DEPARTMENT OF PLANNING INDUSTRY AND ENVIRONMENT

SNOWY SPECIAL ACTIVATION PRECINCT

BIODIVERSITY ASSESSMENT

JUNE 2021

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Imagine tomorrow
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Snowy Special Activation Precinct
Biodiversity Assessment

Department of Planning Industry and Environment

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WSP acknowledge the Monero Ngarigo people as the traditional custodians of the Snowy Mountains Special Activation Precinct area. We acknowledge their ongoing connection to country and pay our respects to elders, past and present. We recognise the significance of the region to the Monero Ngarigo people, and value their ongoing connection to country and their contribution to this project. WSP is committed to engaging with and honouring Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land and waters.

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GLOSSARY

TERM	DEFINITION
BAM	Biodiversity Assessment Method 2020
BC Act	NSW Biodiversity Conservation Act 2016
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity values from the impacts of development.
DPIE	Department of Planning, Industry and Environment
DRNSW	Department of Regional New South Wales
EbD	Enquiry by Design
EPBC Act	Commonwealth Environment Protection and Biodiversity Conservation Act 1999
Ha	Hectares
Habitat	An area or areas occupied, or periodically or occasionally occupied, by a species, population or ecological community, including any biotic or abiotic component.
HNSW	Heritage New South Wales
Hollow bearing tree	A living or dead tree that has at least one hollow. A tree is considered to contain a hollow if: (a) the entrance can be seen; (b) the entrance width is at least 5cm; (c) the hollow appears to have depth (i.e. you cannot see solid wood beyond the entrance); (d) the hollow is at least 1m above the ground.
Investigation Area	Snowy Mountains SAP Investigation Area encompasses 72,211 hectares of land for investigation. Within this investigation area are several key focus areas for potential development opportunities (section 1.4)
KNP	Kosciusko National Park
KNP POM	Kosciusko National Park Plan of Management
LGA	Local Government Area
Master Plan	Generic term for a Master Plan for each SAP (informed by Structure Plan). The Master Plan is a statutory document prepared by DPIE at the conclusion of the technical studies.
MNES	Commonwealth Matters of National Environmental Significance
Monero Ngarigo	Aboriginal linguistic group who traditionally occupied the eastern side of the Kosciuszko plateau and further north towards the Murrumbidgee River. The traditional custodians of the Snowy Mountains are the Monero Ngarigo People.
NPWS	National Parks and Wildlife Service
NSW	New South Wales
Plant community type	A NSW plant community type. Plant Community Types are the agreed foundation level for classifying vegetation in NSW and are intended to provide the most ecologically relevant grouping of plant species. Plant Community Types are described in the BioNet Vegetation Classification.
RGDC	Regional Growth NSW Development Corporation

TERM	DEFINITION
SAP	Special Activation Precinct
SEPP	State Environmental Planning Policy
Snowy Mountains	The highest mountain range on the continent of mainland Australia, located in southern New South Wales and part of the larger Australian Alps and Great Dividing Range. The mountain range experiences large natural snowfalls every winter
SMRC	Snowy Monaro Regional Council
SAP	Special Activation Precinct
TfNSW	Transport for New South Wales
Threatened ecological community (TEC)	Means a critically endangered ecological community, an endangered ecological community or a vulnerable ecological community listed in Schedule 2 of the BC Act.

EXECUTIVE SUMMARY

SPECIAL ACTIVATION PRECINCT OBJECTIVES

Special Activation Precincts (SAPs) are dedicated areas in regional NSW identified by the NSW Government to become thriving hubs. The SAP program facilitates job creation and economic development in these areas through infrastructure investment, streamlining planning approvals and investor attraction.

The Snowy Mountains region plays a crucial role within the regional and state economy, with its local population swelling with an additional 1.4 million international and domestic visitors each year (Destination NSW, June 2020 report). The region's unique natural environment allows locals and visitors to participate in a diverse array of recreational activities year-round, with many visitors still experiencing the region through the peak winter season.

The broad objectives and priorities for the Snowy Mountains SAP are to capitalise on the unique cultural and environmental attributes which attract 1.4 million visitors annually to the region, revitalise the Snowy Mountains into a year-round destination, and reaffirm Australia's Alpine Capital (Destination NSW, June 2020 report). The revitalisation is to focus on year-round adventure and eco-tourism, improving regional transport connectivity, shifting towards a carbon neutral region, increasing the lifestyle and wellbeing activities on offer, and supporting Jindabyne's growth as Australia's national winter sports training base.

SAP INVESTIGATION AREA

The Snowy Mountains SAP Investigation Area encompasses 72,211 hectares of land and within this investigation area are several 'development opportunity areas' which were identified around and in Jindabyne, and within the Kosciuszko National Park (KNP), broadly this encompasses:

- Jindabyne region:
  - growth opportunity areas: parcels of land located primarily to the south and west of the existing Jindabyne township, but also at East Jindabyne
  - Jindabyne centre opportunity areas: areas within the existing town of Jindabyne
  - tourism opportunity areas near the town of Jindabyne.
- Alpine region:
  - tourism opportunity areas within KNP.

BIODIVERSITY ASSESSMENT

To support the Snowy SAP, Strategic biodiversity assessments of key sites have been completed to help inform the master planning for the Snowy Mountains Special Activation Precinct. The biodiversity assessment included:

- desktop review of available information and databases to identify likely biodiversity values
- consultation with NPWS staff, NSW Biodiversity and Conservation (Department of Planning, Industry and Environment)
- field surveys between the 13-14 October, 16-27 November and 7-18 December 2020, including:
  - vegetation surveys including vegetation mapping and plot based assessment following the NSW Biodiversity Assessment Methodology (BAM)
  - fauna habitat assessment

- fauna surveys including:
  - diurnal bird surveys
  - microchiropteran bat surveys
  - frog and reptile (herpetofauna) searches.

BIODIVERSITY VALUES

ALPINE REGION

Parts of the Snowy Mountains SAP are within KNP. Ten development opportunity areas within KNP have been assessed for biodiversity values in this report following field surveys to verify findings of the desktop review. These investigation areas focused on areas of existing disturbances away from the pristine and sensitive alpine environment values of the KNP.

KNP is National Heritage listed as part of the Australian Alps National Parks and Reserves. The Park contains the highest mountains in Australia and is the largest national park in NSW. KNP contains significant biodiversity and it known to provide habitat for approximately 300 vertebrate fauna species, over 800 plant species and high numbers of invertebrates, particularly for high altitude cold-climate specialists which require alpine and subalpine habitats, including numerous endemic and threatened species (NSW National Parks & Wildlife Service 2006).

The lower altitude tourism areas are dominated by the Grassy Woodlands from the Subalpine Woodlands vegetation class dominated by stands of *Eucalyptus pauciflora* (Snow Gum), *Eucalyptus dalrympleana* (Mountain Gum) and *Eucalyptus stellulata* (Black Sallee) with occasional *Eucalyptus delegatensis* (Alpine Ash). As altitude increases at Sponars Resort, Perisher, Charlottes Pass and Guthega, the vegetation changes to the lower Subalpine Woodlands dominated by *Eucalyptus niphophila* (Alpine Snow Gum) and tall heathy shrublands. At Charlottes Pass, the Alpine Complex is dominant with the presence of Alpine Heaths (including boulder fields) and Alpine Bogs and Fens (Upland Bog and Valley Bog complexes). Six Plant Community Types were mapped within the surveyed areas.

One Plant Community Type (PCT), Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion (PCT 637) within the development opportunity areas of Kosciuszko Tourist Park, Guthega, Perisher and Charlottes Pass within KNP, is consistent with the Threatened Ecological Communities (TEC):

- Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions is listed as an Endangered Ecological Community under the BC Act.
- Alpine Sphagnum Bogs and Associated Fens is listed as an Endangered Ecological Community under the EPBC Act.

The region contains a diverse range of alpine habitats and significant biodiversity values including:

- Highly restricted alpine species:
  - A significant population of Mountain Pygmy Possum (*Burramys parvus*) which is known to occur at Blue Cow and at Charlottes Pass. This species is restricted to alpine and subalpine zones.
  - Broad-toothed Rat (*Mastacomys fuscus*) has been recorded within all of the resort areas, and is restricted in NSW to areas above 1000 m.
  - Guthega Skink (*Liopholis guthega*) is known to occur at Charlottes Pass, Thredbo and Perisher Range Alpine Resort areas.

- Alpine and sub-alpine peatlands, damp herbfields and fens:
  - listed as a threatened ecological community
  - offer breeding sites for many threatened and Migratory fauna which occur in the area, including the Alpine Tree Frog, Alpine Water Skink, Latham's Snipe and Broad-toothed Rat.
- Habitat for numerous other threatened fauna species including Olive Whistler, Guthega Skink, Mountain Galaxias, Eastern False Pipistrelle, Large Bent-wing Bat, Greater Glider, Eastern Pygmy Possum, Smoky Mouse, Spotted-tailed Quoll, Koala, Gang-gang Cockatoo, Flame Robin, Scarlet Robin, Pink Robin, Diamond Firetail, Brown Treecreeper and Powerful Owl.
- Old growth snow gum woodland- Woodland habitats provide critical habitat resources for a variety of fauna, including tree-hollows which are only present in (unburnt) mature woodland vegetation.

A summary of the ecological values in each sub-precinct is provided in Section 3.3.4.

JINDABYNE REGION

The investigation area, around the Jindabyne township, occurs in an agricultural landscape with patches of remnant biodiversity. The region is subject to a range of disturbances and has a long agricultural history of grazing. None the less, the area supports significant biodiversity including significant areas of derived grassland where despite removal of canopy trees, the ground cover vegetation is diverse and characteristic of the remnant woodland community.

The area contains a variety of PCTs dominated by the Grassy Woodlands from the Subalpine Woodlands vegetation class. The vegetation types are characterised by stands of *Eucalyptus pauciflora* (Snow Gum), *Eucalyptus stellulata* (Black Sallee), *Eucalyptus rubida* (Candlebark) and *Eucalyptus dalrympleana* (Mountain Gum).

Much of the woodland and grassland in the area is consistent with Monaro Tableland Cool Temperate Grassy Woodland in The South Eastern Highlands Bioregion, which is listed as a Critically Endangered TEC under the BC Act. PCTs consistent with this TEC include:

- Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion (PCT 679
- Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion (PCT 1191).

Habitat connectivity in the east around the Jindabyne township is patchy due to agricultural and urban development and infrastructure. However, physical and functional connectivity (stepping stones) from Lake Jindabyne through the subject land to the forested areas to the west and into the KNP exists.

Five candidate threatened flora species (species credit species) and eleven candidate threatened fauna were assessed as having potential habitat within the area (see Section 3.2.2.1 and 3.2.2.2).

Additional surveys of other development opportunity sites would be required as well as seasonal surveys for threatened species. Prior to finalisation of the Snowy Mountains Special Activation Precinct Master Plan, further site investigations and surveys may be undertaken to include additional areas in the Jindabyne region.

A summary of the ecological values in each sub-precinct is provided in Section 3.2.4.

ADDITIONAL SURVEYS

Surveys were undertaken of sites that were prioritised in the early stages of the project based on site accessibility and potential for development. Through the planning and design process, the priority of development opportunities has been and will be refined further. As a result, field surveys may not cover all areas considered in the final masterplan. Additional surveys would be required for areas that have not been surveyed.

Surveys of the potential development areas focused on the vegetation and habitat conditions and did not include targeted threatened species surveys. Seasonal threatened species surveys are the preferred approach to determine presence within the investigation area of threatened species. It should be noted that as an alternate to additional seasonal field surveys, an expert report could be prepared by an expert appointed under the BC Act to cover off survey deficiencies for these species or the species could be assumed present and biodiversity offsets would then be required for these species. Alternatively, the avoidance of impact to potential habitat for these species would eliminate the requirement for additional targeted surveys.

Targeted field surveys are recommended should potential habitat for threatened species be impacted for the SAP (see Section 5.2 for list of species and survey season).

MINIMISING IMPACTS TO BIODIVERSITY THROUGH MASTER PLANNING

The master planning process for the SAPs should adopt an evidenced based approach to determining the best outcome. It is designed to ultimately provide a clear pathway for the right types of future development, in the right locations. This process includes avoiding and minimising impacts to biodiversity. Unavoidable impacts would be mitigated and residual impacts offset.

Through the Snowy SAP early workshopping and reporting including enquiry by design workshops, potential opportunity areas have been identified which aimed to minimise impacts to biodiversity by locating these in existing disturbed areas and focussing development outside the KNP and in areas that are more disturbed.

Overall the Snowy SAP provides a unique opportunity to protect biodiversity and environmental values and improve engagement with the unique environment of the region.

Opportunities exist to protect the existing native vegetation and enhance its habitat value, conservation potential, overall landscape connectivity and develop and enhance biodiversity linkages and corridors.

Within the Jindabyne opportunity area, these opportunities could occur through incorporating planned open space zoning in the Structure Plan such as by:

- strengthening riparian areas
- retention of smaller remnant patches and paddock trees to provide stepping stones for fauna movement
- connecting larger vegetation patches through revegetation of riparian areas and green corridors.

Within KNP, the opportunities are to improve visitor experiences to allow greater engagement with the unique environment. Opportunities for within KNP include:

- low impact sustainable development
- focussing development within already disturbed areas as far as possible
- locating development near to existing infrastructure to limit the need for additional impacts associated with creation of infrastructure and services (e.g. roads and utilities)
- co-locating (and infill) developments as to minimise the spread of impacts on biodiversity values
- offset funding to improve conservation outcomes within KNP for its unique alpine biodiversity. Any biodiversity offset arrangements within the Kosciuszko National Park would need to be tailored to deliver appropriate outcomes for this unique sensitive environment. The potential for biodiversity offset arrangements within the Kosciuszko

National Park would require further consultation and investigation with National Parks and Wildlife Service, and the Department of Planning, Industry and Environment.

BIODIVERSITY CONSTRAINT RANKING

To assist with avoidance and minimisation of impacts during the masterplan development phase, the biodiversity values recorded during the site surveys within the investigation area have been ranked in terms of biodiversity constraint: Biodiversity constraints ranking have been based on the criteria outlined in table below.

BIODIVERSITY CONSTRAINT RANKING	
Tier 1 – Highest biodiversity impact	Native vegetation corresponding to Threatened Ecological Communities listed under the EPBC and BC Acts; Known habitat for highly restricted threatened alpine species, namely Pygmy possum, Guthega Skink and Alpine Skink habitat; impacts areas would require offsets; referral requirements likely.
Tier 2 – High biodiversity constraint	Disturbed versions Threatened Ecological Communities (including poor condition, regeneration, revegetation areas); native plant communities and habitat for threatened species not included in tier 1; impacts areas would require offsets; referral requirements likely.
Tier 3 – Low biodiversity constraint	Disturbed or poor condition vegetation zones that are not consistent with a Threatened Ecological Communities; isolated trees within existing development areas; no offset obligation; referral requirement unlikely.
Tier 4 – Least constraint	Disturbed areas that are not consistent with native plant community types; on-native vegetation which is unlikely to provided habitat for Threatened fauna; no offset obligation; referral requirement unlikely.

RECOMMENDATIONS

With a focus on avoiding and minimising impacts on biodiversity, development is therefore best suited to areas that are already disturbed including areas of existing development, cleared areas, and areas supporting exotic vegetation. This corresponds to Tier 4 and 3. It is acknowledged however that some disturbed areas may still contain constraints such as threatened fauna habitat and hydrological functions important for surrounding vegetation communities which may require avoidance or minimisation and mitigation.

Where possible, development should be located close to existing infrastructure as to limit the additional impacts associated with establishing supporting infrastructure (e.g., roads and utilities). This is of particular importance in areas within Alpine Precinct (KNP) given its significance as a conservation area which supports a number of high biodiversity values.

Tier 1 and 2 have the highest biodiversity values and includes threatened ecological communities listed under the EPBC Act and/or BC Act as well as areas of high quality habitat for threatened species. Development in these areas should be avoided or minimised as far as possible. Avoidance of all areas may not be possible, but the priority should be given to avoidance of tier 1 and then 2 as far as practical. Tier 1 and 2 areas that are linked to areas of native vegetation areas would provide good offsets for development in other areas.

