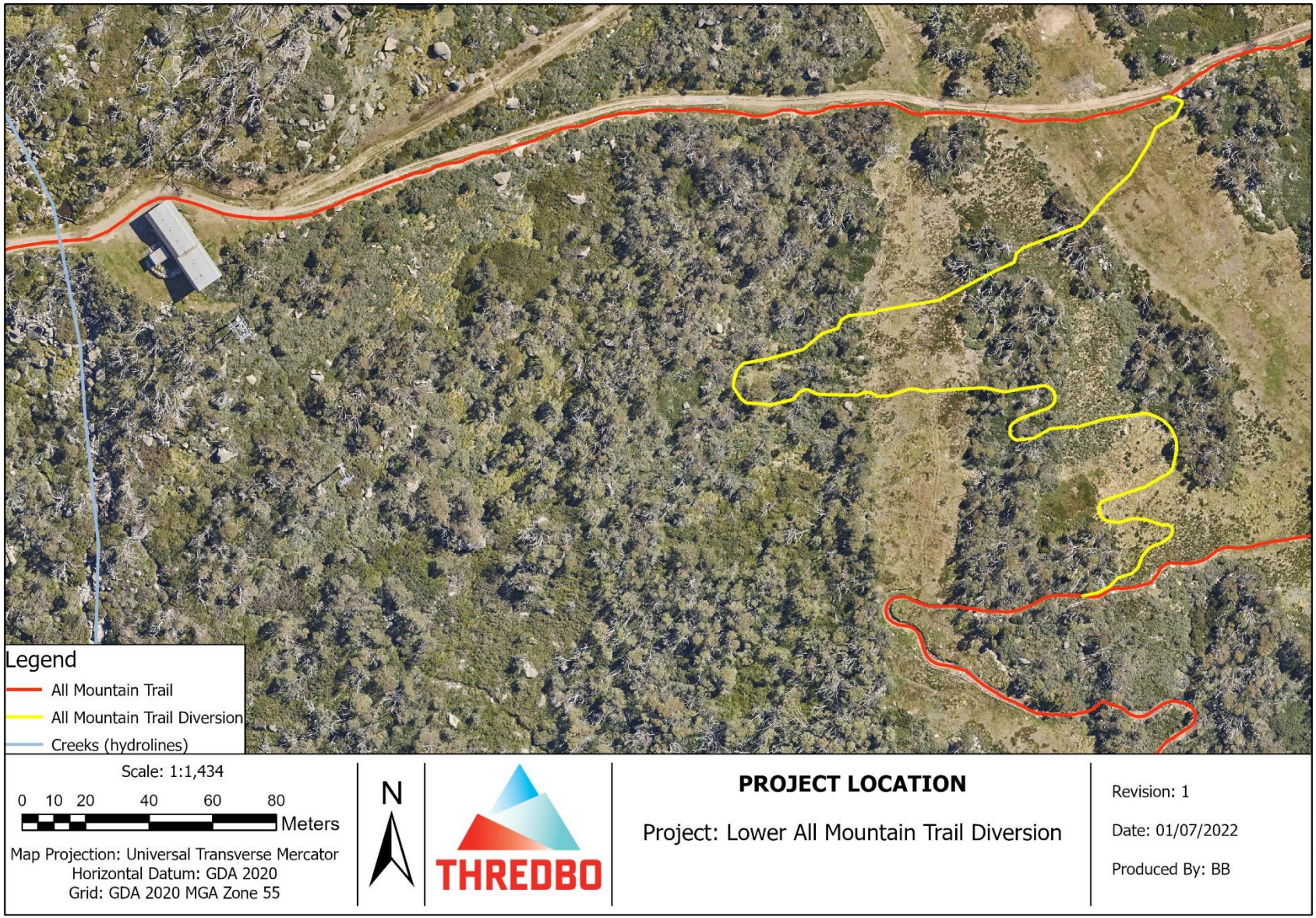

Figure 3: The proposal

2. Landscape features

The site-based method was applied for this assessment. As such, the assessment area is the 1,500 m buffer surrounding the outside edge of the development footprint.

The landscape features considered for this assessment are presented in Table 2, Figure 1 and Figure 2.

Table 2: Landscape features

Landscape feature	Development Site	Assessment Area	Data source
IBRA Region(s)	Australian Alps	Australian Alps	Interim Biogeographic Regionalisation for Australia, Version 7
IBRA subregion(s)	Snowy Mountains	Snowy Mountains	Interim Biogeographic Regionalisation for Australia, Version 7
Rivers and streams	Minor unmapped watercourses that are tributaries of Merritts Creek.	Minor unmapped watercourses that are tributaries of Merritts Creek	NSW LPI Waterway mapping
Estuaries and wetlands	No	No	NSW directory of important wetlands
Connectivity of different areas of habitat	The development site is connected to vast areas of native vegetation.	No	Aerial imagery
Geological features of significance and soil hazard features	The rock outcropping in the development site is very typical of the locality and not of any particular geological significance.	No	Site observation
Areas of Outstanding Biodiversity Value	No	No	Register of Declared Areas of Outstanding Biodiversity Value (DPIE 2020)
NSW (Mitchell) Landscapes	Main Range Subalpine	-	NSW (Mitchell) Landscapes - version 3.1 (DPIE 2016)
Percent (%) native vegetation extent	88	There are no substantial differences between the mapped vegetation extent and the aerial imagery	Calculated using aerial imagery and ArcGIS software

3. Native Vegetation

3.1. Survey Effort

Vegetation survey was undertaken within the development site by Ryan Smithers on 27 April 2022 (Figure 4).

One full-floristic vegetation plot was surveyed to identify Plant Community Types (PCTs) and Threatened Ecological Communities (TECs) on the development site (Table 3). One vegetation integrity survey plot was undertaken on the development site to assess the composition, structure and function components of each vegetation zone in accordance with the BAM. A second full-floristic and vegetation integrity plot that had been collected nearby by ELA for the Cruiser Blue project (ELA 2022) was used in the assessment.

All field data collected at full-floristic and vegetation integrity plots is included in Appendix B and Appendix C.

Table 3: Full-floristic PCT identification plots

PCT ID	PCT Name	Number of plots surveyed
645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	2

3.2. Native vegetation extent within the development site

There are no substantial differences between the extent of native vegetation within the development site as identified in recent aerial imagery and that identified during the vegetation survey.

3.3. Plant Community Types present

One PCT was identified within the development site as shown in Table 3. Further detail with respect to the PCTs identified within the development site is presented in Table 4, and their distribution identified in Figure 4.

Table 4: Plant Community Types

PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Area within the development site (ha)	Percent cleared
645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Subalpine Woodlands	Grassy Woodland	0.1	5

3.3.1. Plant Community Type selection justification

In determining the PCTs for the development site, various attributes were considered in combination to assign vegetation to the best fit PCT. Attributes included dominant species in each stratum and relative abundance, community composition, soils and landscape position. Reference was made to the PCT descriptions in the BioNet Vegetation Classification. There are only a small number of PCTs in the alpine and sub-alpine so there are very few PCT options, as shown in Table 5.

Table 5: Potential PCTs

Selected PCT ID	PCT Name	Other PCT options
645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	644

3.4. Threatened Ecological Communities

PCT 645 does not comprise any TEC which is listed on the BC Act or EPBC Act, as identified in Table 6. PCT 637, which occurs just beyond the development site comprises the *Montane Peatland and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions* endangered ecological community (EEC) (hereafter referred to as the Montane Peatland and Swamps), which is listed on the BC Act. It also comprises the *Alpine Sphagnum Bogs and Associated Fens* EEC (hereafter referred to as the Alpine Sphagnum Bogs and Associated Fens) which is listed on the EPBC Act. The proposed development has been designed to avoid impacts on these communities.

Table 6: Threatened Ecological Communities

PCT ID	BC Act			EPBC Act		
	Listing status	Name	Area (ha)	Listing status	Name	Area (ha)
645	Not listed	-	-	Not listed	-	-
637	Endangered	Endangered Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions	-	Endangered	Alpine Sphagnum Bogs and Associated Fens	-

3.5. Vegetation integrity assessment

3.5.1. Vegetation zones

Two vegetation zones were identified within the development site or immediate surrounds based on the broad condition states of PCT 645, as shown in Figure 5. A total of two vegetation integrity survey plots were collected within the development site or immediate surrounds, which is consistent with the BAM (Table 7). Descriptions of vegetation zones are provided in Table 8 and Table 9.

3.5.2. Patch size

Patch size was calculated using available vegetation mapping for all patches of intact native vegetation on and adjoining the development site. Patch size was assigned to one of four classes (<5 ha, 5-24 ha, 25-100 ha or ≥100 ha). A patch size ≥100 ha was determined for the development site.

3.5.3. Assessing vegetation integrity

A vegetation integrity assessment using the BAM Calculator (BAMC) was undertaken and the results are outlined in Table 10.

