Alpine Coaster and Associated Works– Thredbo Alpine Resort – Flora and Fauna Assessment

Kosciuszko Thredbo Pty Ltd

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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
DAWE	Commonwealth Department of Agriculture, Water and Environment
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 an Alpine Coaster and snowmaking infrastructure within the Valley Terminal precinct at Thredbo Alpine Resort.

The Alpine Coaster is a gravity-based rail-guided toboggan run comprising two-seat sleds fixed to stainless steel tubes, which are self-supported mostly without foundations. The Alpine Coaster will be over 1400 m in total length with an approximately 380 m uphill track and just over 1000 m of descending track. The bottom station comprises a base building, tunnel and associated works. The alignment of the Alpine Coaster was selected to use a mix of existing ski slopes and remnant native vegetation to achieve the operational requirements and desired guest experience.

The construction of the Alpine Coaster will require the clearing of trees, shrubs and groundcovers in a 4 m wide corridor where the trail traverses remnant native vegetation. The Alpine Coaster 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 Scrubs and Subalpine Bog. For this reason, the alignment has been modified in places to avoid land mapped on the Biodiversity Values Map, as defined in the NSW Biodiversity Conservation Regulation 2017 (BC Reg). The proposal will not trigger the Biodiversity Offsets Scheme (BOS), as whilst it will encroach on a very small area of land identified on the Biodiversity Values no clearing of native vegetation will be required in this area. 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. Fifty plant species were recorded within the study area or immediate surrounds during the survey period. 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 0.29 ha of Subalpine Woodland and up to 0.001 ha of Subalpine Riparian Scrub 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 these communities 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 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 at the request of Dabyne Planning Pty Ltd to prepare a flora and fauna assessment to accompany a proposal to construct an Alpine Coaster and snowmaking infrastructure, 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 proposal is to construct an Alpine Coaster in the Valley Terminal precinct of the Thredbo Alpine Resort, between the Cat Shed and Valley Terminal. The Alpine Coaster is a gravity-based rail-guided toboggan run comprising two-seat sleds fixed to stainless steel tubes, which are self-supported mostly without foundations. The Alpine Coaster will be over 1400 m in total length with an approximately 380 m uphill track and just over 1000 m of descending track. The bottom station comprises a base building, tunnel and associated works. The alignment of the Alpine Coaster was selected to use a mix of ski slopes and remnant vegetation to achieve the operational requirements and desired guest experience.

The proposal also includes some modifications and additions to the snowmaking infrastructure near the bottom station.

Impacts of the proposal can be summarised as follows:

- The clearing of shrubs, groundcovers and trees in a 4 m wide and up to 4 m high corridor where the alignment traverses native vegetation. The clearing will be undertaken with a mix of machinery and hand tools i.e. chainsaws and brush-cutters. Felled material will be dispersed into surrounding vegetation. Larger material will be winched up to the proposed top station area and chipped for disposal.
- Strategically placed fencing to restrict access to the coaster alignment.
- Minor trenching for power supply to the bottom station and top station and for the proposed snowmaking infrastructure.
- Excavation for the bottom station building, top station, tunnel, retaining walls, Alpine Coaster footings and snowmaking infrastructure.
- Landscaping around the bottom station.

An overview of the proposal is shown in Figures 1-3 and further identified in Photos 1-4. A more detailed description of the proposal is also provided in the Statement of Environmental Effects for the proposal (Dabyne Planning 2022).

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 2,920 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 4 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 20 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

1.4 Biodiversity Offset Scheme

The proposal will affect a very small area of land mapped within the Biodiversity Values Map as defined in the NSW Biodiversity Conservation Regulation 2017 (BC Reg), as shown in Figure 5. However, the proposal has been designed so that no vegetation clearing will be required within the Biodiversity Values Mapped area. Where the alignment of the Alpine Coaster encroaches slightly into the mapped area (Circle 3), the centreline of the Coaster will be setback 3 m from the remnant Subalpine Woodland, avoiding the need for any tree removal. Furthermore, at Circle 3 the track will be elevated, as shown in Figure 3, avoiding the need for any vegetation removal apart from the track footings, which are on the inside of the track, which has already been cleared of native vegetation as shown in Photo 5.

The area of native vegetation affected will be approximately 0.29 ha, which is well below the threshold (1 ha) trigger for the Biodiversity Offset Scheme (BOS).

