Summit to Gully Mountain Bike Trail: Flora and fauna assessment

FINAL REPORT

Prepared for Alpine Resorts Victoria – Falls Creek

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- Victorian Government Department of Environment, Energy and Climate Action for access to the Victorian Biodiversity Atlas, NatureKit and EnSym/Native Vegetation Information Management tool
- Australian Government Department of Climate Change Energy the Environment and Water for access to the Protected Matters Search Tool.

Biosis staff involved in this project were:

- Nicholas Lloyd (assistance in the field)
- Grace O'Loghin (mapping)
- Matt Looby (quality assurance).

SUMMARY

Biosis Pty Ltd was commissioned by Alpine Resorts Victoria - Falls Creek (ARV-FC) to undertake a flora and fauna assessment (FFA) of areas of land proposed for the construction of the Summit to Gully Mountain Bike Trail at Falls Creek (the study area). The study area is located in Falls Creek Alpine Resort, approximately 18 kilometres east of Harrietville and approximately 30 kilometres south-east of Bright.

The primary objective of the flora and fauna assessment is to demonstrate compliance with current biodiversity legislation to support a planning permit application for the study area impact footprint.

Ecological values

Key ecological values identified within the study area are as follows:

- Alpine and sub-alpine Ecological Vegetation Classes (EVCs), including:
  - Alpine Grassy Heathland EVC 1004 (Bioregional Conservation Status [BCS]: Rare)
  - Sub-alpine Shrubland EVC 42 (BCS: Rare)
  - Sub-alpine Woodland EVC 43 (BCS: Least Concern)
  - Sub-alpine Wet Heathland EVC 210 (BCS: Endangered).
- Examples of one threatened ecological community, Alpine Sphagnum Bogs and Associated Fens Community, which is listed under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). This community is synonymous with the Alpine Bog Community which is listed under the Victorian *Flora and Fauna Guarantee Act 1988* (FFG Act).
- A suite of fauna habitat elements including rocky outcrops, tussock-forming grasses, seasonally wet areas and woodland areas supporting an intact canopy and areas of dense shrubby understorey.
- Confirmed habitat for Broad-toothed Rat *Mastacomys fuscus mordicus* which is listed as endangered under the EPBC Act and the FFG Act. Indirect evidence (scats) and direct evidence (camera trap images) of Broad-toothed Rat was recorded within the study area.
- Confirmed habitat for Tussock Skink *Pseudemoia pagenstecheri* which is listed as endangered under the FFG Act. The species was recorded during targeted surveys and suitable habitat occurs throughout the study area.
- Confirmed habitat for 17 flora species listed under the FFG Act, including Snow Beard-heath *Acrothamnus montanus*, Carpet Sedge *Carex jackiana*, Carpet Snow-daisy *Celmisia costiniana,* Silver Snow-daisy *Celmisia tomentella,* Bogong Sally *Eucalyptus pauciflora* subsp. *hedraia*, Royal Grevillea *Grevillea victoriae* subsp. *victoriae*, Rusty Daisy-bush *Olearia brevipedunculata*, Bogong Daisy-bush *Olearia frostii*, Dusty Daisy-bush *Olearia phlogopappa* subsp. *flavescens*, Alpine Phebalium *Phebalium squamulosum* subsp. *alpinum*, Alpine Bootlace Bush *Pimelea axiflora* subsp. *alpina*, Fringed Rice-flower *Pimelea ligustrina* subsp. *ciliata,* Buffalo Leek-orchid *Prasophyllum suttonii,* Victorian Buttercup *Ranunculus victoriensis,* Brock Knawel *Scleranthus brockiei,* Mossy Knawel *S. singuliflorus* and Alpine Triggerplant *Stylidium montanum*.
- Potential habitat for the following EPBC Act and FFG Act listed fauna species:
  - Gang-gang Cockatoo *Callocephalon fimbriatum*
  - White-throated Needletail *Hirundapus caudacutus*

- Spot-tailed Quoll *Dasyurus maculatus maculatus*
- Mountain Pygmy-possum *Burramys parvus*
- Guthega Skink *Liopholis guthega*
- Mountain Skink *Liopholis montana*
- Alpine She-oak Skink *Cyclodomorphus praealtus*
- Alpine Bog Skink *Pseudemoia cryodroma*
- Alpine Stonefly *Thaumatoperla alpina*
- Dingo *Canis lupus dingo*
- Alpine Water Skink *Eulamprus kosciuskoi*
- Tussock Skink *Pseudemoia pagenstecheri*
- Alpine Darner Dragonfly *Austroaeschna flavomaculata*
- Stonefly *Riekoperla intermedia*
- Freshwater Isopod *Colubotelson joyneri.*

Government legislation and policy

An assessment of the project in relation to key biodiversity legislation and policy is provided and summarised below.

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
EPBC Act	Known or potential habitat for 10 EPBC Act listed fauna species on site (Appendix C): • Gang-gang Cockatoo • White-throated Needletail • Spot-tailed Quoll • Mountain Pygmy-possum • Broad-toothed Rat • Guthega Skink • Mountain Skink • Alpine Bog Skink • Alpine She-oak Skink • Alpine Stonefly. Alpine Sphagnum Bogs and Associated Fens threatened ecological community present	Referral not recommended as a significant impact to matters of national environmental significance is considered unlikely, however ARV - FC may choose to refer the project for legal certainty.	Targeted surveys have been completed for particular fauna species with restricted ranges and specific habitat requirements, such as Mountain Pygmy Possum, Broad-toothed Rat and threatened reptiles, in particular Guthega Skink. Recommendations to avoid and minimise impacts on Alpine Bogs must be implemented. Significant impact criteria assessments have been completed for relevant species and communities in Section 4.
FFG Act	Protected flora and Alpine Bog community present. Known habitat for 16 listed flora species.	Protected Flora Permit required. ARV - FC to consider obligations under the	Site is public land (Alpine Resort Crown Land) and a permit is required to take or destroy protected flora.

Legislation / policy	Relevant ecological feature on site	Permit / approval required	Notes
	Known or potential habitat for 15 listed fauna species	Public Authority Duty. Actions required to avoid and minimise impacts on listed species	
***Planning & Environment Act 1994* (P&E Act)**	Indigenous vegetation.	Planning permit required to remove, destroy or lop native vegetation. Application requirements and decision guidelines of ESO1 must be considered (see Section 4.2.3).	Best practice environmental management on public land requires avoidance, minimisation and offsetting of native vegetation in accordance with the *Guidelines for the removal, destruction or lopping of native vegetation*.
***Catchment and Land Protection Act 1987* (CaLP Act)**	Regionally controlled weeds, restricted weeds, and pest animals have been recorded in the study area historically and/or during the current assessment.	N/A	Comply with requirements to control/eradicate pest species
***Water Act 1989* (Water Act)**	Crossings of unnamed tributaries of Rocky Valley Creek and Fryingpan aqueduct	North East Catchment Management Authority (CMA) Works on Waterway permit required.	Works on waterway approval to be obtained from North East Catchment Management Authority.
Fisheries Act 1995	Potential habitat for Alpine Stonefly and Stonefly, and tributaries of Rocky Valley Creek and Pretty Valley Creek	No permit required if mitigation measures are strictly adhered to and no habitat or biota are destroyed.	Mitigation measures to be implemented to avoid and minimise impacts on aquatic habitats.

Guidelines for the removal, destruction or lopping of native vegetation (the Guidelines)

Based on the current design, the proposed development will require the removal of 0.375 hectares of native vegetation from within location category 3. Additionally, 2.963 hectares of past removal by ARV – FC within the last 5 years is relevant, creating a total removal extent (including past and proposed) of 3.338 hectares. Therefore the planning permit application will be assessed on the detailed assessment pathway. The strategic biodiversity value score of the native vegetation to be removed is high, ranging between 0.930 and 0.996.

The steps that have been taken during the design of the mountain bike trail to ensure that impacts on biodiversity from the removal of native vegetation have been minimised are summarised below in accordance with the DEECA Assessor's Handbook (DELWP 2018). A summary of how avoidance and minimisation has been achieved in relation to the native vegetation values described in Appendix 1D of DELWP (2018) is provided in Section 5 of this report.

Strategic level planning

At a strategic level, steps have been taken through resort-wide master planning and preliminary trail planning to avoid areas of highest biodiversity value, these include:

- Preparation of the Falls Creek Mountain Bike Trail Masterplan and Feasibility Study commencing in 2008.
- Preparation of the Falls Creek Alpine Resort Biodiversity Management Strategy, Ecology Australia (2011), which has guided understanding of native vegetation extent, types and highest value areas for various development projects.
- Preparation of a feasibility study between May and August 2018 for Stage 5 trails and future trails (internal document prepared by World Trail and Biosis for ARV – FC [then FCRM]).
- For previous stages of trail development since 2013, steps have been taken to avoid or minimise designing trails in high value native vegetation and habitats above the tree line where threatened species and ecological communities occur. This has been done in line with the Falls Creek Alpine Resort Biodiversity Management Strategy and best available knowledge at each stage of planning.
- Where, feasible, trail strategic level planning has focused on choosing design corridors close to existing infrastructure footprints or disturbed areas in the resort such as ski-field areas, adjacent to existing roads, existing walking tracks, within power line easements.
- Falls Creek's trail expansion strategy is a North East Victoria Cycling Optimisation (NEVCO) Masterplan priority project (Tourism North East 2018).
- Preparation of a resort wide trail management plan for operational and maintenance requirements.

Site level planning

Avoid and minimise steps taken at a site level specifically for the proposed trail has included:

- Where practical, aligning the trail on existing disturbed footprints such as existing walking tracks, ski-runs or power line easements.
- Micro-siting and ground truthing trail alignment with the trail designers to determine lowest impact alignment within the assessed study area.
- Detailed habitat mapping for Mountain Pygmy-possum and Guthega Skink (Figure 4) was completed to refine the habitat distribution for these species within the study area and further inform the design process.
- High detail evaluation of habitats for Guthega Skink within the study area, to avoid the highest quality habitat.
- Utilising elevated structures that are permeable to light and rainfall to minimise impacts to sensitive vegetation types and waterways.

If a permit is granted, the offset requirements would be 0.265 general habitat units. The general offset must be within the North East catchment management authority area or the Falls Creek Alpine Resort and must have a minimum strategic biodiversity value score of 0.780. No large tree offsets are required for the project.

Alpine Resorts Victoria – Falls Creek has a registered offset site within the Falls Creek Alpine Resort. A credit extract indicates 21.792 general habitat units with an SBV of up to 0.991 are available in ARV-FC's offset area to meet the project's offset requirements.

Recommendations

The trail construction methods and design responses intend to minimise vegetation and habitat impacts. The results and recommendations in this assessment have been incorporated into the final trail design. Priority has been given to minimising disturbance of habitat for Mountain Pygmy-possum, Broad-toothed Rat and Guthega Skink, and aligning the trail to avoid impacts on Alpine Bog communities and threatened aquatic fauna habitats where possible. Where the trail will pass in the vicinity of these habitats, the use of strict sediment control protocols will be required. Elevated structures or rock armouring with large voids or PVC pipes will be used to overcome minor habitat fragmentation created by trail construction in areas of habitat for Broad-toothed Rat.

Micro-siting of the trail during the construction phase will be required at rocky outcrops and near waterways to avoid impacts on these sensitive ecosystems. Sediment control measures and sensitive trail construction techniques will be used throughout the construction phase, including actions such as replacement of cut soil sods and other material in suitable locations along trail edges to encourage natural regeneration and reduce erosion. These requirements will be captured in the Site Environmental Management Plan (SEMP) submitted with the planning permit application.

We understand ARV – FC intends to apply seasonal restrictions on the use of the Summit to Gully trail, which will be open between January and March.

The Trail Management Plan covers previous stages of mountain bike trail development at Falls Creek. The Trail Management Plan addresses ongoing biodiversity issues such as pest plant and animal control, managing regrowth vegetation, sediment control, responding to flood, storm or fire events and managing introduction of soil and animal pathogens. We recommend the Trail Management Plan be updated to include an adaptive management approach for the Summit to Gully trail. The adaptive management approach should specify a schedule of monitoring for reptile activity and mortality during the first season of trail use to ensure any impacts to reptiles are understood and inform whether any curtailment in trail use is warranted.

1. Introduction

1.1. Project background

Biosis Pty Ltd was commissioned by Alpine Resorts Victoria - Falls Creek (ARV-FC) to undertake a flora and fauna assessment (FFA) of areas of land proposed for the construction of the Summit to Gully Mountain Bike Trail at Falls Creek (the study area).

The Summit to Gully trail is approximately 1.8 kilometres and will consist of a downhill mountain bike trail from the Summit of Falls Creek to Gully chairlift bottom station. The trail will link rock garden sections and predominantly follow existing ski run areas and proposes to include two removable built features.

The flora and fauna assessment work for the trail involved a number of components. The first component was an ecological constraints assessment of proposed trail alignment undertaken by Matt Looby (Biosis) in tandem with Max O'Connor (trail designer from World Trail Pty Ltd) on 17 February 2023. This entailed ground-checking proposed trail alignment and amending the alignment based on avoiding areas of highest ecological value. A detailed ecological assessment of the trail alignment was undertaken in February 2023. Detailed mapping of Mountain Pygmy-possum habitat (i.e. distribution of Mountain Plum-pine) within the Gully area was undertaken in May 2023. On the basis of habitats identified during the ecological assessment and detailed habitat mapping, it was recommended that targeted surveys for Mountain Pygmy-possum, Broad-toothed Rat and threatened alpine skinks (in particular Guthega Skink) be completed. Targeted surveys were designed to gather contemporary data, refine the habitat distribution for these species within the study area and to further inform the trail avoidance, minimisation and micro-siting process.

An on-site pre-application meeting with representatives from ARV – FC, Biosis and DEECA was held on 17 May 2023.

The primary objective of this flora and fauna assessment is to demonstrate avoidance and minimisation measures in compliance within current biodiversity legislation to support a planning permit application for the Summit to Gully trail.

1.2. Scope of assessment

The objectives of this investigation are to:

- Describe the vascular flora (ferns, conifers, flowering plants), vertebrate fauna (mammals, birds, reptiles, frogs, fishes) and decapod crustacea (e.g., crayfish).
- Map native vegetation and other habitat features.
- Conduct a vegetation quality assessment.
- Review the implications of relevant biodiversity legislation and policy, including Victoria's Guidelines for the removal, destruction or lopping of native vegetation ('the Guidelines').
- Identify potential implications of the proposed development and provide recommendations to assist with development design.
- Recommend any further assessments of the site that may be required.
- Undertake detailed habitat mapping for Mountain Pygmy-possum within the Gully area (covered by ESO1).

- Undertake targeted surveys for Broad-toothed Rat, Mountain Pygmy-possum and Guthega Skink.

1.3. Location of the study area

The study area is located in Falls Creek Alpine Resort, approximately 18 kilometres east of Harrietville and approximately 30 kilometres south-east of Bright. The study area is zoned as a Comprehensive Development Zone (CDZ2). Environment and Landscape Overlays, including Environmental Significance Overlays 1 and 2 (ESO1 and ESO2) which occur on the south-east edges of the study area. The Bushfire Management Overlay (BMO1) and the Erosion Management Overlay (EMO1) cover the entirety of the study area.

The study area is within the:

- Victorian Alps Bioregion
- Kiewa River Basin
- North East Catchment Management Authority (CMA)
- Alpine Shire Council.

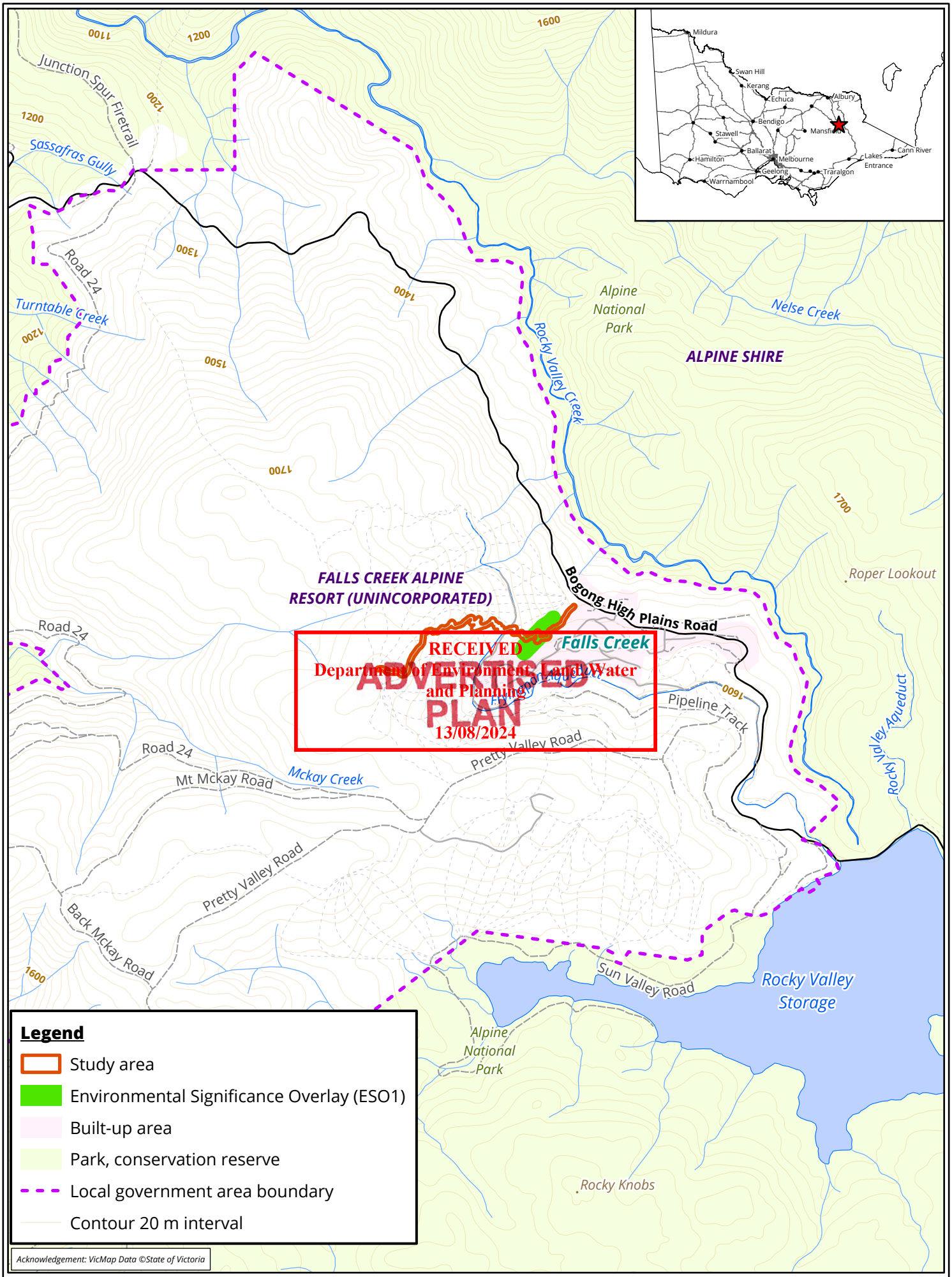

Figure 1 Location of the study area - Bogong High Plains Road, Falls Creek, Victoria

Matter: 38638,
Date: 17 July 2024 ,
Prepared for: GZ, Prepared by: SP, Last edited by: spanter
Layout: 38638_F1_Location
Project: P:\38600s\38638\Mapping\38638_FC_SummitToGully_MTB.aprx

0 250 500 750 1,000
Metres

Scale: 1:25,000 @ A4
Coordinate System GDA2020 MGA Zone 55

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2. Methods

2.1. Database review

In order to provide a context for the study area, information about flora and fauna from within 10 kilometres of the study area (the 'local area') was obtained from relevant biodiversity databases, many of which are maintained by the Victorian Government Department of Energy, Environment and Climate Action (DEECA) (formerly Department of Environment, Land, Water and Planning (DELWP)) or the Australian Government Department of Climate Change, Energy, Environment and Water (DCCEEW). Records from the following databases were collated and reviewed:

- DEECA's Victorian Biodiversity Atlas (VBA), including the 'VBA_FLORA25, FLORA100 & FLORA Restricted' and 'VBA_FAUNA25, FAUNA100 & FAUNA Restricted' datasets
- DCCEEW's Protected Matters Search Tool for matters protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act)

Other sources of biodiversity information were examined including:

- DEECA's NatureKit mapping tool.
- DEECA's Habitat Importance maps.
- DEECA's Native Vegetation Information Management (NVIM) system.
- DEECA's Ensym NVR Tool Support team was provided with site-based spatial information in order to generate a Native Vegetation Removal Report for the study area.
- Planning Scheme overlays relevant to biodiversity based on http://planningschemes.dpcd.vic.gov.au.
- Mountain Pygmy-possum expert Dean Heinz was consulted regarding habitat quality and trapping effort within the Gully area.

2.2. Definitions of threatened species or communities

Threatened species or communities include those species or communities that are listed under the EPBC Act and/or FFG Act. The conservation status of a species or ecological community is determined by its listing status under Commonwealth or State legislation / policy (Table 1).

Table 1 Conservation status of threatened species and ecological communities

Government level	Conservation status
National	Listed as nationally critically endangered, endangered or vulnerable under the EPBC Act
State	Listed as extinct, extinct in the wild, critically endangered, endangered, vulnerable or conservation dependent in Victoria under the FFG Act

Lists of threatened species generated from the databases are provided in Appendix B (flora) and Appendix C (fauna) and the species have been assessed to determine their likelihood of occurrence based on the process outlined below.

2.3. Determining likelihood of occurrence of threatened species

Likelihood of occurrence indicates the potential for a species or ecological community to occur regularly within the study area. It is based on expert opinion, information in relevant biodiversity databases and reports, and an assessment of the habitats on site. Likelihood of occurrence is ranked as negligible, low, medium, high or recorded. The rationale for the rank assigned is provided for each species in Appendix B (flora) and Appendix C (fauna). Those species for which there is little or no suitable habitat within the study area are assigned a likelihood of low or negligible and are not considered further.

Only those species listed under the EPBC Act or the FFG Act (hereafter referred to as 'threatened species') are assessed to determine their likelihood of occurrence. The habitat value for threatened species is calculated by the Habitat Importance Modelling produced by DEECA (DELWP 2017a). Where threatened species are recorded in the study area this is noted in Appendix B (flora) and Appendix C (fauna).

Threatened species which have at least medium likelihood of occurrence are given further consideration in this report. The need for targeted survey for these species is also considered.

2.4. Site investigation

2.4.1. Flora assessment

The flora assessment was undertaken by Georgina Zacks (Senior Botanist) and Nick Lloyd (Botanist) on 20 - 22 February 2023. A list of flora species was collected during each survey. These lists will be submitted to DEECA for incorporation into the Victorian Biodiversity Atlas. Planted species have not been recorded unless they are naturalised.

Additionally, detailed mapping of Mountain Pygmy-possum habitat (i.e. distribution of Mountain Plum-pine *Podocarpus lawrencei*) within the Gully area was undertaken in May 2023. The locations of individual plants were recorded as points and larger areas with dense Mountain Plum-pine were mapped out with polygons. This was undertaken with a view to understanding the quality and distribution of Mountain Pygmy-possum habitat in this area in high detail.

Native vegetation is defined in the Victoria Planning Provisions as 'plants that are indigenous to Victoria, including trees, shrubs, herbs, and grasses' (Clause 73.01).

The Guidelines classify native vegetation into two categories (DELWP 2017a):

- A **patch** of native vegetation (measured in hectares) is either:
  - An area of native vegetation, with or without trees, where at least 25% of the total perennial understorey cover is native plants.
  - An area with three or more native canopy trees where the drip line (i.e. the outermost boundary of a tree canopy) of each tree touches the drip line of at least one other tree, forming a continuous canopy.
  - Any mapped wetland included in the Current wetlands map, available in DEECA systems and tools.

Patch vegetation is classified into ecological vegetation classes (EVCs). An EVC contains one or more floristic (plant) communities, and represents a grouping of broadly similar environments. Definitions of EVCs and benchmarks (condition against which vegetation quality at the site can be compared) are determined by DEECA.

- A **scattered tree** is defined as a native canopy tree that does not form part of a patch of native vegetation.

A canopy tree is a mature tree that is greater than three metres in height and is normally found in the upper layer of a vegetation type. Ecological vegetation class descriptions provide a list of the typical canopy species. A scattered tree is defined as either small or large, and is determined using the large tree benchmark for the relevant EVC. The extent of a small scattered tree is the area of a circle with a 10 metre radius (i.e. 0.031 hectares), while the extent of a large scattered tree is a circle with a 15 metre radius (i.e. 0.070 hectares). A condition score is applied to each scattered tree based on information provided by DEECA's NVIM.

A Vegetation Quality Assessment (VQA) was undertaken for all patches of native vegetation identified in the study area. This assessment is consistent with DEECA's habitat hectare method (DSE 2004) and the Guidelines (DELWP 2017a). For the purposes of this assessment the limit of the resolution for identification of a patch of native vegetation was taken to be 0.001 habitat hectares (Hha). That is, if a discrete patch native vegetation was present with sufficient cover but its condition and extent would not have resulted in the identification of at least 0.001 habitat hectares, the vegetation patch of vegetation was not mapped or included in the assessment.