Table 7: Vegetation zones and vegetation integrity survey plots collected on the development site

Vegetation Zone	PCT ID	PCT Name	Condition	Area (ha)	Patch Size	Vegetation Integrity Survey Plots required	Vegetation Integrity Survey Plots collected
1	645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Good	0.05	101	1	1
2	645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Low	0.05	101	1	1
			Total	0.1	101	2	2

Table 8: Zone 1 PCT 645 Good Condition

645 - Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion			
Vegetation formation	Grassy Woodlands		
Vegetation Class	Subalpine Woodlands		
Conservation status	Widespread and well conserved. Not listed as a TEC on the BC Act or EPBC Act		
Description	This community is common in the locality but highly variable. It is poorly described by the current PCTs and associated benchmarks which don't well describe the variety of vegetation communities covered by PCT 645 and the variation in composition and structure values within "benchmark" occurrences.		
Characteristic canopy trees	*Eucalyptus niphophila*.		
Characteristic mid-storey	*Grevillea australis, Ozothamnus cupressoides*, *Prostanthera cuneata, Nematolepis ovatifolia, Ozothamnus secundiflorus, Ozothamnus alpinus, Olearia phlogopappa, Orites lancifolius, Oxylobium ellipticum.*		
Characteristic groundcovers	*Acaena novae-zelandiae , Asperula gunnii , Carex breviculmis, Lycopodium fastigiatum, Pimelea alpina, Poa fawcettiae, Polystichum proliferum, Senecio gunnii.*		
Mean native richness	22		
Exotic species / HTW cover	*Acetosella vulgaris*		
Condition	Good		
Variation and disturbance	PCT 645 is in good condition within the zone with minor variations in shrub cover.		
No. sites sampled	1		
Threatened flora species	-		
Fauna habitats	Broad-toothed Rat and Flame Robin.		
Composition	**Structure**	**Function**	**Vegetation Integrity Score**
64.8	89	49.5	65.9

Table 9: Zone 2 PCT 645 Low Condition

645 - Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion			
Vegetation formation	Grassy Woodlands		
Vegetation Class	Subalpine Woodlands		
Conservation status	Widespread and well conserved. Not listed as a TEC on the BC Act or EPBC Act		
Description	This community is common in the locality but highly variable. It is poorly described by the current PCTs and associated benchmarks which don't well describe the variety of vegetation communities covered by PCT 645 and the variation in composition and structure values within "benchmark" occurrences.		
Characteristic canopy trees	*Eucalyptus niphophila*.		
Characteristic mid-storey	*Grevillea australis, Ozothamnus cupressoides, Prostanthera cuneata, Nematolepis ovatifolia, Ozothamnus secundiflorus, Ozothamnus alpinus, Olearia phlogopappa, Orites lancifolius, Oxylobium ellipticum.*		
Characteristic groundcovers	*Acaena novae-zelandiae, Asperula gunnii, Carex breviculmis, Lycopodium fastigiatum, Pimelea alpina, Poa fawcettiae, Polystichum proliferum, Senecio gunnii.*		
Mean native richness	33		
Exotic species / HTW cover	*Acetosella vulgaris, Agrostis capillaris*		
Condition	Low		
Variation and disturbance	PCT 645 is in low condition within the zone and has been affected by historic and ongoing tree removal and pruning for ski slopes management and other disturbances which have resulted in considerable exotic grass cover.		
No. sites sampled	1		
Threatened flora species	-		
Fauna habitats	Broad-toothed Rat and Flame Robin.		
Composition	**Structure**	**Function**	**Vegetation Integrity Score**
65.1	79.5	15.4	43.1