The following considerations should be made to minimise impacts to biodiversity as far as reasonably practicable:

- development within Tier 1 and 2 should be avoided or minimised and offset
- any development within KNP should be low impact sustainable development and would need to consider the impacts of bushfire asset protection zones
- focussing or keeping development within already disturbed areas as far as possible (Tier 3 and 4)
- locating development nearby existing infrastructure to limit the need for additional impacts associated with creation of infrastructure and services (e.g. roads and utilities)

- maintaining a buffer between high ecological constraints (Tier 1 and 2) and development. A buffer of 30 m should be applied, or specific species buffers as specified in the Threatened Species Database.
- co-locating (and infill) developments as to minimise the spread of impacts on biodiversity values.

Residual impacts to biodiversity values would be assessed under the Biodiversity Assessment Methodology and require biodiversity offsetting in accordance with the NSW Biodiversity Offset Scheme. This scheme provides a transparent and scientific methodology to assess suitable offset types and quantum and provides a mechanism for long-term protection and management of offsets for conservation. The approach for biodiversity offset arrangements would be tailored for the Alpine region and the Jindabyne region. In the Jindabyne region, where possible local or regional biodiversity offset arrangements should be investigated and provided to deliver benefits back to the regional community. This could include residual areas that are not developed becoming offset sites. In the Alpine region, the potential to deliver biodiversity offset arrangements will require further investigation with both NPWS and DPIE due to the unique environment of the Alpine area.

Residual impacts to biodiversity listed under the EPBC Act would require assessment including the need for a referral to the Commonwealth Department of Agriculture, Water and the Environment. Referral assessment can be undertaken concurrently to approvals and may include referral of the entire master plan or early submission of referral of key sub-precincts with Matters of National Environmental Significance (e.g. Alpine Sphagnum Bogs and Associated Fens, Guthega Skink, Mountain Pygmy Possum). Early discussions with the Commonwealth Department are underway to confirm appropriate assessment approach.

1 INTRODUCTION

Special Activation Precincts (SAPs) are dedicated areas in regional NSW identified by the NSW Government to become thriving hubs. The SAP program facilitates job creation and economic development in these areas through infrastructure investment, streamlining planning approvals and investor attraction.

The SAP program adopts a collaborative and integrated whole-of-government approach, bringing together the local Council and a range of other relevant State and local agencies.

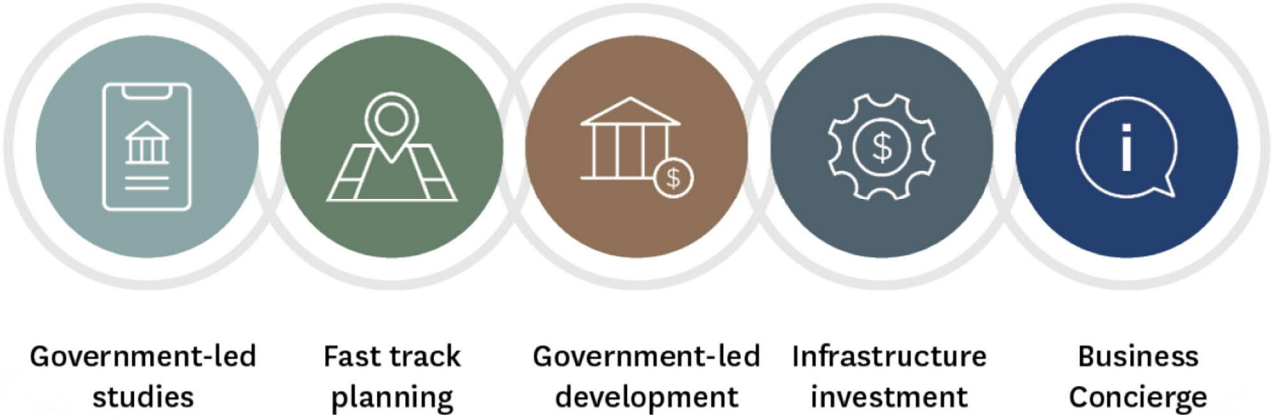
SAPs are unique to regional NSW. By focusing on planning and investment, their goal is to stimulate economic development and create jobs in line with the competitive advantages and economic strengths of a region.

On 15 November 2019, the NSW Government announced its commitment to investigating the Snowy Mountains SAP, to revitalise the Snowy Mountains into a year-round destination and Australia's Alpine Capital, with Jindabyne at its heart. The Snowy Mountains SAP is being delivered through the $4.2-billion Snowy Hydro Legacy Fund.

Different components of each SAP are led by different teams within the NSW Government:

- The **Department of Regional NSW** assesses potential locations for inclusion in the program and considers government investment for essential infrastructure to service the SAPs.
- The **NSW Department of Planning, Industry and Environment** (the Department) is responsible for the planning of SAPs. The Department leads the master planning process, including community and stakeholder engagement, the technical studies required to inform the preparation of a master plan and development of the simplified planning framework for each Precinct.
- The **Regional Growth NSW Development Corporation** (Regional Growth NSW) is responsible for delivering and implementing Special Activation Precincts. This includes attracting investment, providing support to businesses, developing enabling infrastructure, and creating strategic partnerships to foster education, training and collaboration opportunities.

The five core pillars of the Special Activation Precincts are:



The planning framework for each Special Activation Precinct includes three key parts:

State Environmental Planning Policy (Activation Precincts) 2020

- Identifies each Special Activation Precinct.
- Requires that an Activation Precinct Certificate be sought prior to a development application or complying development certificate being issued, to ensure the development is consistent with the Master Plan and Delivery Plan.
- Provides zoning and land use controls for each Precinct.
- Identifies Exempt and Complying Development pathways for certain development.

Special Activation Precinct Master Plans

- Made by the NSW Department of Planning, Industry and Environment and approved by the Minister.
- Identifies the Vision, Aspirations and Principles for the Precinct.
- Provides more detailed land use controls where required.
- Identifies Performance Criteria at a Precinct-scale for amenity, environmental performance and infrastructure provision.
- Identifies the matters to be addressed as part of the Delivery Plan.

Special Activation Precinct Delivery Plans

- Prepared by Regional Growth NSW and approved by the Planning Secretary.
- Identifies site-level development controls.
- Provides detailed strategies and plans for:
  - Aboriginal cultural heritage
  - Environmental protection and management
  - Protection of amenity
  - Infrastructure and services
  - Staging.
- Provides procedures for ongoing monitoring and reporting.

1.1 MASTER PLANNING

The master planning process for the SAPs adopts an evidenced based approach to determining the best outcome for the precincts. It is designed to ultimately provide a clear pathway for the right types of future development, in the right locations.

The process involves the engagement of a range of technical experts to investigate the study area and prepare technical studies (such as this report) to demonstrate their findings. Each of the technical studies are specifically designed and scoped for each SAP and tailored to the needs of the study area.

Importantly, the master planning process for the Snowy Mountains SAP will build on work already undertaken for portions of the study area as part of the Go Jindabyne master plan.

To achieve integrated and balanced planning outcomes, technical experts and other stakeholders work together at a series of enquiry by design workshops throughout the master planning process. At these workshops, opportunities and constraints are discussed and assessed to inform how the precinct should be shaped. This includes the evaluation of matters such as environmental impacts and benefits, transport opportunities, infrastructure capabilities, stormwater, economic viability and many others. These workshops are designed to give technical experts and decision makers a chance to ensure the identified vision, aspirations and principals for the precinct are guiding the outcomes.

The technical reports will ultimately inform the development of planning controls for the Snowy Mountains SAP to guide the precincts development. These controls will be contained in the master plan, Special Activation Precincts SEPP and

delivery plan and will relate to important matters such as amenity, environmental performance and infrastructure provision.

Throughout the planning process, community, stakeholder and industry consultation takes place. Ongoing consultation provides an opportunity for community members and landowners to contribute and help shape the vision for the project.

1.2 SNOWY MOUNTAINS SAP

The Snowy Mountains region is one of Australia's most iconic natural environments. In addition to hosting some of Australia's premier alpine destinations, the Snowy Mountains is home to over 35,000 people and Australia's highest peak, Mount Kosciuszko. The traditional custodians of the Snowy Mountains are the Monero Ngarigo people, in connection with the Walgalu, Ngunnawal and Bidhawal people.

The Snowy Mountains are located in the south east of NSW. This region forms the northern part of the Australian Alps which extends south into Victoria. Predominantly the region is accessed from Canberra which is located approximately 150 kilometres to the north. To the south and west of this region is the sparsely populated high country. The township of Jindabyne situated on Lake Jindabyne provides a hub for the region, with opportunities for tourism and facilities supporting the regional catchment.

Jindabyne is located 175 km south of Canberra and 60 km south-west of Cooma. Jindabyne has evolved into the gateway to the Snowy Mountains and currently services 1.4 million visitors each year who travel to the region to enjoy its unique tourism and recreational offerings (Destination NSW, June 2020 report). There are approximately 35,500 residents of the Snowy Mountains, of which 3,500 residents live in Jindabyne (including Kalkite, East Jindabyne and Tyrolean Village).

Portions of the Snowy Mountains are within KNP. The National Park is the central segment of the Australian Alps Bioregion containing the highest mountains in Australia and is the largest national park in NSW (NSW National Parks & Wildlife Service, 2006). The park possesses exceptional diversity of alpine plant communities, containing threatened ecological communities and providing habitat for a number of rare and threatened species (NSW National Parks & Wildlife Service, 2006). The park contains most of the alpine endemic species found on the Australian mainland (NSW National Parks & Wildlife Service, 2006).

The Snowy Mountains region is home to the Monero Ngarigo people, the tribal homeland stretches from the western slopes of the coastal ranges to the eastern side of the Kosciusko plateau and further north. Included in the Ngarigo land is the peak of Mount Kosciusko and the Snowy Ranges. European settlers accessed the region in 1823, and between the late 1830s to 1957 the Monaro highland region was grazing by cattle and sheep. The original town of Jindabyne was settled in the 1840s on the banks of the Snowy River where the main river crossing took place. A bridge was constructed over the river in 1893, contributing to the success of the town. In 1949 the Snowy Mountains Scheme was introduced which consisted of plans to dam and divert water from the Snowy River. By 1964 the dam had created Lake Jindabyne and the township relocated to where it is today. The old town disappeared under Lake Jindabyne in 1967. Although losing much of its built heritage, Jindabyne, as we know it today, was rebuilt and has continued to steadily grow leveraging its tourist and agricultural offerings (Ozark Environment and Heritage, 2020).

Today, the Snowy Mountains region plays a crucial role within the regional and state economy, with its local population swelling with an additional 1.4 million international and domestic visitors each year (Destination NSW, June 2020 report). The region's unique natural environment allows locals and visitors to participate in a diverse array of recreational activities year-round, with many visitors still experiencing the region through the peak winter season.

Priorities for the Snowy Mountains SAP are to capitalise on the unique cultural and environmental attributes which attract 1.4 million visitors annually to the region, revitalise the Snowy Mountains into a year-round destination, and reaffirm Australia's Alpine Capital (Destination NSW, June 2020 report). The revitalisation is to focus on year-round adventure and eco-tourism, improving regional transport connectivity, shifting towards a carbon neutral region, increasing the lifestyle and wellbeing activities on offer, and supporting Jindabyne's growth as Australia's national winter sports training base.

1.3 KEY OBJECTIVES OF THE SAP

The Snowy Mountains region plays a crucial role within the regional and state economy, with its local population swelling with an additional 1.4 million international and domestic visitors each year (Destination NSW, June 2020 report). The region's unique natural environment allows locals and visitors to participate in a diverse array of recreational activities year-round, with many visitors still experiencing the region through the peak winter season.

The broad objectives and priorities for the Snowy Mountains SAP are to capitalise on the unique cultural and environmental attributes which attract 1.4 million visitors annually to the region, revitalise the Snowy Mountains into a year-round destination, and reaffirm Australia's Alpine Capital (Destination NSW, June 2020 report). The revitalisation is to focus on year-round adventure and eco-tourism, improving regional transport connectivity, shifting towards a carbon neutral region, increasing the lifestyle and wellbeing activities on offer, and supporting Jindabyne's growth as Australia's national winter sports training base. The broad conservation objective of the SAP is to avoid, maintain or improve the biodiversity values in the region.

1.4 INVESTIGATION AREA

The Snowy Mountains SAP Investigation Area encompasses 72,211 hectares of land and within this investigation area are several 'development opportunity areas' which were identified around and in Jindabyne, and within the Kosciuszko National Park (KNP), broadly this encompasses:

- Jindabyne region:
  - growth opportunity areas: parcels of land located primarily to the south and west of the existing Jindabyne township, but also at East Jindabyne
  - Jindabyne centre opportunity areas: areas within the existing town of Jindabyne
  - tourism opportunity areas near the town of Jindabyne.
- Alpine region:
  - tourism opportunity areas within KNP.

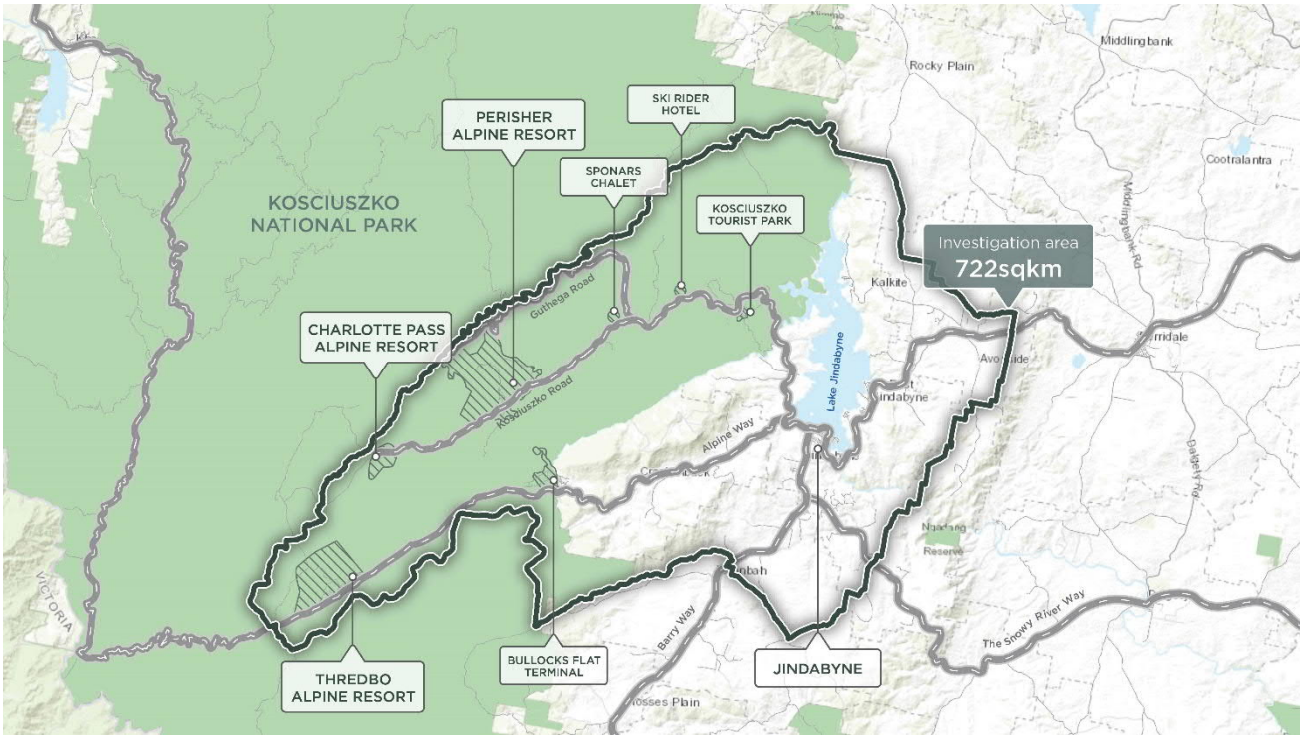


Figure 1.1 Investigation area

1.5 PURPOSE OF THIS REPORT

This report presents the ecological opportunities and constraints analysis of the SAP investigation area based on desktop review and field surveys of key sites. Strategic biodiversity assessments of key sites have been completed to help inform the master planning for the Snowy Mountains Special Activation Precinct. This study has been undertaken to support the SAP in its multidisciplinary approach for strategic planning in ensuring biodiversity constraints and opportunities are realised early on in the planning stage to achieve the desired outcomes.