Species nomenclature for flora follows the Victorian Biodiversity Atlas (VBA).

2.4.2. Fauna assessment

An initial desktop fauna assessment was undertaken by Senior Zoologist Clare McCutcheon to assess the fauna habitat values of the study area, and to determine the likelihood of threatened fauna species occurring. The desktop fauna assessment incorporated a review of database records of significant fauna species, along with photographs and vegetation descriptions obtained during the flora assessment.

The desktop fauna assessment was followed by a field-based assessment of fauna habitat undertaken by Shannon Braun (Zoologist) on 13 April 2023. The field-based assessment was undertaken to provide further information on quality of habitat for threatened reptiles, in particular Guthega Skink, and in order to make a recommendation on whether targeted surveys should be completed. Potential reptile habitat within and adjacent to the study area was visually assessed, photographed and mapped.

Following the field-based assessment and recommendation for targeted survey, a targeted survey for Broad-toothed Rat, Mountain Pygmy-possum and Guthega Skink was undertaken in order to inform an assessment of the project under the EPBC Act. The targeted surveys focussed on high alpine areas with rocky outcrops providing habitat for threatened reptiles, on wet drainage lines providing habitat for Broad-toothed Rat, and on denser areas of Mountain Plum Pine *Podocarpus lawrencei* providing habitat for Mountain Pygmy-possum. Surveys incorporated the following survey techniques to determine presence and distribution of these threatened species, and to provide greater certainty regarding the assessment of potential impacts to EPBC Act listed species:

- Active searching and binocular searching for threatened reptiles and detailed assessment of the quality and distribution of habitat within the highest altitude parts of the study area.
- Searching for signs of Broad-toothed Rat activity and high quality habitat.
- Remote camera surveys for Mountain Pygmy-possum within the Gully portion of the study area.

Targeted survey methods and effort are outlined in Appendix A.

2.4.3. Permits

Biosis undertakes flora and fauna assessments under the following permits and approvals:

- Permit to Take/Keep Protected Flora issued by DEECA under the *Flora and Fauna Guarantee Act 1988* (FFG Act) (Permit Number 10010194).
- Approvals 18.21 and 20.21 issued by the Wildlife and Small Institutions Animal Ethics Committee of the Victorian Government Department of Economic Development, Jobs, Transport and Resources (DEDJTR).
- Scientific Procedures Fieldwork Licence issued by DEDJTR's Wildlife and Small Institutions Animal Ethics Committee (Licence Number 20020).

2.5. Qualifications

Ecological surveys provide a sampling of flora and fauna at a given time and season. There are a number of reasons why not all species will be detected at a site during survey, such as low abundance, patchy distribution, species dormancy, seasonal conditions, and migration and breeding behaviours. In many cases these factors do not present a significant limitation to assessing the overall biodiversity values of a site.

The current flora and fauna assessment was conducted in summer and autumn. Parts of the study area were examined in detail (e.g. detailed habitat mapping occurred within the Gully ESO1 area). This the survey effort combined with the ecological expertise of Biosis staff and knowledge of Falls Creek resort area is considered sufficient to assess the general values of the study area and to inform recommendations for further assessments. Targeted surveys for threatened fauna were undertaken during summer to maximise the likelihood of detecting target species.

Native Vegetation Removal Reports are prepared through DEECA's NVIM system or requested through DEECA's Ensym NVR Tool Support team. Biosis supplies relevant site-based spatial information as inputs to DEECA and we are reliant on DEECA's output reports for all assessment pathway applications. Biosis makes every effort to ensure site and spatial information entered into the NVIM, or supplied to DEECA, is an accurate reflection of proposed native vegetation removal.

2.6. Legislation and policy

The implications for the project were assessed in relation to key biodiversity legislation and policy including:

- Matters listed under the EPBC Act, associated policy statements, significant impacts guidelines, listing advice and key threatening processes.
- Threatened taxa, communities and threatening processes listed under Section 10 of the FFG Act and associated action statements and listing advice.
- Guidelines for the removal, destruction or lopping of native vegetation (DELWP 2017a).
- *Planning and Environment Act 1987* – specifically Clauses 12.01-2, 52.17 and 66.02 and Overlays in the Alpine Shire Planning Scheme.
- Noxious weeds and pest animals lists under the *Catchment and Land Protection Act 1994* (CaLP Act).

2.7. Mapping

Alpine Resorts Victoria – Falls Creek supplied plans of the trail alignment and specified construction widths (Falls_Creek_Downhill_Concept). Mapping was conducted using hand-held GPS-enabled tablets and aerial photo interpretation. The accuracy of this mapping is therefore subject to the accuracy of the tablets (generally ± 5 metres) and dependent on the limitations of aerial photo rectification and registration.

Mapping has been produced using a Geographic Information System (GIS). Electronic GIS files which contain our flora and fauna spatial data are available to incorporate into design concept plans. However, this mapping may not be sufficiently precise for detailed design purposes.

3. Results

The ecological features of the study area are described below and mapped in Figure 2.

Species recorded during the flora and fauna assessment, including targeted fauna surveys, are listed in Appendix B (flora) and Appendix C (fauna). Unless of particular note, these species are not discussed further.

Threatened species recorded or predicted to occur in the local area is also provided in those appendices, along with an assessment of the likelihood of the species occurring within the study area.

3.1. Vegetation and fauna habitat

The proposed new trail traverses both alpine and sub-alpine vegetation and habitat types.

The study area has been subject to disturbances such as ski-field and hydro-electricity infrastructure development, hydrological modification and road and track building. Parts of the study area were severely burnt in the 2003 alpine fires.

The study area supports shrubland, heathland, wet heathland and sub-alpine woodland, as well as a combination of predominantly introduced vegetation adjacent to areas of previous disturbance and on ski runs. Native vegetation is represented by four EVCs including Alpine Grassy Heathland EVC 1004, Sub-alpine Shrubland EVC 42, Sub-alpine Woodland EVC 43 and Sub-alpine Wet Heathland EVC 210. These EVCs occur in various condition states as a result of current and historical land use. Each EVC and respective condition state are shown in Figure 2 and described in Table 2. Photos are provided in Appendix D.

Fauna recorded during targeted surveys are outlined below in Table 3. Some example photos are included in Appendix D.

Table 2 Summary of vegetation and habitat types within the study area

Vegetation or habitat type	Description	Location	Significant values
Alpine Grassy Heathland EVC 1004 **Bioregional Conservation Status (BCS):** Rare **Photo 1**	**Structure**: Treeless, high altitude heathland to 0.5 metre tall with an open structure with dense layer of shrubs (Photo 1). Scattered emergent Bogong Sally *Eucalyptus pauciflora* subsp. *hedraia*. **Character species**: Dense heathy-shrub layer supporting species including Yellow Kunzea *Kunzea muelleri*, Alpine Grevillea *Grevillea australis*, Leafy Bossiaea *Bossiaea foliosa* and Snow Beard-heath *Acrothamnus montanus*. The ground layer supports a wide range of native herbs and grasses including Bidgee-widgee *Acaena novae-zelandiae*, Mountain Woodruff *Asperula gunnii*, *Brachyscome* species, *Poa* species, Buffalo Leek-orchid *Prasophyllum suttonii* s.s. and Alpine Wallaby Grass *Rytidosperma nudiflorum*. **Weeds**: Weed cover is low to moderate due to varying degrees of edge effects and proximity to previously disturbed/cleared areas. Commonly encountered species include Sheep Sorrel *Acetosella vulgaris*, Brown-top Bent *Agrostis capillaris,* Red Fescue *Festuca rubra* and Flatweed *Hypochaeris radicata*.	On flatter, high altitude areas at the western extent of the study area, above 1680 metres above sea level.	Alpine Grassy Heathland within the study area is considered highly likely to support a number of threatened species that are known to occupy similar habitat in the broader local area, including Broad-toothed Rat, Alpine Bog Skink and Tussock Skink. Rocky outcrops within areas mapped as Alpine Grassy Heathland also have potential to support Guthega Skink and Mountain Skink.
Sub-alpine Shrubland EVC 42 **BCS:** Rare **Photo 2**	**Structure:** Treeless. Patchy dense shrubland to 1.5 metres tall. **Character species:** Shrubs including Alpine Orites *Orites lancifolius*, Alpine Mint-bush *Prostanthera cuneata*, Leafy Bossiaea, Alpine Phebalium *Phebalium squamulosum* subsp. *alpinum*, Alpine Grevillea and Alpine Pepper *Tasmannia xerophila*. Low density of grasses and herbs in	On steeper easterly-facing slopes between approximately between 1720 and 1640 metres above sea level.	Good quality habitat present for Broad-toothed Rat and Tussock Skink, all of which were recorded throughout this vegetation type within the study area. Habitat for Guthega Skink and Alpine Bog Skink occurs particularly where rocks, woody debris and canopy openings present opportunities, though the

Vegetation or habitat type	Description	Location	Significant values
	the understorey, mostly restricted to gaps in the shrub layer, consisting of Common Grass-sedge *Carex breviculmis* , Ledge Grass *Poa hothamensis*, Silver Snow-daisy *Celmisia tomentella*, Mountain Everlasting *Coronidium monticola*, and Highland Picris *Picris angustifolia* subsp. *merxmuelleri.* **Weeds:** Moderate weed cover of Red Fescue, Brown-top bent, Sheep Sorrel, St John's Wort *Hypericum perforatum*, and Sweet Vernal-grass *Anthoxanthum odoratum*.		likelihood of these species occurring has been downgraded following the completion of targeted surveys.
Sub-alpine Wet Heathland EVC 210 **Alpine Bog community** **BSC:** Endangered **Photo 3**	**Structure:** Open heathland/sedgeland to 1 meter tall **Character species:** Peat Moss *Sphagnum cristatum,* Spreading Rope-rush *Empodisma minus*, Fen Sedge *Carex gaudichaudiana*, Swamp Heath *Epacris paludosa*, Candle Heath *Richea continentis*, Alpine Baeckea *Baeckea gunniana* and Carpet Sedge *Carex jackiana*. **Weeds:** Low cover of weeds including Flatweed and Sheep Sorrel.	In drainage lines, depressions and where groundwater discharge reaches the surface.	EPBC Act listed Alpine Sphagnum Bog and Associated Fens community present, which is synonymous with the FFG Act listed Alpine Bog Community. Habitat present for Broad-toothed Rat. Potential habitat for Alpine Bog Skink.
Sub-alpine Woodland EVC 43 **BCS:** Least Concern **Photo 4** and **Photo 5**	Present in two condition states within the study area. **Unburnt** **Structure:** Woodland to 10 metres with moderately dense shrubby midstorey to 2 metres. **Character species:** Canopy dominated by Bogong Sally. Midstorey dominated by Leafy Bossiaea, Alpine Pepper, Alpine Orites and Alpine Mint-bush. Understorey supporting a range of grasses, ferns and herbs including Ledge Grass, Mother Shield-fern *Polystichum proliferum* and Fireweed Groundsel *Senecio linearis.* **Weeds:** Generally low weed cover, common species including Sheep Sorrel and Flatweed.	Throughout much of the lower altitudes of the study area, below 1660 metres above sea level.	Sub-alpine Woodland within the study area with canopy species present provides foraging habitat for Gang-gang Cockatoo. This vegetation type also provides habitat for Broad-toothed Rat *Mastacomys fuscus.*

Vegetation or habitat type	Description	Location	Significant values
	Burnt **Structure:** Canopy absent. Dense midstorey re-growth to 5 metres tall. **Character species:** Dense resprouting of Bogong Sally from lignotubers. Dense recruitment of shrubby midstorey species including Leafy Bossiaea and Mountain Hickory Wattle *Acacia obliquinervia* and Victorian Christmas-bush *Prostanthera lasianthos*. The density of the midstorey results in a relatively sparse ground layer comprising a range of grasses, ferns and herbs including Ledge Grass, Common Grass-sedge, Prickly Starwort *Stellaria pungens*, Mountain Pennywort *Hydrocotyle algida.* **Weeds:** Moderate weed cover including Sheep Sorrel, Brown-top Bent, Flatweed and Sweet Vernal-grass.		
Rocky outcrops **Photo 6**	Large, scattered rock outcrops and boulders protrude from native vegetation at higher altitudes of the study area. These rocks will be used to anchor the boardwalk foundations in some areas.	Above 1640 meters above sea level.	Rock outcrops within the study area and the broader resort area support potential habitat for Guthega Skink and Mountain Skink.
Dense areas of Mountain Plum Pine	Dense areas of Mountain Plum Pine to 2 metres tall, occurring within Sub-alpine Woodland EVC 43.	Within the Gully portion of the study area covered by ESO1	Mountain Plum Pine is known habitat and a food source for Mountain Pygmy Possum
Predominantly introduced vegetation **Photo 7**	Mostly cover made up of grasses including Brown-top Bent, Red Fescue, Sweet Vernal-grass, Timothy Grass *Phleum pratense*, Cocksfoot *Dactylis glomerata*, and Yorkshire Fog *Holcus lanatus.* Common non-grass weeds include Milfoil *Achillea millefolium*, Sheep Sorrel,	Within and adjacent to ski runs and other areas of previous disturbance throughout the study area.	Predominantly introduced vegetation provides limited ecological value for native species in the study area, however a number of threatened fauna species are known to utilise this habitat type in

Vegetation or habitat type	Description	Location	Significant values
	Blackberry *Rubus anglocandicans,* White Clover *Trifolium repens* var. *repens* and Flatweed.		the local area including Broad-toothed Rat, Alpine Bog Skink and Tussock Skink.

Table 3 Fauna recorded during targeted survey

Status	Scientific Name	Common Name	Recorded during
Indigenous species			
	Acanthiza pusilla	Brown Thornbill	Camera trap survey
	Antechinus swainsonii	Dusky Antechinus	Camera trap survey
	Antechinus spp.	Antechinus	Camera trap survey
	Anthochaera carunculata	Red Wattlebird	Camera trap survey
	Drysdalia coronoides	White-lipped Snake	Targeted survey
	Felis catus	Feral Cat	Camera trap survey
EN, v, en	*Mastacomys fuscus mordicus*	Broad-toothed Rat	General flora and fauna survey, camera trap survey
	Pseudemoia entrecasteauxii	Southern Grass Skink	Targeted survey
e, vu	*Pseudemoia pagenstecheri*	Tussock Skink	Targeted survey
	Rattus fuscipes	Bush Rat	Camera trap survey
	Rattus spp.	Rat	Camera trap survey
	Sericornis frontalis	White-browed Scrubwren	Camera trap survey
	Strepera graculina	Pied Currawong	Camera trap survey

3.2. Landscape context

The study area is located with the Falls Creek Alpine Resort, which supports a broad range of vegetation and habitat types, including significant tracts of sub-alpine, alpine and montane vegetation similar to that of the surrounding Alpine National Park. Historical disturbances and land uses have created a mosaic of disturbed, regenerating and intact vegetation types, with the highest levels of disturbance around Falls Creek village and near hydroelectricity infrastructure.

3.3. Threatened species

Threatened species recorded or predicted to occur within 10 kilometres of the study area or from the relevant catchment (aquatic species) are listed in Appendix B (flora) and Appendix C (fauna). An assessment of the likelihood of these species occurring in the study area and an indication of where within the site (i.e. which habitats or features of relevance to the species) is included.

Seventeen FFG Act threatened flora species were recorded in the study area during the site assessment (Appendix B.1). No EPBC Act threatened flora species were recorded. The study area and broader database search area contains records of 169 FFG Act listed flora species. The majority of these species are either located outside the Falls Creek Resort boundaries, or are locally common sub-alpine species. These locally common species are geographically restricted due to their occurrence in the Australian Alps and are thus considered rare at a state level, but are regionally common species that, in some instances, make up the majority of species in the mid- and understorey. We have included only the FFG threatened species that were recorded in the study area during the site assessment in the table below. We have excluded other FFG species from the database search from the remainder of this report, only focusing on flora species that are perceived to be threatened at the local scale.

A summary of those species recorded or with a medium or higher likelihood of occurring in the study area is provided below in Table 4.

Table 4 Summary of EPBC and FFG Act listed flora and fauna species most likely to occur in the study area

Species name	Listing status	Area of value within the study area
Snow Beard-heath ***Acrothamnus montanus***	Endangered under the FFG Act	Alpine Grassy Heathland EVC 1004
Carpet Sedge ***Carex jackiana***	Endangered under the FFG Act	EVC 210 and other wet areas
Carpet Snow-daisy ***Celmisia costiniana***	Endangered under the FFG Act	Alpine Grassy Heathland EVC 1004
Silver Snow-daisy ***Celmisia tomentella***	Vulnerable under the FFG Act	Alpine Grassy Heathland EVC 1004 and Sub-alpine Woodland EVC 43
Bogong Sally ***Eucalyptus pauciflora* subsp. *hedraia***	Critically endangered under the FFG Act	Throughout the study area
Royal Grevillea ***Grevillea victoriae* subsp. *victoriae***	Endangered under the FFG Act	Sub-alpine Woodland EVC 43
Rusty Daisy Bush ***Olearia brevipedunculata***	Endangered under the FFG Act	Alpine Grassy Heathland EVC 1004 and Sub-alpine Shrubland EVC 42
Bogong Daisy-bush ***Olearia frostii***	Vulnerable under the FFG Act	Alpine Grassy Heathland EVC 1004 and Sub-alpine Shrubland EVC 42
Dusty Daisy-bush ***Olearia phlogopappa* subsp. *Flavescens***	Endangered under the FFG Act	Sub-alpine Woodland EVC 43
Alpine Bootlace Bush ***Pimelea axiflora* subsp. *Alpina***	Vulnerable under the FFG Act	Alpine Grassy Heathland EVC 1004
Fringed Rice-flower ***Pimelea ligustrina* subsp. *Ciliata***	Endangered under the FFG Act	Throughout the study area
Victorian Buttercup ***Ranunculus victoriensis***	Endangered under the FFG Act	Alpine Grassy Heathland EVC 1004
Brock Knawel ***Scleranthus brockiei***	Endangered under the FFG Act	Alpine Grassy Heathland EVC 1004
Mossy Knawel ***Scleranthus singuliflorus***	Endangered under the FFG Act	Alpine Grassy Heathland EVC 1004
Alpine Triggerplant ***Stylidium montanum***	Endangered under the FFG Act	Alpine Grassy Heathland EVC 1004
Gang-gang Cockatoo ***Callocephalon fimbriatum***	Endangered under the EPBC Act Endangered under the FFG Act	Foraging habitat in Sub-alpine Woodland EVC.
White-throated Needletail ***Hirundapus caudacutus***	Vulnerable under the EPBC Act. Vulnerable under the FFG Act.	May occur in the aerial space on occasion, however unlikely to utilise the terrestrial habitat of the study area.
Spot-tailed Quoll ***Dasyurus maculatus maculatus***	Endangered under the EPBC Act.	May occur throughout study area.
Mountain Pygmy-possum ***Burramys parvus***	Endangered under the EPBC Act. Endangered under the FFG Act.	Sub-alpine Shrubland and Woodland EVCs, with nesting habitat in areas with boulders.

Species name	Listing status	Area of value within the study area
Broad-toothed Rat ***Mastacomys fuscus mordicus***	Endangered under the EPBC Act. Vulnerable under the FFG Act.	Suitable habitat throughout the study area, specifically in areas with high sedge and grass cover.
Guthega Skink ***Liopholis guthega***	Endangered under the EPBC Act. Critically Endangered under the FFG Act.	Suitable habitat throughout the study area, especially in areas with rock and boulder cover.
Mountain Skink ***Liopholis montana***	Endangered under the EPBC Act. Endangered under the FFG Act.	Suitable habitat throughout the study area.
Alpine Bog Skink ***Pseudemoia cryodroma***	Endangered under the EPBC Act Endangered under the FFG Act.	Suitable habitat throughout the study area.
Alpine She-oak Skink ***Cyclodomorphus praealtus***	Endangered under the EPBC Act. Critically Endangered under the FFG Act.	Suitable habitat throughout the study area.
Alpine Stonefly ***Thaumatoperla alpina***	Endangered under the EPBC Act. Endangered under the FFG Act.	May utilise the aqueduct.
Dingo ***Canis lupus dingo***	Vulnerable under the FFG Act.	Wide ranging species may occur throughout the study area.
Alpine Water Skink ***Eulamprus kosciuskoi***	Endangered under the FFG Act.	Sub-alpine Wet Heathland EVC and alpine sphagnum bogs.
Tussock Skink ***Pseudemoia pagenstecheri***	Endangered under the FFG Act.	Suitable habitat throughout the study area.
Alpine Darner Dragonfly ***Austroaeschna flavomaculata***	Vulnerable under the FFG Act.	May utilise the aqueduct.
Stonefly ***Riekoperla intermedia***	Vulnerable under the FFG Act.	May utilise the aqueduct.
Freshwater Isopod ***Colubotelson joyneri***	Critically Endangered under the FFG Act.	May utilise the aqueduct.

3.4. Threatened ecological communities

3.4.1. EPBC Act listed communities

There were two EPBC Act listed threatened ecological communities predicted to occur within the 10 kilometre project search area, those being:

- *White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland* (Box Gum Woodland) critically endangered community
- *Alpine Sphagnum Bogs and Associated Fens* endangered community.

The study area does not support any characteristic species nor is it in the correct landscape position for the Box Gum Woodland community.

Some areas of Sub-alpine Wet Heathland EVC 210 within the study area are synonymous with 'Alpine Sphagnum Bogs and Associated Fens' threatened ecological community listed as Endangered under the EPBC

Act and 'Alpine Bog Community' listed under the FFG Act. The defining characteristic of these communities is the presence of Peat Moss *Sphagnum* spp., consequently areas of Sub-alpine Wet Heathland EVC 210 which support *Sphagnum* spp. Are considered part of this community and are mapped as such. Approximately 577 square metres (0.0577 hectares) of this community was identified within the study area (Figure 2).

3.4.2. FFG Act listed communities

There are three FFG Act listed threatened ecological communities that are predicted to occur within the project search area (Appendix B.3), those being:

- *Alpine Bog Community*
- *Alpine Snowpatch Community*
- *Caltha introloba Herbland Community*.

In some instances Sub-alpine Wet Heathland EVC 210 is synonymous with 'Alpine Sphagnum Bogs and Associated Fens' threatened ecological community listed as Endangered under the EPBC Act and 'Alpine Bog Community' listed under the FFG Act (collectively referred to as Alpine Bogs). The defining characteristic of these Alpine Bog communities is the presence of Peat Moss *Sphagnum* spp. Areas of this community are shown in Figure 2.

Alpine Snowpatch vegetation communities typically occur on the steeper sheltered alpine slopes, often with a south-eastern aspect, where snow persists into warmer periods of the year. The community includes two main vegetation associations: Short-turf Snowpatch and Diuturnal Snowpatch. The study area is on an easterly aspect and generally supports shrubby vegetation to approximately 1 metre in height. The vegetation structure and characteristic species are inconsistent with both variations of this community.

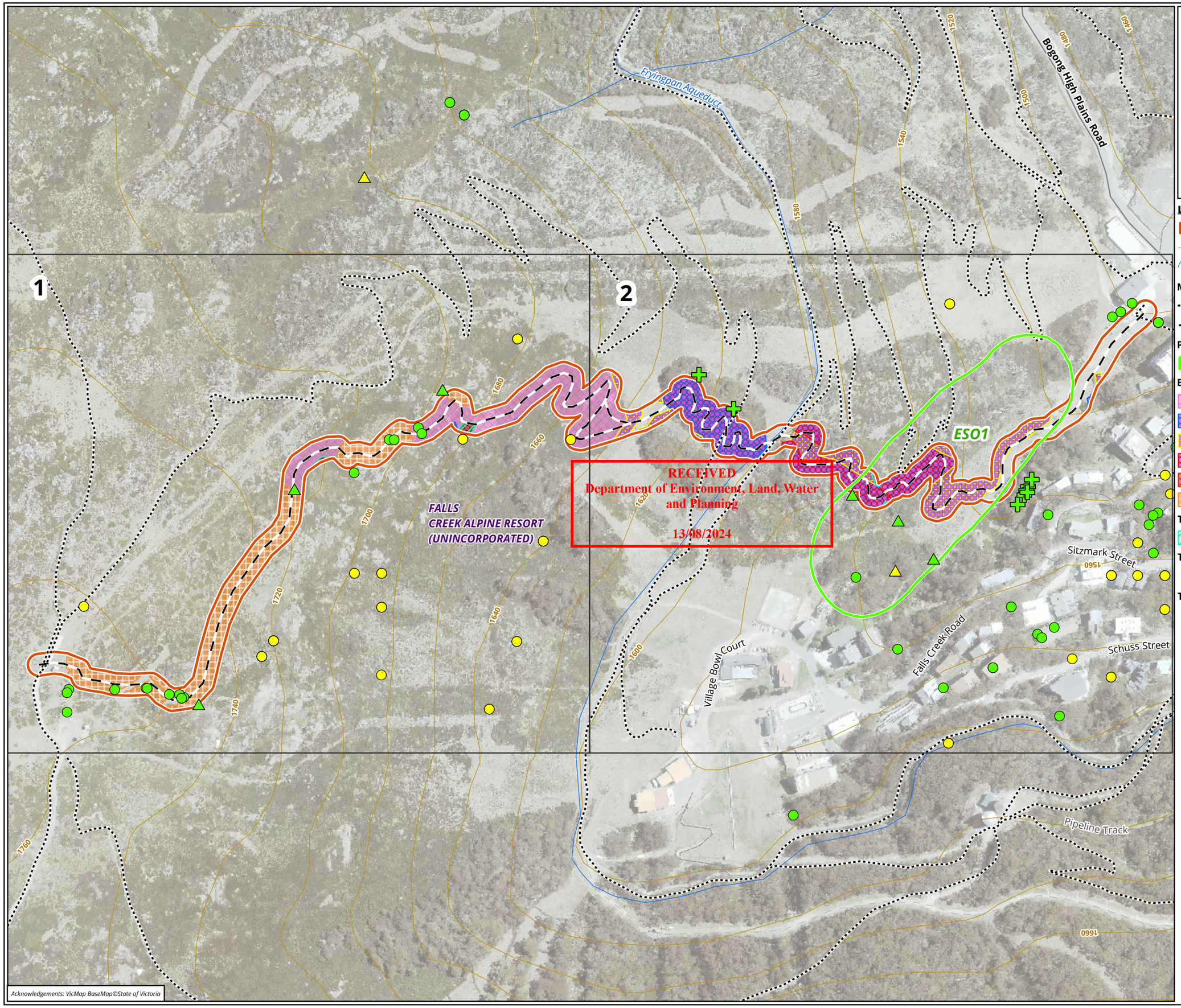
The *Caltha introloba* Community occupies a specialised type of habitat. It mainly occurs on flat rocky outwashes of some snowpatch communities in the sub-alpine zone, but has also been recorded within steep snowpatches in the alpine zone above 1800 metres. The study area contains no rocky outwash or snowpatch, is not considered consistent with this community.