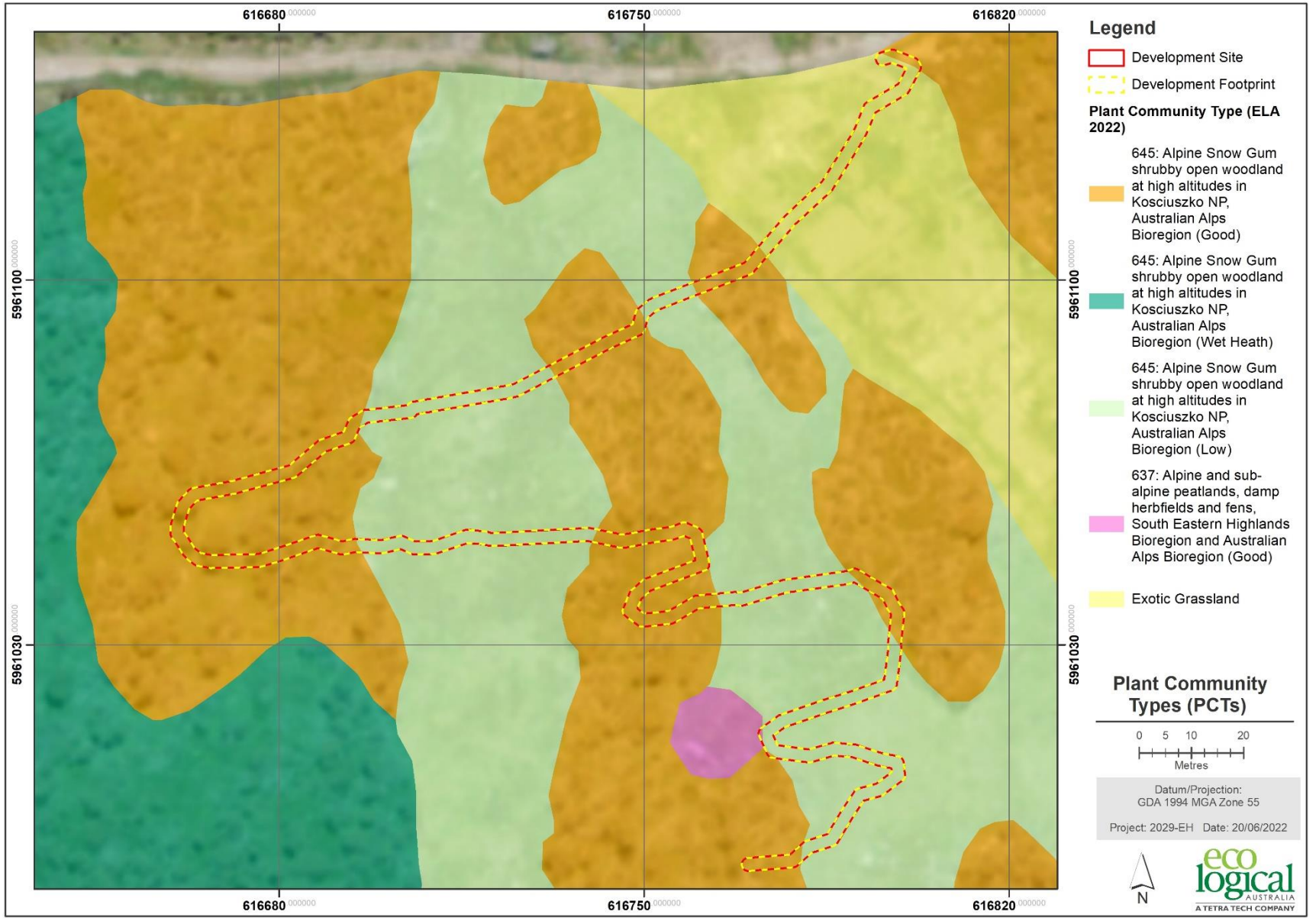

Figure 4: Plant Community Types

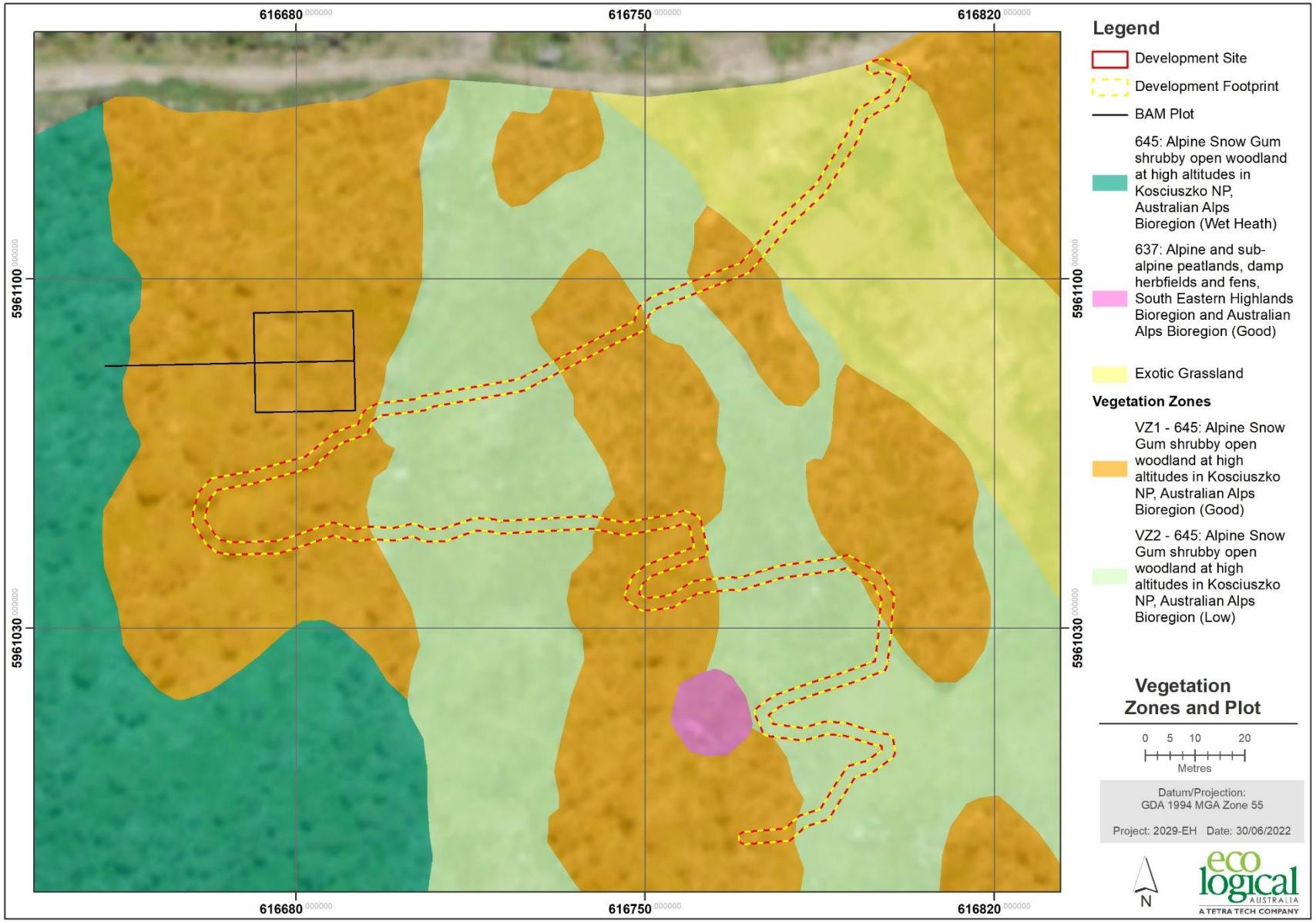

Figure 5: Vegetation Zones and Plots

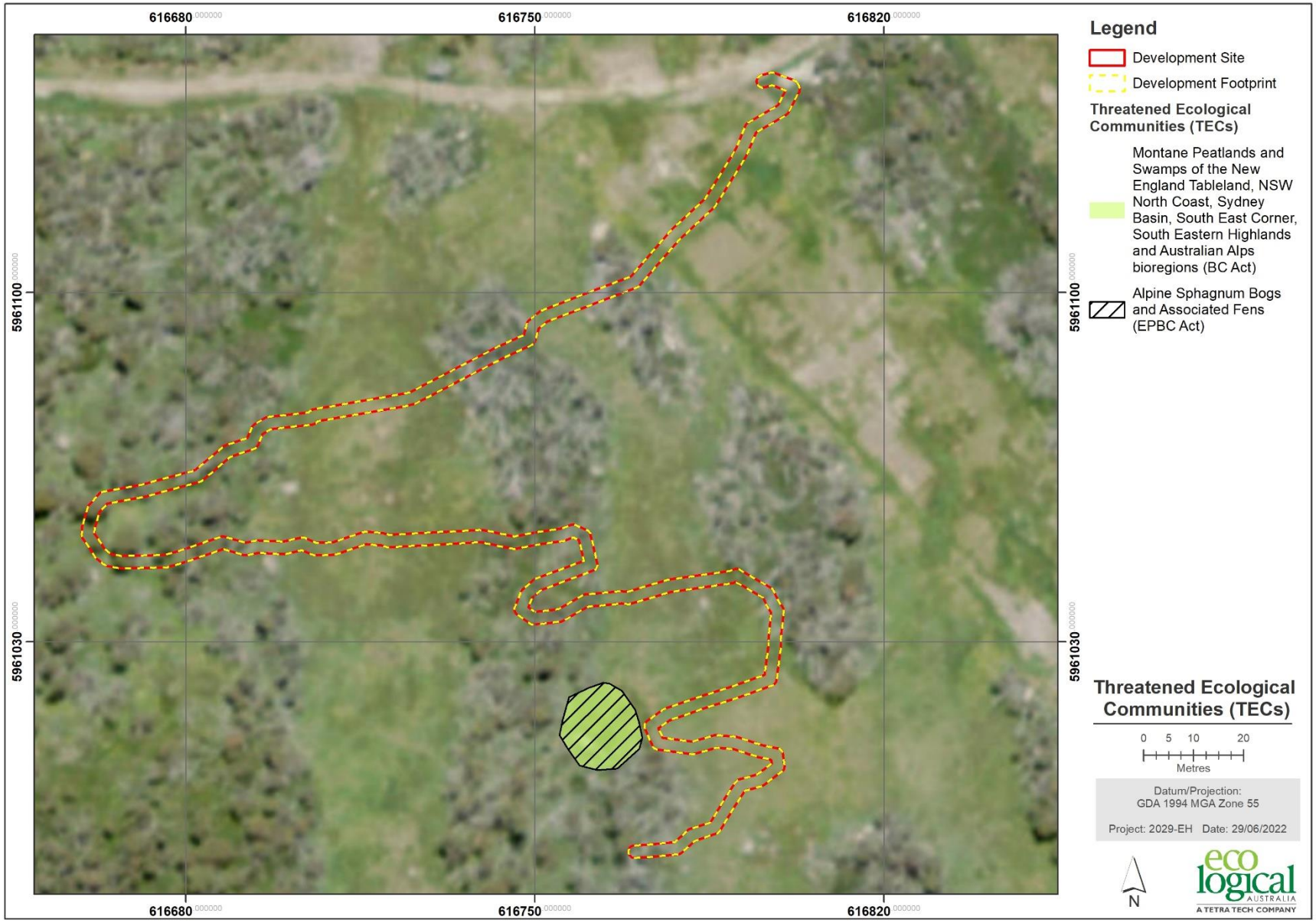

Figure 6: Threatened ecological communities

Table 10: Vegetation integrity scores

Veg Zone	PCT ID	Condition	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Presence of Hollow bearing trees	Current vegetation integrity score
1	645	Good	0.05	64.8	89	49.5	No	65.9
2	645	Low	0.05	65.1	79.5	15.4	No	43.1

3.6. Use of local data

Use of local data instead of benchmark integrity scores is not proposed.

4. Threatened species

4.1. Ecosystem credit species

Ecosystem credit species predicted to occur within the development site are generated by the BAMC following the input of VI data and the PCTs identified within Chapter 3. Ecosystem credit species predicted to occur at the development site, their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 11.

Table 11: Predicted ecosystem credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status
Artamus cyanopterus cyanopterus	Dusky Woodswallow	-	-	Moderate	Vulnerable	Not Listed
Callocephalon fimbriatum (foraging)	Gang-gang Cockatoo	-	-	Moderate	Vulnerable	Endangered
Daphoenositta chrysoptera	Varied Sittella	-	-	Moderate	Vulnerable	Not Listed
Falsistrellus tasmaniensis	Eastern False Pipistrelle	-	-	High	Vulnerable	Not Listed
Hieraaetus morphnoides (Foraging)	Little Eagle	-	-	Moderate	Vulnerable	Not Listed
Hirundapus caudacutus	White-throated Needletail	-	-	High	Not Listed	Vulnerable
Petroica boodang	Scarlet Robin	-	-	Moderate	Vulnerable	Not Listed
Petroica phoenicea	Flame Robin	-	-	Moderate	Vulnerable	Not Listed

4.2. Species credit species

4.2.1. Identification of species credit species

Species credit species that require further assessment within the development site (i.e. candidate species), their associated habitat constraints, geographic limitations and sensitivity to gain class are included in Table 12.

Table 12: Candidate species credit species

Species	Common Name	Habitat Constraints	Geographic limitations	Sensitivity to gain class	NSW listing status	EPBC Listing status
Liopholis guthega	Guthega Skink	Granite substrate and decomposing granite soils		High	Endangered	Endangered
Cyclodomorphus praealtus	Alpine She-oak Skink	-	-	High	Endangered	Endangered
Mastacomys fuscus	Broad-toothed Rat	-	-	High	Vulnerable	Vulnerable
Pseudophryne corroboree	Southern Corroboree Frog	NA/Swamps Within 200 m of high montane and sub-alpine bog or ephemeral pool environments	above 1000 m asl	Very High	Critically Endangered	Critically Endangered
Ranunculus anemoneus	Anemone Buttercup	Treeless vegetation above 1000 m in altitude	Above 1400 m	High	Vulnerable	Vulnerable

4.2.2. Assessment of habitat constraints and vagrant species

Justification for the exclusion of other candidate species credit species is provided in Table 13.

Table 13: Justification for exclusion of candidate species credit species

Species	Common Name	NSW listing status	EPBC Listing status	Sensitivity to gain class	Justification for exclusion of species
Liopholis guthega	Guthega Skink	Endangered	Endangered	High	The nearest records of the Guthega Skink are approximately 400 m to the west, above the Cruiser chairlift top station. The species has not been detected closer to the development footprint despite considerable survey effort by the author over that last decade in and around the Cruiser area.
Pseudophryne corroboree	Southern Corroboree Frog	Critically Endangered	Critically Endangered	Very High	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. It is considered highly unlikely that it would occur within the development site and it was not detected there opportunistically.

4.2.3. Candidate species requiring further assessment

Two species credit species required further assessment following site survey to assess the condition of the development site and the presence of microhabitats; *Mastacomys fuscus* (Broad-toothed Rat) and *Ranunculus anemoneus* (Anemone Buttercup).

4.3. Targeted surveys

The streamlined assessment method only requires targeted surveys for candidate SAII species. The development site does not meet the habitat constraints of any of the candidate species credit species that are candidate SAII species. Two species credit species, the Broad-toothed Rat and the Anemone Buttercup, were incidentally recorded within the development site or immediate surrounds and were added as candidate species.

Targeted surveys for relevant threatened species known from locality the were undertaken within the development site and immediate surrounds on the dates outlined in Table 14. Weather conditions during the targeted surveys are outlined in Table 15 and survey effort is outlined in Table 16.

Table 14: Targeted surveys

Date	Surveyors	Target species
27 April 2022	Ryan Smithers	Broad-toothed Rat and Anemone Buttercup

Table 15: Weather conditions

Date	Rainfall (mm)	Minimum temperature 0C	Maximum temperature 0C
27 April 2022	-	9	10

Table 16: Survey effort

Method	Habitat (ha)	Stratification units	Total effort	Target species
Targeted searches	Approx. 0.2 ha	Suitable habitats within and immediately surrounding the development site	2 person hours	Broad-toothed Rat
Targeted threatened flora searches	Approx. 0.2 ha	Suitable habitats within and immediately surrounding the development site	2 person hours	Anemone Buttercup

The characteristic scats of the Broad-toothed Rat were scattered in low densities throughout the development site and surrounds, as they are in suitable habitats throughout much of the locality.