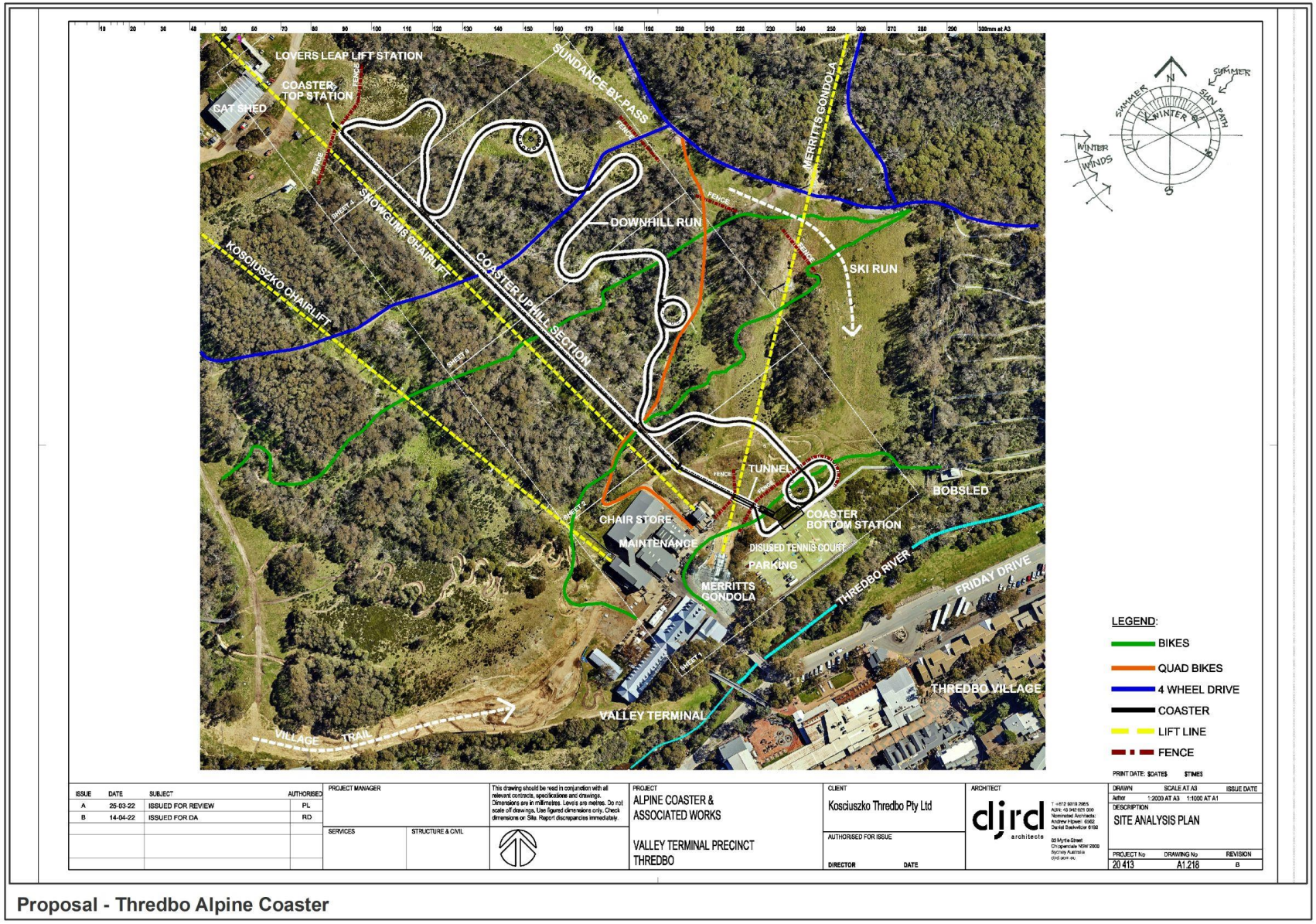

Figure 1: The proposed Alpine Coaster

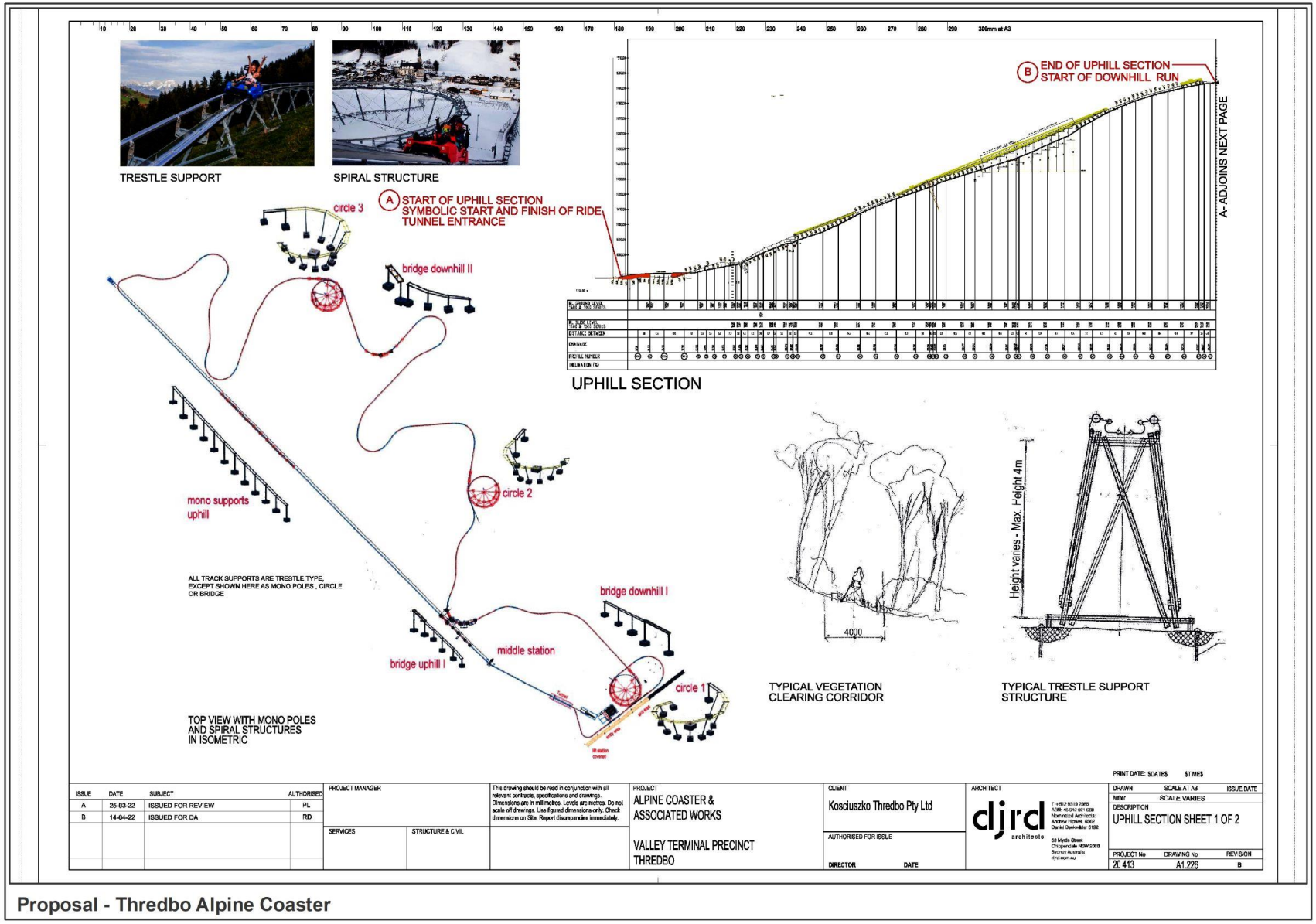