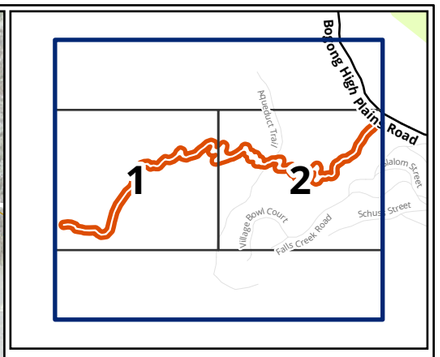
No other threatened ecological communities were recorded in the study area.

3.5. Further survey recommendations

The current assessment has included detailed assessment and mapping of all ecological features within the study area and a targeted survey program for threatened fauna species. The ecological features of the study area are therefore considered to be appropriately assessed to inform the proposed development. No further surveys are recommended for the planning approvals stage of the project.

The assessment of aquatic fauna values was limited to a desktop and habitat-based study. Two threatened aquatic invertebrates are likely to occur within, or a short distance downstream, of the study area: Alpine Stonefly and Stonefly. These species have been assumed present and on that basis actions to prevent waterway degradation through increased stream turbidity will be implemented. This includes the use of elevated structures and sensitive design responses at waterway and bog crossings that will avoid and minimise impacts on aquatic habitats and surrounding riparian vegetation (Figure 2). These measures will include construction using clear span elevated structures, or where footings are required in wet areas low impact footing installation techniques (e.g. pneumatic drilling) will be used. In addition, best practice sediment control will be implemented.





Legend

- Study area
- Contour 20 m interval
- Watercourse

Mountain bike trails

- Existing
- Proposed

Planning overlays

- Environmental Significance Overlay (ESO1)

Ecological vegetation classes (EVCs)

- (VAlp0042) Sub-alpine Shrubland
- (VAlp0043) Sub-alpine Woodland (intact)
- (VAlp0043) Sub-alpine Woodland (derived)
- (VAlp0043) Sub-alpine Woodland (burnt)
- (VAlp0210) Sub-alpine Wet Heathland
- (VAlp1004) Alpine Grassy Heathland

Threatened ecological community (EPBC)

- Alpine Sphagnum Bogs and Associated Fens

Trees

- Large patch tree

Threatened species

- Fauna (recorded by Biosis)
- Flora (recorded by Biosis)
- Flora (VBA)
- Fauna (VBA)

ADVERTISED PLAN

Figure 2.0 Ecological features of the study area: overview

0 20 40 60 80 100

Metres

N

Scale: 1:3,200 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

Matter: 38638,
Date: 18 July 2024,
Prepared for: GZ, Prepared by: SP, Last edited by: spanter
Layout: 38638_F2_EcoFeatures
Project: P:\38600s\38638\Mapping\
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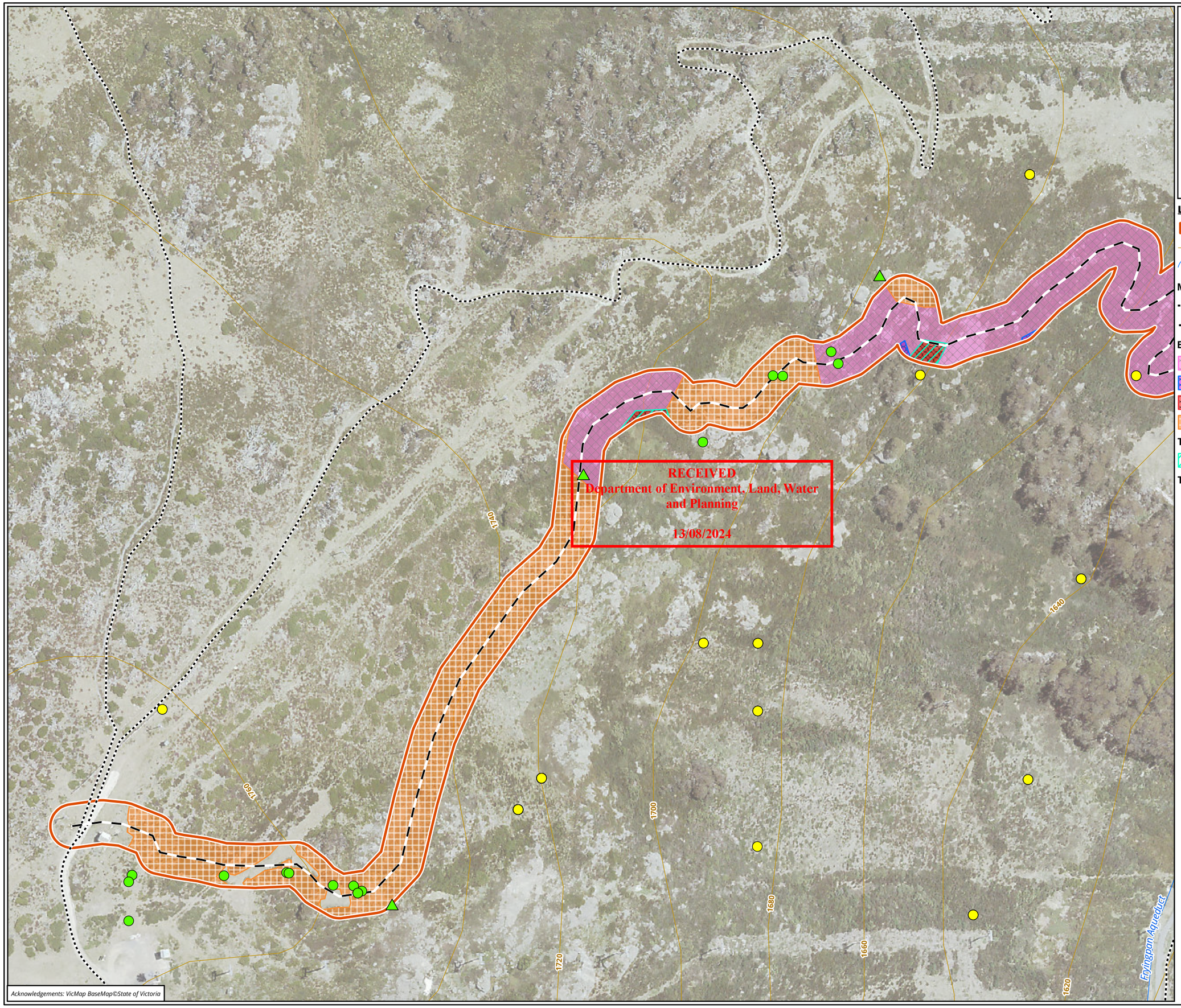

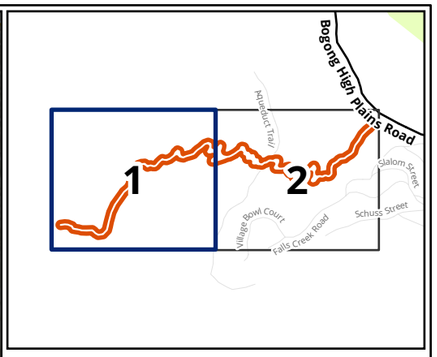

Legend

- Study area
- Contour 20 m interval
- Watercourse

Mountain bike trails

- Existing
- Proposed

Ecological vegetation classes (EVCs)

- (VAlp0042) Sub-alpine Shrubland
- (VAlp0043) Sub-alpine Woodland (intact)
- (VAlp0210) Sub-alpine Wet Heathland
- (VAlp1004) Alpine Grassy Heathland

Threatened ecological community (EPBC)

- Alpine Sphagnum Bogs and Associated Fens

Threatened species

- Fauna (recorded by Biosis)
- Flora (recorded by Biosis)
- Flora (VBA)

Figure 2.1 Ecological features of the study area: detail (west)

0 10 20 30 40 50
Metres

N

Scale: 1:1,600 @ A3
Coordinate System: GDA2020 MGA Zone 55

biosis

Matter: 38638,
Date: 18 July 2024,
Prepared for: GZ, Prepared by: SP, Last edited by: spanter
Layout: 38638_F2_EcoFeatures
Project: P:\38600s\38638\Mapping\
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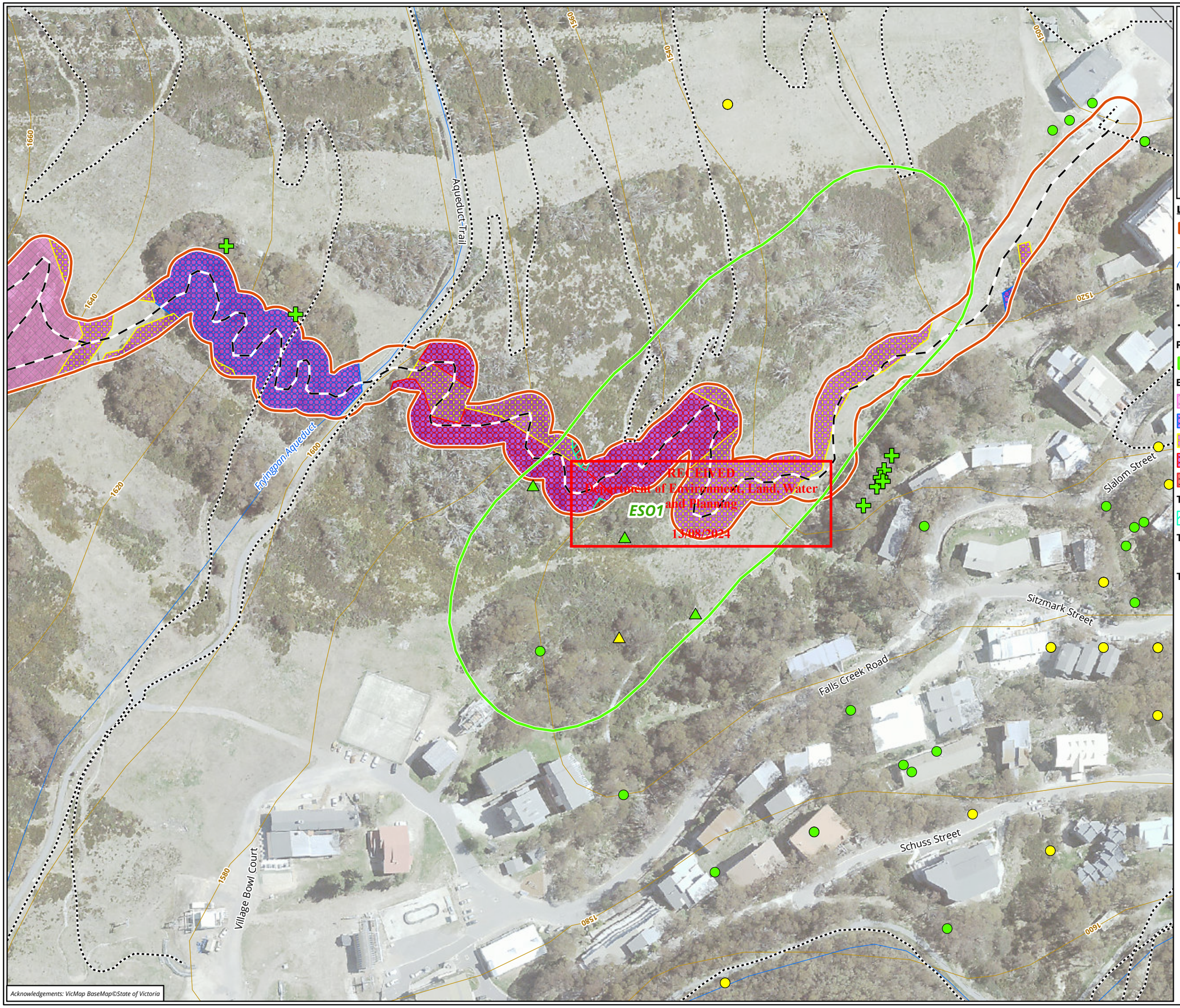
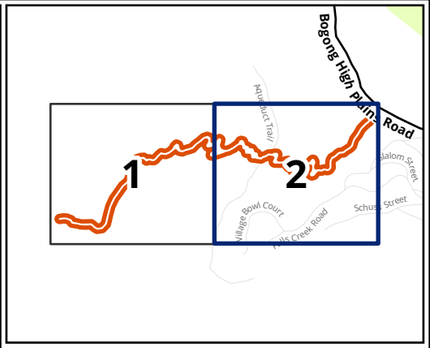




Legend

- Study area
- Contour 20 m interval
- Watercourse

Mountain bike trails

- Existing
- Proposed

Planning overlays

- Environmental Significance Overlay (ESO1)

Ecological vegetation classes (EVCs)

- (VAlp0042) Sub-alpine Shrubland
- (VAlp0043) Sub-alpine Woodland (intact)
- (VAlp0043) Sub-alpine Woodland (derived)
- (VAlp0043) Sub-alpine Woodland (burnt)
- (VAlp0210) Sub-alpine Wet Heathland

Threatened ecological community (EPBC)

- Alpine Sphagnum Bogs and Associated Fens

Trees

- Large patch tree

Threatened species

- Fauna (recorded by Biosis)
- Flora (recorded by Biosis)
- Flora (VBA)
- Fauna (VBA)

ADVERTISED PLAN

Figure 2.2 Ecological features of the study area: detail (east)

0 10 20 30 40 50

Metres

N

Scale: 1:1,600 @ A3

Coordinate System: GDA2020 MGA Zone 55

biosis

Matter: 38638,
Date: 18 July 2024,
Prepared for: GZ, Prepared by: SP, Last edited by: spanter
Layout: 38638_F2_EcoFeatures
Project: P:\38600s\38638\Mapping\
38638_FC_SummitToGully_MTB.aprx

4. Biodiversity legislation and government policy

This section provides an assessment of the project in relation to key biodiversity legislation and government policy. This section does not describe the legislation and policy in detail. Where available, links to further information are provided.

4.1. Commonwealth

4.1.1. Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act applies to developments and associated activities that have the potential to significantly impact on Matters of National Environmental Significance (MNES) protected under the Act.

Further information including a guide to the referral process is available at http://www.environment.gov.au/epbc/index.html

MNES relevant to the project are summarised in Table 5. It includes an assessment against the EPBC Act policy statements published by the Australian Government which provide guidance on the practical application of EPBC Act.

Table 5 Assessment of project in relation to the EPBC Act

MNES	Project specifics	Assessment against significant impact guidelines
EPBC Act listed species	13 EPBC Act listed flora and 32 EPBC Act listed fauna species have been recorded or predicted to occur in the project search area. The likelihood of these species occurring in the study area is assessed in Appendix B (flora) and Appendix C (fauna).	Broad-toothed Rat scats were recorded in the study area and this species has a high likelihood of occurrence throughout the Falls Creek Alpine Resort area. High quality habitat for Guthega Skink, Mountain Skink, Alpine She-oak Skink and Alpine Bog Skink is present within the study area, however these species were not observed during targeted surveys. Mapped habitat and a historical record of Mountain Pygmy-possum occurs within the Gully area of the Summit – Gully trail (covered by ESO1). Significant Impact Criteria (SIC) assessments have been completed below for these Matters of National Environmental Significance (MNES). Alpine Stonefly has a medium likelihood of occurrence within the study area associated with waterways. All locations where Alpine Stonefly may be present are to be spanned by structures and strict sediment controls are to be implemented. As such no impact is considered likely and a SIC assessment has not been completed for this species.

MNES	Project specifics	Assessment against significant impact guidelines
		White-throated Needletail is likely to operate in the airspace above the study area but it is unlikely to utilise or be present in terrestrial habitats in the study area. As such no impact is considered likely and a SIC assessment has not been completed for this species. The remaining threatened species are not likely to occur and development is unlikely to constitute a significant impact.
EPBC Act listed ecological communities	Two EPBC Act listed ecological communities have been recorded or predicted to occur in the project search area: • Alpine Sphagnum Bogs and Associated Fens • White Box – Yellow Box – Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Small occurrences of Alpine Sphagnum Bogs and Associated Fens community were recorded within the study area. A Significant Impact Criteria assessment for this community has been completed below.
Migratory species	Eleven (11) migratory species have been recorded or predicted to occur in the project search area (Appendix C).	Most of these migratory species are unlikely to occur, as they are coastal species not commonly found within the study area. However, Rufous Fantail and Satin Flycatcher may occur on occasion as they are both wide-ranging species. The study area does not provide important habitat for an ecologically significant proportion of any of these species.
Wetlands of international importance (Ramsar sites).	The study area is identified as being within the catchment of seven Ramsar sites: Banrock Station Wetland Complex, Barmah Forest, Gunbower Forest, Hattah-kulkyne Lakes, NSW Central Murray State Forests, Riverland, and The Coorong and Lakes Alexandrina and Albert Wetland.	The study area does not drain directly into any of the identified Ramsar sites and the development is not likely to result in a significant impact on these Ramsar sites.

Broad-toothed Rat

The Broad-toothed Rat is commonly associated with heathland and woodland with a heathy understorey, particularly where sedges and tussock grass species are in high abundance (Milner et al. 2015). Proximity to drainage lines, soaks and other damp areas is also important for the species. Whisson et al. (2015) demonstrated that Broad-toothed Rat freely disperse through and around significantly fragmented and disturbed landscapes and utilise drains, pipes and introduced vegetation to move through modified habitats in alpine environments.

Based on a reasonable understanding of this species' use of alpine environments, and the extent and condition of suitable habitat, it is concluded that trail construction is unlikely to lead to a significant impact. The significant impact assessment presented below in Table 5 has been undertaken with reference to the species' ability to use ski resort environments and modified vegetation, the narrow footprint of the impact and the environmental controls that will be implemented at key habitats along sedge and grass dominated drainage lines (e.g. installation of elevated structures, strict sediment control and PVC tunnels under the track

alignment). Additional recommendations to further minimise the risk of a significant impact are provided in Section 6.

Table 6 Broad-toothed Rat, endangered - assessment against Significant Impact Criteria (CoA 2013)

Significant impact criteria (vulnerable species)	Likelihood of significant impact	Justification
Lead to a long-term decrease in the size of a population	Unlikely	The study area supports habitat utilised by a population of Broad-toothed Rat, which will be impacted by the proposed works. The impact area is relatively small (0.375 ha) and involves creating a small narrow trail through vegetation, which is not expected to fragment the existing population nor affect the ability of the population to utilise adjacent retained habitat. Furthermore, PVC tunnels will be installed beneath the track to facilitate dispersal and provide cover beneath the exposed trail. The proposed works are therefore considered unlikely to lead to a long-term decrease in the size of a population of Broad-toothed Rat.
Reduce the area of occupancy of the species	Unlikely	The proposed works occur in confirmed habitat for Broad-toothed Rat. The impact area is relatively small (0.375 ha) and the overall area that contains the proposed trail will remain suitable for Broad-toothed Rat post construction. Therefore, the overall area of occupancy of Broad-toothed Rat will remain unchanged as the species continues to occupy the area in much the same manner as prior to the creation of the proposed trail.
Fragment an existing population into two or more populations	Unlikely	The majority of the Falls Creek area has been subjected to road, track and building construction. While the proposed works will create a narrow gap between areas of suitable habitat, it is considered unlikely that the proposed works will result in a major barrier for the movement of the species in the study area. Whisson et al. (2015) demonstrates that Broad-toothed Rats in alpine environments freely disperse through and around significantly fragmented and disturbed landscapes and utilise drains, pipes and introduced vegetation to move through inhospitable landscapes. The proposed works are not likely to affect physical or functional connectivity between populations or breeding individuals in the study area and broader area. Furthermore, PVC tunnels will be installed beneath the track to facilitate species dispersal and provide cover when moving across the trail.
Adversely affect habitat critical to the survival of the species	Unlikely	The project will result in the removal of habitat occupied by the species, however the impact is a narrow permeable barrier, which is not expected to fragment the existing population nor remove the ability of the population to utilise adjacent retained habitat. The proposed works are therefore considered unlikely to affect habitat that is critical to the survival of the species.

Significant impact criteria (vulnerable species)	Likelihood of significant impact	Justification
Disrupt the breeding cycle of a population	Unlikely	The study area occurs in an alpine resort, therefore it will be difficult to time the proposed works to occur outside the breeding season, which occurs between October and March (TSSC 2016). However construction activities should be relatively short lived and suitable habitat will be retained in which critical breeding activities can occur. While indirect impacts (noise, vibration) may have some minor localised impacts to breeding individuals immediately adjacent to the proposed trail this should not cause the entire population to experience a breeding decline.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	The project will likely result in the removal of habitat occupied by the species, however the impact involves creating a narrow disturbance through suitable habitat, which is not expected to fragment the existing population nor remove the ability of the population to utilise adjacent retained habitat. The project is therefore considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to an endangered or critically endangered species becoming established in the critically endangered or endangered species' habitat	Unlikely	Invasive fauna species are already present within the project area. Broad-toothed Rats are known to be particularly prone to selective predation by foxes (Green 2002), and their habitat is particularly sensitive to damage by deer. Invasive weed species can modify or simplify vegetation structure that may indirectly influence Broad-toothed Rat habitat through altered structure and/or hydrology. With effective mitigation measures in place, it is unlikely that an invasive species harmful to Broad-toothed Rat will become established within the study area and adjacent retained areas.
Introduce disease that may cause the species to decline	Unlikely	There is no perceived realistic capacity for the project to result in the introduction of a disease that could be harmful to Broad-toothed Rat. The project will be subject to a SEMP that would preclude introduction of a disease that could impact the species.
Interfere substantially with the recovery of a species	Unlikely	The Conservation Advice for the species (TSSC 2016) identifies the key threats to Broad-toothed Rat to include predation, fire, climate change, habitat loss and fragmentation and the reduction in the extent and quality of habitat due to weeds, die-back and damage caused by livestock and feral herbivores. Habitat loss associated with ski resort development is also specifically identified as a threat (TSSC 2016). This species was recognised as having 10% to 30% of its habitat burned in the 2019-20 bushfires in south-eastern Australia (DEE 2020). The broader landscape surrounding Falls Creek has been subject to large-scale bushfires, which increases the significance of populations and habitat within the unburnt Falls Creek resort area.

Significant impact criteria (vulnerable species)	Likelihood of significant impact	Justification
		The project will likely result in the removal of habitat occupied by the species, however the impact area is relatively small (<0.5 ha), and is not expected to fragment populations nor remove the ability of the existing population to utilise adjacent retained habitat. Despite this, the works proposed occur in an alpine resort where habitat loss is specifically identified as a threat to the recovery of the species, and within unburnt areas that are likely to function, with the remainder of the alpine resort, as a significant refuge in a broader landscape that has been subjected to large-scale fire. It is therefore possible that the proposed works are inconsistent with the recovery objectives outlined in the Conservation Advice for the species, however this is not considered to 'substantially' interfere with the recovery of the species.

Conclusion for Broad-toothed Rat

Based on an assessment against the relevant significant impact criteria for the endangered Broad-toothed Rat, the proposed works are unlikely to result in a significant impact on Broad-toothed Rat as the species has the ability to disperse and persist in areas that have been subject to minor fragmentation. While the works are inconsistent with identified recovery objectives and key threats to the species this is unlikely to result in 'substantial interference' with the recovery of the species, due to the small scale of the proposed works and previous and existing land-use context.