The Guthega Skink was not detected within the development site or immediate surrounds during the field assessment. The nearest records of the Guthega Skink are approximately 1 are approximately 400 m to the west, above the Cruiser chairlift top station. It is considered unlikely that the species would occur within the development site, given that the species has not been detected closer to the development footprint, despite considerable survey effort by the author and others over that last decade in and around the Cruiser area.

Targeted surveys were not undertaken for the Southern Corroboree Frog given the absence of suitable habitats for the species, including suitable bog breeding habitat. The extant populations of this species are currently well known and heavily monitored.

The Alpine She-oak Skink was assumed to be present given the presence of potentially suitable habitat and the species' cryptic nature.

Following completion of field surveys, the species credit species included in the assessment are outlined in Table 17.

Table 17: Species credit species included in the assessment

Species	Common Name	Species presence	Geographic limitations	Habitat (ha) / count	Biodiversity Risk Weighting
Mastacomys fuscus	Broad-toothed Rat	Yes	-	0.1	2
Ranunculus anemoneus	Anemone Buttercup	Yes	-	5 individuals	2
Cyclodomorphus praealtus	Alpine She-oak Skink	Assumed present	-	0.1	2

4.3.1. Species credit species included in the assessment

Three species credit species, the Broad-toothed Rat, Anemone Buttercup and Alpine She-oak Skink, have been included in the assessment as the proposed development will impact on habitat for these species. Species polygons for the Broad-toothed Rat, Anemone Buttercup and Alpine She-oak Skink are included as Figure 7.

4.4. Identification of prescribed additional biodiversity impact entities

The proposed development does not include any prescribed additional biodiversity impact entities.

Figure 7: Species polygons

5. Avoiding and Minimising Impacts on Biodiversity Values

5.1. Locating a project to avoid and minimise impacts on biodiversity values

5.1.1. Direct and indirect impacts

The proposal has been designed to avoid and minimise direct and indirect impacts. In particular, this has involved:

- Locating the proposed trail predominately in disturbed areas.
- Minimising the disturbance footprint associated with construction.
- Changing the location of the trail to minimise impacts on less disturbed native vegetation.
- Changing the location of the trail to avoid wet areas.
- Designing and constructing the trail to avoid the need for mature tree removal.
- Using low impact construction methods.
- Undertaking post construction rehabilitation.

5.1.2. Prescribed biodiversity impacts

The proposal does not involve any prescribed biodiversity impacts.

5.2. Designing a project to avoid and minimise impacts on biodiversity values

5.2.1. Direct and indirect impacts

The proposal has been designed to avoid and minimise direct and indirect impacts on biodiversity values as described in Section 5.1.1.

5.2.2. Prescribed biodiversity impacts

Prescribed biodiversity impacts have been avoided and minimised by incorporating the design features identified in Section 5.1.1.

6. Assessment of Impacts

6.1. Direct impacts

The direct impacts of the development on:

- Native vegetation are outlined in Table 18.
- Threatened species and threatened species habitat is outlined in Table 19.
- Prescribed biodiversity impacts is outlined in Section 6.4.

Table 18: Direct impacts to native vegetation

PCT ID	PCT Name	BC Act listing	EPBC Act listing	Direct impact (ha)
645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Not listed	Not Listed	0.1

Table 19: Direct impacts on threatened species and threatened species habitat

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act listing status	EPBC Act Listing status
Mastacomys fuscus	Broad-toothed Rat	0.1	Vulnerable	Vulnerable
Ranunculus anemoneus	Anemone Buttercup	5 individuals	Vulnerable	Vulnerable
Cyclodomorphus praealtus	Alpine She-oak Skink	0.1	Endangered	Endangered

6.2. Change in vegetation integrity

The change in vegetation integrity as a result of the development is outlined in Table 20.

Table 20: Change in vegetation integrity

Veg Zone	PCT ID	Condition	Area (ha)	Current vegetation integrity score	Future vegetation integrity score	Change in vegetation integrity
1	645	Good	0.05	65.9	0	-65.9
2	645	Poor	0.05	43.1	0	-43.1

6.3. Indirect impacts

The indirect impacts of the development are outlined in Table 21. Given the nature of the proposed development, and the proposed mitigation measures, indirect impacts (in the form of increased light and wind penetration) are only anticipated to extend a maximum of 5 m into vegetation surrounding the proposed development site. Indirect impact zones are shown on Figure 8.

6.4. Prescribed biodiversity impacts

The proposal does not involve any prescribed biodiversity impact.

Figure 8: Indirect impact zones

Table 21: Indirect impacts

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Sedimentation and contaminated and/or nutrient rich run-off	Construction and post construction	Minor potential for sedimentation during and immediately post-construction. However, the proposed sediment control measures have been effective during the many other similar developments that have been undertaken within the alpine resorts in recent years.	Minor	During and after any heavy rainfall	12 month maximum	Intermittently during and post construction phase
Noise, dust or light spill	Construction	Minor during construction.	Minor	Intermittently during construction phase	During construction	Intermittently during construction phase
Inadvertent impacts on adjacent habitat or vegetation	Construction	Minor. The construction methods used at Thredbo have been effective at preventing impacts on adjacent vegetation during the many other similar developments that have been undertaken in recent years.	Minor	Not expected, but possible	During construction	Not expected
Transport of weeds and pathogens from the site to adjacent vegetation	Construction	Not expected. The development site includes and abuts areas that are already heavily modified and which support weeds which are common within the Thredbo Resort area and elsewhere within the NSW Alps. The proposal will include post construction rehabilitation and weed control.	Not expected	Not expected, but possible	Not expected	Not expected
Vehicle strike	Construction	Minor. It is considered unlikely that the proposal will include vehicle strike impacts. Vehicles will be travelling at very slow speeds within the development site and the noise and vibration associated with vehicle movements is expected to deter any fauna within or adjoining the development site from the path of any vehicles.	Not expected	Not expected, but possible	During construction	Not expected
Trampling of threatened flora species	Construction	Minor. There are no threatened flora species within the development site.	Minor	Not expected	During construction	Not expected
Rubbish dumping	Construction	Not expected. Construction materials will be removed from the site regularly and no rubbish will be dumped or otherwise left to pollute the surrounding environment.	Not expected	Not expected	Not expected	Not expected
Wood collection	Construction	Not expected.	Not expected	Not expected	Not expected	Not expected

Indirect impact	Project phase	Nature	Extent	Frequency	Duration	Timing
Bush rock removal and disturbance	Construction	Minor. A relatively small amount of rock will be removed as part of the development. No additional indirect impacts are expected.	Minor	Intermittently during construction phase	During construction	Intermittently during construction phase
Increase in predatory species populations	Construction and post construction	Not expected. The proposed development occurs on the edge of an already disturbed area and will not increase the populations of predatory species such as foxes and cats.	Not expected	Not expected	Not expected	Not expected
Increase in pest animal populations	Construction and post construction	Not expected.	Not expected	Not expected	Not expected	Not expected
Increased risk of fire	Construction	Minor potential for increased risk of fire during construction.	Minor	Intermittently during construction phase	During construction	Intermittently during construction phase
Disturbance to specialist breeding and foraging habitat, e.g. beach nesting for shorebirds	Construction and post construction	Not expected as none as none are known to be present.	Not expected	Not expected	Not expected	Not expected

6.5. Mitigating and managing direct and indirect impacts

Measures proposed to mitigate and manage impacts at the development site before, during and after construction are outlined in Table 22.

6.6. Mitigating prescribed impacts

The development does not have any prescribed biodiversity impacts.

6.7. Adaptive management strategy

This section is required for those impacts that are infrequent, cumulative or difficult to predict. Impacts associated with the proposed development have been considered extensively and addressed in Section 5 and Section 6. Further consideration of infrequent, cumulative or difficult to predict impacts is not considered to be necessary.

Table 22: Measures proposed to mitigate and manage impacts

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Displacement of resident fauna	Medium	Low	If any active wombat burrows are detected in close proximity to the trail alignment during the construction phase, then the trail should be realigned to avoid the burrow	Fauna within the disturbance footprint should move and thus any injury to fauna species during construction should be avoided	During construction	Thredbo
Timing works to avoid critical life cycle events such as breeding or nursing	Low	Low	None proposed.	NA	NA	NA
Instigating clearing protocols including pre-clearing surveys, daily surveys and staged clearing, the presence of a trained ecologist or licensed wildlife handler during clearing events	Low	Low	None proposed.	NA	NA	NA
Clearing protocols that identify vegetation to be retained, prevent inadvertent damage and reduce soil disturbance; for example, removal of native vegetation by chainsaw, rather than heavy machinery, is preferable in situations where partial clearing is proposed	Medium	Low	Identify with flagging tape the trail alignment where it encroaches upon relatively undisturbed native vegetation, prior to construction	Risk of disturbance beyond proposed disturbance corridor is reduced	Prior to construction	Thredbo
Sediment barriers or sedimentation ponds to control the quality of water released from the site into the receiving environment	Medium	Low	Sediment control measures as necessary such as fencing and hay bales	Risk of sedimentation of water quality impacts substantially reduced	During and post-construction	Thredbo
Noise barriers or daily/seasonal timing of construction and operational activities to reduce impacts of noise	Low	Low	Restrict work to daylight hours	Noise impacts mitigated	During construction	Thredbo
Light shields or daily/seasonal timing of construction and operational activities to reduce impacts of light spill	Low	Low	Restrict work to daylight hours	Light impacts mitigated	During construction	Thredbo
Adaptive dust monitoring programs to control air quality	Low	Low	None proposed	NA	NA	NA

Measure	Risk before mitigation	Risk after mitigation	Action	Outcome	Timing	Responsibility
Programming construction activities to avoid impacts; for example, timing construction activities for when migratory species are absent from the site, or when particular species known to or likely to use the habitat on the site are not breeding or nesting	Low	Low	None proposed	NA	NA	NA
Temporary fencing to protect significant environmental features such as riparian zones	Low	Low	The trail alignment will be delineated with flagging tape where it encroaches upon relatively undisturbed native vegetation	Protection of vegetation and habitats beyond the disturbance footprint	Prior to and during construction	Thredbo
Hygiene protocols to prevent the spread of weeds or pathogens between infected areas and uninfected areas	Medium	Low	Any machinery or vehicles involved with the proposed works that are not owned by Thredbo will be washed down to remove all soil and vegetative matter before entering the site to limit spread of weeds and disease such as *Phytophthora cinnamomi*	Risk of weed or pathogen spread substantially reduced	Prior to and during construction	Thredbo
Staff training and site briefing to communicate environmental features to be protected and measures to be implemented	Medium	Low	Brief all workers as to limit of disturbance footprint and other environmental safeguards	Risk of disturbance beyond proposed disturbance corridor is reduced	Prior to and during construction as necessary	Thredbo
Making provision for the ecological restoration, rehabilitation and/or ongoing maintenance of retained native vegetation habitat on or adjacent to the development footprint	Medium	Low	Post construction rehabilitation consistent with standard Thredbo rehabilitation strategies	Post construction vegetation within the development footprint with high medium-term recovery potential	Immediately post construction	Thredbo
Monitoring	Low	Low	None proposed	NA	NA	NA

7. Impact summary

Following implementation of the BAM and the BAMC, the following impacts have been determined.