Figure 2: The proposal – schematic

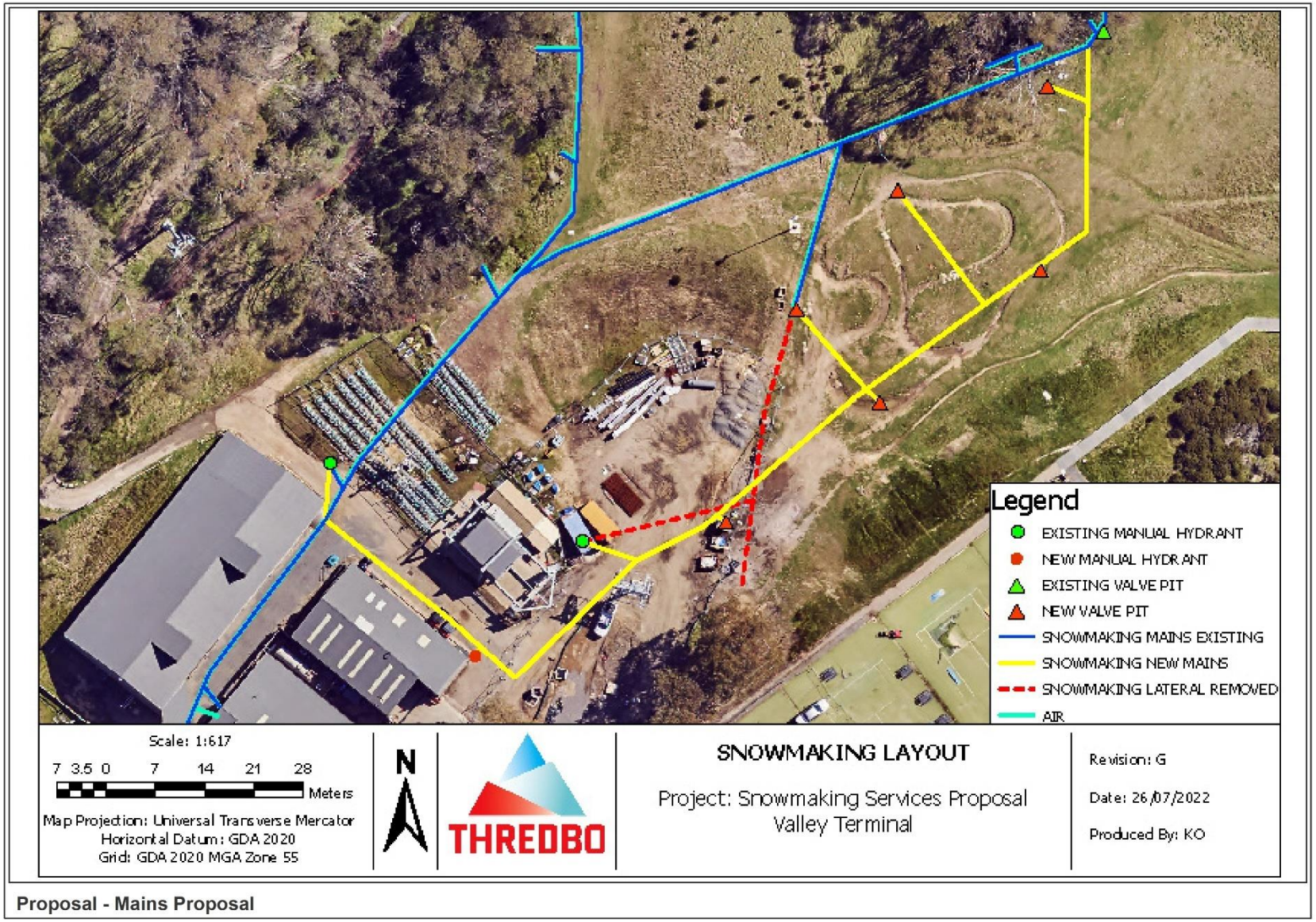

Figure 3: The proposed snowmaking.