Mountain Pygmy-possum

Mountain Pygmy-possum occurs in alpine and subalpine areas of Victoria and New South Wales, where they primarily occupy boulderfields and rock screes. The species occurs in three separate regions within its geographic range, and populations within these regions are genetically distinct from each other (TSSC 2018). Within the broader Falls Creek and Bogong High Plains area, the species has been documented within a number of core areas, including around Mount McKay, Falls Creek village, Frying Pan Spur, Ruined Castle and Mount Jaithmathang (Dean Heinze supplied mapping, 2023). Populations in the broader locality have been in decline, with declines of 36% documented at Mount Loch and 92% at previously documented at Mount McKay (TSSC 2018).

The species was not recorded in the study area during 245 camera trap nights. However, despite being largely confined to core habitat areas, individuals make dispersal movements more broadly between these areas, and the extent to which this occurs within the Falls Creek area is not well understood. The species may utilise the study area when dispersing between areas of core habitat.

An assessment of the proposed works against the relevant significant impact criteria for the endangered Mountain Pygmy-possum is provided in Table 7.

Table 7 Mountain Pygmy-possum, endangered - assessment against Significant Impact Criteria (CoA 2013)

Significant impact criteria (endangered species)	Likelihood of significant impact	Justification
Lead to a long-term decrease in the size of a population	Unlikely	The study area does not support core boulderfield habitat, but supports dispersal habitat which will be impacted by the proposed works. The impact area is relatively small (0.375ha) and involves the creation of a narrow track through suitable dispersal habitat, which will not fragment any existing population nor remove the ability of the population to utilise retained habitat. The proposed works are therefore considered unlikely to lead to a long-term decrease in the size of a Mountain Pygmy-possum population.
Reduce the area of occupancy of the species	Unlikely	The proposed works occur within and immediately adjacent to a section of the alpine resort which has previously been subjected to road, track and building construction. The impact area is also relatively small (0.375 ha), and requires the creation of a narrow permeable track between suitable dispersal habitat. While the trail passes through the area protected by ESO1, construction will avoid impact to habitat values for Mountain Pygmy-possum mapped in detail in ESO 1 and within 30 m of the ESO boundary. It is considered unlikely that the proposed trail development will reduce the area of occupancy of the species.
Fragment an existing population into two or more populations	Unlikely	The proposed works occur within an area of Falls Creek that has been subjected to road, track and building construction, with the works intersecting modified ski run areas. While the proposed works will result in a gap between areas of suitable habitat, it is considered unlikely that the proposed works will result in a major barrier for the movement of the species in the study area. The proposed works are not likely to affect physical or functional connectivity between populations or breeding individuals in the broader area.
Adversely affect habitat critical to the survival of the species	Unlikely	The study area does not support core boulderfield habitat but supports potential dispersal habitat which will be impacted by the proposed works. Targeted surveys and detailed habitat mapping in the ESO1 did not confirm that the species is utilising an area of habitat. The proposed works are therefore considered unlikely to affect habitat that is critical to the survival of the species.

Significant impact criteria (endangered species)	Likelihood of significant impact	Justification
Disrupt the breeding cycle of a population	Unlikely	The study area does not support any core breeding habitat based on detailed mapping in the ESO1, therefore works within the study area are unlikely to disrupt the breeding cycle of a population.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	The project will likely result in the removal of habitat that is potentially utilised during post-breeding dispersal, however the impact area is relatively small (0.375 ha) and involves the creation of a narrow trail through potential dispersal habitat, which is not expected to fragment an existing population nor remove the ability of the population to utilise adjacent retained habitat. The project is therefore considered unlikely to modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely	Invasive fauna species are already present within the project area. Predation by introduced predators is a known threat to the species, and browsing from introduced grazing animals can damage vegetation (DELWP 2016). With effective mitigation measures in place, it is highly unlikely that an invasive species harmful to Mountain Pygmy-possum will become established within the study area and adjacent retained areas.
Introduce disease that may cause the species to decline	Unlikely	There is no perceived realistic capacity for the project to result in the introduction of a disease that could be harmful to Mountain Pygmy-possum. The project will be subject to a SEMP that would preclude introduction of a disease that could impact the species.
Interfere with the recovery of a species	Unlikely	The Conservation Advice (TSSC 2018) and Recovery Plan (DELWP 2016) for the species identifies the key threats to Mountain Pygmy-possum to include loss, degradation and fragmentation of habitat, decline in Bogong Moths, erosion and sedimentation, predation by cats and foxes, genetic loss and small populations, winter ski resort impacts (e.g. grooming and snow compaction), bushfire, climate change and weed invasion. Due to the size and scale of the proposed works, and the fact that no core breeding habitat will be impacted, it is considered unlikely that the proposed works will interfere with the recovery of the species.

Conclusion for Mountain Pygmy-possum

Based on an assessment against the relevant significant impact criteria for the endangered Mountain Pygmy-possum, the proposed works are unlikely to result in a significant impact on the species. As the proposed trail development is not expected to result in, or contribute to, population decline as the proposed works will not impact on core breeding habitat for the species, nor prevent future use of / dispersal through retained habitat.

Endangered Alpine Skinks

Guthega Skink, Mountain Skink, Alpine Bog Skink and Alpine She-oak Skink occupy various habitat niches from mountain forests (Mountain Skink) to sub-alpine woodlands, alpine grasslands and low heathlands at a range of altitudes. Rocky outcrops are particularly important for Guthega Skink and Mountain Skink while tussock grasses are believed to be an important habitat feature for Alpine She-oak Skink and Alpine Bog Skink (Clemann 2003). All four species are considered Endangered under the EPBC Act.

Major threats to these endangered Alpine Skinks include loss and degradation of habitat, fire and predation. Climate change and weeds are also considered to be potential threats. Sites where the species occurs within the alpine resorts are threatened by development for recreational infrastructure and by recreational activities (Clemann 2003).

All four of these species occur in the Falls Creek and Bogong High Plains area and may be impacted by the proposed trail development, noting that these species will occupy different, at times, non-overlapping habitat niches across an altitudinal gradient. We have grouped the impact assessment for these species given their similar listing status and their similar potential to be impacted by the proposed works. An assessment of the proposed works against the relevant significant impact criteria for the endangered alpine skinks is provided in Table 8.

Table 8 Alpine skinks, endangered - assessment against Significant Impact Criteria (CoA 2013)

Significant impact criteria (endangered species)	Likelihood of significant impact	Justification
Lead to a long-term decrease in the size of a population	Unlikely	Endangered Alpine Skinks (Mountain Skink, Guthega Skink, Alpine She-oak Skink and Alpine Bog Skink) may occur within the proposed impact area and adjacent areas, and are known to occur within areas of similar habitat in the locality. The project will avoid all rocky outcrops through micro-siting. The proposed works will result in the removal of 0.375 hectares of potential habitat for these species (although these species will not occupy or utilise the habitat in the same manner). The proposed works include the creation of a narrow trail through potential habitat areas. It is expected that all species listed here have the ability to disperse between habitat patches and PVC pipe will be installed at various points beneath the track to aid with dispersal and provide cover. While the proposed works would result in the removal of potential habitat in the short term, the works are considered unlikely to result in a long-term population decrease.
Reduce the area of occupancy of the species	Unlikely	The proposed works will result in the removal of 0.375 hectares of potential habitat. Key habitat areas (rocky outcrops) will be avoided. The remaining habitat surrounding the narrow permeable trail will remain intact and suitable for these species. Therefore, the overall area of occupancy of the species in the broader Falls Creek area will remain unchanged as the habitat in which the trail is located will remain suitable for these species.
Fragment an existing population into two or more populations	Unlikely	The project will avoid all rocky outcrops through micro-siting. The proposed works will result in the removal of 0.375 hectares of potential habitat for these species (although these species will not occupy or utilise the habitat in the same manner). The proposed works include the creation of a narrow trail through potential habitat areas. It is expected that all species listed here have the ability to disperse between habitat patches and PVC pipe will be installed at various points beneath the track to aid with dispersal and provide cover. As such it is not expected that the works will fragment a population such that two populations become genetically or functionally isolated.

Significant impact criteria (endangered species)	Likelihood of significant impact	Justification
Adversely affect habitat critical to the survival of the species	Unlikely	Habitat critical to the survival of a species is defined by CoA (2013) as areas that are necessary for essential activities (e.g. foraging, breeding, roosting, or dispersal), for the long-term maintenance of the species, maintaining genetic diversity and long term evolutionary development, and/or the recovery of the species. The study area supports habitat for the species that may be utilised for foraging, breeding and shelter. The proposed works will result in the removal of 0.375 hectares of habitat that may be used for these activities. Habitat within the study area therefore meets the definition of 'habitat critical to the survival of the species'. However the level and type of impact to this habitat is not considered likely to result in the species declining at the location or more broadly across the Falls Creek area.
Disrupt the breeding cycle of a population	Unlikely	Due to the seasonal constraints of undertaking works in the alpine environment, the proposed works would likely be undertaken during the breeding cycle for these species. However construction activities should be relatively short lived and suitable habitat will be retained in which critical breeding activities can occur. While direct (mortality) and indirect impacts (noise, vibration) may have some minor localised impacts to breeding individuals immediately adjacent to the proposed trail this should not cause the entire population to experience a breeding decline.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	Due to the avoidance of key habitat types, the implementation of construction controls and the nature and relatively small size of the proposed works, it is considered unlikely that the proposed works will result in long-term species decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely	Hawkweed is a high threat weed known to occur within the Falls Creek area, and this weed is identified as a threat to Endangered Alpine Skink habitat. The risk of spreading Hawkweed on site will be managed in accordance with best practice measures identified in a project-specific SEMP. The proposed works are considered unlikely to result in new weeds or pests becoming established within the study area and broader area.

Significant impact criteria (endangered species)	Likelihood of significant impact	Justification
Introduce disease that may cause the species to decline	Unlikely	There are no known diseases that have been transmitted to this species as a result of previous ski-field development that has occurred within the study area and broader Resort, therefore it is considered highly unlikely that the proposed works will introduce disease that may cause the species to decline.
Interfere with the recovery of a species	Unlikely	There is no Recovery Plan for these species, however the approved Conservation Advice for each of them identifies loss and degradation of habitat as the main identified threat to the species. The FFG Act Action Statement for Alpine She-oak Skink identifies the protection of habitat for known populations as a major conservation objective, and specifically identifies development within alpine resorts as a threat to the species. Specifically, the proposed works conflict with a management action to avoid track works, ski run development, construction activities and any other forms of ground layer disturbance around known Alpine She-oak Skink habitat (Clemann 2003, pp 4). While the works contravene this advice, given the avoidance proposed and the construction controls to be implemented, it is possible that they can be carried out in a manner which does not significantly interfere with the recovery of these species.

Conclusion for Endangered Alpine Skinks

The study area supports potential habitat for Endangered Alpine Skinks (Alpine She-oak Skink, Mountain Skink, Guthega Skink and Alpine Bog Skink) noting that these species will occupy different, at times, non-overlapping habitat niches across an altitudinal gradient. The proposed works will result in the removal of 0.375 hectares of potential habitat. Based on an assessment against the relevant significant impact criteria for Endangered Alpine Skinks, the proposed works are unlikely to constitute a significant impact on the species as the impact scale and type is not considered sufficient to result in a decline in the species at the location.

Gang-gang Cockatoo

Gang-gang Cockatoos occur throughout temperate eucalypt forests and woodlands of south-eastern Australia, particularly at higher altitudes and lower latitudes where temperatures are generally cooler. The species was recently listed as endangered under the EPBC Act due to significant and ongoing population decline, largely due to the widespread bushfires in 2019/2020 (DCCEEW 2022a).

The species was recorded adjacent to the study area during the current assessment, and is likely to utilise Snow Gums within the study area for foraging activities. An assessment of the proposed works against the relevant significant impact criteria for the endangered Gang-gang Cockatoo is provided in Table 8.

Table 9 Gang-gang Cockatoo, endangered - assessment against Significant Impact Criteria (CoA 2013)

Significant impact criteria (endangered species)	Likelihood of significant impact	Justification
Lead to a long-term decrease in the size of a population	Unlikely	Impacts from the proposed trail construction are expected to be confined to understorey habitat (i.e. trees will be avoided). The removal of understorey sub-alpine vegetation is highly unlikely to lead to a long-term decrease in the size of a population of Gang-gang Cockatoo, nor reduce the area of occupancy for the species, which will still continue to occur in the local area and utilise foraging habitat within and adjacent to the study area.
Reduce the area of occupancy of the species	Unlikely	
Fragment an existing population into two or more populations	Unlikely	Gang-gang Cockatoos are capable of dispersing between summer habitat in the Australian alpine area and winter habitat at lower altitudes (DAWE 2022a). It is also capable of dispersing and foraging within urban environments. The proposed vegetation removal will not act as a barrier to this highly mobile species, nor will it result in population or habitat fragmentation.
Adversely affect habitat critical to the survival of the species	Unlikely	Habitat critical to the survival of the Gang-gang Cockatoo is defined by DAWE (2022a) as all foraging habitat during both the breeding and non-breeding seasons, excluding introduced trees and shrubs. Hollow-bearing trees containing suitable nesting hollows are also defined as habitat critical to the survival of the species. Snow Gums within the study area provides foraging habitat for Gang-gang Cockatoo and therefore meets the definition of 'habitat critical to the survival of the species' (DAWE 2022a). No Snow Gums are proposed for removal within the proposed works area. The habitat definition provided above from DAWE (2022a) is very broad and realistically could encompass any suitable forest/woodland habitat in south-eastern Australia. The magnitude and scale of impacts is not considered significantly adverse to the point where it would compromise the survival of this species at the local, regional or National scale.

Significant impact criteria (endangered species)	Likelihood of significant impact	Justification
Disrupt the breeding cycle of a population	Unlikely	The study area does not contain breeding habitat for Gang-gang Cockatoo, as Snow Gums within the study area do not support the size of tree hollow needed. Breeding individuals may continue to forage within the study area and local area during the breeding season (October to January), however the proposed works are unlikely to disrupt the breeding activities of the species, due to the spatially restricted nature of the proposed works.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline	Unlikely	The works are not considered to be of a magnitude great enough to decrease the availability or quality of habitat to the extent that the species is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat	Unlikely	Feral animals and plants are known to be established in the study area. Some of these are known to negatively impact Gang-gang Cockatoo including cats and, to a lesser extent, foxes. However it is unlikely that the works would result in the establishment of new species. The proposed action is unlikely to exacerbate the current level of invasive species threat operating within the study area.
Introduce disease that may cause the species to decline	Unlikely	Psittacine beak and feather disease (PBFD) is known to impact Gang-gang Cockatoo and is generally transmitted via contact with infected birds or water sources. It is unlikely that construction activities would exacerbate or introduce this disease into the area.
Interfere with the recovery of a species	Unlikely	DAWE (2022a) contains a number of recovery items aimed at halting the decline of Gang-gang Cockatoo. The scale and type of disturbance proposed is highly unlikely to interfere substantially with the recovery of the species.

Conclusion for Gang-gang Cockatoo

Based on an assessment against the relevant significant impact criteria for the endangered Gang-gang Cockatoo, it is considered unlikely that the proposed works will result in a significant impact on the species. The works will not contribute to species decline and will not reduce the area of occupancy for the species

Alpine Sphagnum Bogs and Associated Fens

Alpine Sphagnum Bogs and Associated Fens ecological community is found in alpine and sub-alpine areas of Victoria, NSW and the ACT in permanently wet valley floors or along drainage areas in gullies or stream edges (Costin et al. 2000). The key component for bog formation is an overabundance of groundwater and

interrupted or impeded drainage. This interrupted drainage causes organic material to become trapped which causes incomplete decomposition and eventually forms an underlying peat bed (Whinam et al. 2003). The presence or absence of *Sphagnum* spp. and peat define the threatened ecological community (TSSC 2009). Characteristic species also include Wire Rush *Empodisma minus* and Candle Heath *Richea continentis*.

Threats to Alpine Sphagnum Bogs and Associated Fens include the break-up of the underlying peat beds by hooved animals such as deer, pigs, horses and cows, the incidence of frequent wildfire and over grazing by native and introduced grazers. Direct impacts through construction works will affect 51 square metres (0.0051 hectares) of this community. Indirect impacts such as erosion and sediment run-off during construction are important considerations when assessing impacts on this community.

Based on a reasonable understanding of this community's occurrence and ecology in alpine environments, and the extent and condition of habitat, it is concluded that the proposed trail construction works are unlikely to lead to a significant impact to this community. The significant impact assessment presented below in Table 10 has been undertaken with reference to the proposed extent of removal, the existing disturbed nature of the study area, and the environmental controls that will be implemented where this community occurs (e.g. strict sediment control).

Table 10 Alpine Sphagnum Bogs and Associated Fens, endangered - assessment against Significant Impact Criteria (CoA 2013)

Significant impact criteria (endangered community)	Likelihood of significant impact	Justification
Reduce the extent of an ecological community.	Unlikely	The proposed trail construction works will result in direct disturbance of up to 0.0051 hectares of the Alpine Bogs community. The examples of this community within the study area are in the centre of the community's geographic distribution in the mainland alps. Given the localised scale of the vegetation disturbance, the disturbance of 0.0051 hectares will not lead to a broader decline that will reduce the overall geographic extent of the community.
Fragment or increase fragmentation of an ecological community.	Unlikely	All Alpine Bogs will be spanned by elevated structures that will allow gene flow beneath the structures and will not impede physical or hydrological functioning. As such the trail will be permeable and the Alpine Bogs community will not become fragmented or isolated as a result of trail construction. The elevated structures will not affect physical or functional connectivity between occurrences of the community.
Adversely affect habitat critical to the survival of an ecological community.	Unlikely	The vegetation to be disturbed for construction and operation of the trail includes up to 0.0051 hectares. This extent of removal will not jeopardise the long-term survival of this community in the locality given the quantity of similar high quality contiguous habitat immediately adjacent to the development. The use of elevated structures will also allow for continued functioning of the community at the trail locations.

Significant impact criteria (endangered community)	Likelihood of significant impact	Justification
Modify or destroy abiotic factors necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns.	Unlikely	Trail development and trampling by riders and maintenance staff can cause disruption in hydrology, gene flow and the breaking up of sphagnum and peat. This process can lead to the degradation and ultimately collapse of the community as the peatlands collapse. To mitigate these impacts all occurrences of Alpine Bog along the trail alignment will be spanned by elevated structures. This will limit the disruption to hydrology and will allow gene flow and species persistence beneath the structures, which will be permeable to sunlight and rainfall. Given this level of mitigation it is considered unlikely that the trail development will lead to a destruction of abiotic factors that would lead to a broader community decline within the subject site.
Cause a substantial change in the species composition of an occurrence of an ecological community, including a decline or loss of functionally important species, for example through regular burning or flora and fauna harvesting.	Unlikely	All areas containing the Alpine Bogs community will be spanned by elevated structures. Damage to the community outside of the construction footprint will be managed through construction techniques, including building structures sequentially off the platform, to avoid driving machines on the community. Species will be allowed to persist and recolonise beneath the elevated structures. Provided these mitigation measures are adhered to the proposed trail development is unlikely to significantly alter the composition of the community.
Cause a substantial reduction in the quality or integrity of an occurrence of an ecological community, including but not limited to: ***- Assisting invasive species establishment*** ***- Causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants into the ecological community which kill or inhibit the growth of species in the ecological community.***	Unlikely	Soil disturbance and subsequent weed invasion will be minimised through construction management and follow up weed control. The project SEMP will specifically deal with controlling the introduction and spread of weed species in ecologically sensitive areas, especially those species associated with MTB/walking track edges in the resort. Ongoing monitoring will be required to manage the establishment of weeds once the trail is operational under the existing resort trail management plan.

Significant impact criteria (endangered community)	Likelihood of significant impact	Justification
Interfere with the recovery of an ecological community.	Unlikely	Several bog rehabilitation programs have been implemented across the Bogong High Plains and at Falls Creek. The national recovery plan for sphagnum bogs identifies a range of generic strategies and actions for bog recovery (DoE 2015). These actions are focused on restoring hydrological patterns and vegetation cover disrupted by historical cattle grazing and more recent severe fire events. The bog systems crossed by the trail have not been subject to restoration activities and would not be considered a priority for rehabilitation as they are all relatively intact and occur at sub-alpine altitudes.

Conclusion for Alpine Bogs

Based on an assessment against the relevant significant impact criteria for the endangered Alpine Sphagnum Bogs and Associated Fens, it is considered unlikely that the proposed works will result in a significant impact on the community. The works will not contribute to fragmentation of the community and or contribute to its overall decline.

Summary of EPBC Significant Impact Criteria assessments

On the basis of overarching guidance and specific criteria outlined in the Significant Impact Guidelines 1.1, it is considered unlikely that a significant impact on a Matter of National Environmental Significance would result from the proposed action. This is due to the ecological and spatial context of the impact being a small permeable footprint in a developed part of an alpine resort ski field, the duration and temporal scale of the impact being limited to a short construction period and managed seasonal trail operational period, and the relative ease of rehabilitation of trail impacts as and when required in terms of recovery time.

Referral of the proposed action to the Australian Government Minister for the Environment to determine whether the action requires approval under the EPBC Act is therefore unlikely to be required. However ARV-FC may choose to refer the project for legal certainty.

4.2. State

4.2.1. Flora and Fauna Guarantee Act 1988 (FFG Act)

The FFG Act is the key piece of Victorian legislation for the conservation of threatened species and communities and for the management of potentially threatening processes. Under the FFG Act a permit is required from DEECA to 'take' protected flora species. Permit exemptions under the FFG Act generally apply to the non-commercial removal of protected flora from private land, unless there is 'critical habitat' that has been declared on the land. Authorisation under the FFG Act is required to collect, kill, injure or disturb listed fish on private or public land.

Link for further information: https://www.environment.vic.gov.au/conserving-threatened-species/victorias-framework-for-conserving-threatened-species

The FFG Act defines public land as Crown land or land owned by, or vested in, a public authority, while private land is defined as any land other than public land. A public authority is defined in the FFG Act as a body established for a public purpose by or under any Act and includes:

- an Administrative Office
- a Government Department
- a municipal council
- a public entity
- a State-owned enterprise.

The study area is on Crown Land or land owned by or vested in a public authority (ARV-FC), and is therefore public land for the purposes of the FFG Act. Some areas of native vegetation on site are consistent with an FFG Act listed threatened community (Alpine Bog Community), contains 41 protected flora species and 17 FFG Act listed threatened flora species or habitat for them (Appendix B) and a protected flora permit from DEECA will be required to support the project.

In addition to the requirement for a protected flora permit, it is a requirement of the FFG Act that a public authority, in performing its functions, must consider the objectives of the FFG Act and the impact on biodiversity. Public authorities are also required to consider the Biodiversity 2037 targets (DELWP 2017b), action statements, critical habitat determinations and management plans made under the FFG Act.

A consideration of the public authority duty is included in Table 11 (DELWP 2021).

Table 11 Public authority duty consideration of impact on biodiversity (DELWP 2021)

Impact on biodiversity	Response
Long and short-term impacts	Short-term impacts that could arise from the proposed development include: • Temporary noise disturbance during construction. • Low potential for death of individual fauna species during construction. • Potential for indirect impacts during construction such as sediment run-off, erosion and the introduction of pest plants (to be managed by the project SEMP). Long-term impacts that could arise from the proposed development include: • Reduction in extent and quality of available habitat. • Increased levels of disturbance due to increased traffic and human presence in the area.
Beneficial and detrimental impacts	Detrimental impacts include: • Removal of habitat and reduction in remaining habitat quality. • Increased human presence within the area, creating disturbance to resident fauna. • Potential for fatality of basking skinks on rocky outcrops within the alignment.
Direct and indirect impacts	Direct impacts include: • Removal of potential habitat for FFG listed species and communities. Indirect impacts include: • Increased disturbance by increased traffic and human presence in the area. • Invasion of pest plants (although weed control measurements will be included in the project SEMP).

Impact on biodiversity	Response
	• Increased sediment run-off and erosion (although this will be managed by the project SEMP).
Cumulative impacts	The cumulative extent of clearing within the Falls Creek resort area within the last five years equates to 2.963 hectares of native vegetation removal using the past clearing cumulative impact approach of the Guidelines.
The impacts of potentially threatening processes	Potentially threatening process already operating in the broader area (not specific to the project) include: • Introduction of live fish into waters outside their natural range within a Victorian river catchment after 1770. • Invasion of native vegetation by Blackberry *Rubus fruticosus* L. agg • Invasion of native vegetation by 'environmental weeds'. • Predation of native wildlife by the cat, *Felis catus*. • Predation of native wildlife by the introduced Red Fox *Vulpes vulpes*. • Prevention of passage of aquatic biota as a result of the presence of instream structures. • Loss of terrestrial climatic habitat caused by anthropogenic emissions of greenhouse gases. • Reduction in biodiversity of native vegetation by Sambar (*Cervus unicolor*). • Reduction in biomass and biodiversity of native vegetation through grazing by the Rabbit *Oryctolagus cuniculus*.

4.2.2. Catchment and Land Protection Act 1994 (CaLP Act)

The CaLP Act identifies and classifies certain species as noxious weeds or pest animals, and provides a system of controls on noxious species.