2 METHODOLOGY

A combination of desktop review and field survey verification was undertaken depending on site access. This aimed to:

- identify and map known biodiversity values, particularly areas of significant conservation value
- provide a summary of ecological constraints associated with the investigation areas and identify opportunities
- classify ecological values according to the level of constraints they impose on the project.

2.1 DESKTOP

A desktop analysis has been undertaken to support the masterplan.

The desktop review included a review of available information for the investigation area (Table 2.1) to determine known mapped biodiversity values and potential biodiversity values to assign biodiversity constraints and apply an avoidance hierarchy for the Project.

Table 2.1 Resources reviewed

RESOURCE	RELEVANCE TO PROJECT
– Existing biodiversity reports: – Environment and Heritage Study Go Jindabyne 2036 Masterplan (ngh environmental 2019) – Kosciuszko National Park Plan of Management (NSW National Parks & Wildlife Service 2006) – Perisher Range Resorts Environmental Study Perisher Range Resorts Environmental Study (Connell Wagner Pty Ltd 2000) – Charlotte Pass Village Environmental Values Report (ngh environmental 2008) – Iconic Walk: Flora and fauna assessment & Test of Significance report (Biosis 2017) – Review of Environmental Factors – Proposed Lower Thredbo Valley Track, Bullocks Flat to Thredbo River Picnic Area (EnviroKey 2015).	Site specific environmental assessments. Generally provides more detailed information and refined mapping than broad-scale mapping.
– Existing broad-scale vegetation maps of the local area (Ecology Australia 2003) – Forest Ecosystems: Vegetation of the Southern Forests. VIS ID 3858 (Gellie 2005) – Forest Ecosystems: Native Vegetation of the Southern Forests: South-east Highlands, Australian Alps, South-west Slopes, and SE Corner bioregions. Pre-1750. VIS ID 3859 (Gellie 2005) – South East Local Land Services Biometric vegetation map, 2014. VIS_ID 4211 (Ecological Australia 2015) – Monaro Grassland Mapping, 2005. VIS_ID 3915 (Rehwinkel 2005) – CEEC: Monaro Werriwa Tablelands- Cool temperate grassy woodland v1.4 – Go Jindabyne – biodiversity and heritage	Broad-scale mapping provides an indication of likely vegetation type and condition. All broad-scale mapping requires field survey to verify. In particular, native grassland and derived native grassland are generally not well mapped.

RESOURCE	RELEVANCE TO PROJECT
– Detailed vegetation and habitat mapping provided for KNP including: – Vegetation communities- Kosciuszko vegetation mapping – Charlottes Pass Vegetation – Snowy mountains bogs and fens – Snowy Iconic Walk EIA – Selwyn Inventory 2009- vegetation – Perisher Environmental study fauna (alpine tree frog habitat, broad-toothed rat habitat, travel route) – Threatened species mapping – Vegetation mapping of disturbed areas – Weed density mapping (Charlotte Pass, Perisher, Thredbo, 2014/15)	Detailed mapping within Alpine precinct. More detailed and refined than broad-scale mapping
– Topographic maps and aerial photographs	Used to identify vegetation zones including disturbed areas (e.g. cropped or pasture improved, exotic dominated). Used as a check for existing vegetation mapping and for areas not covered by existing mapping.
– NSW Environment, Energy and Science Threatened Biodiversity Data	Provides information on threatened biodiversity listed under the NSW BC Act
– Areas of outstanding biodiversity value and critical habitat search (NSW Government 2020).	Identified significant areas. Relevant to assessment under NSW BC Act
– Register of critical habitat (Department of the Environment and Energy 2019)	Critical habitat listed under the Commonwealth EPBC Act
– Key Fish habitat maps (Department of Primary Industries 2020)	Key Fish habitats under NSW FM Act
– Department of Primary Industries (fishing) – threatened species lists (Department of Primary Industries 2018).	List of threatened species listed under the NSW FM Act
– NSW Environment, Energy and Science vegetation classification database	Database of NSW plant community types
– NSW Sharing and Enabling Environmental Data portal (NSW Government 2020).	Publicly accessible environmental mapping data
– Commonwealth Protected Matters Search Tool –identifying Matters of National Significance including Threatened species and ecological communities (Department of Agriculture Water and the Environment 2020).	Provides a list of threatened biodiversity listed under the Commonwealth EPBC Act known or predicted to occur in the locality
– BioNet Atlas of NSW Wildlife – NSW Office Environment and Heritage (NSW Government 2020).	Database of species records

RESOURCE	RELEVANCE TO PROJECT
– NSW Flora Online (PlantNet) – The Royal Botanic Gardens and Domain Trust (Royal Botanic Gardens and Domain Trust 2020).	Provides information on species of plant including taxonomic information, location of known records, habitat and ecology.

2.2 FIELD SURVEYS

Where access to sites was available, ecology surveys were undertaken following the Biodiversity Assessment Methodology. Site surveyed are listed in Table 2.2 and mapped in Figure 2.1 and Figure 2.2. These sites were inspected between the 13-14 October, 16-27 November and 7-18 December 2020. Detailed methods and results are provided in draft Stage 1 BDAR report (WSP 2020).

Table 2.2 Field survey locations

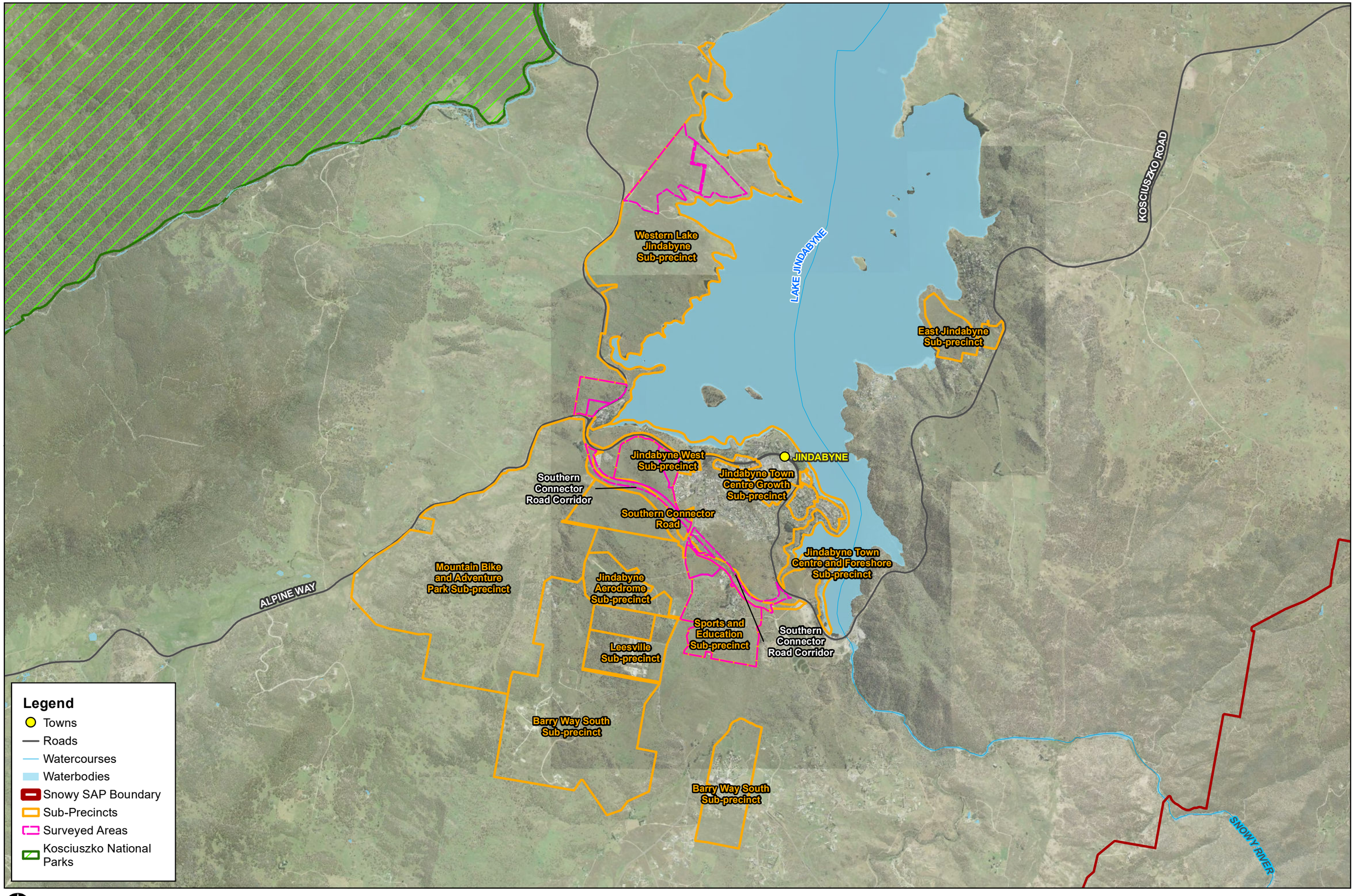
PRECINCT	SITE
Jindabyne Precinct	
Sports and education sub-precinct	— Lot 101 DP1019527 — Lot 14 DP1035279 — Lot 17 DP856844
Western lake Jindabyne sub-precinct	— Lot 2 DP549281 — Lot 3 DP549281 — Lot 1 DP549132 — Lot 2 DP549132 — Lot 1 DP1120042
Jindabyne West sub-precinct	— Lot 12 DP1241336 — Lot 4 DP874113
Other	— Southern Connector Road corridor (Lot 11 DP1241336, Lot 13 DP1035279, Lot 13 DP239506, Lot 26 DP1253407)
Alpine Precinct	
Alpine	— Charlotte Pass — Guthega — Perisher — Sponars Resort — Ski Rider Motel — Kosciuszko Mountain Retreat Alpine Resort (Lot 30 DP725492) — Island Bend Camping — Bullocks Flat Terminal (Lot 500 DP1171936) — Thredbo Ranger Station (Lot 58 DP756725) — Thredbo Village (Lot 876 DP1243112)

2.2.1 NATIVE VEGETATION SURVEYS

Key sites (Table 2.2) within the investigation area were inspected between the 13-14 October, 16-27 November and 7-18 December 2020. These surveys sought primarily to collect vegetation data in accordance with the NSW Biodiversity Assessment Methodology, including collection of vegetation integrity plot data (Table 2.3) to identify the plant community types present, their condition and conservation value.

Table 2.3 Number of Vegetation integrity plots undertaken in surveyed areas

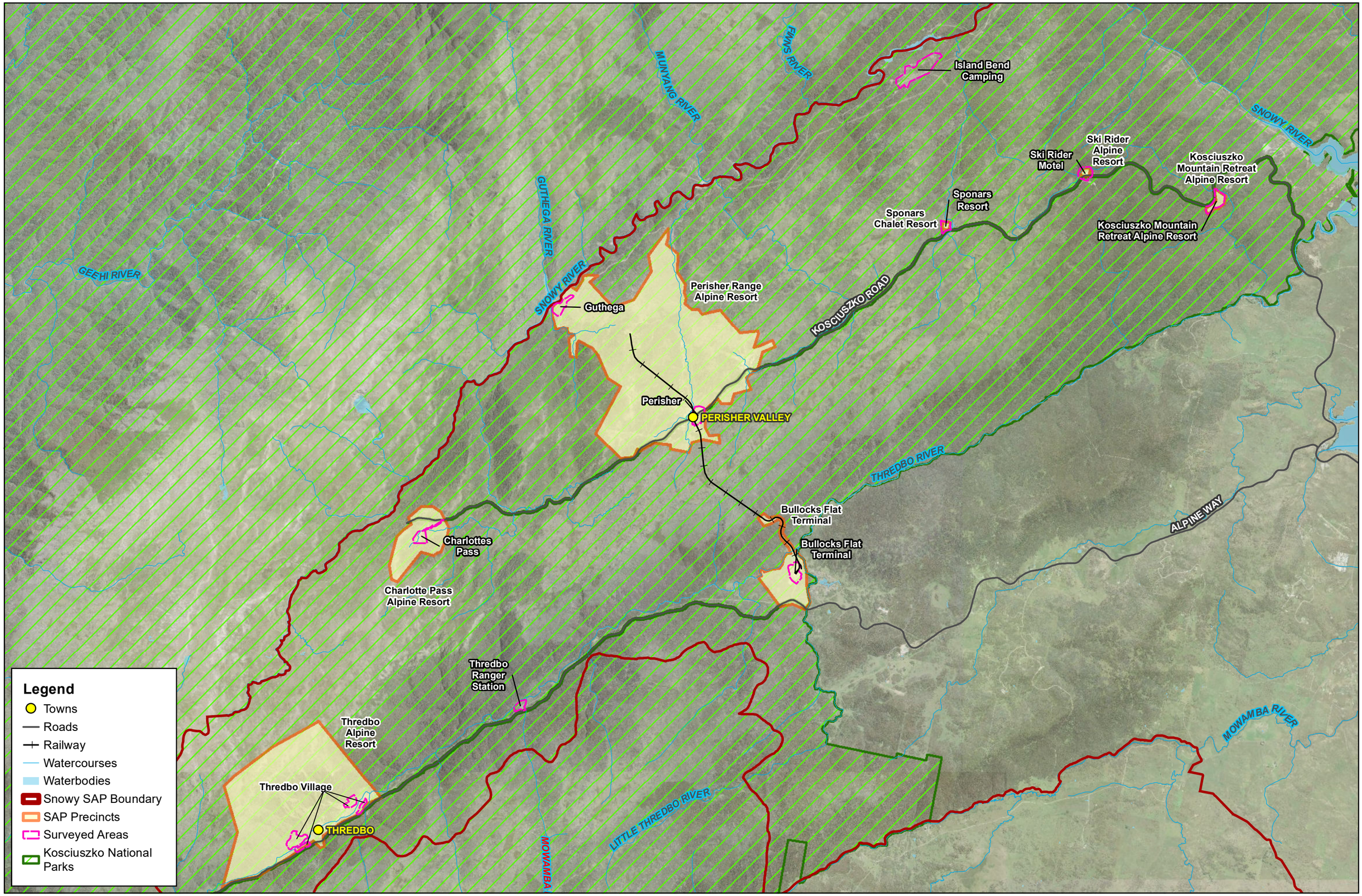
PRECINCT	NUMBER OF VEGETATION INTEGRITY PLOTS
Jindabyne Precinct	
Sports and education sub-precinct	17
Western lake Jindabyne sub-precinct	19
Jindabyne West sub-precinct	14
Other (connector road)	7
Alpine Precinct	
Charlotte Pass	8
Guthega	5
Perisher	3
Sponars Resort	4
Ski Rider Motel	6
Kosciuszko Mountain Retreat Alpine Resort	7
Island Bend Camping	11
Bullocks Flat Terminal	3
Thredbo Ranger Station	4
Thredbo Village	18



Snowy SAP - Investigation Areas

Figure 2.1
Sites surveyed – Jindabyne region

Author: AUVL502876
Date: 15/06/2021
\\corp.pbwan.net\ANZ\ProjectsAU\PS120xxx\PS120074_Snowy_Environment\5_Shared\GIS\54_Production\Maps\PS120074_GIS_092_A3.mxd



Snowy SAP - Investigation Areas

Figure 2.2
Sites surveyed – Alpine region

Author: AUVL502876
Date: 16/06/2021
\\corp.pbwan.net\ANZ\ProjectsAU\PS120xxx\PS120074_Snowy_Environment\5_Shared\GIS\54_Production\Maps\PS120074_GIS_093_A4.mxd

2.2.2 FAUNA HABITAT ASSESSMENT

Fauna habitat assessments were undertaken to assess the likelihood of threatened species of animal (those species known or predicted to occur within the locality from the literature and database review) occurring within the investigation area. Fauna habitat assessments were the primary assessment tool in assessing whether threatened species were likely to occur. The fauna habitat characteristics assessed included:

- structure and floristics of the canopy, understorey and ground vegetation, including the presence of flowering and fruiting trees providing potential foraging resources
- presence of mistletoes providing potential foraging resources
- presence of hollow-bearing trees providing roosting and breeding habitat for arboreal mammals, birds and reptiles
- presence of the ground cover vegetation, leaf litter, rock outcrops and fallen timber and potential to provide protection for ground-dwelling mammals, reptiles and amphibians
- presence of waterways (ephemeral or permanent) and water bodies.
- presence of man-made structures (e.g. culverts) for roosting/breeding microchiropteran bats.