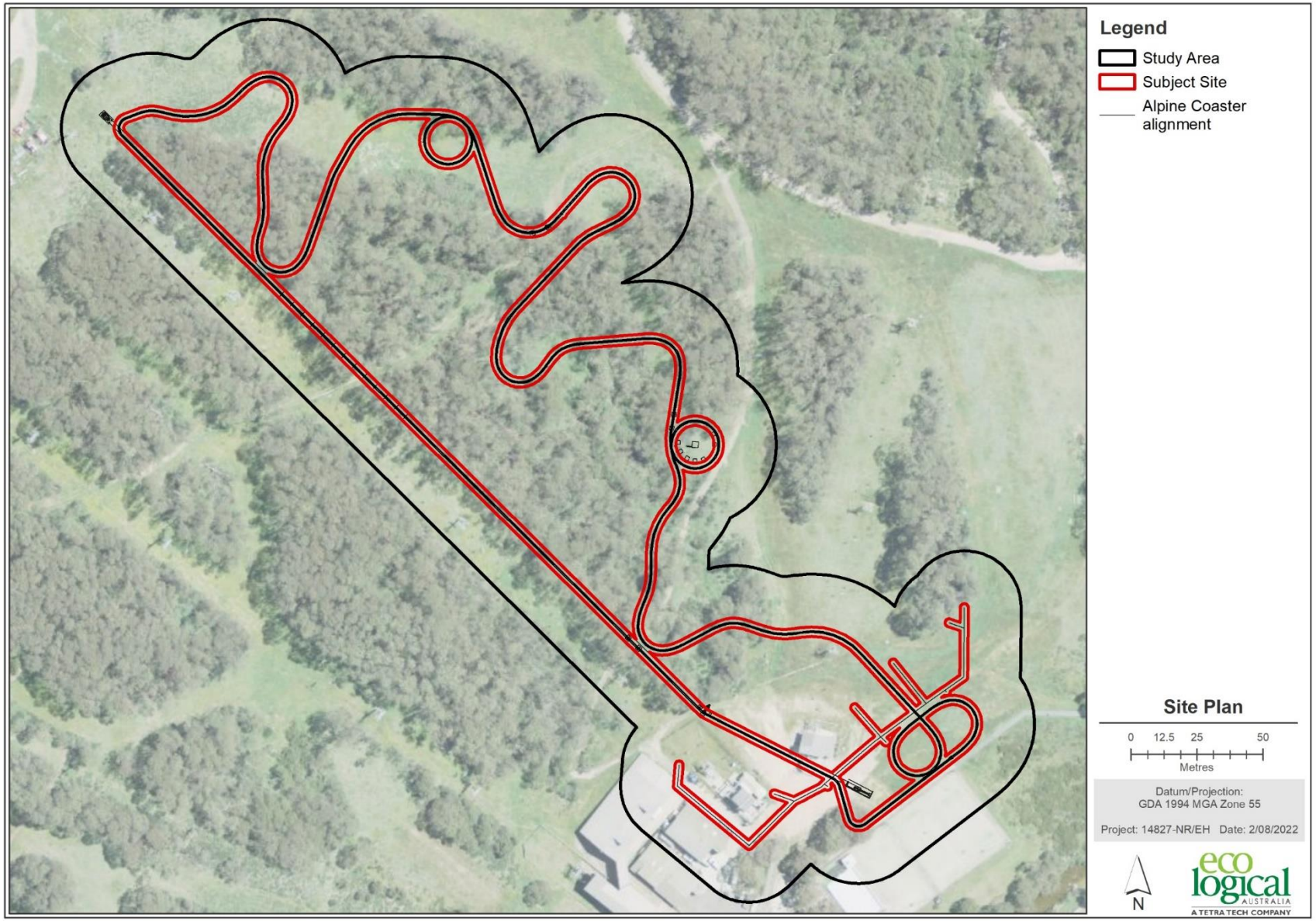

Figure 4: The subject site and study area.