Alpine Resorts Victoria – Falls Creek must take all reasonable steps to eradicate regionally prohibited weeds, prevent the growth and spread of regionally controlled weeds, and prevent the spread of and as far as possible eradicate established pest animals. The State is responsible for eradicating State prohibited weeds from all land in Victoria.

Declared noxious weeds identified in the study area are listed in Appendix B.

Link for further information: http://agriculture.vic.gov.au/agriculture/pests-diseases-and-weeds.

4.2.3. Planning and Environment Act 1987 (incl. Planning Schemes)

The *Planning and Environment Act 1987* controls the planning and development of land in Victoria, and provides for the development of planning schemes for all municipalities.

Of particular relevance to the development proposal are controls relating to the removal, destruction or lopping of native vegetation contained within the Alpine Resorts Planning Scheme (the Scheme), including permit requirements. The Scheme (Clause 72) defines 'native vegetation' as 'Plants that are indigenous to Victoria, including trees, shrubs, herbs and grasses'. It is an objective of Clause 12.01-2 of the State Planning Policy Framework (Native Vegetation Management) that removal of native vegetation results in no net loss in the contribution made by native vegetation to Victoria's biodiversity.

Clause 52.17 (Native Vegetation) requires a planning permit to remove, destroy or lop native vegetation including some dead native vegetation. Decision guidelines that must be considered by the referral or responsible authority are contained in Section 7 of the Guidelines, and referred to in Clause 52.17-4. It should be noted that where native vegetation does not meet the definition of a patch or scattered tree, as described in Section 3.1, the Guidelines do not apply. However, a permit may still be required to remove, destroy or lop native vegetation under the provisions of the Scheme.

Under Clause 66.02 a permit application to remove, destroy or lop native vegetation is required to be referred to DELWP as a recommending referral authority if any of the following apply:

- the class of application is on the detailed assessment pathway
- a property vegetation precinct plan applies to the site or
- the native vegetation is on Crown land occupied or managed by the Responsible Authority.

The planning application will be referred to DELWP on the basis of the amount of vegetation proposed to be removed.

The need for a permit to remove native vegetation may also be triggered by zones and overlays within the Scheme. The location of the overlays in relation to the study area can be determined via the following link: https://planning-schemes.delwp.vic.gov.au/

Environmental Significance Overlay – Schedule 1 (ESO1) covers the Gully area (see Figure 2). The objective of this schedule is to:

- To preserve and enhance Mountain Pygmy-possum (*Burramys parvus*) habitat and identified linkages.
- To prevent the destruction and fragmentation of the existing Mountain Pygmy-possum (*Burramys parvus*) habitat.
- To provide movement corridors for the Mountain Pygmy-possum *Burramys parvus*.
- To ensure development does not have an adverse impact upon Mountain Pygmy-possum (*Burramys parvus)* habitat.

Under the Application requirement of this ESO1, any application muse be referred to DEECA pursuant to Section 55 of the Act.

The Decision Guidelines of the ESO1 are outlined below in Table 12.

Table 12 Decision Guidelines of ESO1

Decision Guideline	Response
Objective of the schedule.	Consideration of these objectives throughout the assessment of the proposed Summit to Gully trail has included: • Avoidance of Mountain Plum-pine during the initial trail mark out. • Detailed mapping of Mountain Pygmy-possum habitat (i.e. Mountain Plum-pine distribution) within the ESO1. • Targeted survey (via camera trapping) within the ESO1 and in the vicinity of the proposed trail to gather contemporary data on fauna use within the ESO1. • Consultation with species experts and DEECA.
The general management prescriptions and guidelines in the *Management Strategy and Guidelines for the conservation of the Mountain Pygmy-possum (Burramys parvus) in Victoria* Mansergh IM, Kelly P and Scotts DJ (1989) Technical Report 66, Arthur Rylah Institute for Environmental Research, Department of Conservation, Forests and Lands, Melbourne.	While the study area does not support a known population of Mountain Pygmy-possum, the species may use the study area when dispersing between areas of core habitat. Habitat quality within the area has declined significantly (due to ski field management) since the species was last recorded in the area. The proposed works will not impact on core breeding habitat for the species, nor will they prevent future use of / dispersal through retained habitat. The trail has been designed to avoid direct impacts to Mountain Pygmy-possum habitat as much as possible, through completion of detailed mapping of Mountain Plum-pine distribution and completion of targeted survey.
Action Statement No. 2 Mountain Pygmy-possum (*Burramys parvus*), Department of Sustainability and Environment.	It is acknowledged that the proposed works are inconsistent with the objectives of the Action Statement in that it is contributing to loss of habitat for the species. However, habitat quality within the area has declined significantly since the species was last recorded in the area. The proposed works will not impact on core breeding habitat for the species, nor will they prevent future use of / dispersal through retained habitat. The trail has been designed to avoid direct impacts to Mountain Pygmy-possum habitat as much as possible, through completion of detailed mapping of Mountain Plum-pine distribution and completion of targeted survey.
The extent to which the proposed development or works will impact upon existing habitat areas.	As above.
The views of the Department of Environment, Land, Water and Planning pursuant to Section 55 of the Act.	A preapplication meeting and site inspection was undertaken on 17 May 2023. This report will be submitted with the planning permit application for DEECA's consideration.

The Schedule can be viewed in its entirety via the following link:
https://planning-schemes.app.planning.vic.gov.au/ALPINE%20RESORTS/ordinance/11055694

Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The Guidelines are incorporated into the Victoria Planning Provisions and all planning schemes in Victoria (DELWP 2017). The Guidelines replaced the previous incorporated document titled *Permitted clearing of native vegetation – Biodiversity assessment guidelines* (DEPI 2013) on 12 December 2017.

The purpose of the Guidelines is to guide how impacts to biodiversity should be considered when assessing a permit application to remove, destroy or lop native vegetation. The objective for the guidelines in Victoria is 'No net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

A detailed assessment of the implications for the project under the Guidelines is provided in Section 5 of this report. Under the Guidelines, there are three assessment pathways for assessing an application for a permit to remove native vegetation: basic, intermediate and detailed.

A detailed determination of the assessment pathway for the planning application relevant to the proposed development is provided in Section 5.2. The planning application for removal of native vegetation must meet the requirements of, and be assessed in, the detailed assessment pathway.

4.2.4. Fisheries Act 1995

The *Fisheries Act 1995* provides a legislative framework for the regulation, management and conservation of Victorian fisheries including aquatic habitats.

A person must not take, injure, damage, destroy or release any protected aquatic biota. Protected aquatic biota includes all species of the family Syngnathidae (seahorses, sea dragons and pipefish), and any fish or aquatic invertebrate or community that is listed under the FFG Act.

Providing the mitigation measures outlined in this report are adhered to, the potential for protected aquatic biota as listed above, to be injured, damaged or destroyed is considered to be negligible and no permit is required.

4.2.5. Water Act 1989

The primary purpose of the *Water Act 1989* is to provide a framework for the allocation and management of surface water and groundwater throughout Victoria. It provides a principal mechanism for maintenance of ecosystem functions including those of aquatic ecosystems. Under By-Laws created by the relevant Authority under the Act, the authorities regulate the works within and in the vicinity of waterways.

The proposed development will involve construction or maintenance activities that affect beds and banks of waterways, riparian vegetation or quality or quantity of water of unnamed tributaries of the Rocky Valley Creek. A Works on waterway permit will need to be obtained for the project from the North East Catchment Management Authority. Any construction within proximity of the designated waterways (including Fryingpan Aqueduct) must be undertaken in accordance with the approved works on waterways permit.

5. Victoria's Guidelines for the removal, destruction or lopping of native vegetation

The Guidelines were introduced in December 2017. They set out and describe the application of Victoria's statewide policy in relation to assessing and compensating for the removal of native vegetation in order to achieve the objective of 'no net loss to biodiversity as a result of the removal, destruction or lopping of native vegetation'.

This objective is to be achieved through Victoria's planning system using an assessment approach that relies on strategic planning and the permit and offset system. The key policy for achieving no net loss to biodiversity is the three-step approach of avoid, minimise and offset:

- **Avoid** the removal, destruction or lopping of native vegetation to ensure that the important biodiversity values of native vegetation continue to be delivered into the future.
- **Minimise** impacts resulting from the removal of native vegetation that cannot be avoided.
- Provide an **offset** to compensate for the biodiversity impact resulting from the removal of native vegetation.

The steps that have been taken during the design of the development to ensure that impacts on biodiversity from the removal of native vegetation have been minimised are summarised below in accordance with the Assessor's Handbook (DELWP 2018). A summary of how avoidance and minimisation has been achieved in relation to the native vegetation values described in Appendix 1D (DELWP 2018) is provided in Table 13.

Strategic level planning

At a strategic level steps have been taken through resort-wide master planning and preliminary trail planning to avoid areas of highest biodiversity value, these include:

- Preparation of the Falls Creek Mountain Bike Trail Masterplan and Feasibility Study commencing in 2008.
- Preparation of the Falls Creek Alpine Resort Biodiversity Management Strategy, Ecology Australia (2011), which has guided understanding of native vegetation extent, types and highest value areas for various development projects.
- Preparation of a feasibility study between May and August 2018 for Stage 5 trails and future trails (internal document prepared by World Trail and Biosis for ARV – FC [then FCRM]).
- For previous stages of trail development since 2013, steps have been taken to avoid or minimise designing trails in high value native vegetation and habitats above the tree line where threatened species and ecological communities occur. This has been done in line with the Falls Creek Alpine Resort Biodiversity Management Strategy and best available knowledge at each stage of planning.
- Where, feasible, trail strategic level planning has focused on choosing design corridors close to existing infrastructure footprints or disturbed areas in the resort such as ski-field areas, adjacent to existing roads, existing walking tracks, within power line easements.
- Falls Creek's trail expansion strategy is a North East Victoria Cycling Optimisation (NEVCO) Masterplan priority project (Tourism North East 2018).

- Preparation of a resort wide trail management plan for operational and maintenance requirements.

Site level planning

Avoid and minimise steps taken at a site level specifically for the proposed trail has included:

- Where practical, aligning the trail on existing disturbed footprints such as existing walking tracks, ski-runs or power line easements.
- Micro-siting and ground truthing the trail alignment with the trail designers to determine lowest impact alignment within the assessed study area.
- Detailed habitat mapping for Mountain Pygmy Possum and Guthega Skink (Figure 4) was completed to refine the habitat distribution for these species within the study area and further inform the design process.
- High detail evaluation of habitats for Guthega Skink and other alpine skinks within the study area, to avoid the highest quality habitat.
- Utilising elevated structures that are permeable to light and rainfall to minimise impacts to sensitive vegetation types and waterways.

Table 13 Summary of avoid and minimise steps in accordance with the *Assessor's Handbook* (DELWP 2018), Appendix 1D

Value (Appendix 1D of DELWP 2018)	Notes on avoid and minimise steps
Land and water protection	**Site value –** Some native vegetation to be removed would be considered higher value as it is near waterways in several places, on steep slopes, in places where ground water recharges and discharges and is in the upper Kiewa River Declared Special Water Supply Catchment Area. **Response -** Impacts to riparian vegetation, bogs at groundwater discharge points and waterways will be avoided and minimised by use of elevated structures to cross all waterways and installation of sediment control and appropriate trail drainage close to waterways. Trail design is focussed on minimising erosion risk.
Landscape values	**Site value –** The alpine resorts are managed for both recreation and environmental values. **Response -** Removal of native vegetation to facilitate recreational development is a regular source of policy conflict in alpine resorts. The project aims to minimise impacts on the most sensitive values by aligning the trail down existing ski runs where possible and through sub-alpine environments with less exposure and lower biodiversity/landscape values.
Protection under the Aboriginal Heritage Act 2006	**Site value –** Areas of cultural heritage sensitivity along waterways and on the High Plains. **Response –** Heritage assessments have been completed for the project.
Extent	**Site value –** The amount of vegetation to be removed is 0.375 ha and this is from a relatively intact landscape supporting hundreds of thousands of hectares of contiguous vegetation across the Victoria Alps and Eastern Highlands. **Response –** Vegetation to be removed comprises understorey vegetation within the disturbed context of a ski resort. The functioning and viability of the largely intact surrounding Bogong

Value (Appendix 1D of DELWP 2018)	Notes on avoid and minimise steps
	High Plains and adjacent woodlands and forests will not be significantly impacted by the project.
Condition	**Site value –** Condition scores are high for the vegetation to be removed, ranging between 0.175 and 0.730 out of 1.0. **Response –** All vegetation in the resort is of relatively high condition due to the intact nature of the landscape. Avoiding high condition vegetation is not viable for this project.
Strategic Biodiversity Value (SBV)	**Site value –** SBV scores for vegetation to be removed are high, between 0.939 – 0.996 out of 1.0. **Response –** Almost all vegetation in the resort has a high SBV score due to the intact nature of the landscape. It is not possible to focus on areas of lower SBV as they do not occur across the majority of the resort – see mapping in Native Vegetation Removal Report (Appendix F).
Large Trees	**Site value –** Large trees occur at low densities in Sub-alpine Woodland mainly due to fire history and tree collapse. **Response –** No large trees will be removed for the project. General arborist advice provided for previous MTB trail developments within the resort in relation to minimising impacts during construction has been reviewed and will be adhered to.
Ecological Vegetation Class	**Site value –** Much of the vegetation to be impacted is from an EVC with a 'least concern' status (Sub-alpine Woodland) or a 'rare' status due to the restricted nature of these EVCs distributions (Alpine Grassy Heathland and Sub-alpine Shrubland). Small areas of EVCs with an 'endangered' status will be impacted (Sub-alpine Wet Heathland) and these represent the Alpine Bogs threatened ecological community. **Response –** Trail crossing waterways / drainage lines and near bogs will be elevated to minimise impacts on endangered EVCs.
Sensitive wetland and coastal areas	**Site value –** The trail will not impact on sensitive wetlands or coastal areas mapped as Location 2 – see mapping in Appendix F. **Response –** No sensitive wetlands are mapped by DEECA however the trail has been aligned to avoid crossing sub-alpine bogs (wetlands) where possible and pass with an elevated structure where they cannot be avoided.
Habitat for threatened species	**Site value –** A large number of modelled species habitats occur in the alpine resort and will be traversed by the trail. **Response –** While modelled habitat is present, species offsets have not been triggered for any species due to the proposed extent of removal being <0.5 hectares.

The DEECA has provided biodiversity information tools to assist with determining the assessment pathway associated with the removal of native vegetation and the contribution that native vegetation within the study area makes to Victoria's biodiversity.

All planning permit applications to remove native vegetation are assigned to an assessment pathway determined by the extent and location of proposed native vegetation removal. The assessment pathway will dictate the information to be provided in a planning permit application and the decision guidelines the responsible authority (DEECA in this case) will use to assess the permit application.

The biodiversity information tools have two components:

Site-based information

The site-based information is observable at a particular site. Biosis has collected the requisite site-based information for the assessment against the Guidelines.

Landscape scale information

Landscape scale information requires consideration of information beyond the site. This information is managed by DEECA and can be accessed via the NVIM.

The following section summarises the results of the site-based assessment and the outputs generated by the Native Vegetation Removal Report, which identifies the assessment pathway on which the planning application will be assessed. The full Native Vegetation Removal Report can be viewed in Appendix F.

5.1. Proposed removal of native vegetation

The extent of native vegetation patches, the location of large trees within patches and any scattered trees were mapped within the study area (Figure 2) and the condition was assessed in relation to standard methods provided by DSE (2004) and pre-determined EVC benchmarks: https://www.environment.vic.gov.au/biodiversity/bioregions-and-evc-benchmarks.

As the canopy will not be impacted by the proposed works, partial clearing has been applied to the proposed clearing extent where it passes through treed EVCs (i.e. Sub-alpine Woodland EVC 43). Full clearing has been applied in all other cases. In a conservative approach, full clearing has also been applied over Sub-alpine Wet Heathland EVCs, even though no direct removal will occur as these areas will be spanned through use of an elevated structure.

An arborist assessment completed for Stage 5 mountain bike trail development within Falls Creek resort reviewed the impact historical mountain bike trail construction has had on adjacent trees, and concluded that trail development would not cause the loss of any trees if sensitive construction methodology is utilised. Although not re-assessed specifically, this advice is considered relevant to the proposed trail as it is within similar vegetation types (i.e. Sub-alpine Woodland) and tree species (i.e. Snow Gums *Eucalyptus pauciflora*). This guidance on sensitive construction methodology for the proposed mountain bike trail will be adhered to during construction of the current proposed trail. No impacts to large trees are anticipated to occur as a result of the proposed works. The full arborist report is provided in Appendix G.

The proposed removal of native vegetation was assessed in accordance with the footprint included in the concept design provided (Falls_Creek_Downhill_Concept). The following steps were applied to mapping native vegetation impacts:

- World Trail's construction data detailed the required width of disturbance for construction throughout the length of the trail. Widths range between 1.5 metres and 10 metres.

The development proposes to remove 0.375 hectares of native vegetation (Figure 3). An additional 2.963 hectares of clearing is relevant to the project, associated with the Stage 5 MTB trails and Ropers Car Park

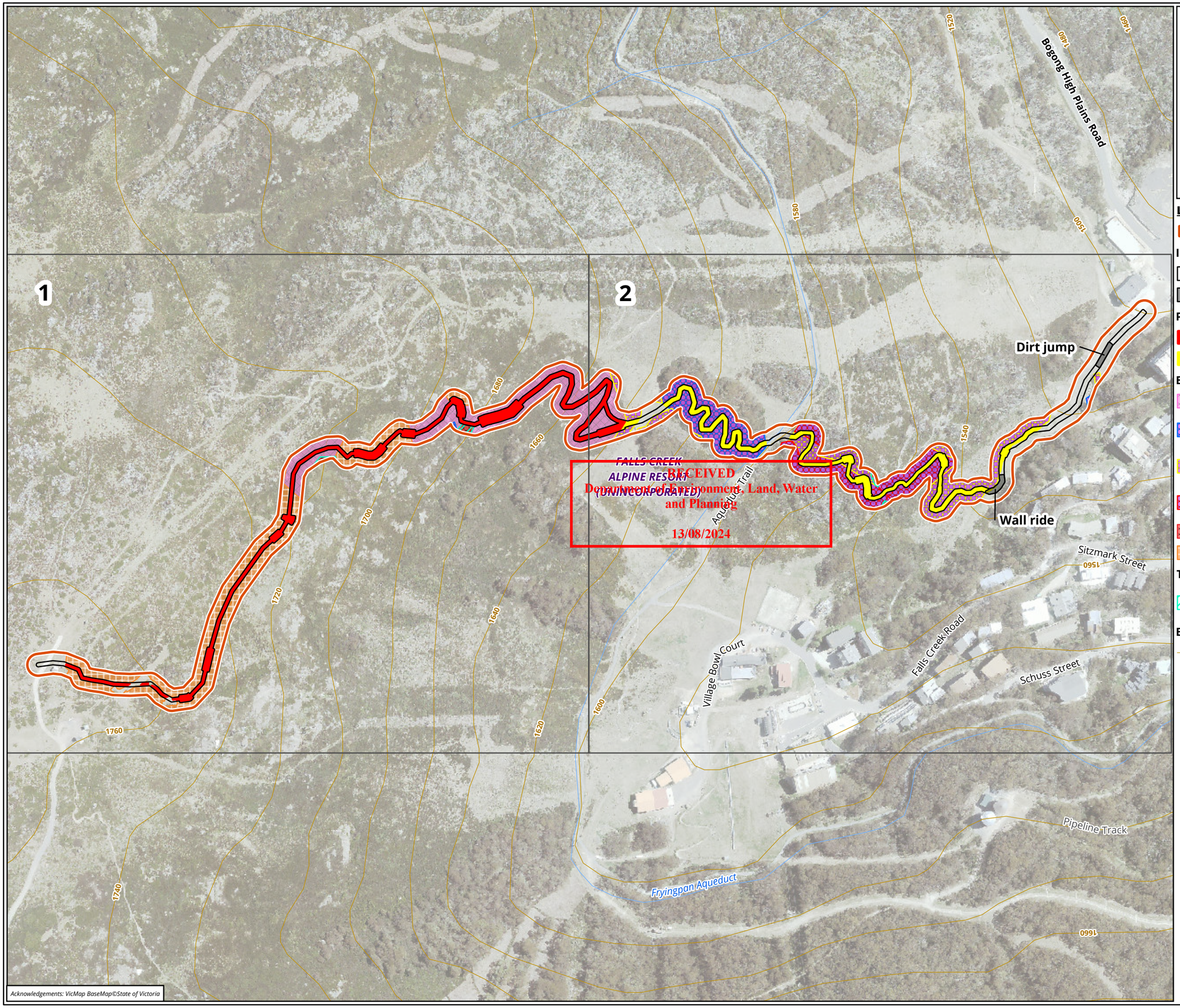
projects. Spatial data (shapefiles) of proposed vegetation removal were submitted to DEECA's native vegetation support team, who provided a Native Vegetation Removal Report for the project. This is provided in Appendix F and summarised in the following sections.

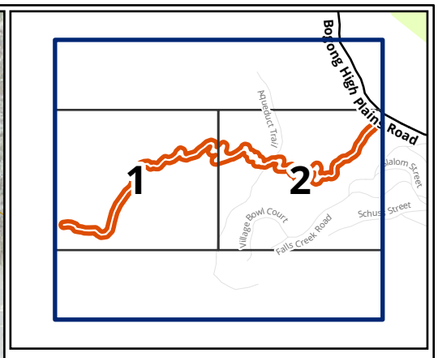
The two proposed removable built features are also included in Figure 3.

5.1.1. Vegetation Quality Assessment

A continuous area of the same EVC is termed a 'habitat zone'. Different habitat zones exists where there are different EVCs present and/or discrete (non-continuous) patches of the same EVC. Habitat zones of the same EVC and condition state were grouped for the purposes of vegetation scoring. A separate vegetation quality assessment was conducted for each EVC and EVC condition state. The results of the vegetation quality assessment are provided in Appendix E.

There are many large trees within patches of native vegetation within the study area. The locations of large trees within patches are shown in Figure 2. None of these large trees is expected to be impacted by the proposed works (arborist report provided in Appendix G).