Habitat assessments were used to inform seasonal survey requirements for targeted threatened fauna species. During these surveys, a hand-held GPS was used to record the locations of important habitat features including:

- hollow-bearing trees
- aquatic habitat
- rock outcrops
- habitat type boundaries.

2.2.3 FAUNA SURVEYS

Fauna surveys undertaken included:

- Diurnal bird surveys – Formal 20-minute diurnal bird searches were completed within the investigation area. Diurnal bird surveys were completed by actively walking through the nominated site (transect) over a period of 20 minutes. All birds were identified to the species level, either through direct observation or identification of calls. Diurnal bird surveys were completed during different times of the day, but generally occurred during morning hours or evening. Birds were also recorded opportunistically during other on-site surveys.

- Microchiropteran bat surveys – Ultrasonic Anabat bat detection (Titley Electronics) was used to record and identify the echolocation calls of microchiropterans foraging across a number of native vegetation communities in the investigation area.

- Frog and reptile searches – Active searches during the day and at night, involved looking for active specimens and eye shine, turning over suitable ground shelter, such as fallen timber, sheets of iron, exposed rocks, raking debris, other debris, and peeling decorticating bark. Specimens were identified visually, by aural recognition of call (frogs only) or were collected and identified. Frogs and reptiles were also surveyed opportunistically during all other surveys in the investigation area.

- Opportunistic sightings – Opportunistic sightings of animals were recorded. Evidence of animal activity, such as scats, diggings, scratch marks, nests/dreys, burrows etc., was also noted. This provided indirect information on animal presence and activity.

3 EXISTING ENVIRONMENT

3.1 ENVIRONMENTAL CONTEXT

3.1.1 GENERAL

The Snowy Mountains are located in the south east of NSW. This region forms the northern part of the Australian Alps which extends south into Victoria. Predominantly the region is accessed from Canberra which is located approximately 150 kilometres to the north. To the south and west of this region is the sparsely populated high country.

The traditional custodians of the Snowy Mountains are the Monero Ngarigo people, in connection with the Walgalu, Ngunnawal and Bidhawal people. The tribal homeland for Monero Ngarigo people stretches from the western slopes of the coastal ranges to the eastern side of the Kosciusko plateau and further north. Included in the Ngarigo land is the peak of Mount Kosciusko and the Snowy Ranges.

European settlers accessed the region in 1823, and between the late 1830s to 1957 the Monaro highland region was grazing by cattle and sheep. The original town of Jindabyne was settled in the 1840s on the banks of the Snowy River where the main river crossing took place. A bridge was constructed over the river in 1893, contributing to the success of the town. In 1949 the Snowy Mountains Scheme was introduced which consisted of plans to dam and divert water from the Snowy River. By 1964 the dam had created Lake Jindabyne and the township relocated to where it is today. The old town disappeared under Lake Jindabyne in 1967. Although losing much of its built heritage, Jindabyne, as we know it today, was rebuilt and has continued to steadily grow leveraging its tourist and agricultural offerings (Ozark Environment and Heritage, 2020).

The township of Jindabyne situated on Lake Jindabyne provides a hub for the region, with opportunities for tourism and facilities supporting the regional catchment. Jindabyne has evolved into the gateway to the Snowy Mountains and currently services 1.4 million visitors each year who travel to the region to enjoy its unique tourism and recreational offerings (Destination NSW, June 2020 report). There are approximately 35,500 residents of the Snowy Mountains, of which 3,500 residents live in Jindabyne (including Kalkite, East Jindabyne and Tyrolean Village).

The Snowy Mountains region is one of Australia's most iconic natural environments. In addition to hosting some of Australia's premier alpine destinations, the Snowy Mountains is home to over 35,000 people.

3.1.2 PLANT COMMUNITY TYPES

Seven Plant Community Types (PCTs) were identified during detailed field surveys:

- PCT 637: Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion
- PCT 643: Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion
- PCT 644: Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP, South Eastern Highlands Bioregion and Australian Alps Bioregion
- PCT 645: Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion
- PCT 679: Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion
- PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion
- PCT 1196: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion.

In addition, Miscellaneous Ecosystems were identified which were largely areas of planted exotic trees or weed dominated vegetation. A description of the plant community types recorded during the field surveys is provided in Appendix A.

3.2 JINDABYNE REGION

3.2.1 SITE CONTEXT

The Jindabyne region has a long agricultural history of grazing. None the less, the area supports significant biodiversity including significant areas of derived grassland where despite removal of canopy trees, the ground cover vegetation is diverse and characteristic of the remnant woodland community.

The area contains a variety of Plant Community Types dominated by the Grassy Woodlands from the Subalpine Woodlands vegetation class. The vegetation types are characterised by stands of *Eucalyptus pauciflora* (Snow Gum), *Eucalyptus stellulata* (Black Sallee), *Eucalyptus rubida* (Candlebark) and *Eucalyptus dalrympleana* (Mountain Gum).

Photo 3.1 Jindabyne region

Photo credit: Gavin Shelley

3.2.2 THREATENED BIODIVERSITY

3.2.2.1 THREATENED ECOLOGICAL COMMUNITIES

Much of the native woodland and grassland in the Precinct is consistent one of two threatened ecological communities:

- Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion listed as Critically Endangered under the *Biodiversity Conservation Act 2016* (BC Act) – this community also includes areas of derived grassland where trees have been cleared.
- Natural Temperate Grassland of the South Eastern Highlands listed as Critically Endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The Aquatic Ecological Community in the catchment of the Snowy River in NSW, listed under the FM Act also occurs in the Precinct. This threatened ecological community is associated with aquatic habitat within the Snowy River and its tributaries within the study area.

Photo 3.2 Monaro Tableland Cool Temperate Grassy Woodland at the Jindabyne Sport & Rec Centre

Photo 3.3 Monaro Tableland Cool Temperate Grassy Woodland near Rabbits Corner

Photo 3.4 Example of Monaro Tableland Cool Temperate Grassy Woodland, rocky outcrop shrubland

Photo 3.5 Example of derived native grassland variant of Monaro Tableland Cool Temperate Grassy Woodland

3.2.2.2 THREATENED FLORA

Threatened flora species are known to occur within the Jindabyne precinct and may have important habitat resources (Table 3.1) within the precinct. In addition, *Leucochrysum albicans* var. *tricolor* (Hoary Sunray) has been identified as occurring within a 10 km radius. Further assessment and surveys to identify any other threatened flora species which may occur within this precinct are recommended. Surveys for these species should be undertaken in all sub-precincts in areas of native vegetation.

Table 3.1 Threatened flora known or likely to occur within the Jindabyne Precinct

SCIENTIFIC NAME	COMMON NAME	BC ACT[1]	EPBC ACT[2]	SURVEY SEASONALITY
Calotis glandulosa	Mauve Burr-daisy	V	V	Oct – Mar
Euphrasia scabra	Rough Eyebright	E	–	Feb – Apr
Swainsona sericea	Silky Swainson-pea	V	–	Sept – Nov
Discaria nitida	Leafy Anchor Plant	V	-	Nov – Apr
Thesium australe	Austral Toadflax	V	V	Nov – Feb

(1) E = Endangered, CE= Critically Endangered under the BC Act.

(2) V= Vulnerable under the EPBC Act.

3.2.2.3 THREATENED FAUNA

The Jindabyne precinct includes woodland and grassland communities. Important habitat features recorded include:

- hollow-bearing trees
- large trees
- rocky outcrops and fallen timber
- dense midstorey and shrubby habitat
- tussock and native grasslands and
- aquatic habitat and riparian vegetation.

Several threatened species, which have been confirmed to be present within the precinct and for whom these habitat resources may be important have been identified below in Table 3.2. A number of other threatened fauna species which occupy habitats known to occur within the Jindabyne area (forest, woodland, grassland, and riparian habitats) have potential habitat within the Jindabyne precinct including Striped Legless Lizard and other grassland fauna as well as a range of bird such as Barking Owl and Pink Robin.

Table 3.2 Threatened fauna known to occur within Jindabyne Precinct

SCIENTIFIC NAME	COMMON NAME	BC STATUS[1]	EPBC STATUS[1]	FM STATUS[1]
Litoria aurea	Green and Golden Bell Frog	E	E	–
Artamus cyanopterus cyanopterus	Dusky Woodswallow	V	V	–
Calyptorhynchus lathami	Glossy Black-Cockatoo	V	V	–
Epthianura albifrons	White-fronted Chat	V	V	–
Hieraaetus morphnoides	Little Eagle	V	V	–
Neophema pulchella	Turquoise Parrot	V	V	–
Pachycephala olivacea	Olive Whistler	V	V	–
Petroica boodang	Scarlet Robin	V	V	–
Stagonopleura guttata	Diamond Firetail	V	V	–
Gadopsis marmoratus	River Blackfish	–	–	E
Callocephalon fimbriatum	Gang-gang Cockatoo	V	–	–
Daphoenositta chrysoptera	Varied Sittella	V	–	–

SCIENTIFIC NAME	COMMON NAME	BC STATUS[1]	EPBC STATUS[1]	FM STATUS[1]
Petroica phoenicea	Flame Robin	V	–	–
Melanodryas cucullata	Hooded Robin	V	–	–
Pyrrholaemus sagittatus	Speckled Warbler	V	–	–
Petaurus norfolcensis	Squirrel Glider	V	–	–

(1) E = Endangered, V= Vulnerable.

3.2.3 OTHER SIGNIFICANT VALUES

3.2.3.1 CONNECTIVITY CORRIDORS

Habitat connectivity in the east around the Jindabyne township is patchy due to agricultural and urban development and infrastructure. However, physical and functional connectivity (stepping stones) from Lake Jindabyne through the subject land to the forested areas to the west and into the Kosciuszko National Park exists. Large trees are important features in this Precinct to maintain stepping stone connectivity at the local scale.

3.2.3.2 ROCKY OUTCROPPING

The rocky outcrops provide suitable habitat for a range of common reptile species including Cunninghams Skink (*Egernia cunninghamii*) and Eastern Brown Snake (*Pseudonaja textilis*). Threatened species that may potentially use these rocky areas as habitat include the Pink-tailed Legless Lizard (*Aprasia parapulchella*) and the Striped Legless Lizard (*Delma impar*).

Photo 3.6 Rocky granitoid outcrops exist on hill sides and hill tops in the subject lands around Jindabyne

3.2.3.3 AQUATIC HABITAT AND RIPARIAN VEGETATION

The precinct includes important aquatic and riparian vegetation which provide habitat for aquatic species as well as important connectivity corridors.

Key fish habitat are aquatic habitats that are important to the sustainability of the recreational and commercial fishing industries, the maintenance of fish populations generally and the survival and recovery of threatened aquatic species (Department of Primary Industries 2019). These areas have been mapped by Department of Primary Industries (DPI) and include Widows Creek, Lees Creek and Cobbin Creek.

Areas of Key Fish Habitat mapped within the investigation area are also likely to align to the Aquatic Ecological Community in the catchment of the Snowy River in NSW which is listed as Endangered Ecological Community under the FM Act.

3.2.3.4 KOALA HABITAT

The Koala habitat protection State Environmental Planning Policy 2021 (Koala SEPP 2021) applies to land zoned RU1, RU2, RU3 in the Snowy Monaro LGA. There is no approved KPOM for the study area as the Cooma-Monaro Koala Plan of Management doesn't apply to the Jindabyne region.

The Koala is predicted to occur in the region based on desktop review of databases (Section 2.1). Field surveys confirmed the presence of known feed trees including *Eucalyptus rubida, Eucalyptus dalrympleana,* and *Eucalyptus bridgesiana* but their occurrence doesn't meet the definition of 'highly suitable habitat' under the Koala SEPP 2021. No evidence of koalas or 'highly suitable habitat' was detected during surveys of the key sites. Furthermore, there have not been any Koala records in the locality since 1950. The key sites are not considered to provide core Koala habitat.

3.2.4 SUMMARY OF SUB-PRECINCTS

A summary of ecological values known or likely to occur in the Jindabyne sub-precincts is provided below in Table 3.3.

Table 3.3 Summary of ecological values of Jindabyne sub-precincts

SUB-PRECINCT	DESCRIPTION	THREATENED ECOLOGICAL COMMUNITIES	WILDLIFE CONNECTIVITY	AQUATIC HABITAT	OPPORTUNITIES
Desktop only					
Jindabyne Town Centre	— Within urban area of Jindabyne. — No significant biodiversity values are evident	Unlikely	Trees provide stepping stone connectivity for birds	None	— Retention and enhancement of bird habitat through urban landscaping.
Barry Way South sub-precinct	— Predominantly woodland but includes areas of grassland with scattered trees. — Includes residential and rural residential areas and associated infrastructure, roads and tracks. — Existing mapping suggest that the area would have supported open grassy woodland dominated by Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*E. stellulata*), consistent with Monaro Tableland Cool Temperate Grassy Woodland — Eastern section with only small patches of native vegetation mapped. However, grassland areas have extensive rocky outcropping and may be consistent with Monaro Tableland Cool Temperate Grassy Woodland derived grassland — Area to north of Snowy River Way likely to have lower ecological value due to past disturbance. — Majority of western section mapped as consisting of woodland dominated by Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*E. stellulata*), (PCT 1191) and is likely to be consistent with Monaro Tableland Cool Temperate Grassy Woodland. Grassland areas likely to be dominated by native species.	Likely — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland	Woodland provides wildlife connectivity	Lees Creek occurs in the north of the western section of this sub-precinct. Several unnamed watercourses occur to the south and flow into Cobbin Creek.	— Protection of riparian corridors and revegetation to connect wildlife habitats in the western section. — Retention of woodland habitats — Area to north of Snowy River Way likely to have lower ecological value and be suitable for development. — Other areas may provide suitable offsets for development within this or other sub-precincts.
Mountain Bike and adventure park	— Majority of sub-precinct is covered in woodland. Open grassland occurs in lower areas in north of the sub-precinct and as small patches within woodland/grassland mosaic and is mapped as native grassland. — Much of the vegetation is mapped as grassy woodland dominated by Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*E. stellulata*),and is likely to be consistent with Monaro Tableland Cool Temperate Grassy Woodland. This critically endangered ecological community is mapped as occurring across the site including grassland areas. — Widows Creek and Casleys Spring riparian vegetation is mapped as high value vegetation — Rocky outcropping present — Includes a patch of high value old growth vegetation in south west	Likely — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland	Vegetation within site connected extensive vegetation to south and to vegetation to east	Widows Creek and its tributaries. Casleys Spring and its tributaries	— Low impact development — Provides suitable offsets for development within this or other sub-precincts. — Protection and enhancement of connectivity e.g. through revegetation along riparian corridors.
Leesville	— Sub-precinct includes industrial development — Western section contains woodland mapped as grassy woodland dominated by Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*E. stellulata*), and is likely to be consistent with Monaro Tableland Cool Temperate Grassy Woodland — Eastern section consists of grassland which is mapped as Monaro Tableland Cool Temperate Grassy Woodland and derived grassland. — The critically endangered ecological community is mapped as occurring across the site including grassland areas.	Likely — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland — Potential areas of Natural Temperate Grassland	Western woodland links woodland to north and south and west.	Lees Creek	— Protection and enhancement of connectivity e.g. through woodland retention and revegetation along riparian corridors.