7.1. Serious and Irreversible Impacts (SAII)

The development does not have any Serious and Irreversible Impacts (SAII).

7.2. Impacts requiring offsets

The impacts of the development requiring offset for native vegetation are outlined in Table 23 and shown on Figure 9. The impacts of the development requiring offset for species credit species and their habitats are outlined in Table 24 and on Figure 9.

Table 23: Impacts to native vegetation that require offsets

Vegetation Zone	PCT ID	PCT Name	Vegetation Class	Vegetation Formation	Direct impact (ha)
1	645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Subalpine Woodlands	Grassy Woodlands	0.05
2	645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Subalpine Woodlands	Grassy Woodlands	0.05

Table 24: Impacts on threatened species and threatened species habitat that require offsets

Species	Common Name	Direct impact number of individuals / habitat (ha)	BC Act listing status	EPBC Act Listing status
Mastacomys fuscus	Broad-toothed Rat	0.1	Vulnerable	Vulnerable
Ranunculus anemoneus	Anemone Buttercup	5 individuals	Vulnerable	Vulnerable
Cyclodomorphus praealtus	Alpine She-oak Skink	0.1	Endangered	Endangered

7.3. Impacts not requiring offsets

All the impacts of the development on native vegetation and on the Broad-toothed Rat, Anemone Buttercup and Alpine She-oak Skink require offsets. The impacts of the proposed development on non-native vegetation do not require offsets. Those impacts that do not require offsets area shown in Figure 10.

7.4. Areas not requiring assessment

No parts of the proposed development do not require assessment.

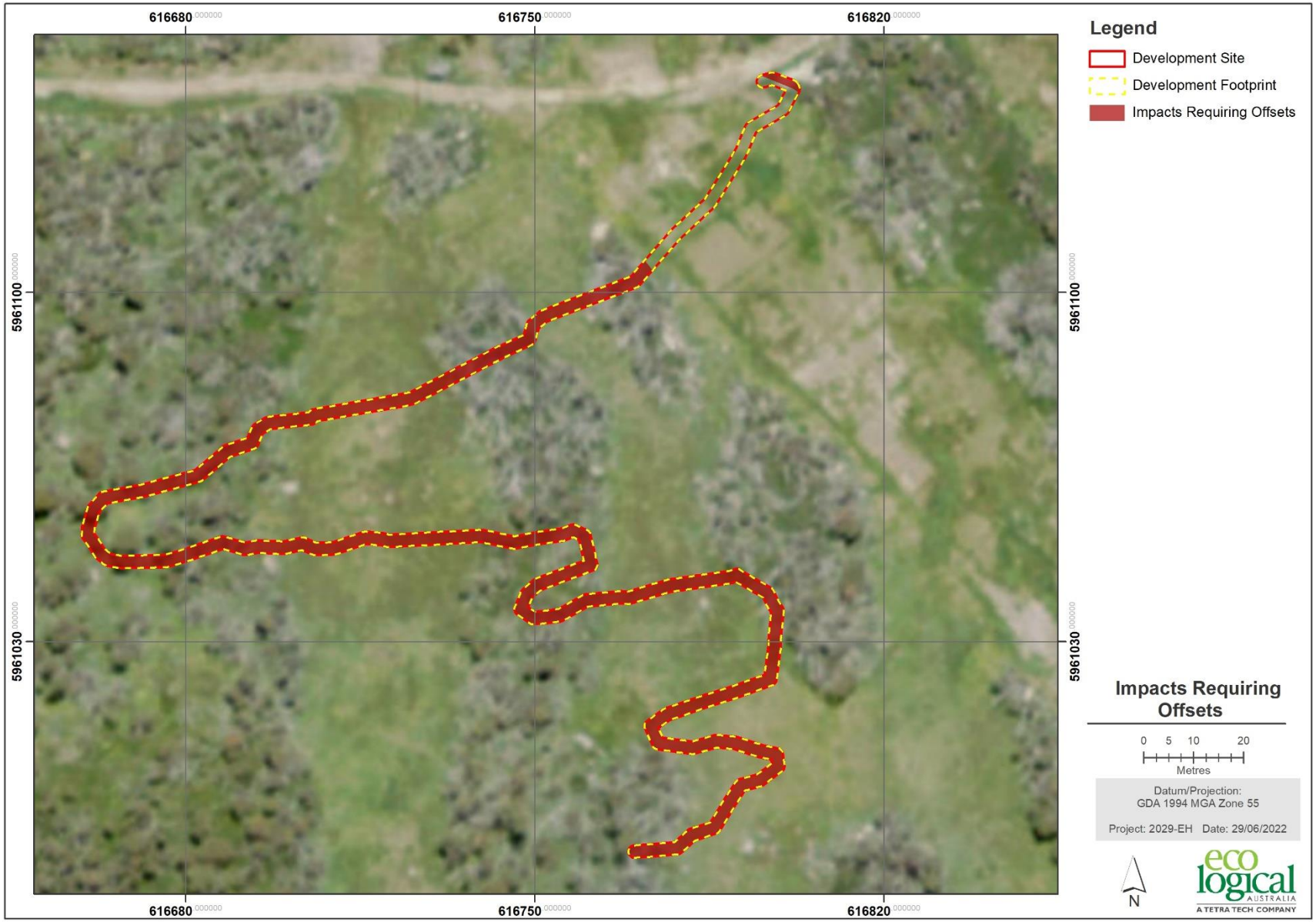

Figure 9: Impacts requiring offset

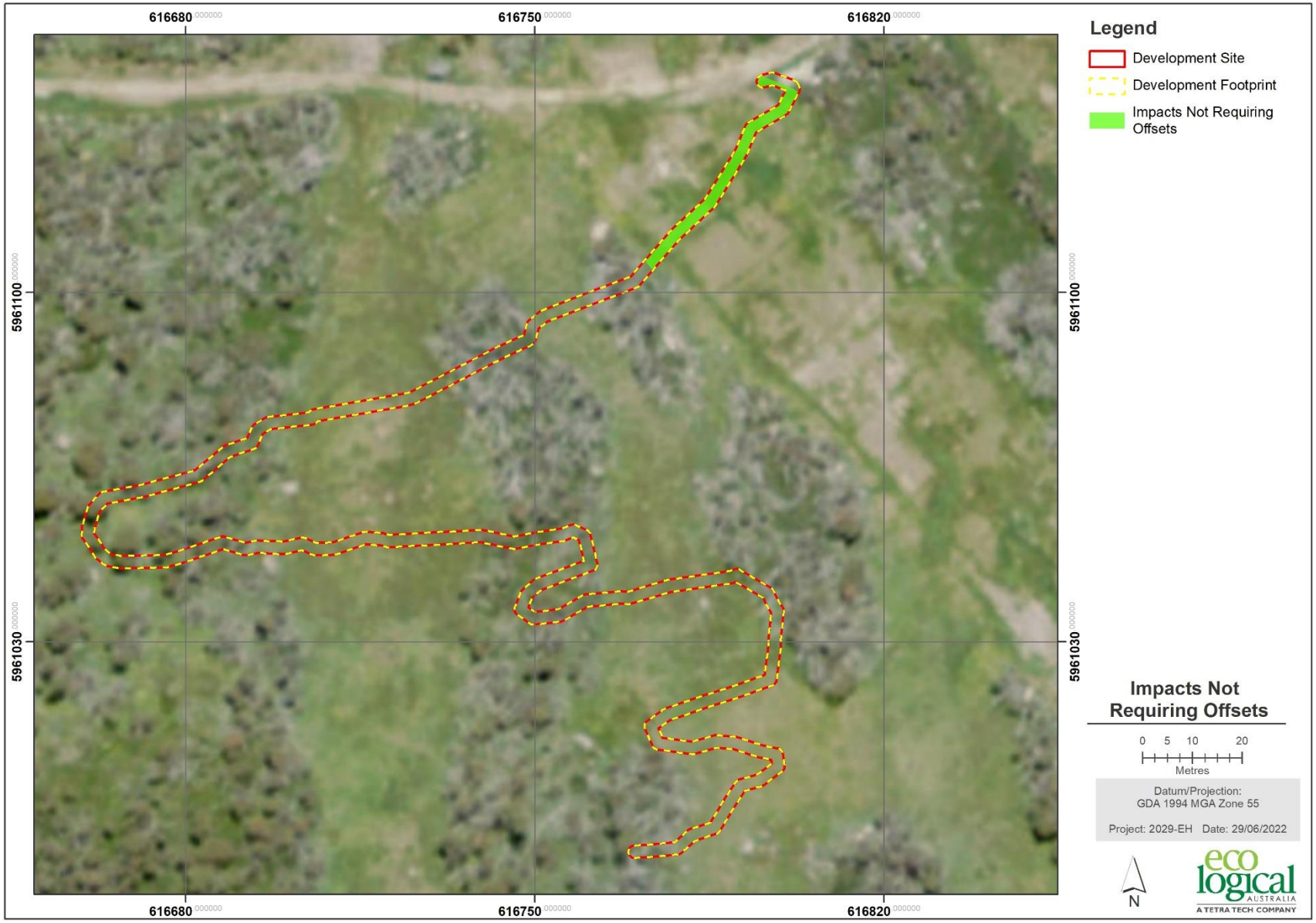

Figure 10: Impacts not requiring offset

7.5. Credit summary

The number of ecosystem credits required for the development are outlined in Table 25.