Legend

Study area

Impact area

Proposed mountain bike trail

Removable built structure

Patch vegetation proposed to be removed

Full removal

Partial removal

Ecological vegetation classes (EVCs)

(VAlp0042) Sub-alpine Shrubland

(VAlp0043) Sub-alpine Woodland (intact)

(VAlp0043) Sub-alpine Woodland (derived)

(VAlp0043) Sub-alpine Woodland (burnt)

(VAlp0210) Sub-alpine Wet Heathland

(VAlp1004) Alpine Grassy Heathland

Threatened ecological community (EPBC)

Alpine Sphagnum Bogs and Associated Fens

Elevation

Contour 20 m interval

Figure 3.0 Vegetation proposed to be removed within the study area: overview

0 20 40 60 80 100

Metres

Scale: 1:3,200 @ A3

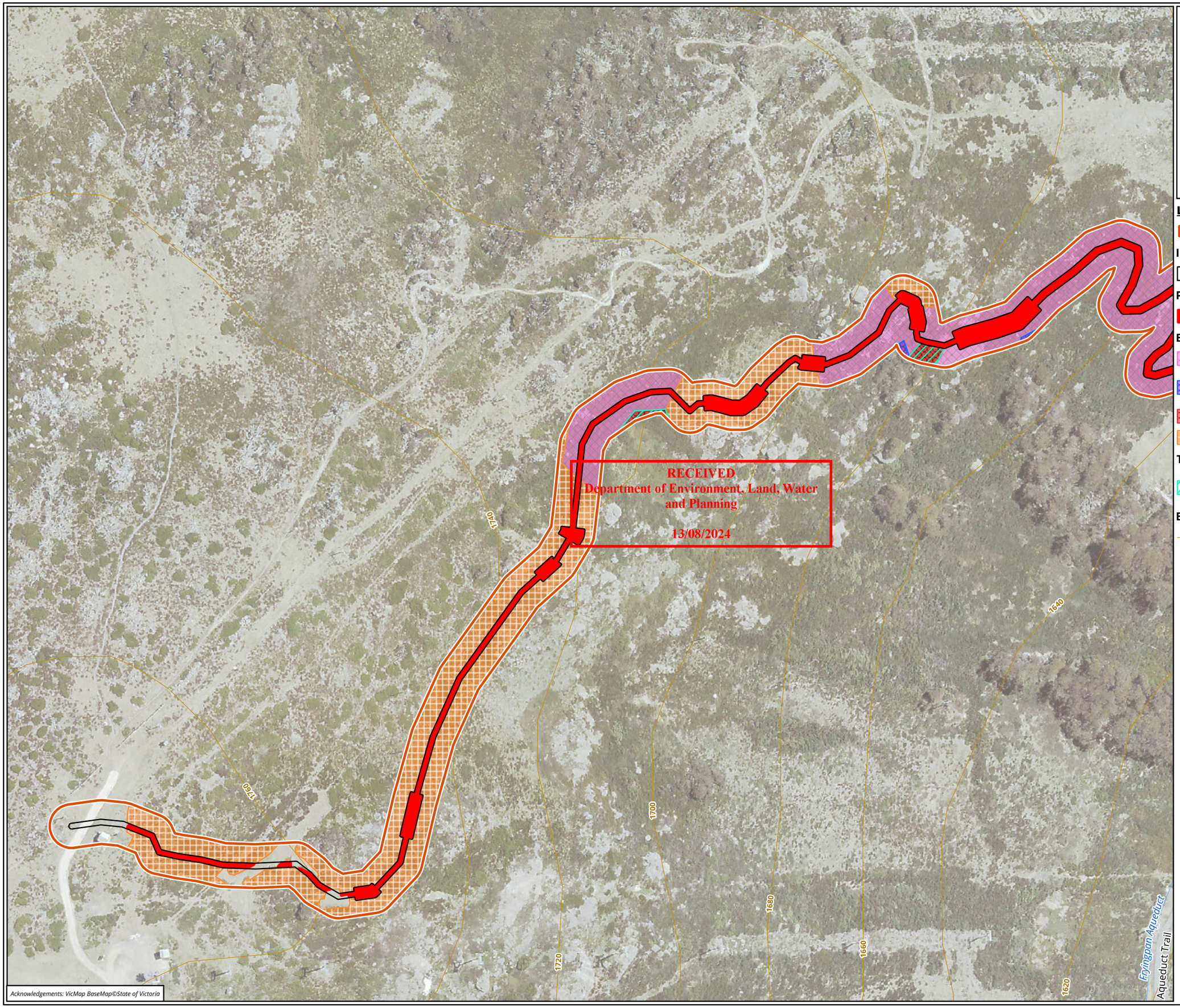
Coordinate System: GDA2020 MGA Zone 55

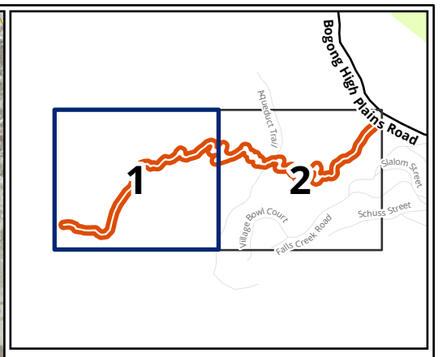
N

biosis

Matter: 38638,
Date: 18 July 2024,
Prepared for: GZ, Prepared by: SP, Last edited by: spanter
Layout: 38638_F3_VegLoss
Project: P:\38600s\38638\Mapping\
38638_FC_SummitToGully_MTB.aprx

Acknowledgements: VicMap BaseMap©State of Victoria





Legend

Study area

Impact area

Proposed mountain bike trail

Patch vegetation proposed to be removed

Full removal

Ecological vegetation classes (EVCs)

(VAlp0042) Sub-alpine Shrubland

(VAlp0043) Sub-alpine Woodland (intact)

(VAlp0210) Sub-alpine Wet Heathland

(VAlp1004) Alpine Grassy Heathland

Threatened ecological community (EPBC)

Alpine Sphagnum Bogs and Associated Fens

Elevation

Contour 20 m interval

Figure 3.1 Vegetation proposed to be removed within the study area: detail (west)

0 10 20 30 40 50

Metres

Scale: 1:1,600 @ A3

Coordinate System: GDA2020 MGA Zone 55

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biosis

Matter: 38638,
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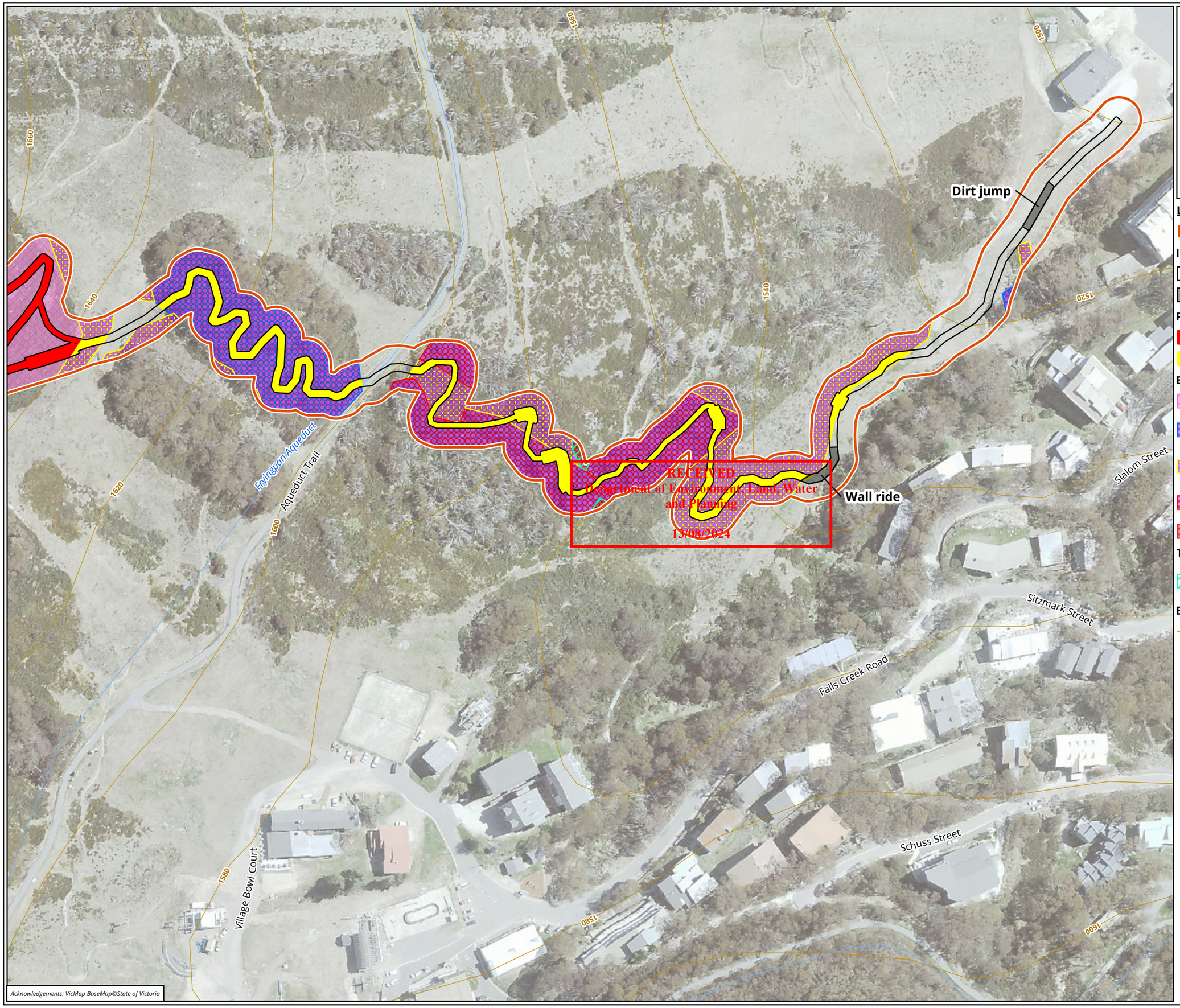

Legend

Study area

Impact area

Proposed mountain bike trail

Removable built structure

Patch vegetation proposed to be removed

Full removal

Partial removal

Ecological vegetation classes (EVCs)

(VAlp0042) Sub-alpine Shrubland

(VAlp0043) Sub-alpine Woodland (intact)

(VAlp0043) Sub-alpine Woodland (derived)

(VAlp0043) Sub-alpine Woodland (burnt)

(VAlp0210) Sub-alpine Wet Heathland

Threatened ecological community (EPBC)

Alpine Sphagnum Bogs and Associated Fens

Elevation

Contour 20 m interval

ADVERTISED PLAN

Figure 3.2 Vegetation proposed to be removed within the study area: detail (east)

0 10 20 30 40 50

Metres

Scale: 1:1,600 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

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Matter: 38638,
Date: 18 July 2024,
Prepared for: GZ, Prepared by: SP, Last edited by: spanter
Layout: 38638_F3_VegLoss
Project: P:\38600s\38638\Mapping\
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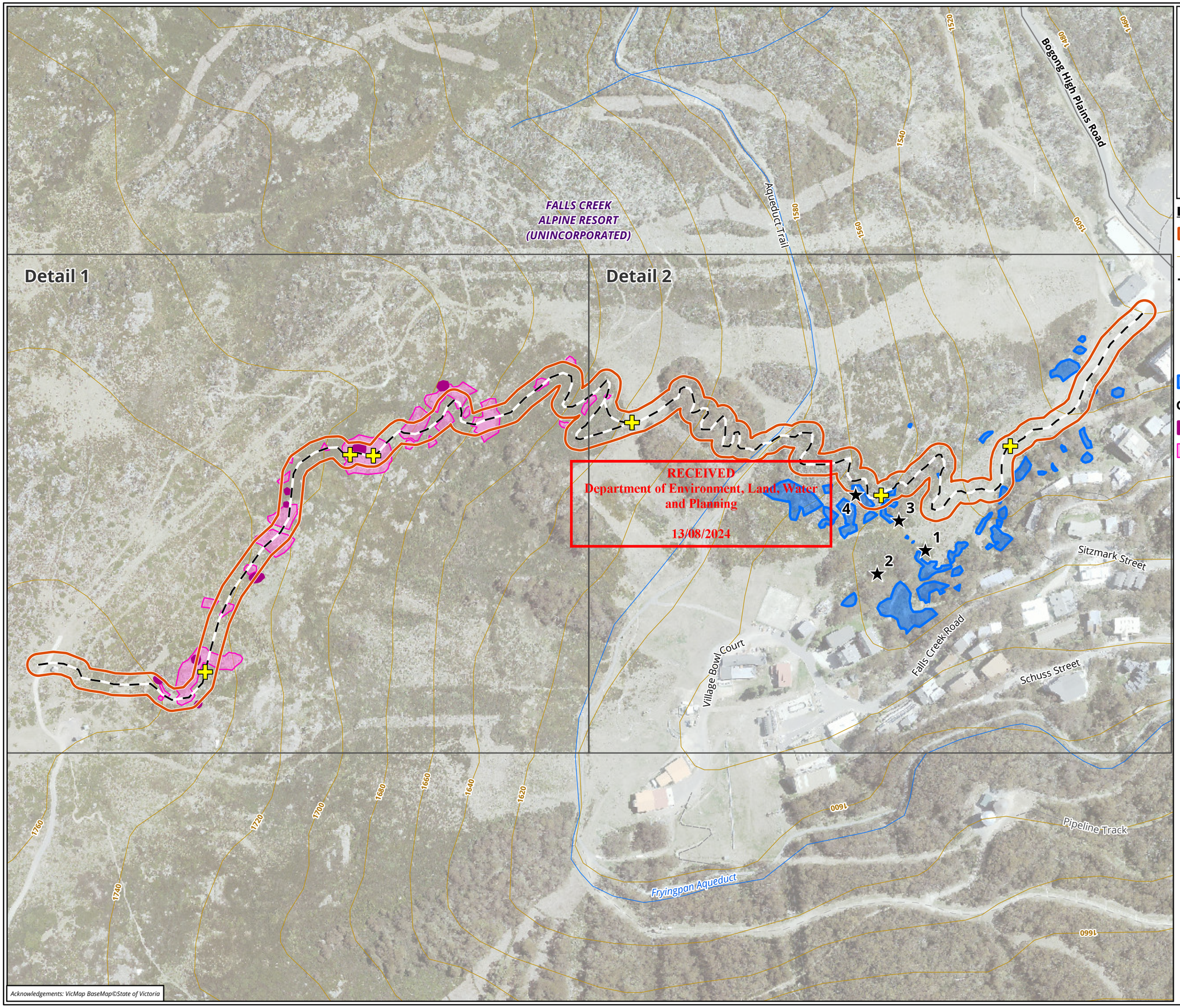

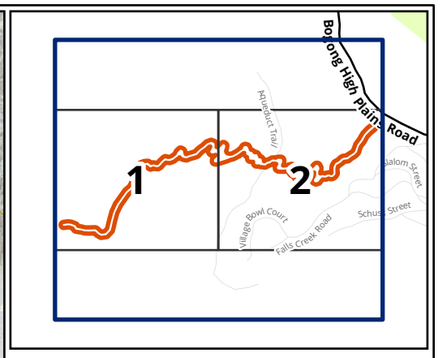

Legend

- Study area
- Contour 20 m interval
- Proposed mountain bike trail
- PVC/rock armour tunnel installation
- Broad-toothed Rat / Mountain Pygmy-possum camera trap
- Dense Mountain Plum Pine

Guthega Skink habitat

- High quality habitat
- Potential habitat

ADVERTISED PLAN

Figure 4.0 Threatened species habitat: overview

0 20 40 60 80 100

Metres

Scale: 1:3,200 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

biosis

Matter: 38638,
Date: 18 July 2024,
Prepared for: GZ, Prepared by: SP, Last edited by: spanter
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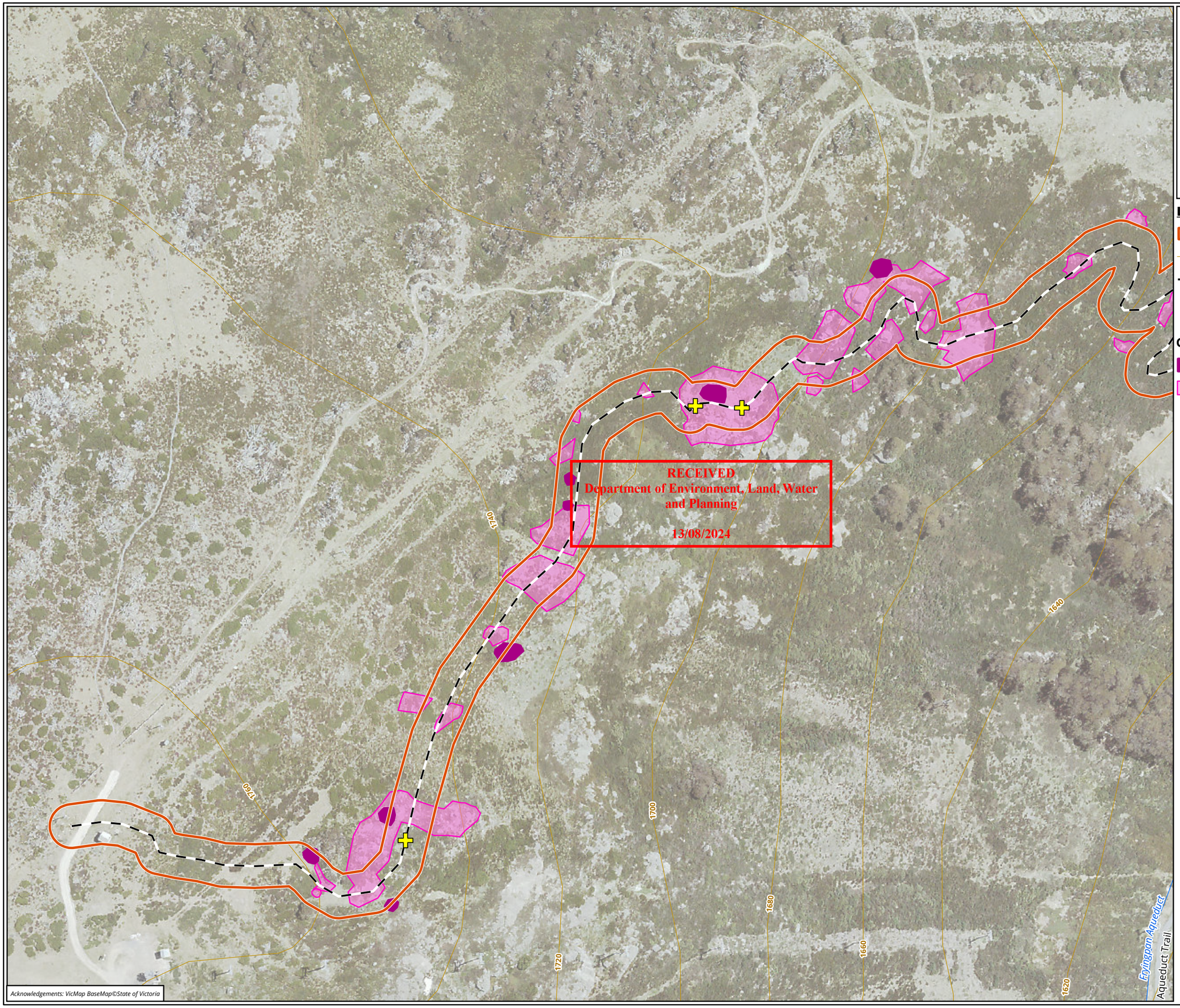

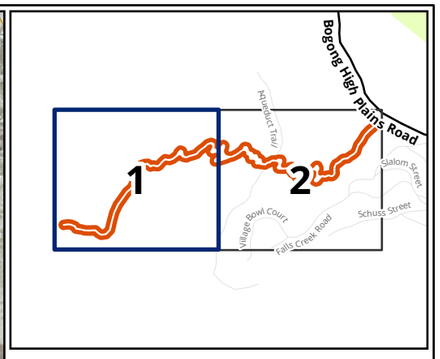

Legend

- Study area
- Contour 20 m interval
- Proposed mountain bike trail
- PVC/rock armour tunnel installation

Guthega Skink habitat

- High quality habitat
- Potential habitat

ADVERTISED PLAN

Figure 4.1 Threatened species habitat: detail (west)

0 10 20 30 40 50

Metres

Scale: 1:1,600 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

biosis

Matter: 38638,
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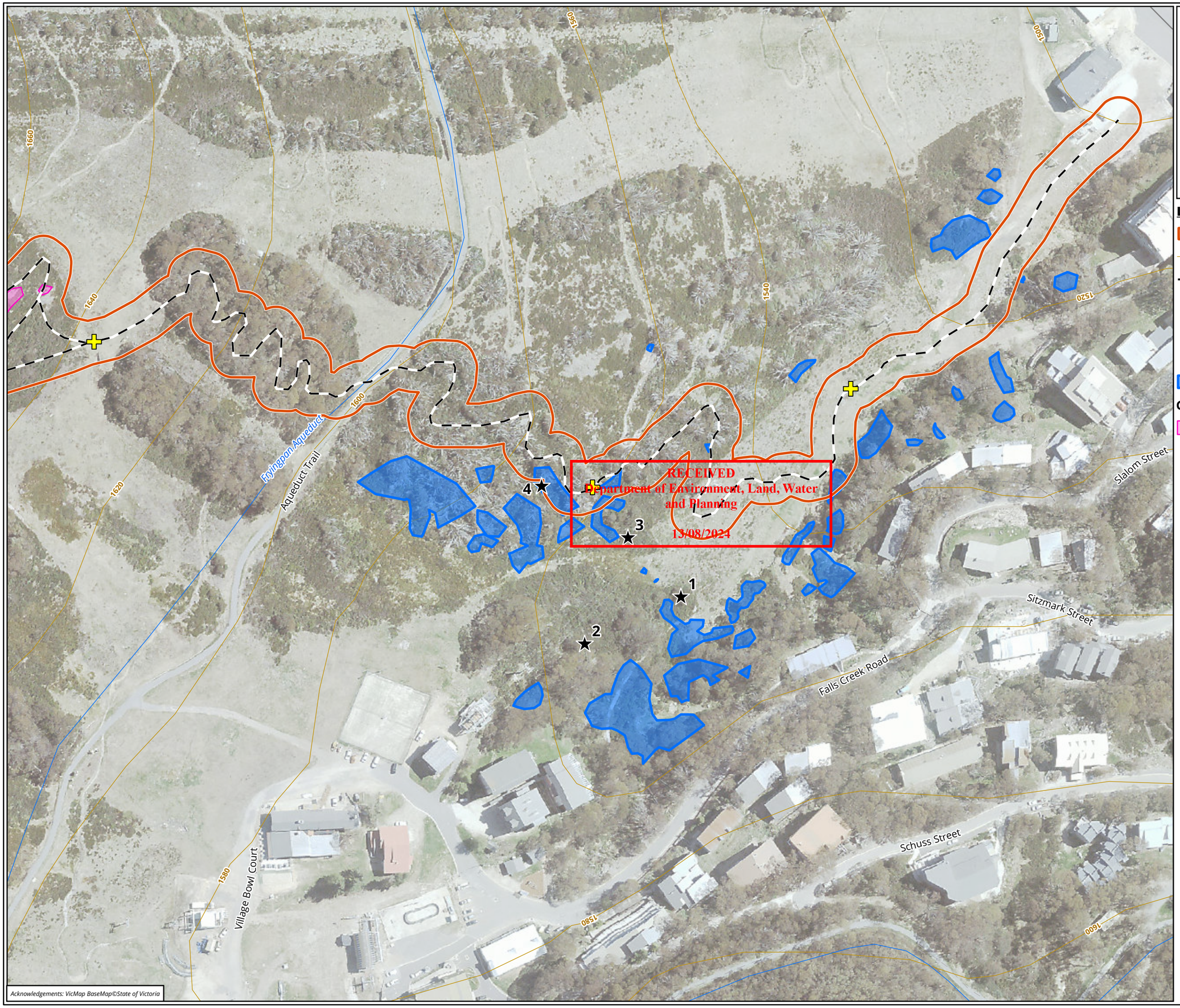

Legend

- Study area
- Contour 20 m interval
- Proposed mountain bike trail
- PVC/rock armour tunnel installation
- ★ Broad-toothed Rat / Mountain Pygmy-possum camera trap
- Dense Mountain Plum Pine

Guthega Skink habitat

- Potential habitat

ADVERTISED PLAN

Figure 4.2 Threatened species habitat: detail (east)

0 10 20 30 40 50

Metres

Scale: 1:1,600 @ A3

Coordinate System: GDA2020 MGA Zone 55

N

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Layout: 38638_F4_Threatened_species_habitat
Project: P:\38600s\38638\Mapping\
38638_FC_SummitToGully_MTB.aprx

Acknowledgements: VicMap BaseMap©State of Victoria

5.2. Determining the assessment pathway

Applications to remove native vegetation are categorised into one of three assessment pathways: basic, intermediate or detailed. Two factors are used to determine the assessment pathway for a permit application, the **location** and **extent** of the native vegetation proposed to be removed. Location has been divided into three possible categories by DEECA, and has been pre-determined by DEECA for all locations in Victoria. The location of a particular site is determined using the location map available in the Native Vegetation Information Management (NVIM) system (http://nvim.depi.vic.gov.au).

The extent of native vegetation proposed to be removed determines the assessment pathway by considering the following:

- The total area (hectares) of native vegetation (including any patches and scattered trees) proposed to be removed
- Whether any large trees are proposed to be removed, either as scattered trees or occurring in patches.

It is proposed to remove <0.5 hectares and no large trees of native vegetation from within location category **3**, therefore the application for removal of this native vegetation must meet the requirements of, and be assessed in, the **detailed** assessment pathway. These requirements are provided in Appendix F.

5.3. Offset requirements

In order to ensure a gain to Victoria's biodiversity that is equivalent to the loss resulting from the proposed removal of native vegetation, compensatory offsets are required. Losses and gains are measured in general or species habitat scores or units. The offset must also include at least one large tree for every large tree removed.

For a detailed assessment pathway application, the species-general offset test will determine if a general offset, species offset or combination of both is required.

The results of the species-general offset test are provided in Appendix F and summarized in Table 14.

Table 14 Summary of DEECA Native Vegetation Removal Report

Attribute	Outcome	Notes
Location category	3	Highest location risk
Native vegetation removal extent	0.375 hectares of proposed removal, 2.963 hectares of past removal	3.338 hectares of removal in total, including past and proposed removal
Assessment pathway	Detailed	Detailed assessment pathway
Strategic Biodiversity Value Score	0.930 and 0.996	Range over multiple patches
Modelled habitat for threatened species	Yes	Extent is below 0.5 hectares and removal will not have a significant impact on any habitat for a rare or threatened species.
Offset type	General	General habitat units required
Offset amount: general habitat units	0.265 units	0.265 general habitat units required

Attribute	Outcome	Notes
General offset vicinity	North East CMA or Falls Creek Alpine Resort	The offset site must be located within the same Catchment Management Authority boundary or municipal district as the native vegetation to be removed.
General offset minimum Strategic Biodiversity Value Score	0.780	The offset must have a minimum Strategic Biodiversity Value Score of 0.780

5.4. Proposed offset strategy

Alpine Resorts Victoria – Falls Creek has a registered offset site within the Falls Creek Alpine Resort. A credit extract indicates 21.792 general habitat units with an SBV of up to 0.991 are available in ARV-FC's offset area to meet the project's offset requirements.

6. Key ecological values and recommendations

This section identifies the key ecological features of the study area, provides an outline of potential implications of proposed trail development on those values and includes recommendations to assist ARV - FC to design the Summit to Gully mountain bike trail to minimise impacts on biodiversity. In total, up to 0.375 hectares of native vegetation is proposed for removal in order to construct the trail for a length of up to 1.8 kilometres.

The primary measure to reduce impacts to biodiversity values within the study area is to minimise removal of native vegetation and terrestrial and aquatic habitat.