SUB-PRECINCT	DESCRIPTION	THREATENED ECOLOGICAL COMMUNITIES	WILDLIFE CONNECTIVITY	AQUATIC HABITAT	OPPORTUNITIES
Jindabyne Aerodrome	— The site contains a mix of woodland patches, open grassland with scattered trees. — Existing land uses and associated infrastructure includes Jindabyne air strip and aero club. A number of dirt tracks are present — Majority of grassland likely to be derived native grassland and may also contain areas of Natural Temperate Grassland Threatened Ecological Community — Rocky outcropping is present, more common in the woodland areas — Fallen and dead standing timber common across woodland patches, may indicate die back. — Woodland patches in the sub-precinct (predominantly near boundary) is mapped as Monaro Tableland Cool Temperate Grassy Woodland critically endangered ecological community. This community may also occur in the less disturbed grassland areas including the south-eastern section of the sub-precinct.	Likely — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland — Potential areas of Natural Temperate Grassland	Limited connectivity	-	— Disturbed areas provide opportunities for development — Retention of woodland areas and enhancement of wildlife connectivity through landscaping.
East Jindabyne	— Short inspection from publicly accessible areas was underaken. — Majority of site consist of native grassland of tussock grasses and moderate to high forb diversity. — Open grassy woodland of Snow Gum (*Eucalyptus pauciflora*) with native understory including moderate diversity occurs as small patches on hill tops and rocky areas. — Western portion in very high condition. Very low disturbance aside from a few narrow vehicle tracks and low weed diversity and cover. — Eastern portion is more disturbed and has higher weed cover. — Lake Jindabyne to the west and north; existing residential development to the south and the north-east; and predominantly cleared agricultural land to the east.	Known — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland — Potential areas of Natural Temperate Grassland	Limited	Steep unnamed creek line fringed by aquatic reeds in the southern portion	— Disturbed areas provide opportunities for development — Maintenance of connectivity along foreshore — Provides high value offsets for development within this or other sub-precincts.
Partial field survey[1]					
Jindabyne West	— Contains a mix of woodland patches, open grassland with scattered trees, and a number of disturbed areas. — Field surveys and existing mapping suggest that the area would have supported open grassy woodland dominated by Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*E. stellulata*), consistent with Monaro Tableland Cool Temperate Grassy Woodland and Natural Temperate Grassland. — Disturbance evident including grazing, fenced paddocks and dirt tracks. — Southern, unsurveyed, portion mapped as Monaro Tableland Cool Temperate Grassy Woodland critically endangered ecological community. Survey required to confirm condition.	Known to occur — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland — Potential areas of Natural Temperate Grassland	Trees provide stepping stone connectivity for birds	Unnamed tributary of Widows Creek mapped in southern section. Appears to be seasonal drainage line.	— Strategic revegetation to connect wildlife habitats.
West Lake Jindabyne	— The sub-precinct contains a mix of woodland patches, open grassland with scattered trees, and a number of disturbed areas. — Existing mapping suggests area would have supported open grassy woodland dominated by Snow Gum (*Eucalyptus pauciflora*) and Black Sallee (*E. stellulata*), consistent with Monaro Tableland Cool Temperate Grassy Woodland and Natural Temperate Grassland. — Disturbance evident including grazing, fenced paddocks and animal yards, constructed dams and dirt tracks. Some dieback of eucalypts is evident. — Based on aerial imagery and limited ground-truthing, the condition of vegetation communities is highly variable with condition generally higher in east.	Known to occur — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland — Potential areas of Natural Temperate Grassland	Limited	— Wollondibby Creek occurs in the southern section. — Several unnamed drainage lines run through the precinct to the east. — Lake Jindabyne	— Development in exotic dominated pasture — Revegetation of Wollondibby Creek — Protection and restoration of foreshore.

SUB-PRECINCT	DESCRIPTION	THREATENED ECOLOGICAL COMMUNITIES	WILDLIFE CONNECTIVITY	AQUATIC HABITAT	OPPORTUNITIES
Comprehensive survey[1]					
Sport and Education	— Mix of woodland patches, exotic amenity plantings and grassland — Majority of grassland is dominated by exotic species. — Woodland consists of Snow Gum - Candle Bark woodland (PCT 1191) on broad valley flats of the tablelands and slopes and is consistent with consistent with Monaro Tableland Cool Temperate Grassy Woodland threatened ecological community — Areas of rocky outcrop shrubland occur in the southern and eastern portions	Known to occur — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland		Lees Creek	— Development in exotic dominated pasture — Retention of higher quality woodland areas as green space — Protection and enhancement of connectivity e.g. through woodland and tree retention as well as revegetation along Lees Creek.
Southern Connector Road	— Mix of woodland patches and open grassland — Majority of grassland is dominated by exotic species. — Approximately half of the site contains native vegetation (PCT 1191) consistent with Monaro Tableland Cool Temperate Grassy Woodland and derived grassland. This includes patches to the west of Kosciuszko Road, in the vicinity of Lees Creek and between Barry Way and Alpine Way.	Known to occur — Monaro Tableland Cool Temperate Grassy Woodland as both woodland and derived grassland	Woodland in the east in vicinity of Lees Creek provides connectivity	— Lees Creek and Unnamed Tributary — Unnamed tributary of Widows Creek	— Maintenance of connectivity in vicinity of Lees Creek.

Notes: 1) Areas surveyed are shown in in Figure 2.1. Methodology is described in Section 2.

3.3 ALPINE REGION

3.3.1 SITE CONTEXT

The region includes the highest mountains in Australia and is the largest national park in NSW. The park possesses exceptional diversity of alpine plant communities, containing threatened ecological communities (TECs) and providing habitat for a number of rare and threatened species. The park contains most of the alpine endemic species found on the Australian mainland.

Portions of the study area are located within Kosciuszko National Park which is the largest national park in NSW. It is also the central segment of the Australian Alps Bioregion containing the highest mountains in Australia (NSW National Parks & Wildlife Service 2006). The park possesses exceptional diversity of alpine plant communities, containing threatened ecological communities (TECs) and provides habitat for a number of rare and threatened species (NSW National Parks & Wildlife Service 2006). The park contains most of the alpine endemic species found on the Australian mainland (NSW National Parks & Wildlife Service 2006).

The Alpine region is characterised by a subalpine climate and environment. Which is subjected to continuous snow cover for one to four months per year, with minimum temperature below zero degrees are six months of the year (Connell Wagner Pty Ltd 2000).

The vegetation is rich and diverse reflecting the range of climates, altitudes, landforms, soil, and geology present. Vegetation occurs in numerous formations including montane forest, wet sclerophyll forests, cool temperate rainforests, open alpine woodlands, alpine heathland, alpine grasslands, herbfields and bogs. Vegetation communities within the national park are largely dominated by Eucalypt species, of which there are approximately 33 species which have been recorded (NSW National Parks & Wildlife Service 2006).

Kosciuszko National Park contains significant biodiversity and it known to provide habitat for approximately 300 vertebrate fauna species, over 800 plant species and high numbers of invertebrates, particularly for high altitude cold-climate specialists which require alpine and subalpine habitats (NSW National Parks & Wildlife Service 2006). Of the 204 species of alpine flowering plants recorded 21 are endemic and 22 are considered rare. Furthermore, 31 species recorded are endemic to the national park and there are numerous threatened flora species which have been recorded (NSW National Parks & Wildlife Service 2006).

The Alpine Precinct contains a wide variety of Plant Community Types. The lower altitude areas of Ski Rider Motel are dominated by the Grassy Woodlands from the Subalpine Woodlands vegetation class dominated by stands of *Eucalyptus pauciflora, Eucalyptus dalrympleana* and *Eucalyptus stellulata* with occasional *Eucalyptus delegatensis.* As altitude increases at Sponars Resort, Perisher, Charlottes Pass and Guthega, the vegetation changes to the lower Subalpine Woodlands dominated by *Eucalyptus niphophila* and tall heathy shrublands. At the Charlottes Pass subject land, the Alpine Complex is dominant with the presence of Alpine Heaths (including boulder fields) and Alpine Bogs and Fens (Upland Bog and Valley Bog complexes).

Photo 3.7 Alpine region

Photo credit: Lukas Clews

3.3.2 THREATENED BIODIVERSITY

3.3.2.1 THREATENED ECOLOGICAL COMMUNITIES

One plant community type within the precinct, Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion (PCT 637) is consistent with a threatened ecological community:

- Alpine Sphagnum Bogs and Associated Fens- listed as endangered under the EPBC Act.
- Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions - listed as an Endangered Ecological Community under the BC Act.

This threatened ecological community is present at Charlottes Pass, Perisher, Guthega and the Kosciuszko Tourist Park.

Photo 3.8 Alpine and sub-alpine peatlands, damp herbfields and fens at Perisher

Photo credit: Lukas Clews

Photo 3.9 Alpine and sub-alpine peatlands, damp herbfields and fens at Charlottes Pass

Photo credit: Lukas Clews

3.3.2.2 THREATENED FLORA

Of the 204 species of alpine flowering plants recorded within Kosciuszko National Park, 21 are endemic and 22 are considered rare. Furthermore, 31 species recorded are endemic to the national park (NSW National Parks & Wildlife Service 2006). Thirteen threatened species are known or likely to occur within the Alpine precinct (Table 3.4).

Targeted surveys for threatened flora are recommended. The specific seasonal requirements for these species are outlined in Table 3.4.

Table 3.4 Threatened flora species known or likely to occur within the Alpine precinct

SCIENTIFIC NAME	COMMON NAME	BC ACT[1]	EPBC ACT[2]	SURVEY SEASONALITY
Caladenia montana	–	V	–	Nov
Calotis glandulosa	Gland Burr Daisy	V	V	Oct – Mar
Carex raleighii	Raleigh Sedge	E	–	Dec – Mar
Discaria nitida	Leafy Anchor Plant	V	–	Nov – Apr
Euphrasia scabra	Rough Eyebright	E	–	Feb – Apr
Pterostylis alpina	–	V	–	Aug – Nov
Pterostylis foliata	Slender Greenhood	V	–	Oct – Nov
Pterostylis oreophila	Blue-tongued Greenhood	CE	CE	Dec – Jan
Ranunculus anemoneus	Anemone Buttercup	V	V	Oct – Apr
Rytidosperma vickeryae	Perisher Wallaby Grass	E	–	Feb – Mar
Thelymitra alpicola	–	V	–	Nov – Jan
Thesium australe	Austral toadflax	V	V	Nov – Feb
Xerochrysum palustre	Bog everlasting	–	V	Sep – May

(1) E = Endangered, CE= Critically Endangered under the BC Act.

(2) E = Endangered, CE= Critically Endangered under the EPBC Act.

3.3.2.3 THREATENED FAUNA

Kosciuszko National Park contains significant biodiversity and it known to provide habitat for approximately 300 vertebrate fauna species. Threatened species and significant habitat known to occur in the precinct include:

- A significant population of Mountain Pygmy Possum (*Burramys parvus*) which is known to occur at Blue Cow and at Charlottes Pass. This species is restricted to alpine and subalpine zones (Connell Wagner Pty Ltd 2000).
- Broad-toothed Rat (*Mastacomys fuscus*) has been recorded within all of the resort areas (NSW Parks and Wildlife Service 2020), and is restricted in NSW to areas above 1000 m.
- Guthega Skink (*Liopholis guthega*) is known to occur at Charlottes Pass, Thredbo and Perisher Range Alpine Resort areas (NSW Parks and Wildlife Service 2020).
- Sphagnum bogs and fens area important components of the Alpine Complex. Bog and Fen communities offer breeding sites for many threatened and Migratory fauna which occur in the area, including the Alpine Tree Frog, Alpine Water Skink, Latham's Snipe and Broad-toothed Rat (Connell Wagner Pty Ltd 2000).
- Habitat for numerous other threatened fauna species including Olive Whistler, Guthega Skink, Mountain Galaxias, Eastern False Pipistrelle, Large Bent-wing Bat, Greater Glider, Eastern Pygmy Possum, Smoky Mouse, Spotted-tailed Quoll, Koala, Gang-gang Cockatoo, Flame Robin, Scarlet Robin, Pink Robin, Diamond Firetail, Brown Treecreeper and Powerful Owl (Connell Wagner Pty Ltd 2000, Biosis 2017).

Threatened species surveys have not been undertaken for the project and are recommended. Many of the species specific seasonal survey requirements are restricted to spring and summer (Table 3.5). Fauna survey should be undertaken during appropriate conditions including seasonal requirements as listed but also considering snow cover. For example there may still be snow in Guthega skink habitat areas up until November and this may limit adequate survey.

Photo 3.10 Mountain Pygmy Possum

Photo credit: Alicia Palmer

Photo 3.11 Boulder field habitat at Charlottes Pass

Photo credit: Lukas Clews

Table 3.5 Threatened fauna known or likely to occur within the Alpine precinct

SCIENTIFIC NAME	COMMON NAME	BC ACT[1]	EPBC ACT[2]	SURVEY TIMING
Callocephalon fimbriatum	Gang-gang Cockatoo (breeding habitat only)	V	–	Dec-Jan
Haliaeetus leucogaster	White-bellied Sea-Eagle (Breeding)	V	–	July-Dec
Hieraaetus morphnoides	Little Eagle (Breeding)	V	–	Aug-Oct
Hirundapus caudacutus	White-throated Needletail	–	V, M	All
Petroica rodinogaster	Pink Robin	V	–	All year
Ninox connivens	Barking Owl (breeding habitat only)	V	–	May- Dec
Ninox strenua	Powerful Owl (breeding habitat only)	V	–	May- Aug
Tyto novaehollandiae	Masked Owl (breeding habitat only)	V	–	May- Aug
Burramys parvus	Mountain Pygmy-Possum	E	E	Oct-March / Species
Cercartetus nanus	Eastern Pygmy-possum	V	–	Oct-March / Species
Mastacomys fuscus	Broad-toothed Rat	V	V	Oct- May
Pseudomys fumeus	Smoky Mouse	CE	E	Sep – early Dec, then Feb – Apr
Dasyurus maculatus	Spotted-tailed Quoll	V	E	All year
Litoria verreauxii alpina	Alpine Tree Frog	E	V	Nov-Dec
Pseudophryne corroboree	Southern Corroboree Frog	CE	CE	January
Cyclodomorphus praealtus	Alpine She-oak Skink	E	E	Oct-April (survey when other skinks (e.g. Eulamprus) are active, difficult to survey and often assumed present)
Liopholis guthega	Guthega Skink	E	E	Oct-April

(1) E = Endangered, CE= Critically Endangered under the BC Act.

(2) E = Endangered, CE= Critically Endangered under the EPBC Act.

(3) The range of this species has been restricted and is likely now extinct from the Snowy SAP KNP investigation area.

In addition to the candidate fauna species identified in the table above, habitat for two species listed under the *Fisheries Management Act 1994* (FM Act) has been mapped within the study area. These are the:

- Alpine Redspot Dragonfly (*Austropetalia tonyana)*, listed as Vulnerable under the FM Act which only occurs amongst rocks, logs and moss within the splash zone of waterfalls or in the nearby stream edge. Distribution includes Thredbo River and riparian areas throughout the Alpine precinct
- River Blackfish (*Gadopsis marmoratus*), in which the Snowy River population is listed as Endangered. Distribution includes Thredbo River and Mowamba River.

Preservation of riparian corridors, including setbacks would protect and preserve habitat for these species.

3.3.3 OTHER SIGNIFICANT VALUES

3.3.3.1 CONNECTIVITY CORRIDORS

Development of the subject lands within the Alpine precinct are unlikely to have any broad landscape scale impacts to connectivity as these areas are already 'key hole' areas within the large expanse of surrounding habitats. There are unlikely to be new barriers to landscape movement as a result of developing these areas. However, small scale habitat connectivity has been heavily impacted in ski resorts and the cumulative impacts have not been well addressed in the past. Such small scale habitat connectivity for small less mobile threatened mammal species such as Broad-toothed Rat, Mountain Pygmy-possum and Smoky Mouse, reptile species including Alpine She-oak Skink and Guthega Skink, and the Alpine Tree Frog will be a consideration as the design of the various precincts develops.