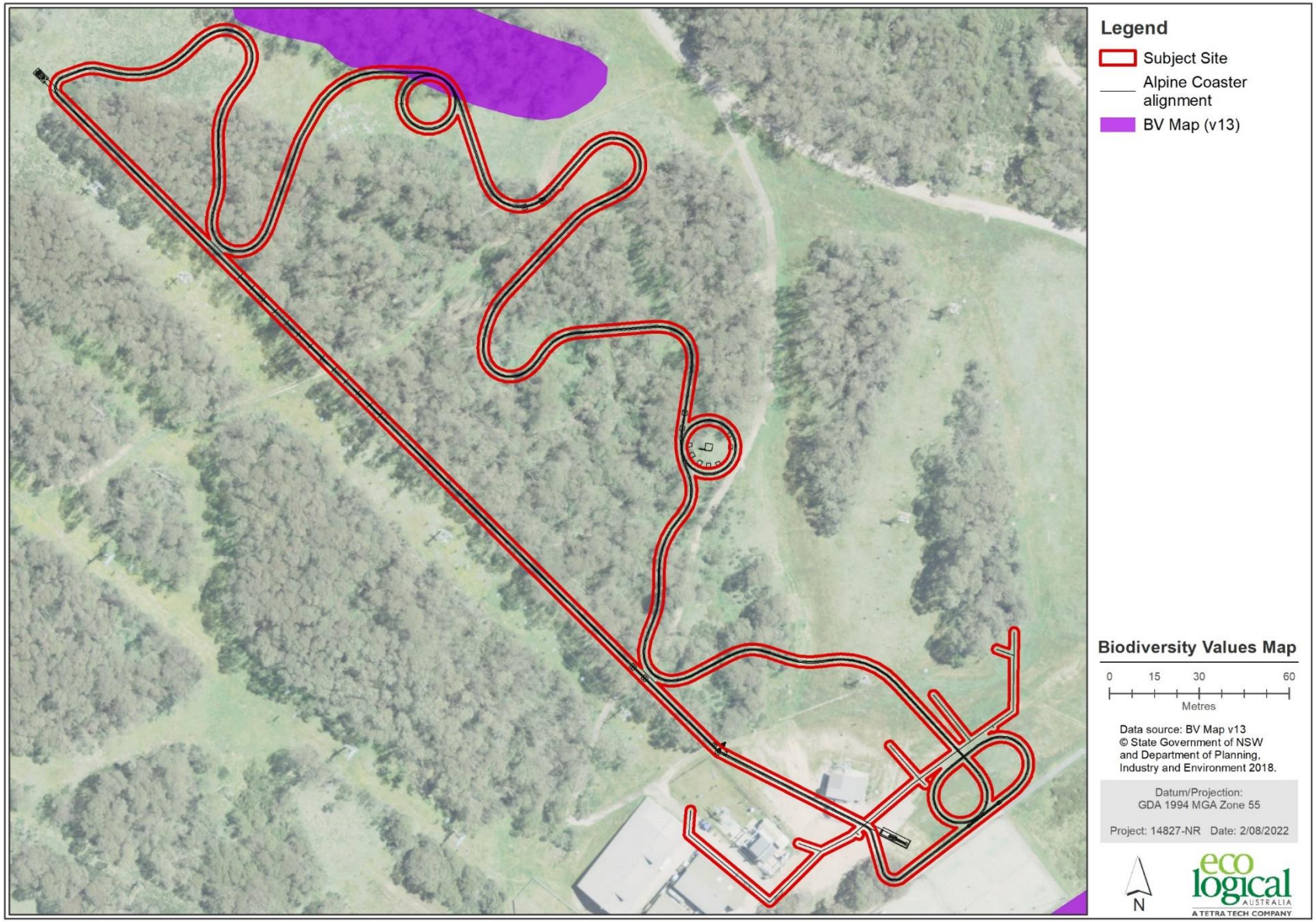

Figure 5: The subject site relative to the Biodiversity Values Map.

Photo 1: The bottom station of the Alpine Coaster and the location of the proposed snowmaking infrastructure will be located entirely within existing cleared parts of the Valley Terminal precinct and will not require the clearing of any native vegetation.

Photo 2: The uphill section will be located on the northern edge of the existing clearing for the Snow Gums chairlift and will require the clearing of the Subalpine Woodland to achieve the required clearances.

Photo 3: The top station will be located in an existing cleared area just below the Cat Shed.

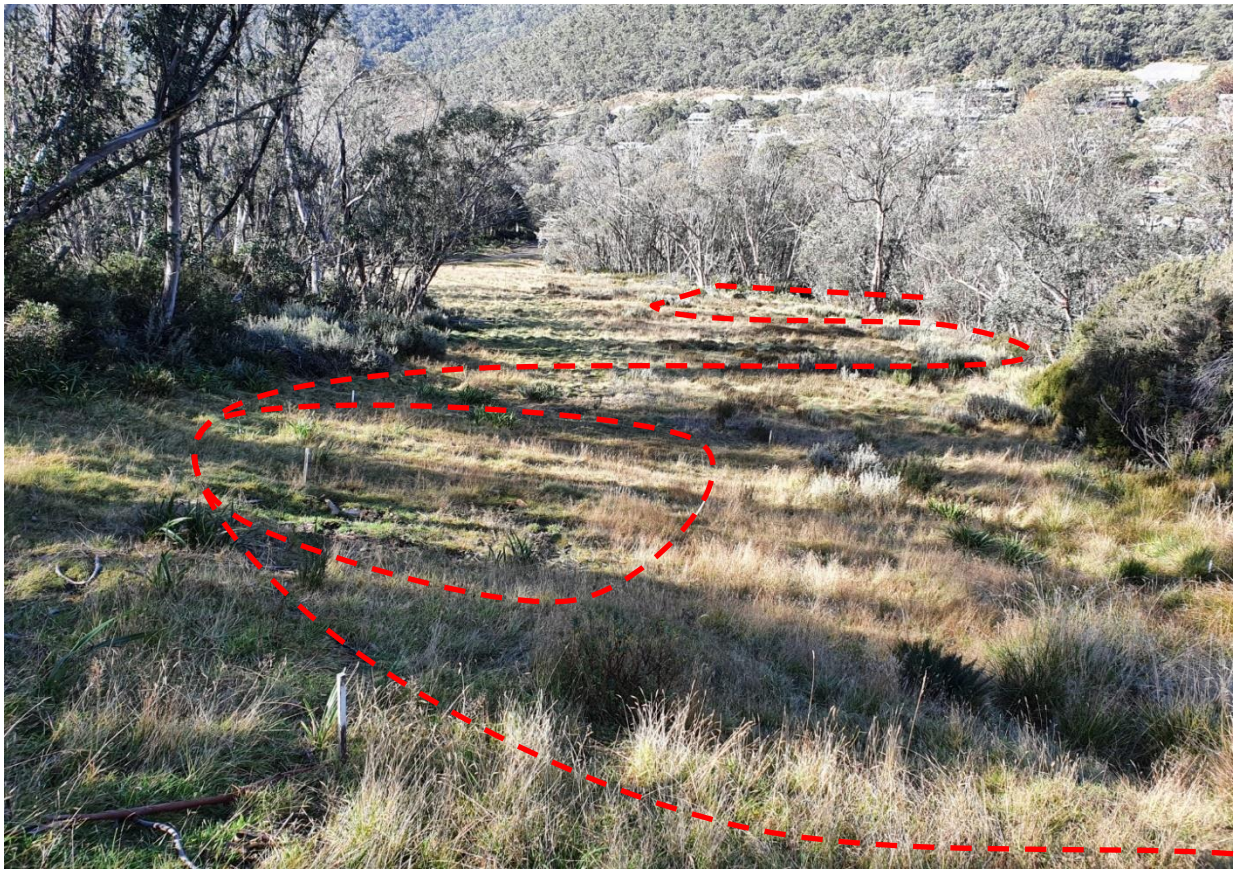

Photo 4: The alignment will be within a mix of existing ski slopes and adjoining Subalpine Woodland. The alignment (approximate shown in red) was modified to avoid and minimise impacts on the patches of Subalpine Riparian Scrub within the study area.