The number of species credits required for the development are outlined in Table 26.

A biodiversity credit report is included in Appendix F.

Table 25: Ecosystem credits required

Vegetation Zone	PCT ID	PCT Name	Condition	Credit Class	Direct impact (ha)	Credits required
1	645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Good	Grassy Woodlands	0.05	1
2	645	Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Low	Grassy Woodlands	0.05	1

Table 26: Species credit summary

Species	Common Name	Direct impact number of individuals / habitat (ha)	Credits required
Mastacomys fuscus	Broad-toothed Rat	0.1	3
Ranunculus anemoneus	Anemone Buttercup	5 individuals	10
Cyclodomorphus praealtus	Alpine She-oak Skink	0.1	3

8. Consistency with legislation and policy

8.1. Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

An impact assessment under the EPBC Act was undertaken on MNES known to occur within the development footprint or immediate surrounds or with potential to occur there. These MNES were:

- Alpine She-oak Skink
- Broad-toothed Rat
- Anemone Buttercup.

The outcome of this assessment was that it is highly unlikely that the development would significantly impact on those MNES assessed (Appendix D).

A referral to the Commonwealth under the EPBC Act is not recommended.

9. Recommendations

To further ameliorate the potential impacts of the proposed development and to improve environmental outcomes, the following recommendations for impact mitigation and amelioration are suggested as modifications to the proposal and/or as conditions of consent.

- The mitigation measures identified in Table 22 should be incorporated into the proposal.

10. Conclusion

Eco Logical Australia Pty Ltd was engaged by Kosciuszko Thredbo Pty Ltd to prepare a BDAR for the proposed construction of a new mountain bike trail and associated works in the Cruiser ski area and associated Cruiser Chairlift, within Thredbo Alpine Resort.

This report has been prepared to meet the requirements of the BAM 2020 established under Section 6.7 of the BC Act.

This BDAR outlines the measures taken to avoid, minimise and mitigate impacts to the vegetation and habitats present within the development footprint during the design, construction and operation of the development. The residual unavoidable impacts of the proposed development were calculated in accordance with the BAM by utilising the BAMC. The BAMC calculated that a total of two ecosystem credits and 16 species credits are required to offset the unavoidable impacts to the vegetation and fauna habitats present within the development footprint.

SAII values have been considered as part of this assessment. The proposal will not result in any SAII.

Following consideration of the administrative guidelines for determining significance under the EPBC Act, it is concluded that the proposal is unlikely to have a significant impact on MNES or Commonwealth land, and a referral to the Commonwealth Environment Minister is therefore not recommended.

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Appendix A - Definitions

The following terminology has been used throughout this report for the purposes of describing the impacts of the proposal in the context of a biodiversity assessment in accordance with the NSW Biodiversity Assessment Method 2020. This terminology may or may not align with other technical documents associated with the proposed development.

Terminology	Definition
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified, or that sets out the number and class of biodiversity credits that are created at a biodiversity stewardship site.
BioNet Atlas	The BioNet Atlas (formerly known as the NSW Wildlife Atlas) is the OEH database of flora and fauna records. The Atlas contains records of plants, mammals, birds, reptiles, amphibians, some fungi, some invertebrates (such as insects and snails) and some fish.
Broad condition state	Areas of the same PCT that are in relatively homogenous condition. Broad condition is used for stratifying areas of the same PCT into a vegetation zone for the purpose of determining the vegetation integrity score.
Connectivity	The measure of the degree to which an area(s) of native vegetation is linked with other areas of vegetation.
Credit Calculator	The computer program that provides decision support to assessors and proponents by applying the BAM, and which calculates the number and class of biodiversity credits required to offset the impacts of a development or created at a biodiversity stewardship site.
Development	Has the same meaning as development at section 4 of the EP&A Act, or an activity in Part 5 of the EP&A Act. It also includes development as defined in section 115T of the EP&A Act.
Development footprint	The area of land that is directly impacted on by a proposed development, including access roads, and areas used to store construction materials.
Development site	An area of land that is subject to a proposed development that is under the EP&A Act.
Ecosystem credits	A measurement of the value of EECs, CEECs and threatened species habitat for species that can be reliably predicted to occur with a PCT. Ecosystem credits measure the loss in biodiversity values at a development site and the gain in biodiversity values at a biodiversity stewardship site.
Extent of occurrence (EOO)	Measures the spatial spread of a taxon to determine the degree to which risks from threatening factors could impact an entire population, and is not intended to be an estimate of the amount of occupied or potential habitat.
High threat exotic plant cover	Plant cover composed of vascular plants not native to Australia that if not controlled will invade and outcompete native plant species.
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the minimum entrance width is at least 5 cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1 m above the ground. Trees must be examined from all angles.
Important wetland	A wetland that is listed in the Directory of Important Wetlands of Australia (DIWA) and SEPP 14 Coastal Wetlands.
Linear shaped development	Development that is generally narrow in width and extends across the landscape for a distance greater than 3.5 kilometres in length.
Local population	The population that occurs in the study area. In cases where multiple populations occur in the study area or a population occupies part of the study area, impacts on each subpopulation must be assessed separately.
Local wetland	Any wetland that is not identified as an important wetland (refer to definition of Important wetland).

Terminology	Definition
NSW (Mitchell) landscape	Landscapes with relatively homogeneous geomorphology, soils and broad vegetation types, mapped at a scale of 1:250,000.
Multiple fragmentation impact development	Developments such as wind farms and coal seam gas extraction that require multiple extraction points (wells) or turbines and a network of associated development including roads, tracks, gathering systems/flow lines, transmission lines.
Operational Manual	The Operational Manual published from time to time by DPIE, which is a guide to assist assessors when using the BAM.
Patch size	An area of intact native vegetation that: a) occurs on the development site or biodiversity stewardship site, and b) includes native vegetation that has a gap of less than 100 m from the next area of native vegetation (or ≤30 m for non-woody ecosystems). Patch size may extend onto adjoining land that is not part of the development site or stewardship site.
Proponent	A person who intends to apply for consent to carry out development or for approval for an activity.
Reference sites	The relatively unmodified sites that are assessed to obtain local benchmark information when benchmarks in the Vegetation Benchmarks Database are too broad or otherwise incorrect for the PCT and/or local situation. Benchmarks can also be obtained from published sources.
Regeneration	The proportion of over-storey species characteristic of the PCT that are naturally regenerating and have a diameter at breast height <5 cm within a vegetation zone.
Residual impact	An impact on biodiversity values after all reasonable measures have been taken to avoid, minimise or mitigate the impacts of development. Under the BAM, an offset requirement is determined for the remaining impacts on biodiversity values.
Retirement of credits	The purchase and retirement of biodiversity credits from an already-established biobank site or a biodiversity stewardship site secured by a biodiversity stewardship agreement.
Riparian buffer	Riparian buffers applied to water bodies in accordance with the BAM.
Sensitive biodiversity values land map	Development within an area identified on the map requires assessment using the BAM.
Site attributes	The matters assessed to determine vegetation integrity. They include: native plant species richness, native over-storey cover, native mid-storey cover, native ground cover (grasses), native ground cover (shrubs), native ground cover (other), exotic plant cover (as a percentage of total ground and mid-storey cover), number of trees with hollows, proportion of over-storey species occurring as regeneration, and total length of fallen logs.
Site-based development	A development other than a linear shaped development, or a multiple fragmentation impact development.
Species credits	The class of biodiversity credits created or required for the impact on threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject land	Is land to which the BAM is applied in Stage 1 to assess the biodiversity values of the land. It includes land that may be a development site, clearing site, proposed for biodiversity certification or land that is proposed for a biodiversity stewardship agreement.
Threatened Biodiversity Data Collection	Part of the BioNet database, published by DPIE and accessible from the BioNet website.
Threatened species	Critically Endangered, Endangered or Vulnerable threatened species as defined by Schedule 1 of the BC Act, or any additional threatened species listed under Part 13 of the EPBC Act as Critically Endangered, Endangered or Vulnerable.

Terminology	Definition
Vegetation Benchmarks Database	A database of benchmarks for vegetation classes and some PCTs. The Vegetation Benchmarks Database is published by OEH and is part of the BioNet Vegetation Classification.
Vegetation zone	A relatively homogenous area of native vegetation on a development site, land to be biodiversity certified or a biodiversity stewardship site that is the same PCT and broad condition state.
Wetland	An area of land that is wet by surface water or ground water, or both, for long enough periods that the plants and animals in it are adapted to, and depend on, moist conditions for at least part of their life cycle. Wetlands may exhibit wet and dry phases and may be wet permanently, cyclically or intermittently with fresh, brackish or saline water.
Woody native vegetation	Native vegetation that contains an over-storey and/or mid-storey that predominantly consists of trees and/or shrubs.