3.3.3.2 OLD GROWTH SNOW GUM WOODLAND

In the 2002-2003 summer period, a series of wildfires burnt approximately 486, 000 ha of the 673, 542 ha National Park (NSW National Parks & Wildlife Service 2006). The ecological impact of such an event can be significant, resulting in changes to vegetation community distribution and age classes, loss of habitat, localised species extinctions, and impacts to soil and water (NSW National Parks & Wildlife Service 2006). Woodland habitats provide critical habitat resources for a variety of fauna, including tree-hollows which are only present in mature woodland vegetation (ngh environmental 2008). Unburnt areas of old growth Snow Gum woodland are therefore of high conservation value across the park. A large unburnt area of Snow Gum (*Eucalyptus niphophila*) extends along the Perisher Ranges from Charlottes Pass to Perisher Resort which is reported to be the largest area of unburnt woodland in the park (ngh environmental 2008, NSW Parks and Wildlife Service 2020).

Photo 3.12 Example of PCT 645 at Perisher showing *Eucalyptus niphophila* trees

Photo 3.13 Example of PCT 645 at Plot PNip1 at Perisher showing large *Eucalyptus niphophila* trees

Photo 3.14 Example of PCT 645 at Plot CPEnip1 at Charlottes Pass showing large *Eucalyptus niphophila* trees

Photo 3.15 Example of PCT 645 at Plot CPEnip2 at Charlottes Pass showing young tree regrowth

Photo credit: Lukas Clews

3.3.3.3 BOULDER FIELDS

The boulder fields (often associated with Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion PCT 643) are known to provide habitat for threatened mammal species including Broad-toothed Rat (*Mastacomys fuscus*), Mountain Pygmy-possum (*Burramys parvus*) and Smoky Mouse (*Pseudomys fumeus*). Monitoring sites for Mountain Pygmy-possum are present in the rocky habitats at Charlottes Pass. This habitat is also potentially suitable for threatened reptile species including Alpine She-oak Skink (*Cyclodomorphus praealtus*) and Guthega Skink (*Liopholis guthega*). Alpine Tree Frog (*Litoria verreauxii alpina*) is also known to be associated with PCT 643. Granite substrate and decomposing granite soils and rocky areas including sub-surface boulders is a habitat constraint for Guthega Skink.

Charlottes Pass contains boulder fields (see Photo 3.16). Steep scree slopes and boulder fields are also present within the broader Assessment Area at Guthega and Perisher.

3.3.4 SUMMARY OF SUB-PRECINCTS

Summary of field survey results in surveyed areas of sub-precincts is provided below.

Table 3.6 Summary of ecological values of Alpine sub-precincts

SUB-PRECINCT	DESCRIPTION

Charlotte Pass	— Highly disturbed areas with limited native vegetation in the vicinity of existing development
	— Plant Community Types include:
	  — Alpine and sub-alpine peatlands, damp herbfields and fens (PCT 637)
	  — Alpine Snow Gum shrubby open woodland at high altitudes (PCT 645)
	  — Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas (PCT 643)
	— Spencers Creek
	— Threatened biodiversity includes:
	  — Significant population of Mountain pygmy Possum to east of village
	  — Guthega Skink habitat
	  — Broad-toothed rat habitat
	  — Sphagnum bogs and fens- Occurs to north east and west of village and along access road

SUB-PRECINCT	DESCRIPTION

Perisher Valley	— Highly disturbed areas with limited native vegetation in the vicinity of existing development
	— Plant Community Types include:
	  — Alpine and sub-alpine peatlands, damp herbfields and fens (PCT 637)
	  — Alpine Snow Gum shrubby open woodland at high altitudes (PCT 645)
	— Rock Creek and Perisher Creek occur near Creek
	— Threatened biodiversity includes:
	  — Sphagnum bogs and fens- Occurs adjacent to existing carpark and in low areas to east of Kosciuszko Road
	  — Guthega Skink habitat
	  — Broad-toothed rat habitat.

Guthega	— Highly disturbed areas with limited native vegetation in the vicinity of existing development
	— Regeneration following fire is evident
	— Plant Community Types include:
	  — Alpine Snow Gum shrubby open woodland at high altitudes (PCT 645)
	  — Alpine and sub-alpine peatlands, damp herbfields and fens (PCT 637)
	— Threatened biodiversity includes:
	  — Sphagnum bogs and fens- Occurs adjacent to existing carpark and in low areas to east of Kosciuszko Road
	  — Mountain Pygmy Possum Habitat

Sponars Chalet resort	— Disturbed areas with limited native vegetation in the vicinity of existing development
	— Plant Community Types include:
	  — Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP (PCT 644)
	— Threatened biodiversity includes:
	  — Guthega Skink habitat
	  — Broad-toothed Rat habitat.

Ski Rider resort	— Disturbed areas with limited native vegetation in the vicinity of existing development and infrastructure
	— Plant Community Types include:
	  — Snow Gum - Mountain Gum shrubby open forest of montane areas (PCT 1196)
	  — Black Sallee - Snow Gum low woodland of montane valleys (PCT 679)
	— Sawpit Creek

Island Bend	— Disturbed areas associated with existing camping area and associated infrastructure
	— Plant Community Types include:
	  — Snow Gum - Mountain Gum shrubby open forest of montane areas (PCT 1196)
	  — Black Sallee - Snow Gum low woodland of montane valleys (PCT 679)
	— Potential habitat for a range of threatened biodiversity including: Olive Whistler, Eastern False Pipistrelle, Large Bent-wing Bat, Greater Glider, Smoky Mouse, Spotted-tailed Quoll, Koala, Gang-gang Cockatoo, Flame Robin, Scarlet Robin, Pink Robin, Diamond Firetail, Brown Treecreeper and Powerful Owl

Kosciuszko Mountain Retreat Alpine resort	— Disturbed areas associated with existing camping area and associated infrastructure — Plant Community Types include: — Snow Gum - Mountain Gum shrubby open forest of montane areas (PCT 1196)

SUB-PRECINCT	DESCRIPTION
	— Potential habitat for a range of threatened biodiversity including: Olive Whistler, Eastern False Pipistrelle, Large Bent-wing Bat, Greater Glider, Smoky Mouse, Spotted-tailed Quoll, Koala, Gang-gang Cockatoo, Flame Robin, Scarlet Robin, Pink Robin, Diamond Firetail, Brown Treecreeper and Powerful Owl — Unnamed tributary of Sawpit Creek
Bullocks Flat	— Disturbed areas adjacent to and between with existing carparks — Plant Community Types includes: — Black Sallee - Snow Gum low woodland of montane valleys (PCT 679)
Thredbo Ranger Station	— Disturbed areas associated with existing buildings, facilities and stockpiles. — Regeneration post fire is evident — Plant Community Types includes: — Black Sallee - Snow Gum low woodland of montane valleys (PCT 679) — Occurs adjacent to Thredbo River
Thredbo Village	— Disturbed areas associated with existing village including buildings, facilities and infrastructure and landscaping — Plant Community Types includes: — Black Sallee - Snow Gum low woodland of montane valleys (PCT 679) — Alpine and sub-alpine peatlands, damp herbfields and fens (PCT 637) — Occurs adjacent to Thredbo River

Photo 3.16 Alpine boulder fields are present in the subject lands at Charlottes Pass

4 OPPORTUNITIES AND CONSTRAINTS

4.1 OPPORTUNITIES

Overall the Snowy SAP and the biodiversity certification assessment for the project provides a unique opportunity to protect biodiversity and environmental values and improve engagement with the unique environment of the region.

Opportunities exist to protect the existing native vegetation and enhance its habitat value, conservation potential, overall landscape connectivity and develop and enhance biodiversity linkages and corridors.

Within the Jindabyne precinct, these opportunities could occur through incorporating planned open space zoning in the Structure Plan such as by:

- strengthening riparian areas
- retention of smaller remnant patches and paddock trees to provide stepping stones for fauna movement
- connecting larger vegetation patches through revegetation of riparian areas and green corridors
- the potential to deliver biodiversity offset arrangements in the Jindabyne region.

Within Alpine precinct, the opportunities are to improve visitor experiences to allow greater engagement with the unique environment, including:

- low impact sustainable development
- focussing development within already disturbed areas as far as possible
- locating development near to existing infrastructure to limit the need for additional impacts associated with creation of infrastructure and services (e.g. roads and utilities).
- co-locating (and infill) developments as to minimise the spread of impacts on biodiversity values
- biodiversity offset arrangements within the Kosciuszko National Park that are tailored to deliver appropriate outcomes for this unique sensitive environment. The potential for biodiversity offset arrangements within the Kosciuszko National Park requires further consultation and investigation with National Parks and Wildlife Service, and the DPIE.

4.2 BIODIVERSITY AVOIDANCE HIERARCHY

The general principle to minimise impacts to biodiversity, should in order of consideration, endeavour to:

- avoid impacts on biodiversity through the planning process
- minimise impacts on biodiversity through the planning process
- mitigate impacts on biodiversity though the use of a range of mitigation measures
- offset residual impacts.

Through the Snowy SAP early workshopping and reporting including enquiry by design workshops, potential opportunity areas have been identified which aimed to minimise impacts to biodiversity by locating these in existing disturbed areas and focussing development outside the KNP and in areas that are more disturbed.

Residual impacts to biodiversity would require offsetting. Impacts to biodiversity listed under the EPBC Act would require further assessment including the potential need for a referral to the Commonwealth Department of Agriculture, Water and the Environment if impacts can't be avoided. Referral assessment can be undertaken concurrently to approvals and may include referral of the entire master plan or early submission of referral of key sub-precincts with Matters of National Environmental Significance (e.g. Alpine Sphagnum Bogs and Associated Fens, Guthega Skink, Mountain Pygmy Possum). Early discussions with the Commonwealth Department are underway to confirm appropriate assessment approach.

To assist with avoidance and minimisation of impacts during the masterplan development phase, the biodiversity values recorded during the site surveys within the investigation area have been ranked in terms of biodiversity constraint in consultation with DPIE BCD (Figure 4.1 and Figure 4.2). Biodiversity constraints ranking have been based on the following criteria:

TIER 1 – HIGHEST BIODIVERSITY CONSTRAINT

- Native vegetation patches that correspond to Threatened Ecological Communities listed under the EPBC Act. Impacts to these would likely require a referral.
  - Alpine Sphagnum Bogs and Associated Fens
- Native vegetation patches (PCTs) that correspond to areas of Threatened Ecological Communities listed under the BC Act including:
  - Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions
  - Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion
- Known habitat for highly restricted threatened alpine species, namely Pygmy possum, Guthega Skink and Alpine Skink habitat
- Impacts to Tier 1 areas should be avoided as far as possible. Impacts would require offsets
- A Commonwealth EPBC Act may be required

TIER 2 – HIGH BIODIVERSITY CONSTRAINT

- Plant community types not included in Tier 1 that are in moderate to good condition
- Disturbed versions Threatened Ecological Communities (including poor condition, regeneration, revegetation areas)
- Vegetation zones that provide potential habitat for threatened species
- Impacts to these areas would require offsets
- A Commonwealth EPBC Act referral may be required

TIER 3 – LOW BIODIVERSITY CONSTRAINT

- Vegetation zones where structure and composition have been significantly altered as a result of ongoing management such as slashing and mowing, however may still provide connectivity value, for example isolated trees within existing development areas (e.g. car park trees) and vegetation within powerline easements
- Vegetation zones that are in low condition and would not require offsets under the BC Act (have Vegetation Integrity scores of less than 17)

TIER 4 – LEAST CONSTRAINT

- Disturbed areas that are not consistent with native plant community types (miscellaneous ecosystems, including, exotic plantings and exotic pasture)
- Non-native vegetation which is unlikely to provided habitat for Threatened fauna.

Island Bend Camping
FUNS RIVER
Ski Rider Motel
Ski Rider Alpine Resort
Kosciuszko Mountain Retreat Alpine Resort
EUCUMBENE RIVER
SNOWY RIVER
Sponars Resort
Kosciuszko Mountain Retreat Alpine Resort
SAWPIT CREEK
Sponars Chalet Resort
GEEHI RIVER
Guthega
Perisher Range Alpine Resort
PIPERS CREEK
KOSCIUSZKO ROAD
THREDBO RIVER
SNOWY RIVER
Perisher
Charlotte Pass Alpine Resort
Charlottes Pass
Bullocks Flat
Bullocks Flat Terminal
WOLLONDIBBY CREEK
ALPINE WAY
COBBIN CREEK
Thredbo Ranger Station
MOWAMBA RIVER
STEELS CREEK
OLD HUT CREEK
LITTLE THREDBO RIVER
GROSSES PLAIN CREEK
RENDEZVOUS CREEK
Thredbo Village

Legend

- Major Roads
- Local Roads
- Walking Tracks
- Watercourses
- Waterbodies
- Surveyed Areas
- Snowy SAP Boundary
- SAP Precincts

Vegetation Zones

- TIER 1
- TIER 2
- TIER 3
- TIER 4

Map: PS120074_GIS_094_A2	Author: AUVL502876
Date: 15/06/2021	Approved by: Selga.Harrington

0 1,000 2,000 m
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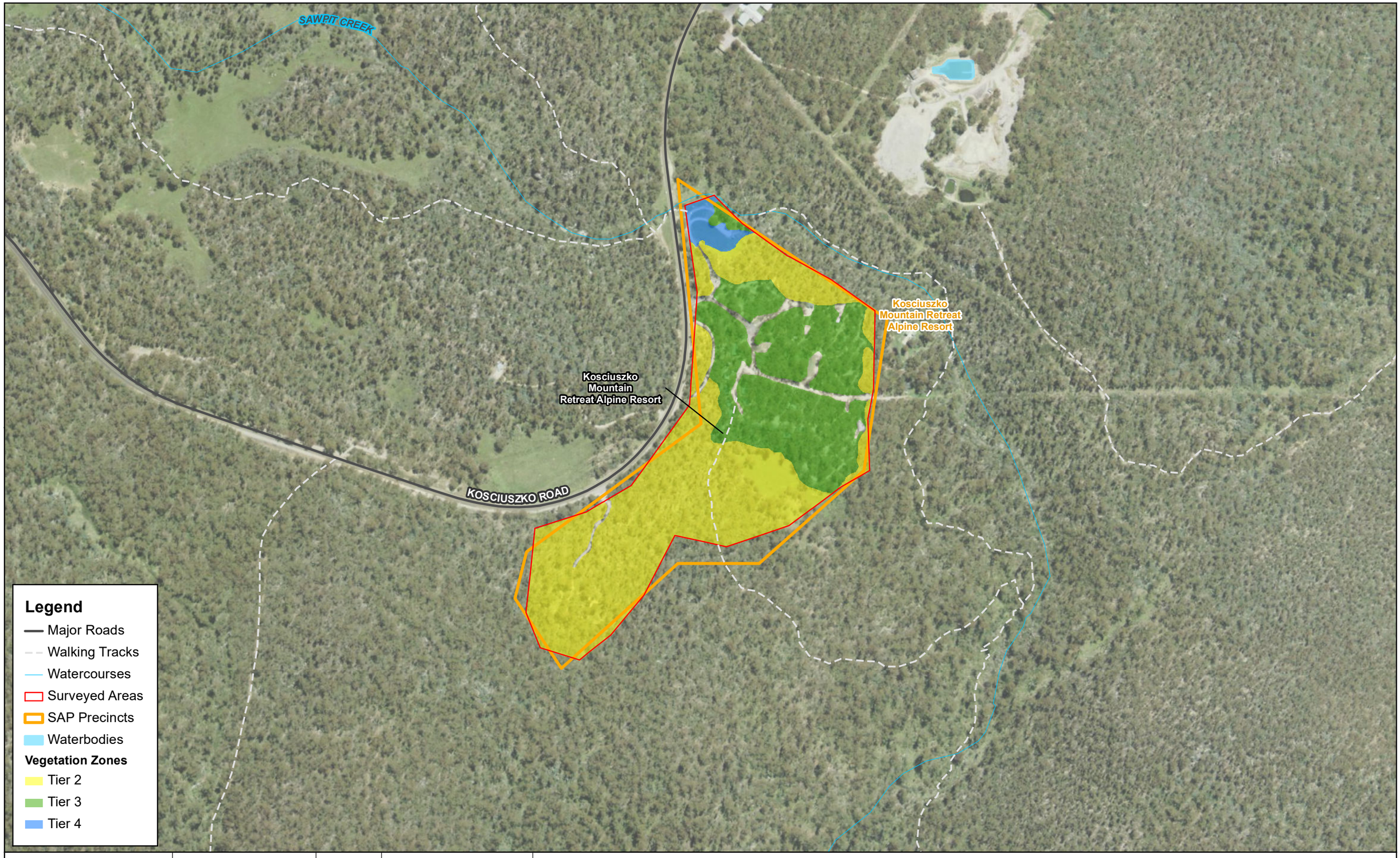
Coordinate System: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A3