Minimisation of impacts has been demonstrated in the early stages of planning by undertaking a micro-siting walk-through with trail designers to avoid key sensitive habitats and utilise disturbed areas such as existing resort ski-field areas where practical. Further refinement of the trail alignment at a micro-level through pre-construction inspections and sensitive construction techniques is critical to ensure impacts are further minimised.

The results of this assessment have been incorporated into the final trail design as presented. Priority should be given to minimising disturbance in areas of habitat for Mountain Pygmy-possum (i.e. Mountain Plum-pine), Broad-toothed Rat, Guthega Skink and other threatened reptiles, avoiding rare and threatened flora, designing elevated structures to ensure Alpine Bog community impacts are minimised and implementing best practice sediment control measures to minimise impacts on threatened aquatic invertebrate habitats.

We understand ARV – FC intends to apply seasonal restrictions on the use of the Summit to Gully trail.

A summary of potential implications of development of the Summit to Gully Trail and recommendations to minimise the biodiversity impacts of the project is provided in Table 15.

Table 15 Summary of key ecological values, potential implications of trail development and recommendations to minimise ecological impacts during the design and construction phase.

Ecological feature (Figure 2)	Implications of development	Recommendations
Native vegetation	The removal of up to 0.375 hectares of vegetation. The application will be assessed on the detailed assessment pathway.	Where native vegetation removal is unavoidable then minimise impacts in accordance with No Net Loss policy. Refer to Section 5. Identify and implement appropriate offsets for vegetation losses as outlined in Section 5.3. Utilise sensitive trail construction methods throughout the trail, measures such as placement of cut material and soil sods along trail edges in suitable locations to reduce erosion and encourage natural regeneration.
Threatened flora and ecological communities	Impacts on recorded threatened flora species.	To minimise impacts, undertake a pre-construction 'micro-siting' survey and alter alignment as required.

Ecological feature (Figure 2)	Implications of development	Recommendations
Threatened fauna habitat	Impacts on threatened fauna species and their habitat, in particular: • Habitat for Broad-toothed Rat throughout the study area • Habitat for Guthega Skink and other threatened alpine reptiles, predominantly in Alpine Grassy Heathland and Sub-alpine Shrubland EVCs • Habitat for Mountain Pygmy-possum in the Gully area. • Habitat for Alpine Stonefly and Stonefly in waterways.	• Undertake pre-construction micro-siting to ensure key habitats including rocky outcrops are avoided. • Impacts will be minimised by using elevated structures and rock armouring (with pipes) over areas of sensitivity. To further avoid and minimise impacts to threatened fauna, undertake a pre-construction 'micro-siting' survey to alter or elevate alignment. • Install fauna-crossing pipes at rock armouring locations where rock armouring intersects any sedge dominated drainage lines/wetter areas. • All waterway crossings to be elevated and strict sediment controls to be implemented during construction and operation of the trail. • Monitor operational impacts of the downhill trail. Adhere to trail closure periods during summer season to rest the area from human traffic.
Weed invasion and spread	Soil disturbance can lead to weed invasion into undisturbed areas or weed spread in existing disturbed areas. Key high and medium threat species known from the resort (but not necessarily in the study area) include Blackberry, Grey Sallow, Hawkweeds, English Broom, St John's Wort, Soft Rush, Sweet Vernal-grass, Timothy Grass, Twiggy Mullein, Spear Thistle and Brown-top Bent.	• Implement trail management plan and Hawkweed buffers and work standard for the entire Falls Creek Trail Network or incorporate the proposed trail network into existing Weed Management Strategies. Ensure weed management and monitoring targets the control of high threat species. Undertake surveillance for new and emerging weeds along new and existing trail.
Spread of introduced predators	New trail may facilitate the further spread and predation success of introduced predators such as cats and foxes, which may result in increased levels of predation along the constructed trail alignment. In particular, foxes have been known to selectively prey on Broad-toothed Rat (Green 2002).	• Incorporate the proposed trail into existing Pest Animal Programs and target pest animals in high priority zones between the village and Howman's Gap.

Ecological feature (Figure 2)	Implications of development	Recommendations
Instream and aquatic habitat	Loss of, or alterations to, riparian and in-stream habitat within and in the vicinity of the trail where waterway crossing occurs via: direct removal, notable hydrological changes, deterioration in water quality (including pollution event) and, sedimentation.	• Design trail and construction methods to minimise removal of drainage line vegetation and avoid instream works via the use of clear span elevated structures. These design responses should be used on all flowing and all mapped waterways (including ephemeral first order tributaries) depicted on the VicMap Hydro 1:25,000 layer. • Utilise the most sensitive short term (i.e. during construction) and long term sediment control methods available for all works located in within and in the vicinity of all flowing and all mapped waterways (including ephemeral first order tributaries). • Design the trail to direct runoff through a buffer of vegetation (preferably > 30 m in width) rather than directly into waterways defined above.
Habitat connectivity	Small scale fragmentation of habitat connectivity for vertebrate and invertebrate fauna species.	• Design all waterway crossings in accordance with relevant guidelines from the North East CMA and in accordance with guidelines for fish friendly waterway crossings (Witheridge 2002, Fairfull & Witheridge 2003). For minor ephemeral tributaries, boardwalks and grates should suffice, but for larger waterways, appropriate culverts or small full-span bridges should be used. • Undertake a pre-construction 'micro-siting' survey to alter or elevate the alignment in order to maintain some areas of habitat connectivity. • Install PVC pipe tunnels beneath the trail during construction in order to provide habitat connectivity for Broad-toothed Rat and threatened alpine skinks.

Conclusion

Specific detail relating to preventing impacts to native vegetation, threatened flora and fauna, aquatic habitats and spreading pest plants and animals will be addressed in a Site Environmental Management Plan (SEMP) for the project. This plan will provide information for contractors such as environmental inductions, guidelines for installation of temporary fencing/signage, drainage and particularly detailed sediment control measures and monitoring.

A Trail Management Plan was developed by ARV - FC for the Falls Creek Mountain Bike Trail network in 2018 to address longer term management of threats such as pest plant and animal control, managing regrowth vegetation, sediment control, soil pathogens and responding to flood or fire events. These trail sections should be added to the resort Trail Management plan. Additionally, we recommend the Trail Management Plan be updated to include an adaptive management approach for the Summit to Gully trail. The adaptive management approach should specify a schedule of monitoring for reptile activity and mortality during the first season of trail use to ensure any impacts to reptiles are understood and inform whether any curtailment in trail use is warranted.

REFERENCES

Clemann, N. 2003. Flora & Fauna Guarantee Action Statement for the Alpine She-oak Skink *Cyclodomorphus praealtus.* Department of Sustainability and Environment, Victoria.

CoA 2013. *Matters of National Environmental Significance: Significant impact guidelines 1.1 Environment Protection and Biodiversity Conservation Act 1999.* Commonwealth of Australia, Canberra.

DAWE 2022a. Conservation Advice for *Callocephalon fimbriatum* (Gang-gang Cockatoo). Australian Government Department of Agriculture, Water and the Environment, Canberra. Available from: http://www.environment.gov.au/biodiversity/threatened/species/pubs/768-conservation-advice-02032022.pdf

DAWE 2022b. *Cyclodomorphus praealtus* in Species Profile and Threats Database, Department of the Environment, Canberra. Available from: http://www.environment.gov.au/sprat. Accessed 10 June 2022

DELWP 2016. National Recovery Plan for the Mountain Pygmy-possum Burramys parvus. Prepared by Department of Environment, Land, Water and Planning for the Australian Government, Canberra.

DELWP 2017a. Guidelines for the removal, destruction or lopping of native vegetation, Department of Environment, Land, Water, and Planning. East Melbourne, Victoria. https://www.environment.vic.gov.au/__data/assets/pdf_file/0021/91146/Guidelines-for-the-removal,-destruction-or-lopping-of-native-vegetation,-2017.pdf.

DELWP 2017b. Protecting Victoria's Environment - Biodiversity 2037, Victorian Government Department of Environment, Land, Water and Planning. Melbourne.

DELWP 2018. *Assessor's Handbook Applications to remove destroy or lop native vegetation*. Victorian Government Department of Environment, Land, Water, and Planning. East Melbourne, Victoria

DEPI 2013. Permitted clearing of native vegetation - Biodiversity assessment guidelines, Victorian Government Department of Environment and Primary Industries. Melbourne, Victoria.

DEPI 2014. Advisory List of Rare or Threatened Plants in Victoria - 2014, Victorian Government Department of Environment and Primary Industries. East melbourne, Victoria.

DoE 2015. National recovery plan for the Alpine Sphagnum Bogs and Associated Fens ecological community. Department of the Environment, Canberra.

DSE 2004. Native Vegetation: Sustaining a living landscape. Vegetation Quality Assessment Manual – Guidelines for applying the Habitat hectares scoring method. Version 1.3, Victorian Government Department of Sustainability and Environment. Melbourne, Victoria.

DSE 2005a. Index of Stream Condition: The Second Benchmark of Victorian River Condition, Victoria Government Department of Sustainability and Environment. East Melbourne, Victoria.

DSE 2005b. Ministerial guidelines for assessment of environmental effects under the Environment Effects Act 1978 Seventh edition 2006, Victorian Government Department of Sustainability and Environment. Melbourne, Victoria.

DSE 2009. Advisory List of Threatened Invertebrate Fauna in Victoria - 2009, Victorian Government Department of Sustainability and Environment. East Melbourne, Victoria.

DSE 2013. Advisory List of Threatened Vertebrate Fauna in Victoria – 2013, Victorian Government Department of Sustainability and Environment. Melbourne, Victoria.

Ecology Australia 2011. Falls Creek Alpine Resort Biodiversity Management Strategy, Project 09-31. Report prepared for Falls Creek Resort Management

Fairfull S & Witheridge G 2003. Why do fish need to cross the road: fish passage requirements for waterway crossings, NSW Fisheries, Cronulla, NSW.

Green K. 2002. Selective predation on the broad-toothed rat *Mastacomys fuscus* (Rodentia:Muridae) by the introduced red fox *Vulpes vulp*es (Carnivora: Canidae) in the Snowy Mountains. Austral Ecology 27: 353-359.

Milner R. N. C., Starrs D., Hayes G. & Evans M. C. 2015. Distribution and habitat preference of the broad-toothed rat (*Mastocomys fuscus*) in the Australian Capital Territory, Australia. *Australian Mammalogy* 37: 125-131.

RBGV 2020. Flora of Victoria, VICFLORA-Royal Botanic Gardens Victoria, accessed 26 March 2020, https://vicflora.rbg.vic.gov.au/flora/taxon/92359bf9-5cfa-4dcf-8b4b-f0e62fcdc70c.

SAC 2013. Flora and Fauna Guarantee Act 1988 – Threatened List: Characteristics of Threatened Communities, Victorian Government Department of Environment, Land, Water and Planning, Melbourne.

Tourism North East 2018. North East Victoria Cycling Optimisation (NEVCO) Masterplan priority project.

TSSC 2009. Alpine Sphagnum Bogs and Associated Fens ecological community Listing Advice. Threatened Species Scientific Committee.

Threatened Species Scientific Committee 2018 Conservation Advice *Burramys parvus* Mountain Pygmy-possum. Canberra: Department of the Environment and Energy.

Whinam J., Hope G. S., Clarkson B. R., Alspatch P. A. & Adam P. 2003. Sphagnum in peatlands of Australasia: The resource, its utilisation and management. Cunninghamia, 7(3): 463-500

Whisson D. A., Holland J. G. & Kelly R. T. 2015. Persistence of a threatened species in a modified alpine resort environment: the broad-toothed rat. *Journal of Mammalogy* 96(1): 151-158.

Witheridge G 2002. Fish passage requirements for waterway crossings - Engineering guidelines, Catchment and Creeks Pty ltd. Brisbane, Queensland.

APPENDICES

Appendix A. Targeted survey methods

Guthega Skink and other threatened alpine reptile survey

Shannon Braun (Zoologist) completed a habitat assessment during April 2023 to confirm if suitable habitat is present within the study area. As suitable habitat was identified (Figure 4), targeted survey was recommended.

Active searching: Searches for Guthega Skink (and other threatened alpine reptiles) were undertaken between December 2023 and January 2024. Wyn Russel (Zoologist) actively searched in suitable habitat and scanned rocks and other basking sites visually and with the aid of binoculars to observe presence of the species.

Broad-toothed Rat

Active searching: The trail length was walked and notes made regarding presence of rat runs and any locations where high densities of scats were observed.

Remote camera surveys: Four Reconyx HyperFire HC600 cameras™ (Reconyx Inc., Holmen, Wisconsin USA) were used for the current survey, at locations shown in Figure 4. Camera stations were set next to or within potential Broad-toothed Rat/Mountain Pygmy-possum dispersal habitat. Camera units were fixed to a star picket or trunk of a suitable tree approximately 0.5 metres above the ground. Each camera unit was located approximately 1 metre from a bait station to lure animals to within the camera's sensor range. Mammal bait (peanut butter, rolled oats, golden syrup and truffle oil) was placed inside bait station containers and then fixed into the ground with a long metal peg. The bait station was set up so that the bottom of the bait was approximately level with the camera's sensor. Vegetation that might obscure the view of an animal investigating the bait or cause the camera to 'false trigger' was cleared from the within the field of view. Cameras were set for 70 nights (15 December 2023 to 23 February 2024, however one camera malfunctioned for between 15 December 2023 to 19 January 2024 [35 nights]). Therefore, cameras were operational for a total of 245 camera-nights. Due to the exposed nature of the remote camera sites, a significant number of false trigger events were captured, resulting in >30,000 camera images. Camera SD cards and batteries were checked and replaced once to ensure that the remote cameras remained active during the deployment period despite the large volume of false trigger events. Camera locations are shown in Figure 4.

Mountain Pygmy-possum

Remote camera surveys: As above.

Appendix B. Flora

The following abbreviations and symbols are relevant to this Appendix.

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
PMST	Protected Matters Search Tool	
State listings (FFG Act and DEECA Advisory List)		
x	Extinct	Victorian Flora and Fauna Guarantee Act 1988 (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	
P	Protected (public land only)	
Weed status (CaLP Act)		
SP	State prohibited species	Victorian Catchment and Land Protection Act 1994 (CaLP Act)
RP	Regionally prohibited species	
RC	Regionally controlled species	
R	Restricted species	
WoNS	Weed of National Significance	Australian Weeds Strategy (DAWE 2017)
Other		
#	Native species outside its natural range	Victorian Biodiversity Atlas (VBA)

Appendix B.1. Flora species recorded from the study area

Table 16 Flora species recorded from the study area

Status	Scientific Name	Common Name
Indigenous species		
P	*Acacia obliquinervia*	Mountain Hickory Wattle
	Acaena novae-zelandiae	Bidgee-widgee
e, P, r	*Acrothamnus montanus*	Snow Beard-heath
	Anthosachne scabra s.l.	Common Wheat-grass
P	*Argyrotegium fordianum*	Alpine Cudweed
	Asperula conferta	Common Woodruff
	Asperula gunnii	Mountain Woodruff
	Asperula spp.	Woodruff
	Asterolasia trymalioides	Alpine Star-bush
P	*Baeckea gunniana*	Alpine Baeckea
P	*Baeckea utilis* s.l.	Mountain Baeckea
P	*Blechnum penna-marina* subsp. *alpina*	Alpine Water-fern
	Bossiaea foliosa s.l.	Leafy Bossiaea
P	*Brachyscome scapigera*	Tufted Daisy
P	*Brachyscome* spp.	Daisy
	Bulbine bulbosa	Bulbine Lily
	Callistemon pityoides	Alpine Bottlebrush
	Carex appressa	Tall Sedge
	Carex breviculmis	Common Grass-sedge
	Carex gaudichaudiana	Fen Sedge
	Carex hebes	Mountain Sedge
e, r	*Carex jackiana*	Carpet Sedge
	Carex spp.	Sedge
e, P, r	*Celmisia costiniana*	Carpet Snow-daisy
v, P, r	*Celmisia tomentella*	Silver Snow-daisy
	Coprosma hirtella	Rough Coprosma
P	*Coronidium monticola*	Mountain Everlasting
P	*Cotula alpina*	Alpine Cotula
P	*Craspedia* spp.	Billy Buttons
	Deyeuxia spp.	Bent Grass
	Dianella tasmanica	Tasman Flax-lily
	Dichondra repens	Kidney-weed
P	*Dracophyllum continentis*	Candle Heath
	Empodisma minus	Spreading Rope-rush
P	*Epacris paludosa*	Swamp Heath
	Epilobium billardiereanum	Variable Willow-herb
	Epilobium billardiereanum subsp. *hydrophilum*	Robust Willow-herb
	Epilobium spp.	Willow Herb
cr, r	*Eucalyptus pauciflora* subsp. *hedraia*	Bogong Sally
P	*Euchiton involucratus* s.l.	Common Cudweed

Status	Scientific Name	Common Name
P	*Euchiton* spp.	Cudweed
	Geranium spp.	Crane's Bill
	Gonocarpus micranthus	Creeping Raspwort
	Gonocarpus montanus	Mat Raspwort
	Gonocarpus tetragynus	Common Raspwort
	Goodenia hederacea	Ivy Goodenia
	Goodenia hederacea subsp. *alpestris*	Ivy Goodenia
P	*Grevillea australis*	Alpine Grevillea
P	*Grevillea victoriae* s.l.	Royal Grevillea
e, P, r	*Grevillea victoriae* subsp. *victoriae*	Royal Grevillea
	Hovea montana	Alpine Rusty-pods
	Hydrocotyle algida	Mountain Pennywort
	Hypericum japonicum	Matted St John's Wort
	Isolepis spp.	Club Sedge
	Juncus spp.	Rush
	Kunzea muelleri	Yellow Kunzea
P	*Leptinella filicula*	Mountain Cotula
	Luzula spp.	Woodrush
P	*Lycopodium fastigiatum*	Mountain Clubmoss
	Melicytus dentatus s.l.	Tree Violet
P	*Microseris lanceolata*	Alpine Yam-daisy
P	*Microtis* spp.	Onion Orchid
e, P, r	*Olearia brevipedunculata*	Rusty Daisy-bush
v, P, r	*Olearia frostii*	Bogong Daisy-bush
e, P, r	*Olearia phlogopappa* subsp. *flavescens*	Dusty Daisy-bush
	Oreomyrrhis eriopoda	Australian Caraway
	Orites lancifolius	Alpine Orites
	Oxylobium ellipticum	Common Oxylobium
P	*Ozothamnus secundiflorus*	Cascade Everlasting
P	*Ozothamnus* spp.	Everlasting
	Phebalium squamulosum	Forest Phebalium
e, r	*Phebalium squamulosum* subsp. *alpinum*	Alpine Phebalium
P	*Picris angustifolia* subsp. *merxmuelleri*	Highland Picris
	Pimelea alpina	Alpine Rice-flower
v, r	*Pimelea axiflora* subsp. *alpina*	Alpine Bootlace Bush
e, r	*Pimelea ligustrina* subsp. *ciliata*	Fringed Rice-flower
	Plantago varia	Variable Plantain
	Poa costiniana	Bog Snow-grass
	Poa ensiformis	Sword Tussock-grass
	Poa fawcettiae	Horny Snow-grass
	Poa hiemata	Soft Snow-grass
	Poa hothamensis	Ledge Grass
	Poa spp.	Tussock Grass
	Podocarpus lawrencei	Mountain Plum-pine
	Podolobium alpestre	Alpine Shaggy-pea

Status	Scientific Name	Common Name
	Polyscias sambucifolia	Elderberry Panax
P	*Polystichum proliferum*	Mother Shield-fern
	Poranthera microphylla s.l.	Small Poranthera
P	*Prasophyllum alpestre*	Mauve Leek-orchid
P, x	*Prasophyllum suttonii* s.s.	Buffalo Leek-orchid
P	*Prostanthera cuneata*	Alpine Mint-bush
P	*Prostanthera lasianthos*	Victorian Christmas-bush
e, r	*Ranunculus victoriensis*	Victorian Buttercup
	Rytidosperma nudiflorum	Alpine Wallaby-grass
	Rytidosperma spp.	Wallaby Grass
	Scleranthus biflorus s.l.	Twin-flower Knawel
e, r	*Scleranthus brockiei*	Brock Knawel
e, r	*Scleranthus singuliflorus*	Mossy Knawel
P	*Senecio gunnii*	Mountain Fireweed
P	*Senecio linearifolius*	Fireweed Groundsel
P	*Senecio pinnatifolius*	Variable Groundsel
P	*Sphagnum cristatum*	Peat Moss
	Stellaria pungens	Prickly Starwort
P	*Stylidium armeria*	Common Triggerplant
e, P, r	*Stylidium montanum*	Alpine Triggerplant
	Tasmannia xerophila	Alpine Pepper
	Trachymene humilis	Alpine Trachymene
	Trisetum spicatum subsp. *australiense*	Bristle Grass
	Veronica derwentiana subsp. *maideniana*	Derwent Speedwell
	Viola betonicifolia	Showy Violet
	Wahlenbergia gloriosa	Royal Bluebell
	Wahlenbergia spp.	Bluebell
Introduced species		
	Acetosella vulgaris	Sheep Sorrel
	Achillea millefolium	Milfoil
	Agrostis capillaris	Brown-top Bent
	Anthoxanthum odoratum	Sweet Vernal-grass
	Cerastium vulgare	Common Mouse-ear Chickweed
	Dactylis glomerata	Cocksfoot
	Erythranthe moschata	Musk Monkey-flower
	Festuca rubra s.l.	Red Fescue
	Holcus lanatus	Yorkshire Fog
	Hypochaeris radicata	Flatweed
	Lotus uliginosus	Greater Bird's-foot Trefoil
	Malus spp.	Apple
	Phleum pratense	Timothy Grass
	Populus spp.	Poplar
RC	*Rubus anglocandicans*	Common Blackberry
	Rumex crispus	Curled Dock
R	*Salix cinerea*	Grey Sallow

Status	Scientific Name	Common Name
	Trifolium repens var. *repens*	White Clover
	Verbascum virgatum	Twiggy Mullein

Appendix B.2. Listed flora species

The following table includes threatened flora species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 17 March 2023 and updated on 31 January 2024). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur. A proportion of the flora habitat descriptions have been reproduced with permission from the Royal Botanic Gardens Victoria (RBGV 2020).

Table 17 Threatened flora species recorded or predicted to occur within 10 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Argyrotegium nitidulum	Shining Cudweed	VU		2020	PMST	Restricted to damp, open grassland communities between Mt Cope and Mt Nelse.	**Low**	Mostly known on Bogong High Plains between Mt Cope and Mt Nelse, however the species is known from within Falls Creek resort including one record nearby the study area from 1967. While there is some suitable habitat within damp, open areas with alpine grasses, these areas have been modified by disturbances associated with ski field management, and this rare species is unlikely to occur.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Colobanthus curtisiae	Snowy Colobanth	VU			PMST	Grassland and grassy woodland; known in Victoria from a small number of records in the Alpine National Park.	**Low**	There are no records for this species in the search area. There is some suitable habitat for this species in the study area, however no recent records and only known for a small number of records in the Alpine NP.
Euphrasia crassiuscula subsp. *glandulifera*	Thick Eyebright	VU	cr	2004	PMST	Alpine grasslands, heathlands and herbfields.	**Low**	Records for this species in the search area, however none within Falls Creek resort. Records in Mt Nelse and south of Falls Creek village. Some suitable habitat for this species on margins of heathlands and open grassy sites in the study area, however these areas have been modified by disturbances associated with ski field management.
Euphrasia eichleri	Bogong Eyebright	VU	e	2007	PMST	Low open heath, grassland, and Sphagnum bogs in alpine and higher subalpine tracts.	**Low**	Records for this species in the search area, however none within Falls Creek resort. Records in Mt Nelse and south of Falls Creek village on the Bogong High Plains. Some suitable habitat for this species in low, open

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
								heathlands in the study area however these areas have been modified by disturbances associated with ski field management.
Glycine latrobeana	Clover Glycine	VU	v		PMST	Grasslands and grassy woodlands, particularly those dominated by Kangaroo Grass.	**Negligible**	No records for this species from the search area. No suitable grassland or grassy woodlands for this species in the study area.
Kelleria bogongensis	Snow Daphne	VU	cr	2006	PMST	Depressions within Bog Snow-grass grassland and Mud Pratia spp. – Alpine Stackhousia spp. herblands. Confined to the Bogong High Plains.	**Low**	Records for this species in the search area from the Bogong High Plains, to which it is confined. Minimal suitable habitat for this species in the study area and outside of range.
Leucochrysum albicans subsp. *tricolor*	White Sunray	EN	e		PMST	Grasslands of the Victorian Volcanic Plains, primarily on acidic clay soils derived from basalt, with occasional occurrences on adjacent sedimentary, sandy-clay soils.	**Negligible**	No records for this species from the search area. No suitable grassland habitat for this species in the study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Lobelia gelida	Snow Pratia	VU	e		PMST	Alpine grasslands, on heavy dark mud around seasonal pools and creek edges.	**Low**	No records for this species from the search area. There is some suitable habitat for this species in open grassland and along the edges of drainage lines in the study area, however, this species is not known for and has no records in Falls Creek.
Prasophyllum morganii	Mignonette Leek-orchid	VU	x		PMST	Known from only one location near Cobungra in Snow Gum open forest at about 1000 m ASL. Presumed to be extinct.	**Negligible**	No records for this species from the search area. Known only for subalpine herbfields om the Nunniong Plateau and near Cobungra, but presumed extinct.
Pterostylis oreophila	Blue-tongue Greenhood	CR			PMST	Damp, shady habitat along watercourses.	**Negligible**	Species associated with *Leptospermum grandiflorum* thickets. No suitable habitat within the study area
Thesium australe	Austral Toad-flax	VU	e		PMST	Most commonly in damp grassland and woodland, including subalpine grassy heathlands.	**Negligible**	No records for this species from the search area. Suitable habitat in the study area, however recent records and collections of this species are in Wulgulmerang and is suspected to be extinct in the rest of its Australian range.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Viola improcera	Dwarf Violet	EN			PMST	High-altitude open shrubland or Snow-gum woodland.	**Low**	Known from only 2 populations in Victoria, neither of which is within the project search area.
Xerochrysum palustre	Swamp Everlasting	VU	cr		PMST	Sedge-swamps and shallow freshwater marshes and swamps in lowlands, on black cracking clay soils.	**Negligible**	No records for this species from the search area. No suitable habitat in the study area.