Appendix B - Vegetation Floristic Plot Data

Table 27: Species recorded in the plots and incidentally elsewhere within the development site or immediate surrounds.

Family	Species	Common Name	Listing Status	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
							Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Rosaceae	*Acaena* sp.	Sheep's Burr	-			Forb (FG)	g	0.1	3	g	2	50
Polygonaceae	*Acetosella vulgaris*	Sheep Sorrel	-	Yes	Yes	-	g	0.1	10	g	0.1	100
Apiaceae	*Aciphylla simplicifolia*	Mountain Aciphyll	-			Forb (FG)				g	0.1	2
Poaceae	*Agrostis capillaris*	Browntop Bent	-	Yes	Yes	-				g	0.1	20
Rubiaceae	*Asperula gunnii*	Mountain Woodruff	-			Forb (FG)	g	0.2	20	g	0.1	20
Myrtaceae	*Baeckea gunniana*	Alpine Baeckea	-			Shrub (SG)				m	1	5
Cyperaceae	*Carex breviculmis*		-			Grass & grasslike (GG)				g	0.1	50
Cyperaceae	*Carex inversa*	Knob Sedge	-			Grass & grasslike (GG)				g	0.1	20
Asteraceae	*Celmisia pugioniformis*		-			Forb (FG)	g	0.1	20	g	1	100
Poaceae	*Chionochloa frigida*	Robust Wallaby Grass	-			Grass & grasslike (GG)		0		g	6	50
Asteraceae	*Coronidium scorpioides*	Button Everlasting	-			Forb (FG)				g	3	500
Asteraceae	*Craspedia aurantia*		-			Forb (FG)				g	0.1	20
Poaceae	*Deyeuxia crassiuscula*		-			Grass & grasslike (GG)				g	0.1	20
Phormiaceae	*Dianella tasmanica*		-			Forb (FG)	g	0.1	5			
Restionaceae	*Empodisma minus*		-			Grass & grasslike (GG)				g	2	100
Ericaceae	*Epacris paludosa*	Swamp Heath	-			Shrub (SG)				m	1	5
Myrtaceae	*Eucalyptus niphophila*		-			Tree (TG)	u	25	20	m	3	20

Family	Species	Common Name	Listing Status	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
							Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Geraniaceae	*Geranium potentilloides* var. *potentilloides*		-			Forb (FG)	g	0.1	1			
Haloragaceae	*Gonocarpus montanus*		-			Forb (FG)	g	0.1	5	m	6	50
Fabaceae (Faboideae)	*Hovea montana*		-			Shrub (SG)	m	10	100			
Apiaceae	*Hydrocotyle algida*	Pennywort	-	Yes		-	g	0.1	1			
Asteraceae	*Olearia phlogopappa*		-			Shrub (SG)	m	5	100	g	3	100
Fabaceae (Faboideae)	*Oxylobium ellipticum*	Common Shaggy Pea	-			Shrub (SG)	g	3	50	g	8	100
Asteraceae	*Ozothamnus secundiflorus*	Cascade Everlasting	-			Shrub (SG)	m	30	50	m	15	10
Thymelaeaceae	*Pimelea alpina*		-			Shrub (SG)	g	0.1	5	g	0.1	20
Thymelaeaceae	*Pimelea ligustrina* subsp. *ciliata*						m	0.5	20			
Poaceae	*Poa fawcettiae*	Smooth Blue Snowgrass	-			Grass & grasslike (GG)	g	40	2000	g	20	1000
Podocarpaceae	*Podocarpus lawrencei*	Mountain Plum Pine	-			Shrub (SG)	m	2	10			
Dryopteridaceae	*Polystichum proliferum*	Mother Shield Fern	-			Fern (EG)	g	0.1	1	g	0.2	20
Lamiaceae	*Prostanthera cuneata*	Alpine Mint-bush	-			Shrub (SG)	m	15	50	g	0.1	10
Asteraceae	*Senecio gunnii*		-			Forb (FG)	g	0.1	1	g	0.1	5
Sphagnaceae	*Sphagnum cristatum*		-			-	g	0.1	2	g	0.1	2
Caryophyllaceae	*Stellaria pungens*	Prickly Starwort	-			Forb (FG)	g	0.2	20			

Family	Species	Common Name	Listing Status	Exotic	High Threat Weed	Growth Form Group	Plot 1			Plot 2		
							Stratum & Layer	Cover	Abundance	Stratum & Layer	Cover	Abundance
Winteraceae	*Tasmannia xerophila* subsp. *xerophila*	Alpine Pepperbush	-			Shrub (SG)	g	0.1	1	g	0.1	1

Appendix C - Vegetation Integrity Plot Data

Table 28: Plot location data

Plot no.	PCT	Condition	Easting	Northing	Bearing
1	645	Good	616692	5961085	240
2	645	Low	616811	5961599	150

Table 29: Vegetation integrity data (composition)

Composition (number of species)						
Plot	Tree	Shrub	Grass	Forb	Fern	Other
1	1	9	1	10	1	0
2	1	5	4	11	0	0

Table 30: Vegetation integrity data (Structure)

Structure (Total cover)						
Plot	Tree	Shrub	Grass	Forb	Fern	Other
1	25.0	65.7	45.0	1.2	0.1	0
2	0.5	38	45.4	9.1	0	0

Table 31: Vegetation integrity data (Function)

Function											
Plot	Large Trees	Hollow trees	Litter Cover	Length Fallen Logs	Tree Stem 5-9	Tree Stem 10-1 9	Tree Stem 20-29	Tree Stem 30-49	Tree Stem 50-79	Tree Regen	High Threat Weed Cover
1	0	0	29	40	1	1	1	0	0	1	0.1
2	0	0	7	0	0	0	0	0	0	1	1.5

Appendix D - EPBC Act Significant Impact Criteria

The EPBC Act Administrative Guidelines on Significance (DoE 2013) 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
- 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.

The Commonwealth listed species which are known or considered to have the potential to occur within the study area are the:

- Alpine She-oak Skink
- Broad-toothed Rat.

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

Matters to be considered	Impact
Any environmental impact on a World Heritage Property or National Heritage Places	No. The proposed action does not impact on a World Heritage Property or a National Heritage Place - (listed natural: Australian Alpine National Parks and Reserves; nominated historic: Snowy Mountains Scheme NSW).
Any environmental impact on Wetlands of International Importance	No. The proposal will not affect any part of a wetland of international importance.
Any impact on Commonwealth Listed Critically Endangered or Endangered Species;	Yes. The study area does provide potential habitat for the following Commonwealth listed endangered species: Alpine She-oak Skink. 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. The impacts associated with the proposed action will result in the removal of only a very small area (0.1 ha) of potential habitat for the Alpine She-oak Skink. It is considered highly unlikely that the proposed works would result in injury or death of any Alpine She-oak Skink individuals as the disturbances associated with the proposed works are likely to temporarily deter any individuals from using the locations where works are being undertaken, and there is adequate alternative habitat available for individuals to use. Under these circumstances, it is considered highly unlikely that the proposed action will lead to a long-term decrease in the size of the Alpine She-oak Skink population. b. reduce the area of occupancy of the species. The proposed action will be limited to the removal of a very small (0.1 ha) amount of vegetation in the context of the extent of this resource in the locality and is highly unlikely to affect any key

Matters to be considered	Impact
	habitat resources for the Alpine She-oak Skink; nor affect its ability to access habitats within or beyond the development site. Under these circumstances, the proposed action is highly unlikely to reduce the area of occupancy of the local population of the Alpine She-oak Skink. c. fragment an existing population into two or more populations The proposed action will be limited to the removal of a very small (0.1 ha) amount of vegetation and rocks in the context of the extent of these resources in the locality and is highly unlikely to affect any key habitat resources for the Alpine She-oak Skink; nor affect its ability to access habitats within or beyond the development site. Under these circumstances, the proposed action will not fragment an existing population of the Alpine She-oak Skink 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 Alpine She-oak Skink. 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. There is sufficient retained habitat such that individuals can continue to survive. e. disrupt the breeding cycle of a population It is possible although unlikely that the Alpine She-oak Skink may breed within the development site. However, any local population of these species is highly unlikely to be limited to the development site, which represents only a very small proportion of the potential habitat available to the species in the locality and so breeding can proceed as normal in the other available areas. Under these circumstances, it is highly unlikely that the proposed action would disrupt the breeding cycle of a population of the Alpine She-oak Skink. 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 potential habitat for the Alpine She-oak Skink, but this area is unlikely to be important to these 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 Alpine She-oak Skink 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 Alpine She-oak Skink. Species such as cats or foxes are already present in the landscape and are subject to control programs within the resort. h. introduce disease that may cause the species to decline The proposed action is unlikely to introduce disease that may cause the Alpine She-oak Skink 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 Alpine She-oak Skink is unlikely to be adversely impacted.
Any impact on Commonwealth Listed Vulnerable Species;	Yes. The study area provides known habitat for two Commonwealth listed vulnerable species: the Broad-toothed Rat and the Anemone Buttercup. 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 known Broad-toothed Rat habitat, it will affect only a very small amount (0.1 ha) of the potential habitat for the species in the immediate area. As such, the proposed works are 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

Matters to be considered	Impact
	which could isolate individuals or a population of the Broad-toothed Rat. The noise and vibration associated with the proposed works 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 killed during the implementation of the proposed action. The Anenome Buttercup has recovered well from the brink of extinction since the cessation of grazing in the NSW alpine areas, and is now locally common throughout the main range. The local population of the species is likely to comprise many thousands of plants. The species is common in the Cruiser area and elsewhere throughout the higher parts of the Thredbo Resort Area. 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 or the Anenome Buttercup . 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 development site 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. The proposed action will reduce the area of occupancy of the Anenome Buttercup by a very small amount, approximately 0.5 m2. c. fragment an existing important population into two or more populations The proposed action will not fragment an existing important population of either the Broad-toothed Rat or the Anenome Buttercup into two or more populations. Both species populations extend beyond the development site and the Thredbo Resort Area. d. adversely affect habitat critical to the survival of a species No habitat within the development site is considered to be critical to the survival of the Broad-toothed Rat or the Anenome Buttercup. 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 or the Anenome Buttercup.. 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 or the Anenome Buttercup is likely to decline as the habitat to be affected is very small in the context of the available habitat within the Thredbo Resort Area and the proposal will not cause any additional fragmentation of habitat or barriers to movement. 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 or Anemone Buttercup. Invasive species, including foxes and cats, are already present. h. introduce disease that may cause the species to decline The proposed action is unlikely to introduce disease that may cause the Broad-toothed Rat or Anemone Buttercup to decline. i. 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 factors such as major bushfire events and early snow thaws, and not impacts of the nature of those proposed. 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- including within the village, and in areas that have been subject to the sorts of activities proposed. As such, it is considered highly unlikely that proposed action will substantially interfere with the recovery of the Broad-toothed Rat.