Snowy SAP - Tier Mapping

Figure 4.1
Biodiversity tier mapping – Alpine region: Overview



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Date: 16/06/2021	Approved by: Selga.Harrington		

0 50 100 m
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Coordinate System: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A3

Snowy SAP - Tier Mapping

Figure 4.1a
Biodiversity tier mapping – Alpine region: Kosciuszko Mountain Retreat Alpine Resort

Map: PS120074_GIS_095_A3	Author: AUVL502876		0 50 100 m 1:5,000
Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

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Snowy SAP - Tier Mapping

Figure 4.1b
Biodiversity tier mapping – Alpine region: Ski Rider Motel

DIGGERS CREEK

Sponars Chalet Resort

KOSCIUSZKO ROAD

Sponars Resort

LITTLE DIGGERS CREEK

Legend

- Major Roads
- Local Roads
- Watercourses
- Surveyed Areas
- SAP Precincts
- Waterbodies

Vegetation Zones

- Tier 2
- Tier 3
- Tier 4

Map: PS120074_GIS_095_A3	Author: AUVL502876		0 50 100 m 1:5,000
Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

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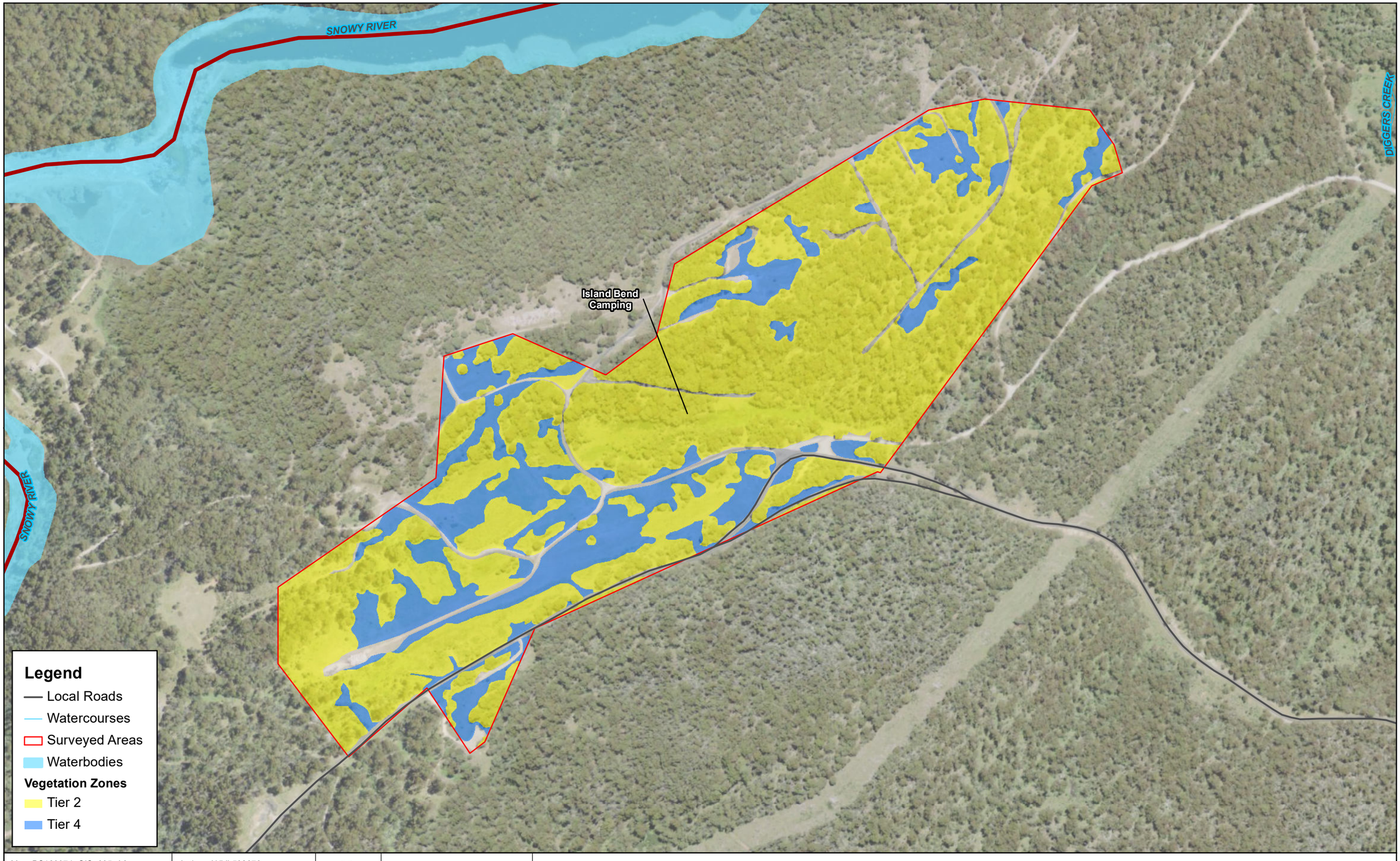
Snowy SAP - Tier Mapping

Figure 4.1c
Biodiversity tier mapping – Alpine region: Sponars Resort



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Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

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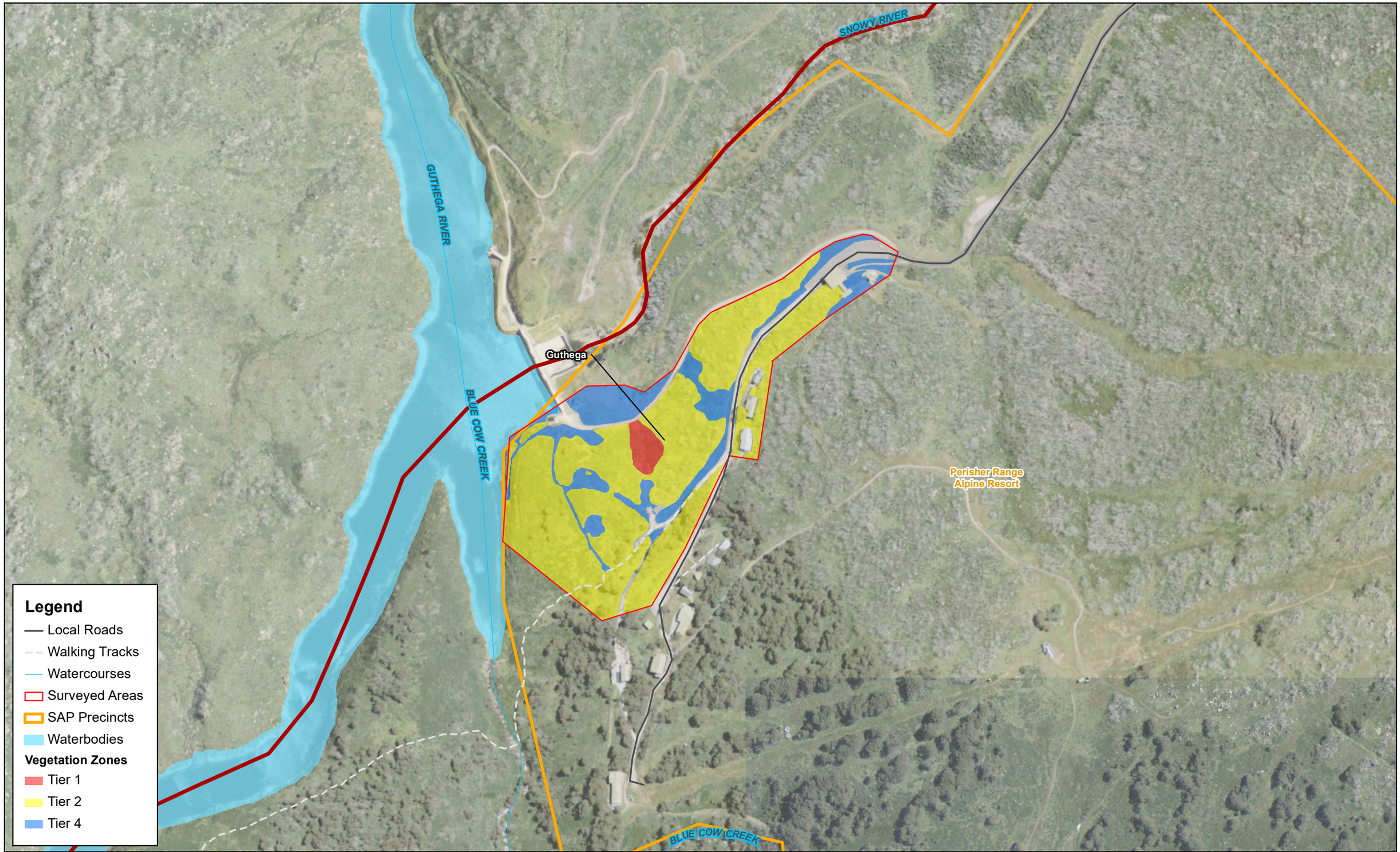
Snowy SAP - Tier Mapping

Figure 4.1d
Biodiversity tier mapping – Alpine region: Island Bend Camping



Map: PS120074_GIS_095_A3	Author: AUVL502876		0 50 100 m 1:5,000
Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

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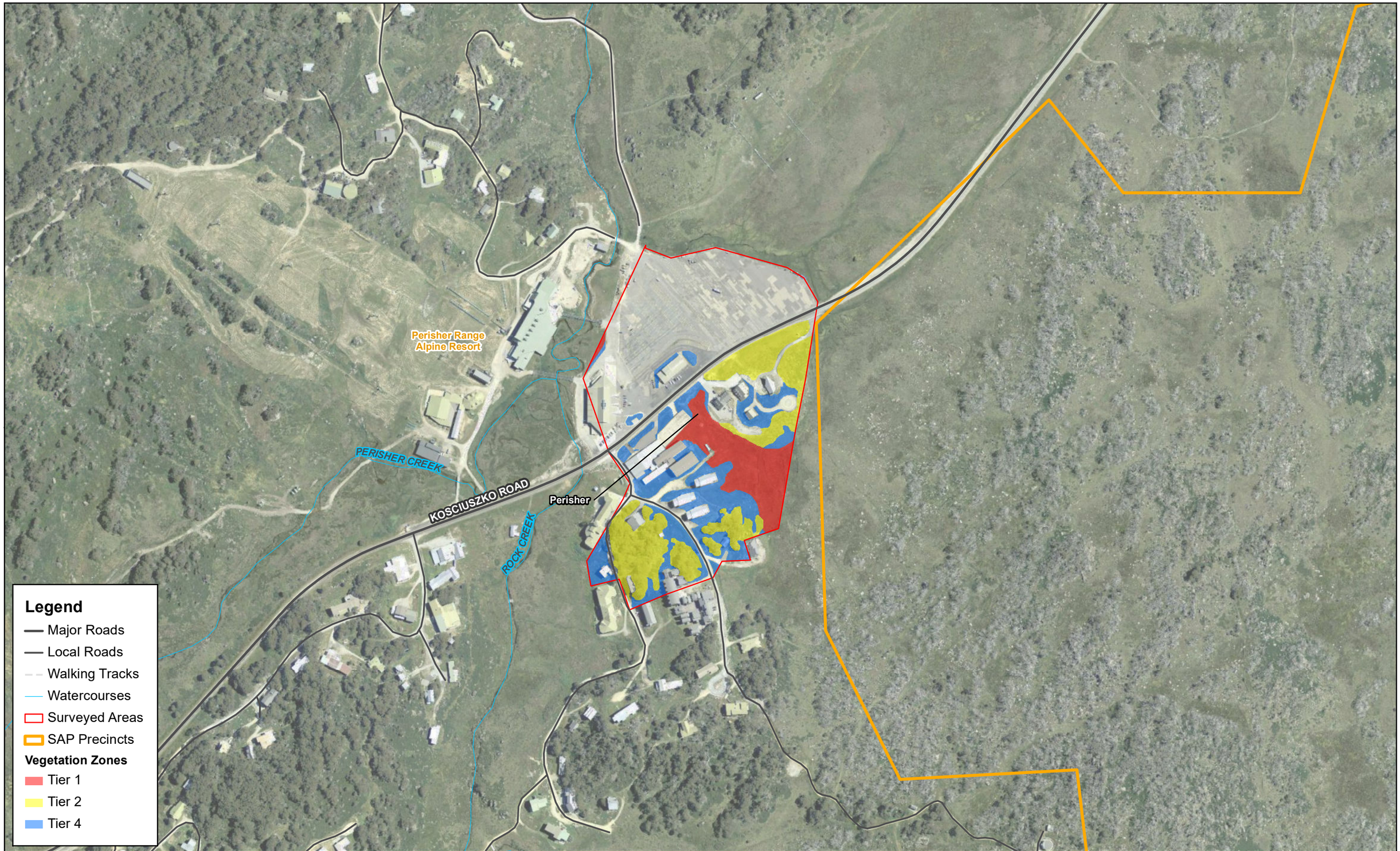
Snowy SAP - Tier Mapping

Figure 4.1e
Biodiversity tier mapping – Alpine region: Guthega



Map: PS120074_GIS_095_A3	Author: AUVL502876
Date: 16/06/2021	Approved by: Selga.Harrington