Appendix B.3. Threatened ecological communities

The following table includes the threatened ecological communities that have potential to occur within the project area. The list of threatened ecological communities has been compiled with reference to characteristics of FFG Act threatened communities (SAC 2013) and predictive output from the PMST (accessed on 1 February 2023).

Table 18 Threatened ecological communities predicted to occur within 10 km of the project area.

Community Name	Conservation status	Description
National significance		
Alpine Sphagnum Bogs and Associated Fens	Endangered	Present on site, synonymous with Sub-alpine Wet Heathland EVC 210.
White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland	Critically Endangered	Not present on site due to incorrect landscape position and lack of diagnostic flora species.
State significance		
Alpine Bog Community	Threatened	Present on site, synonymous with Sub-alpine Wet Heathland EVC 210.
Alpine Snowpatch Community	Threatened	Not present on site. This community is known from the Bogong High Plains however the landscape does not support persistent snow patches within the study area for this community to have established.
Caltha introloba Herbland Community	Threatened	Not present on site. This community is known from within Falls Creek Resort (eg adjacent to Pretty Valley Road) however is not present in the study area due to lack of typical landscape position and diagnostic flora species.

Appendix C. Fauna

The following abbreviations and symbols are relevant to this Appendix:

Code	Meaning	Reference
National listings (EPBC Act)		
EX	Extinct	Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)
CR	Critically endangered	
EN	Endangered	
VU	Vulnerable	
NT	Near threatened	
CD	Conservation dependent	
PMST	Protected Matters Search Tool	
State listings (FFG Act)		
x	Extinct	Victorian Flora and Fauna Guarantee Act 1988 (FFG Act)
cr	Critically endangered	
e	Endangered	
v	Vulnerable	
t	Threatened	

Appendix C.1. Fauna species recorded from the study area

Table 19 Fauna species recorded from the study area

Status	Scientific Name	Common Name
Indigenous species		
	Acanthiza pusilla	Brown Thornbill
	Antechinus spp.	Antechinus
	Anthochaera carunculata	Red Wattlebird
	Anthus australis	Australian Pipit
	Drysdalia coronoides	White-lipped Snake
	Geopelia placida	Peaceful Dove
	Gymnorhina tibicen	Australian Magpie
EN, v, en	*Mastacomys fuscus mordicus*	Broad-toothed Rat
	Petroica phoenicea	Flame Robin
	Pseudemoia entrecasteauxii	Southern Grass Skink
e, vu	*Pseudemoia pagenstecheri*	Tussock Skink
	Rattus fuscipes	Bush Rat
	Sericornis frontalis	White-browed Scrubwren
	Strepera graculina	Pied Currawong
Introduced species		
	Mus musculus	House Mouse
	Oryctolagus cuniculus	European Rabbit

Appendix C.2. Listed fauna species

The following table includes a list of threatened fauna species that have potential to occur within the study area. The list of threatened species is sourced from the VBA and PMST (accessed on 17 March 2023 and updated 31 January 2024). Where years are specified for the most recent database records, these refer to records from the VBA unless otherwise specified. Where no year is specified, the PMST has predicted that the species has potential to occur.

Table 20 Threatened fauna species recorded or predicted to occur within 10 km of the study area

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
National significance								
Gallinago hardwickii	Latham's Snipe	VU		2018	PMST	A migrant to Australia from July to April occurring in a wide variety of permanent and ephemeral wetlands. Prefers open freshwater wetlands with nearby cover, but also recorded on the edges of creeks and rivers, river-pools and floodplains. Forages in soft mud at edge of wetlands and roosts in a variety of vegetation around wetlands including tussock grasslands, reeds and rushes, tea-tree scrub, woodlands and forests.	**Negligible**	No suitable wetland habitat
Rostratula australis	Australian Painted-snipe	EN	cr		PMST	Shallows of well-vegetated freshwater wetlands.	**Negligible**	No suitable wetland habitat
Calyptorhynchus lathami	Glossy Black-Cockatoo	VU	v	2013		Forests and woodlands with Buloke Allocasuarina spp.	**Low**	More commonly associated with woodlands and forest at lower altitudes.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Callocephalon fimbriatum	Gang-gang Cockatoo	EN	e	2019	PMST	S Vic to E NSW. Forests and woodlands from coast to alpine areas. Autumn-winter dispersal from highlands to lower altitudes. Forages in eucalypts, acacias and some exotic garden trees and shrubs.	**High**	Recent local records. Likely to utilise sub-alpine woodland.
Neophema chrysostoma	Blue-winged Parrot	VU			PMST	A range of coastal, sub-coastal and semi-arid regions throughout south-eastern Australia. Nests in tree hollows in coastal eucalypt forests and woodlands. Feeds on seeds of a range of native grasses and herbs.	**Low**	No local records. Species usually found at lower altitudes in coastal and semi-arid regions.
Hirundapus caudacutus	White-throated Needletail	VU	v	1993	PMST	An almost exclusively aerial species within Australia, occurring over most types of habitat, particularly wooded areas.	**High**	Likely to be present in airspace above the study area but almost exclusively aerial species unlikely to utilise terrestrial vegetation in the study area.
Calidris ferruginea	Curlew Sandpiper	CR	cr		PMST	Large intertidal sandflats, banks, mudflats, estuaries, inlets, sewage farms, saltworks, harbours, coastal lagoons and bays.	**Negligible**	No suitable wetland habitat
Calidris acuminata	Sharp-tailed Sandpiper	VU			PMST	Prefers muddy edges of shallow fresh or brackish wetlands with inundated or emergent low vegetation. Occasionally use flooded paddocks and other ephemeral wetlands.	**Negligible**	No suitable wetland habitat

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Pycnoptilus floccosus	Pilotbird	VU	v	1998	PMST	E Vic to SE NSW. Largely ground-dwelling among leaf litter, logs and lower storey vegetation of wet sclerophyll forests and rainforest. Less often, alpine and coastal woodlands.	**Low**	Historic records in gullies to the north-west. Species more commonly found at lower altitudes.
Grantiella picta	Painted Honeyeater	VU	v		PMST	Dry open woodlands and forests. Typically forages for fruit and nectar in mistletoes and in tree canopies.	**Low**	No local records. Species more commonly found at lower altitudes on the northern side of the Great Dividing Ranges. Primary food source, mistletoe, not present in study area.
Anthochaera phrygia	Regent Honeyeater	CR	cr	1965	PMST	A range of dry woodlands and forests dominated by nectar-producing tree species.	**Low**	Species more commonly found at lower altitudes and is generally restricted to three known populations in Victoria between Albury and Chiltern.
Stagonopleura guttata	Diamond Firetail	VU	v		PMST	Open forests and woodlands with a grassy ground layer.	**Low**	No local records. Species more commonly found at lower altitudes in open grassy woodlands. No suitable open grassy woodland within study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Climacteris picumnus	Brown Treecreeper	VU		1979	PMST	Open eucalypt forests, woodlands and Mallee, often where there are stands of dead trees.	**Low**	No recent local records. Species more commonly found at lower altitudes in open woodland. No suitable open woodland within study area.
Dasyurus maculatus maculatus	Spot-tailed Quoll	EN		2001	PMST	Rainforest and wet and dry sclerophyll forests and woodlands.	**Medium**	Observation from 2001 (located approx. 6km NW of study area) and indirect observation from 2000 (approx. 8km north-east) in sub-alpine woodland vegetation. Suitable habitat present within study area.
Petauroides volans	Southern Greater Glider	EN	e	1987	PMST	Wet and damp sclerophyll forest with large hollow-bearing trees.	**Low**	No recent local records. More commonly associated with tall dense forests supporting large hollow-bearing trees at lower altitudes.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Petaurus australis	Yellow-bellied Glider	VU	v		PMST	Sclerophyll forest with large hollow-bearing trees, prefers mature eucalypt dominated forest and woodland. Distributed along South-eastern Australia.	**Low**	No recent local records. More commonly associated with tall dense forests supporting large hollow-bearing trees at lower altitudes adjacent to waterways.
Burramys parvus	Mountain Pygmy-possum	EN	e	2021	PMST	Alpine rock screes and boulder fields supporting heathy vegetation.	**Medium**	Suitable dispersal habitat present in study area. Known to feed on Mountain Plum Pine Podocarpus lawrencei which is present in high densities within the Gully section of the study area.
Potorous longipes	Long-footed Potoroo	EN	e		PMST	Temperate rainforest, riparian forest and wet and dry sclerophyll forest.	**Low**	No local records. Known records within the Alpine area are concentrated in vegetation at lower altitudes, mostly to the west of Mt Feathertop.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Mastacomys fuscus mordicus	Broad-toothed Rat	EN	v	2019	PMST	Sub-alpine Woodland, Heathland, Sedgeland, and sedge-dominated areas within forest.	**Recorded**	Multiple recent records in local landscape, with suitable habitat present in study area. Aged scats of species recorded from Sub-alpine woodland and heathland within the study area.
Pseudomys fumeus	Smoky Mouse	EN	e		PMST	Coastal heath and heathy woodland, wet forest, sub-alpine heath and dry sclerophyll forest.	**Low**	Suitable habitat present however the species has not been recorded from the Resort area previously.
Pteropus poliocephalus	Grey-headed Flying-fox	VU	v		PMST	Rainforest, wet and dry sclerophyll forest, woodland and urban areas.	**Low**	No local records. Species commonly associated with lower altitudes. Species usually travels 5-15 km from camps to forage, can travel up to 50 km for exceptional food resources. Closest recently populated camp at Albury, over 90 km from study area.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Liopholis guthega	Guthega Skink	EN	cr	2021	PMST	Alpine woodlands, grasslands and heathlands with sub-surface boulders.	**Medium**	Recent local records. Suitable vegetated sub-surface boulder habitat within study area.
Liopholis montana	Mountain Skink	EN	e		PMST	Alpine woodland and montane forest environments along the Great Dividing Range in Victoria to the upper Yarra River valley. An exceptionally low altitude population has also been recorded in the Wombat SF. Relatively little is known about the species' biology and ecology.	**Medium**	No records within local area, but recent records in similar habitat on Mt Bogong and at Dargo High Plains. Suitable habitat present in study area.
Cyclodomorphus praealtus	Alpine She-oak Skink	EN	cr	2021	PMST	Sparsely treed subalpine woodland, alpine heathlands and native and introduced alpine grasslands.	**High**	Recent records in similar habitat within local area. Suitable habitat present within study area.
Pseudemoia cryodroma	Alpine Bog Skink	EN	e	2021	PMST	Alpine and Sub-alpine Grassland, Heathland and Woodland.	**High**	Recent records in similar habitat within local area. Suitable habitat present within study area.
Litoria spenceri	Spotted Tree Frog	CR	cr		PMST	Rocky areas along streams within forest and woodland.	**Low**	No local records. No suitable rocky stream habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Litoria verreauxii alpina	Alpine Tree Frog	VU	cr	2004	PMST	Alpine and subalpine woodland, heath and grassland; breeds in a variety of natural and artificial waterbodies including dams and reservoirs.	**Low**	The species is now considered extinct on the Bogong High Plains.
Galaxias rostratus	Flat-headed Galaxias	CR	v		PMST	Still or slow-moving waters of rivers, billabongs, lakes and swamps.	**Low**	No local records. No suitable slow-moving waterway habitat. Records within region are restricted to lower elevation areas of Ovens River and Mitta Mitta River.
Maccullochella macquariensis	Trout Cod	EN	e		PMST	Streams characterised by a high abundance of large woody debris.	**Negligible**	No local records. No suitable habitat.
Maccullochella peelii	Murray Cod	VU	e		PMST	A diverse range of stream habitats in the Murray-Darling basin; principally the main channels of rivers and their major tributaries.	**Negligible**	No local records. No suitable habitat.
Macquaria australasica	Macquarie Perch	EN	e		PMST	Streams with clear water and deep, rocky holes with abundant cover.	**Negligible**	No local records. No suitable habitat.
Thaumatoperla alpina	Alpine Stonefly	EN	e	2016	PMST	In and around steep, stony and cool alpine streams.	**Medium**	Multiple recent records exist in local area. With potential habitat present in stream at eastern section of study area.
State significance								
Lewinia pectoralis	Lewin's Rail		v	1968		Swamps, dense riparian vegetation and saltmarsh.	**Low**	No recent local records. No suitable habitat.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Aythya australis	Hardhead		v	2019		Deep freshwater swamps and wetlands, with abundant aquatic and terrestrial vegetation for roosting. Can occur in sheltered estuaries.	**Low**	Occasional records in the local area. No suitable habitat within study area.
Hieraaetus morphnoides	Little Eagle		v	1991		Woodland and open areas. Rabbits are a key component of their diet. Nesting occurs in mature trees in open woodland or riparian vegetation.	**Low**	Historic records across the Alpine region. Species more commonly found at lower altitudes in areas.
Hydroprogne caspia	Caspian Tern		v	1996		Estuaries, inlets, bays, lagoons, inland lakes, flooded pasture, sewage ponds.	**Negligible**	No recent local records. No suitable habitat.
Actitis hypoleucos	Common Sandpiper		v		PMST	Migrates to Australia from Eurasia in August where it inhabits a wide variety of coastal and inland wetlands with muddy margins before departing north in March.	**Negligible**	No local records. No suitable habitat.
Ornithorhynchus anatinus	Platypus		v	2021		A variety of freshwater waterbodies, particularly those with stable banks suitable for burrows, and shallow waters for foraging.	**Low**	Occasional records in the local area. Species may utilise stream at eastern section of study area.
Canis lupus dingo	Dingo		v	2006		Virtually all terrestrial environments but range reduced by exclusion fencing, persecution and hybridisation with domestic dogs.	**Medium**	Wide ranging species, occasionally recorded within the local area. Likely to utilise the study area occasionally.

Scientific name	Common name	Conservation status		Most recent database record	Other records	Habitat description	Likely occurrence in study area	Rationale for likelihood ranking
		EPBC	FFG					
Eulamprus kosciuskoi	Alpine Water Skink		e	2017		Alpine sphagnum bogs, wet alpine heathlands and alpine creeks and streams.	**High**	Recent records in similar habitat within local area. Suitable habitat present within study area.
Pseudemoia pagenstecheri	Tussock Skink		e	2021		On the ground in a range of grasslands or sparse grassy woodlands from alps to coast.	**Recorded**	Species recorded within study area. Suitable habitat throughout study area.
Austroaeschna (Austroaeschna) flavomaculata	Alpine Darner Dragonfly		v	2012		Mountain streams, alpine trickles, and run-off waters, occurring in sphagnum and under rocks in alpine regions of Victoria and NSW	**Medium**	Suitable habitat present in stream at eastern section of study area.
Riekoperla intermedia	Stonefly		v	1972		Slow flowing stream habitats in the Falls Creek, Mount Feathertop and Mount Bogong area, Victoria.	**Medium**	No recent records in local area; suitable habitat present in stream at eastern section of study area.
Colubotelson joyneri	Freshwater Isopod		cr	2008		Freshwater streams.	**Medium**	Recent local record. May occur in stream and aqueducts within study area.

Appendix C.3. Migratory species (EPBC Act listed)

Table 21 Migratory fauna species recorded or predicted to occur within 10 km of the study area

Scientific name	Common name	Most recent record
Migratory species		
Gallinago hardwickii	Latham's Snipe	2018
Hirundapus caudacutus	White-throated Needletail	1993
Apus pacificus	Fork-tailed Swift	2019
Hydroprogne caspia	Caspian Tern	1996
Numenius madagascariensis	Eastern Curlew	PMST
Actitis hypoleucos	Common Sandpiper	PMST
Calidris ferruginea	Curlew Sandpiper	PMST
Calidris acuminata	Sharp-tailed Sandpiper	PMST
Calidris melanotos	Pectoral Sandpiper	PMST
Motacilla flava	Yellow Wagtail	PMST
Rhipidura rufifrons	Rufous Fantail	1994
Myiagra cyanoleuca	Satin Flycatcher	1997

Appendix D. Photos of the study area

Photo 1 **Alpine Grassy Heathland EVC 1004 within the study area. View to west. Photo taken 22 February 2023.**

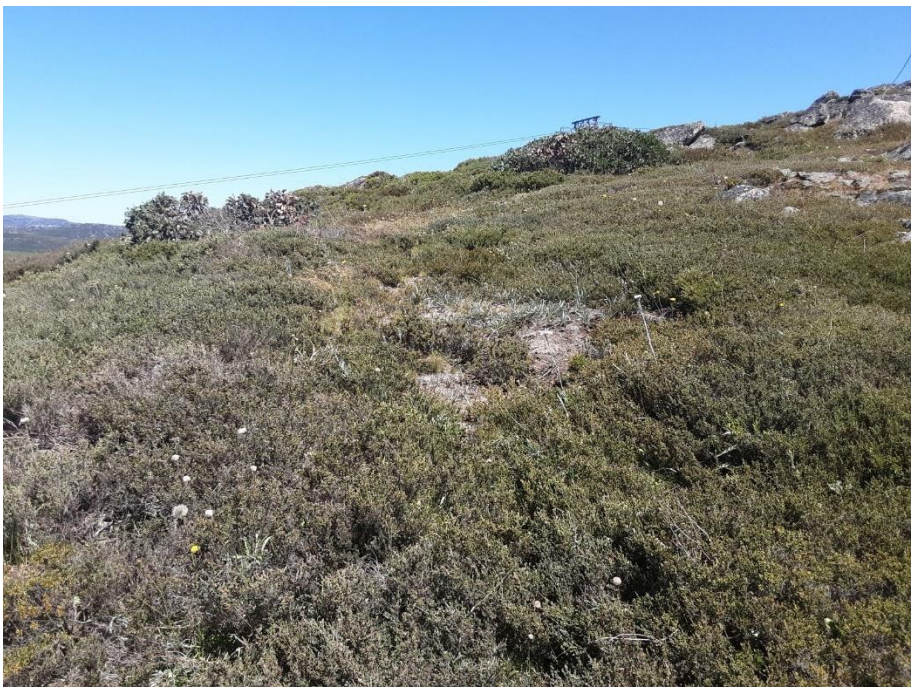

Photo 2 **Sub-alpine Shrubland EVC 42 within the study area. View to south. Photo taken 20 February 2023.**

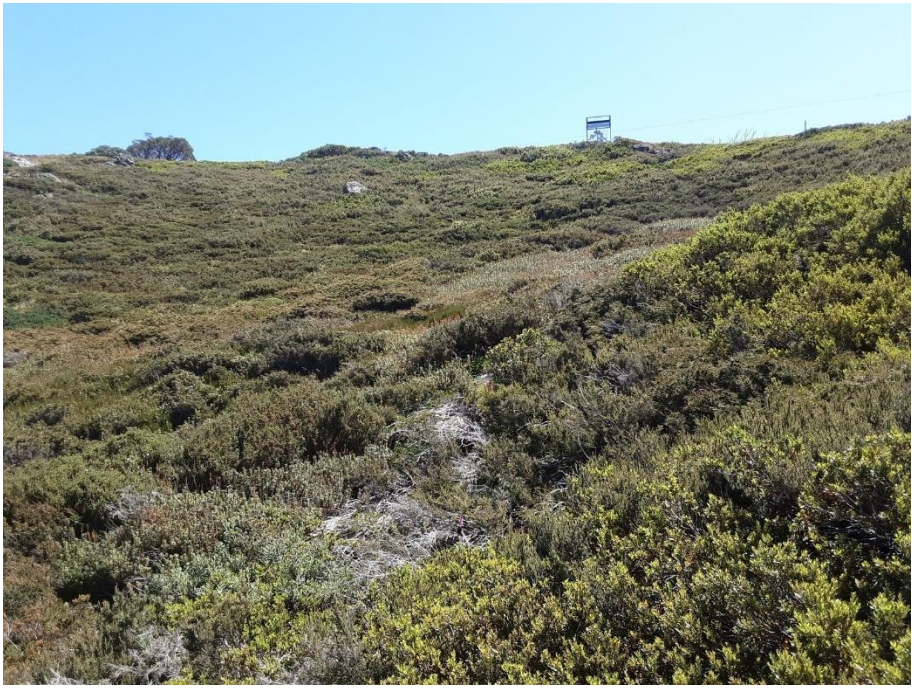

Photo 3 **Sub-alpine Wet Heathland EVC 210 within the study area. The trail was realigned to avoid this bog during the trail micro-siting process. View to west. Photo taken 20 February 2023.**

Photo 4 **Unburnt Sub-alpine Woodland EVC 43 within the study area. View to east. Photo taken 22 February 2023.**

Photo 5 **Burnt (2003) Sub-alpine Woodland EVC 43 within the study area, also partially cleared for within a ski run. View to south-east. Photo taken 22 February 2023.**

Photo 6 **Rocky outcrop within the study area. Photo taken during Guthega Skink habitat assessment, 13 April 2023.**

Photo 7 **Predominantly introduced vegetation near Frying Pan aqueduct within the study area. Photo taken 20 February 2023.**

Photo 8 **Image of a Broad-toothed Rat recorded during camera trap surveys. Image recorded 9 February 2024 on Camera #2.**

Photo 9 Image of a feral cat recorded during camera trap surveys. Image recorded 22 February 2024 on Camera #1.

Photo 10 Image of a White-browed Scrub-wren recorded during camera trap surveys. Image recorded 20 January 2024 on Camera #3.

Photo 11 **Image of an Antechinus recorded during camera trap surveys. Image recorded 3 February 2024 on Camera #4.**

Appendix E. Vegetation impact assessment results

Appendix E.1. Quantification and significance of losses

Table 22 Vegetation quality assessment for treeless native vegetation within the study area

Site ID			Summit - Gully MTB	Summit - Gully MTB	Summit - Gully MTB
Habitat Zone ID			1	3	4
EVC #: Name			1004	42	210
		Max Score	Score	Score	Score
Site Condition	Large Trees	10	-	-	-
	Tree Canopy Cover	5	-	-	-
	Lack of Weeds	15	11	11	11
	Understorey	25	20	15	15
	Recruitment	10	0	0	10
	Organic Matter	5	3	5	5
	Logs	5	-	0	-
	Total Site Score		34	31	41
	EVC standardiser		1.36	1.25	1.36
	Adjusted Site Score		46.24	38.75	55.76
Landscape Value	Patch Size	10	8	8	8
	Neighbourhood	10	5	5	5
	Distance to Core Area	5	4	4	4
	Total Landscape Score		17	17	17
Habitat points = #/100		100	63.24	55.75	72.76
CONDITION SCORE		1	0.63	0.56	0.73

Table 23 Vegetation quality assessment for treed native vegetation within the study area

Site ID			Summit - Gully MTB	Summit - Gully MTB	Summit - Gully MTB	Summit - Gully MTB	Summit - Gully MTB	Summit - Gully MTB
Habitat Zone ID			5 (derived, shrubby/herby)	6 (high quality, unburnt)	7 (burnt shrubby w/ canopy)	8 (derived, burnt)	9 (derived, grassy)	10 (unburnt, Podocarpus)
EVC #: Name			43	43	43	43	43	43
		Max Score	**Score**	**Score**	**Score**	**Score**	**Score**	**Score**
Site Condition	Large Trees	10	0	3	0	0	0	10
	Tree Canopy Cover	5	0	5	0	0	0	5
	Lack of Weeds	15	0	13	7	7	7	4
	Understorey	25	5	15	15	10	5	15
	Recruitment	10	10	10	10	10	10	10
	Organic Matter	5	3	5	3	3	3	5
	Logs	5	0	4	5	0	0	0
	Total Site Score		18	55	40	30	25	49
Landscape Value	Patch Size	10	8	8	8	8	8	1
	Neighbourhood	10	5	5	5	5	5	5
	Distance to Core Area	5	4	4	4	4	4	3
	Total Landscape Score		17	17	17	17	17	9
Habitat points = #/100		100	35	72	57	47	42	58
CONDITION SCORE		1	0.35	0.72	0.57	0.47	0.42	0.58

Appendix F. Native vegetation removal report

Appendix G. Arborist report

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