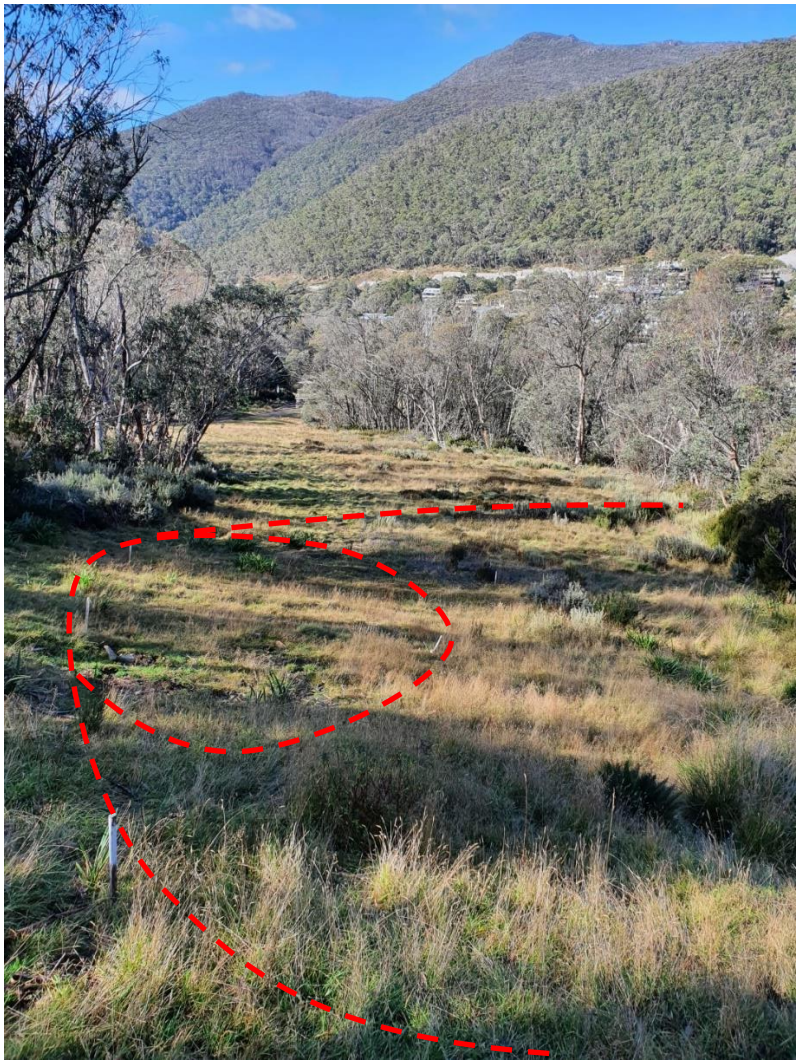

Photo 5: Clearing of native vegetation will not be required where the alignment at Circle 3 encroaches upon the Biodiversity Values mapped area.

1.5 Topography, geology and soils

The study area occupies moderately sloping east facing slopes at an altitude of between approximately 1380 m and 1500 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 coaster is within the catchment 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). Other areas have been reduced to derived native grasslands or herbfields where trees and shrubs have been removed but native groundcovers persist and continue to dominate. 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 (Dabyne Planning 2022). 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 9 and 10 December 2019, and 10 May 2022.

2.2.1 Flora surveys

A botanical survey was conducted in the study area by ELA Senior Ecologist Ryan Smithers on 9 and 10 December 2019.

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. All flora species encountered within the study area were identified to species level. 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 five person-hours.

2.2.2 Fauna surveys

Field investigations for fauna were conducted in conjunction with the flora surveys on 9 and 10 December 2019.

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 five person-hours.

3. Results

3.1 Database and literature review

Appendix A provides a list of threatened and migratory species and TEC 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 subalpine 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. 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 6 and Photos 6-9.

3.2.1 Subalpine Woodland

Subalpine Woodland dominates the study area and surrounds, as shown in Figure 6, and is the most common community within the subalpine area in the locality and region. It is the most dominant community within the Thredbo Resort area covering an estimated 443 ha (Ecology Australia 2002). It equates with Plant Community Type (PCT) 644 - *Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP, South Eastern Highlands Bioregion and Australian Alps Bioregion*.

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 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 existing ski slopes support a low grassland / herbfield / shrubland derived from the clearing of the Subalpine Woodland. These areas are characterised by regularly slashed and thus low growing individuals of common shrubs and groundcovers such as *Bossiaea foliosa, Olearia phlogopappa, Hovea montana* and *Tasmannia xerophila* subsp. *xerophila*, *Poa fawcettiae, Asperula gunnii, Senecio gunnii*, *Dianella tasmanica, Geranium potentilloides* var. *potentilloides*, *Acaena novae-zelandiae* and *Goodenia hederacea* subsp. *alpestris*