Matters to be considered	Impact
	The Anenome Buttercup has recovered well from the brink of extinction since the cessation of grazing in the NSW alpine areas, and is now locally common throughout the main range. The local population of the species is likely to comprise many thousands of plants.
Any impact on a Commonwealth Endangered Ecological Community	No endangered ecological communities occur within the development site.
Any environmental impact on Commonwealth Listed Migratory Species;	No. The proposed action will not have any adverse impacts on any listed migratory species.
Does any part of the Proposal involve a Nuclear Action;	No. The project does not include a Nuclear Action.
Any environmental impact on a Commonwealth Marine Area;	No. There are no Commonwealth Marine Areas within the study area.
In addition- any direct or indirect impact on Commonwealth lands	No. The project does not directly or indirectly affect Commonwealth land.

Appendix E - Staff CVs

CURRICULUM VITAE

Ryan Smithers

SENIOR ECOLOGIST

QUALIFICATIONS

BEnvSc (Land Resources Management)- University of Wollongong with 1st Class Honours 1995.
Accredited BBAM- FBA- and BAM Assessor
Alpine Ecology Course Australian Alpine Institute and La Trobe University
Senior First Aid- St. Johns Ambulance.

Ryan brings to ELA more than 20 years' experience in natural resource management (21 years as a consultant- and 3 years with Sydney Catchment Authority as a Catchment Protection Officer). He has extensive practical experience in flora and fauna surveying- fire-fighting- planning and land management throughout southern NSW and has undertaken numerous flora and fauna surveys- biodiversity plans- environmental impact assessments- vegetation management plans- fire management plans and weed management plans.

Ryan has extensive experience in general and targeted fauna surveys using a diverse range of survey techniques. Ryan has undertaken many flora and fauna surveys on the NSW south coast- southern tablelands and in the Australian Alps- and in other parts of Australia including in the Northern Territory.

Ryan is an accredited Biobanking (BBAM)- Framework for Biodiversity Assessment (FBA) and Biodiversity Assessment Method (BAM) assessor and has undertaken may surveys using BBAM-BAM and DPIE Vegetation Survey Standard or very similar methodologies. Ryan project managed ELAs contributions to the Full-floristic Vegetation Survey and Condition Assessment for the South-east Highlands and Australian Alps of the Upper Murrumbidgee Catchment and South-east Corner Biometric Benchmark projects which involved the collection of more than 250 plots.

Ryan has particular ecological expertise in the NSW southern tablelands and Alps- gained from 15 years of survey and assessment across the Alps- including many assessments within the Charlotte Pass- Thredbo and Perisher Ski Resorts- and assessments on the Monaro including around Jindabyne.

Ryan has undertaken assessments in the region for a broad range of clients including NSW NPWS, Local Land Services, Biodiversity Conservation Trust, Kosciuszko Thredbo, Vail Resorts and Charlotte Pass Ski Resort.

RELEVANT PROJECT EXPERIENCE

Monaro and Werriwa Snow Gum Woodland and Grasslands Conservation Tender
Monaro Grasslands Conservation Tender
Kosi Walk Realignment Review of Environmental Factors
Diggings Campground Upgrade Review of Environmental Factors
Mount Perisher Chairlift Biodiversity Development Assessment Report
Merritts Gondola Biodiversity Development Assessment Report
Corin Forest Ski Slope Assessment
Montane Peatlands Strategic Action Plan
Perisher Guthega Skink Targeted Surveys
Numerous Mountain Bike Ecological Assessments at Thredbo
Leichardt Chairlift Ecological Assessment
Thredbo Masterplan Ecological Assessment
Guthega Quad Chair Flora and Fauna Assessment
Thredbo Chairlift Constraints Analysis
Friday Flat Ecological Assessment
Sponars Traverse Flora and Fauna Assessment
Lobs Hole Review of Environmental Factors
Lake Wallace Flora and Fauna Assessment for Cooma Monaro Shire at Nimmitabel
Numerous Impact Assessments in alpine and sub-alpine environments for OEH- Vail- Kosciuszko- Thredbo and Charlotte Pass Ski Resorts
Boco Rock Wind Farm Ecological Assessment and Offsets Analysis
South-east Highlands and Australian Alps of the Upper Murrumbidgee Catchment Full Floristic Survey and Condition Assessment
South-east Corner Biometric Benchmark Project
Queanbeyan Biodiversity Study
Mount Jerrabomberra Ecological Assessment
Eurobodalla Bio-certification Project
Jervis Bay Biodiversity Assessment
Broulee and South Moruya Biocertification Project
North Moruya Biodiversity Study
Eurobodalla Vegetation Mapping Validation
Eurobodalla Biodiversity Study for future Urban Expansion Lands
Merimbula STP Upgrade Terrestrial Ecological Assessment
Cobowra LALC Lands Biobanking Assessment
Upper Lachlan Shire Biodiversity Planning Framework
Parkes- Cabonne- Bland- Upper Lachlan and Temora Shires Biodiversity Assessment and NRM Projects
Old Comma Road deviation Species Impact Statement
Flora and Fauna Assessment Edwin Lane Parkway Extension
Ecological Studies – Proposed Googong township
Tarrawonga Biobanking Assessment – Boggabri
Katherine to Gove Pipeline – Mitchell Ranges fauna surveys
Darwin regional flora and fauna survey RAAF Darwin- defence establishment Berrimah and Shoal Bay receiving station.

Appendix F - Biodiversity credit report

BAM Biodiversity Credit Report (Variations)

Proposal Details

Assessment Id
00033789/BAAS17061/22/00033790

Proposal Name
Lower All Mountain Trail Diversion

BAM data last updated *
16/06/2022

Assessor Name
Ryan Smithers

Assessor Number
BAAS17061

BAM Data version *
54

Proponent Name(s)

Report Created
30/08/2022

BAM Case Status
Finalised

Assessment Revision
2

Assessment Type
Part 4 Developments (Small Area)

Date Finalised
30/08/2022

BOS entry trigger
BOS Threshold: Biodiversity Values Map

* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet.

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Nil		

Species
Nil

Additional Information for Approval

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT
No Changes

Predicted Threatened Species Not On Site

Name
No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
645-Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Not a TEC	0.1	0	2	2.00

645-Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion

Like-for-like credit retirement options

Class	Trading group	Zone	HBT	Credits	IBRA region
Subalpine Woodlands This includes PCT's: 644, 645, 650, 677, 679, 952, 1190, 1191, 1196, 1199	Subalpine Woodlands <50%	645_Good	No	1	Snowy Mountains,Bondo, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Subalpine Woodlands This includes PCT's: 644, 645, 650, 677, 679, 952, 1190, 1191, 1196, 1199	Subalpine Woodlands <50%	645_Poor	No	1	Snowy Mountains,Bondo, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

BAM Biodiversity Credit Report (Variations)

645-Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion	Variation options					
	Formation	Trading group	Zone	HBT	Credits	IBRA region
	Grassy Woodlands	Tier 4 or higher threat status	645_Good	No	1	IBRA Region: Australian Alps, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
	Grassy Woodlands	Tier 4 or higher threat status	645_Poor	No	1	IBRA Region: Australian Alps, or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

Species	Vegetation Zone/s	Area / Count	Credits
Cyclodomorphus praealtus / Alpine She-oak Skink	**645_Good, 645_Poor**	0.1	3.00
Mastacomys fuscus / Broad-toothed Rat	**645_Good, 645_Poor**	0.1	3.00
Ranunculus anemoneus / Anemone Buttercup	**645_Good**	5.0	10.00

Credit Retirement Options

Like-for-like options

Cyclodomorphus praealtus/ Alpine She-oak Skink	Spp	IBRA region	
	Cyclodomorphus praealtus/Alpine She-oak Skink	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act	IBRA region

		shown below	
	Fauna	Endangered	Snowy Mountains, Bondo, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Mastacomys fuscus/ Broad-toothed Rat	Spp	IBRA region	
	Mastacomys fuscus/Broad-toothed Rat	Any in NSW	
	Variation options		
	Kingdom	Any species with same or higher category of listing under Part 4 of the BC Act shown below	IBRA region
	Fauna	Vulnerable	Snowy Mountains, Bondo, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.
Ranunculus anemoneus/ Anemone Buttercup	Spp	IBRA region	
	Ranunculus anemoneus/Anemone Buttercup	Any in NSW	
	Variation options		
	Kingdom	Any species with same or	IBRA region

		higher category of listing under Part 4 of the BC Act shown below	
	Flora	Vulnerable	Snowy Mountains, Bondo, Monaro, Murrumbateman, Snowy Mountains and South East Coastal Ranges. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

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