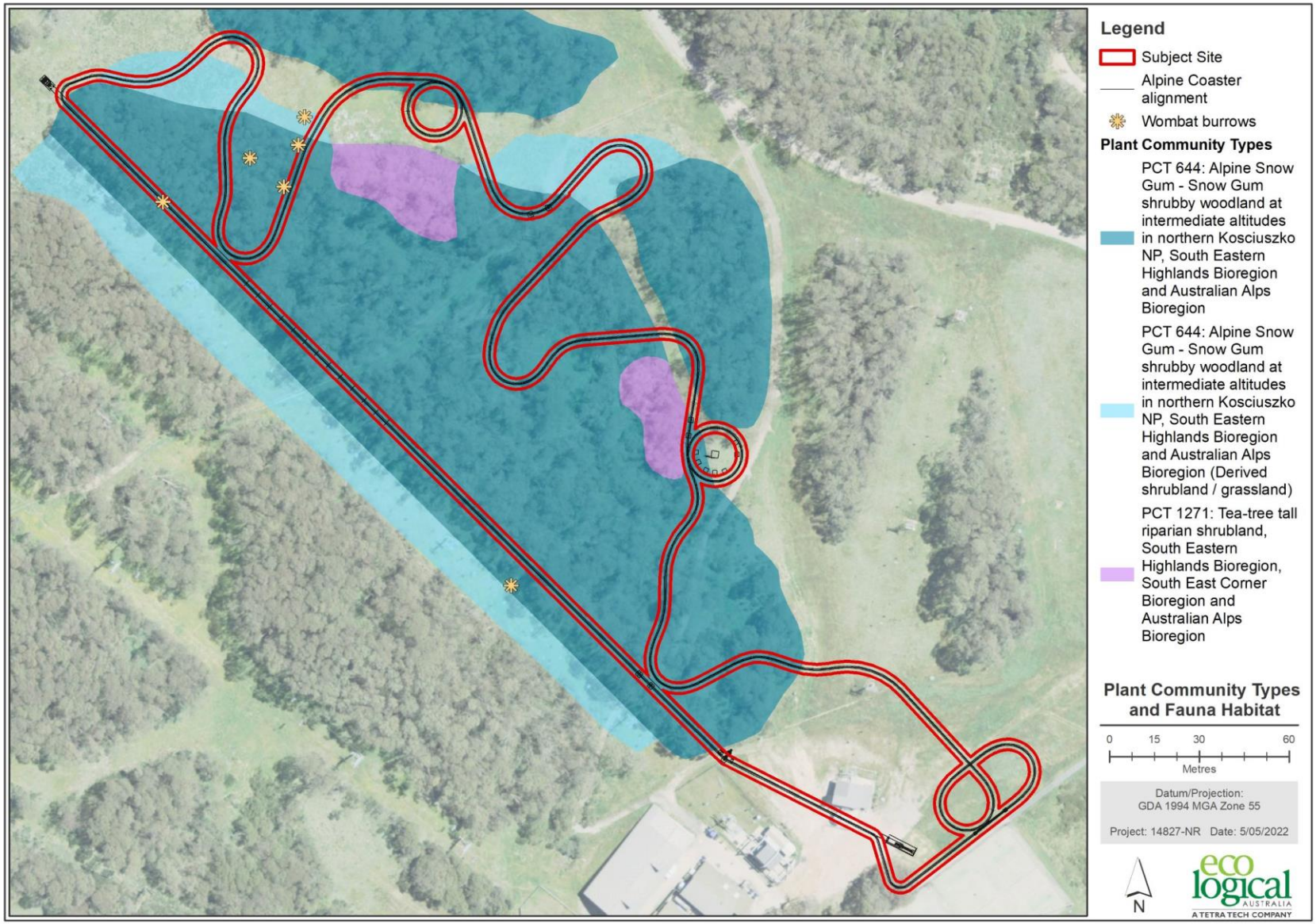

Figure 6: Plant community types and fauna habitats within the study area.

Photo 6: The Subalpine Woodland within the Thredbo Alpine Resort is characterised by dense Snow Gum trees none of which are large of hollow-bearing. The low grassland / herbfield / shrubland derived from the clearing of the Subalpine Woodland is evident in the foreground.

Photo 7: The proposal has been designed to avoid traversing this patch of Subalpine Riparian Scrub.

Photo 8: Lower down the slope the Subalpine Woodland is more open in places.

Photo 9: The alignment will traverse a disturbed seasonally wet area. Footings will be required where "bridges" are proposed such as where the alignment will traverse seasonally wet areas.

3.2.2 Subalpine Riparian Scrub

Two patches of Subalpine Riparian Scrub occur in proximity to the coaster alignment in association with seasonally wet areas that drain to the Thredbo River. Subalpine Riparian Scrub equates with PCT 1271 - *Tea-tree tall riparian shrubland, South Eastern Highlands Bioregion, South East Corner Bioregion and Australian Alps Bioregion*.

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*.

3.2.4 Flora species

Fifty plant species were recorded within the study area or immediate surrounds during the survey period, including 40 native species and ten exotics, and this species list appears in Appendix B. No threatened flora species were detected within the study area and it is unlikely that any occur there.

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 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 6.

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. It is considered highly unlikely that the study area provides any suitable habitat for the Guthega Skink or Alpine She-oak Skink given the dense understorey and paucity of suitable rock habitats associated with the Guthega Skink, or the open heath and tussock grassland associated with the Alpine She-oak Skink.

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).

3.3.2 Fauna species

Nine native fauna species were detected within the study area or immediate surrounds during the survey period, including one mammal and seven birds, as listed in Table 1. A much more diverse range of native and exotic fauna would either be resident within the study area or occur there from time to time. The fauna detected during the survey period are a reflection of the limited survey effort and only provide a guide to the fauna species that would occur there.

Table 1: Fauna species recorded within the study area or immediate surrounds

Category	Common Name	Scientific Name	Detection Method
Mammals	Common Wombat	*Vombatus ursinus*	Scats and diggings
Birds	Brown Thornbill	*Acanthiza pusilla*	Observed
	Crimson Rosella	*Platycercus elegans*	Observed
	Gang-gang Cockatoo	***Callocephalon fimbriatum***	**Call recognition**
	Grey Fantail	*Rhipidura fuliginosa*	Observed
	Little Raven	*Corvus mellori*	Observed
	Silvereye	*Zosterops lateralis*	Call recognition
	White-browed Scrubwren	*Sericornis frontalis*	Observed
Reptiles	Tussock Skink	*Pseudemoia* sp.	Observed

Bold denotes threatened species. * denotes exotic species.

4. Impact assessment

4.1 Impacts on vegetation communities

4.1.1 Subalpine Woodland

The proposal will result in the removal of approximately 2,919 m^2 of the Subalpine Woodland vegetation community in association with the clearing of a 4 m wide alignment where the coaster 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. Gellie (2006) estimates that within NSW there is 45,870 ha and 66,429 ha respectively, of the Subalpine Dry Shrub/Herb Woodland (Community 128) and Subalpine Shrub/Grass Woodland (Community 130) and that less than 0.7% of the pre-European occurrences of these communities have been cleared. Furthermore, the vast majority of the occurrence of these communities in NSW is within conservation reserves and in particular with Kosciuszko National Park.

In this context the loss of approximately 0.29 ha of Subalpine Woodland (<0.1% 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 only result in very minor direct impacts on the Subalpine Riparian Scrub vegetation community, with only an estimate 10 m^2 of the community being trimmed, where the coaster alignment skirts a small patch of 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.

In this context, the 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 a few 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 *Podocarpus lawrencei* shrubs, however, it will not affect any Mountain Plum Pine Closed Heath, or other potentially significant stands of the species. 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 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 0.29 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 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 coaster and the support trestles 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 2 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 2: 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	Known
Petroica phoenicea	Flame Robin	—	V	—	Known
Pachycephala olivacea	Olive Whistler	—	V	—	Known
Petroica rodinogaster	Pink Robin	—	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 2). 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 2).

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. All machinery to be used during the construction phase should be limited to the existing disturbed areas and access tracks and the proposed coaster alignment as far as is possible.
3. 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.
4. 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.

Sediment control

5. 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.
6. 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

7. Rehabilitation activities should be consistent with the resort areas rehabilitation guidelines (NGH Environmental 2007).
8. 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 an Alpine Coaster and snowmaking infrastructure, within the Valley Terminal precinct 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. Fifty plant species were recorded within the study area or immediate surrounds during the survey period. 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 0.29 ha of Subalpine Woodland and up 10 m^2 of Subalpine Riparian Scrub 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 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.	Potential
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.	Yes
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. There is no suitable habitat for the species within the study area and it is considered unlikely that it would occur there.	Unlikely
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	Potential

Scientific name	Common name	FM Act	BC Act	EPBC Act	Habitat associations	Likelihood of occurrence
					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.	
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 DEW 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: Flora list

Scientific name	Common name
Acacia obliquinervia	Mountain Hickory
Acaena novae-zelandiae	Bidgee-widgee
*Acetosella vulgaris**	Sheep Sorrel
*Achillea millefolium**	Yarrow
Aciphylla simplicifolia	Mountain Aciphyll
*Anthoxanthum odoratum**	Sweet Vernal Grass
*Agrostis capillaris**	Browntop Bent
Asperula gunnii	Mountain Woodruff
Bossiaea foliosa	Leafy Bossiaea
Blechnum penna-marina subsp. *alpina*	Alpine Water-fern
Carex breviculmis	
Celmisia pugioniformis	
Coronidium scorpioides	Button Everlasting
Craspedia aurantia	A Billy-button
Dianella tasmanica	Tasman Flax-lily
Epilobium gunnianum	Gunn's Willow-herb
Eucalyptus pauciflora	Snow Gum
*Festuca rubra**	Red Fescue
Geranium potentilloides var. *potentilloides*	
Goodenia hederacea subsp. *alpestris*	Forest Goodenia
Gonocarpus montanus	
Grevillea australis	Alpine Grevillea
Hovea montana	Alpine Hovea
Hydrocotyle algida	
*Hypochaeris radicata**	Flatweed
Leptorhynchos squamatus	Scaly Buttons
Leptospermum grandifolium	Mountain Tea-tree
Lycopodium fastigiatum	Mountain Clubmoss
Olearia megalophylla	Large-leaf Daisy-bush
Olearia phlogopappa	Dusty Daisy-bush
Oreomyrrhis eriopoda	Australian Carraway
Oxalis exilis	
Oxylobium ellipticum	Common Shaggy Pea

Scientific name	Common name
Ozothamnus secundiflorus	Cascade Everlasting
Pimelea ligustrina subsp. *ciliata*	Kosciuszko Rose
Poa ensiformis	Purple-sheathed Tussock-grass
Poa fawcettiae	Smooth Blue Snowgrass
Poa helmsii	Broad-leaved Snowgrass
Podocarpus lawrencei	Mountain Plum Pine
Polyscias sambucifolia subsp. *leptophylla*	
Polystichum proliferum	Mother Shield-fern
Prostanthera lasianthos	Victorian Christmas Bush
*Prunus cerasifera**	Cherry Plum
Ranunculus lappaceus	Common Buttercup
Senecio gunnii	
Stellaria pungens	Prickly Starwort
*Taraxacum officinale**	Dandelion
Tasmannia xerophila	Alpine Pepperbush
*Trifolium repens**	White Clover
Viola betonicifolia	Native Violet

Appendix C: 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)
- *Pachycephala olivacea* (Olive Whistler)
- *Petroica rodinogaster* (Pink Robin)

(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 1800 m. It is possible that the Eastern Pygmy-possum occurs in the subalpine and montane habitats of the Thredbo Resort area although it has not been recorded there.

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 Alpine Coaster 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* (likely 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 (DECC 2005).

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* (likely 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.

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.

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.

(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 (0.29 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 (0.26 ha) for the Flame 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, and to a lesser extent canopy trees. 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 4 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 and that there are no records of the species within the Thredbo Resort area.

In the context of the extent of similar habitat available for the Gang-gang Cockatoo, Olive Whistler, Pink 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 0.29 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.

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 is 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 0.29 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 0.29 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

Matters to be addressed	Impact
	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. 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.

Matters to be addressed	Impact
	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. *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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