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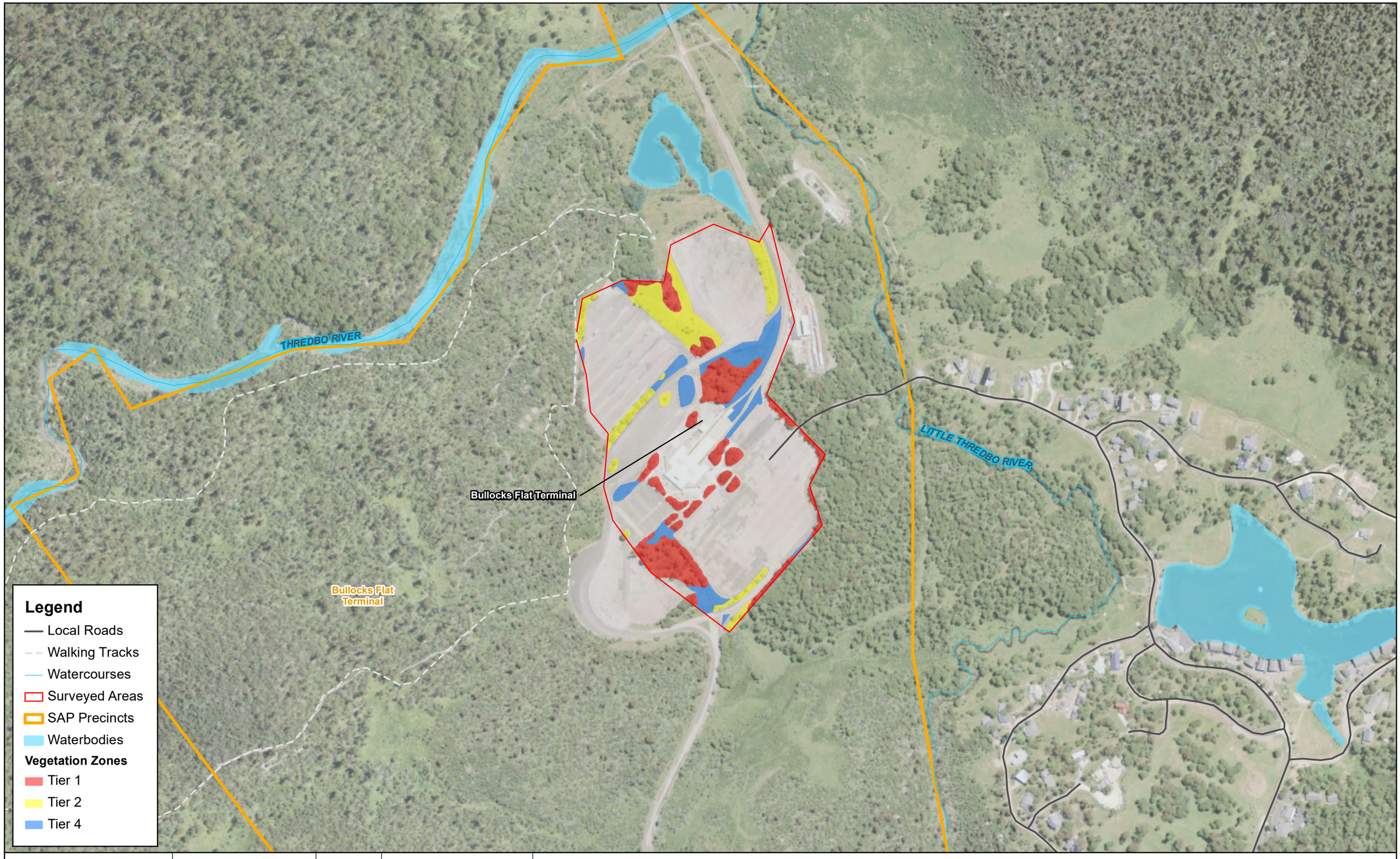
0 50 100 m

1:5,000

Coordinate System: GDA 1994 MGA Zone 55
Scale ratio correct when printed at A3

Snowy SAP - Tier Mapping

Figure 4.1f
Biodiversity tier mapping – Alpine region: Perisher



Map: PS120074_GIS_095_A3	Author: AUVL502876		0 50 100 m 1:5,000
Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

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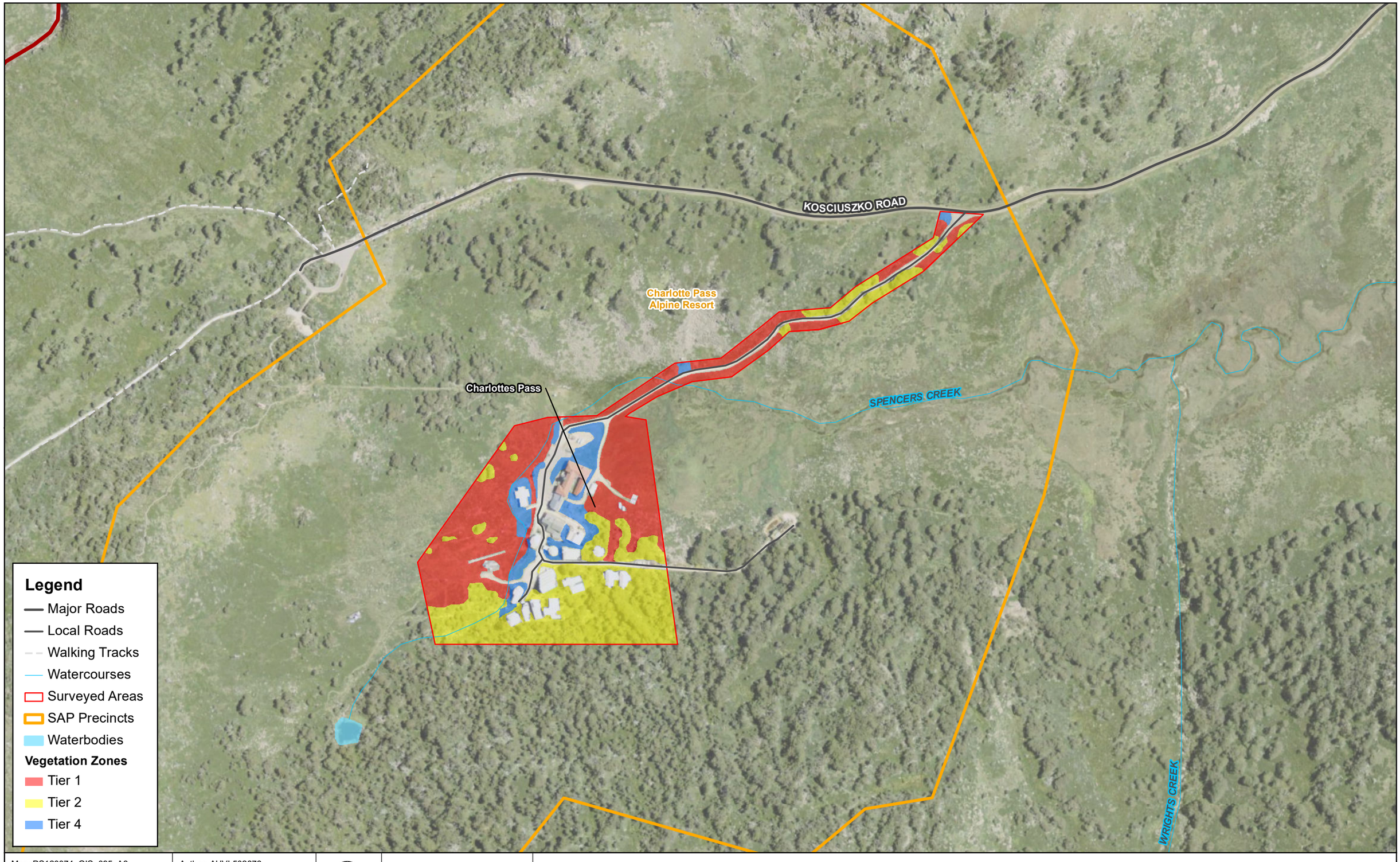
Snowy SAP - Tier Mapping

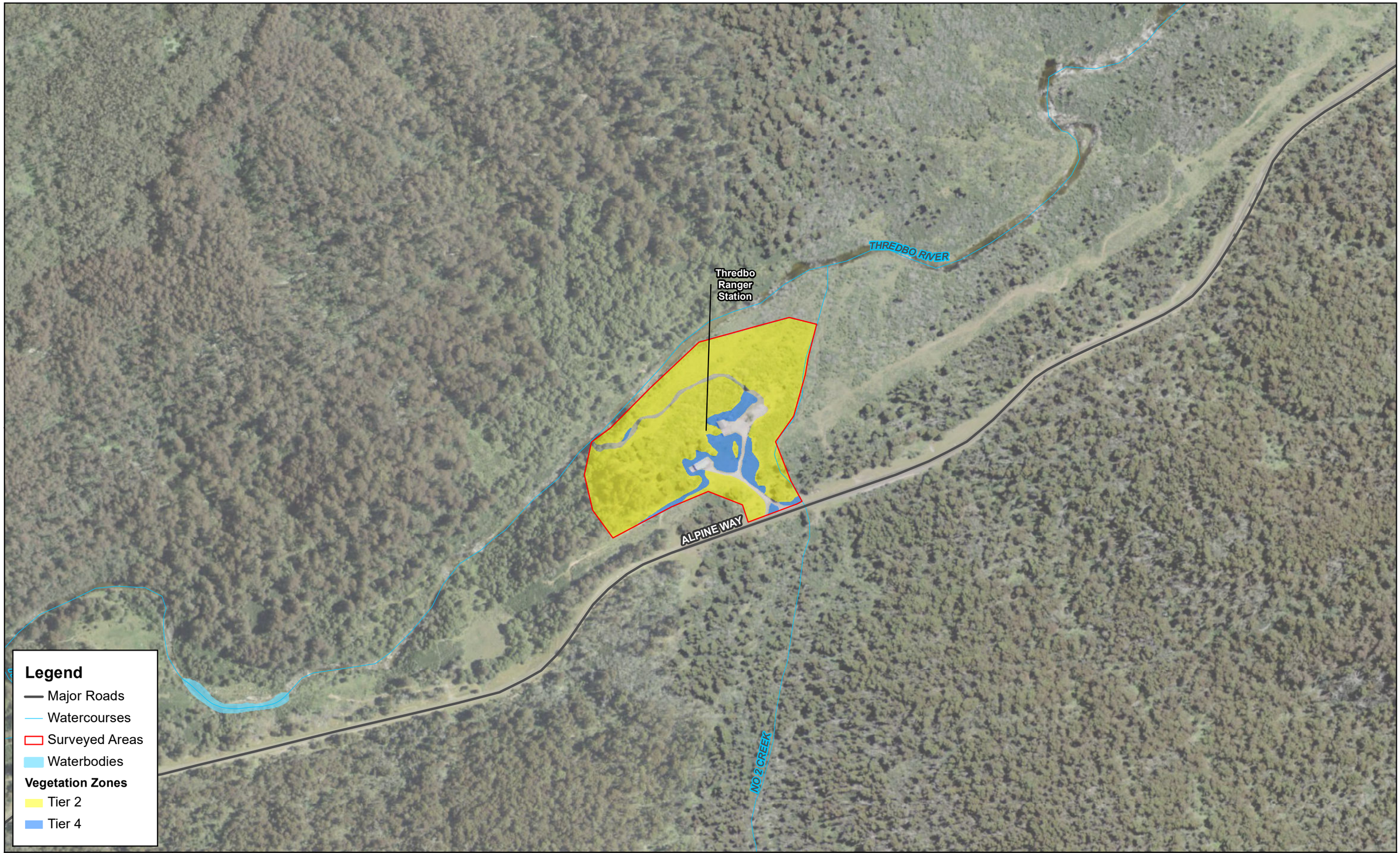
Figure 4.1h
Biodiversity tier mapping – Alpine region: Bullocks Flat Terminal



Map: PS120074_GIS_095_A3	Author: AUVL502876		0 50 100 m 1:5,000
Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

Snowy SAP - Tier Mapping

Figure 4.1i
Biodiversity tier mapping – Alpine region: Charlottes Pass



Map: PS120074_GIS_095_A3	Author: AUVL502876		0 50 100 m 1:5,000
Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

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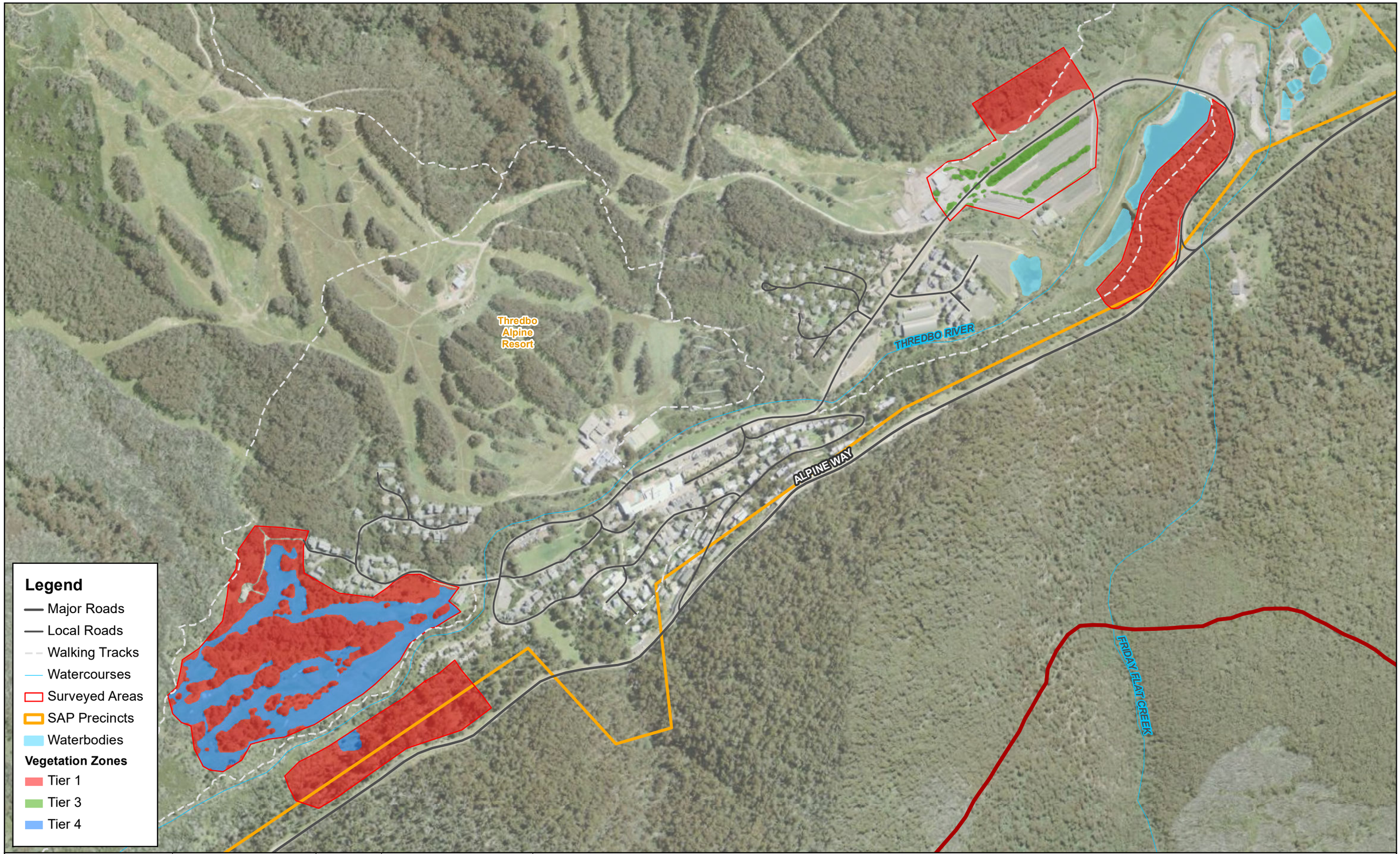
Snowy SAP - Tier Mapping

Figure 4.1j
Biodiversity tier mapping – Alpine region: Thredbo Ranger Station



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Date: 16/06/2021	Approved by: Selga.Harrington		Coordinate System: GDA 1994 MGA Zone 55 Scale ratio correct when printed at A3

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Snowy SAP - Tier Mapping

Figure 4.1k
Biodiversity tier mapping – Alpine region: Thredbo Village

Western Lake Jindabyne Sub-precinct
RUSHES CREEK
KOSCIUSZKO ROAD
WOLLONDIBBY CREEK
WIDOWS CREEK
ALPINE WAY
SNOWY RIVER
Jindabyne Town Centre and Foreshore Sub-precinct
JINDABYNE
Jindabyne West Sub-precinct
Jindabyne Town Centre Growth Sub-precinct
Southern Connector Road Corridor
Jindabyne West Sub-precinct
Southern Connector Road
MILL CREEK
Mountain Bike and Adventure Park Sub-precinct
Jindabyne Aerodrome Sub-precinct
Southern Connector Road Corridor
LEES CREEK
Barry Way South Sub-precinct
Leesville Sub-precinct
Sports and Education Sub-precinct
COBBIN CREEK

Legend

- Major Roads
- Local Roads
- Walking Tracks
- Snowy SAP Boundary
- Surveyed Areas
- Sub-Precincts
- Watercourses
- Waterbodies

Vegetation Zones

- TIER 1
- TIER 4

Map: PS120074_GIS_099_A3	Author: AUVL502876
Date: 15/06/2021	Approved by: S.H

Data source: © Department of Customer Service 2020

0 250 500 m

1:21,000

Coordinate system: GDA 1994 MGA Zone 55

Scale ratio correct when printed at A3

Snowy SAP - Tier Mapping

Figure 4.2

Biodiversity tier mapping – Jindabyne region

5 RECOMMENDATIONS

5.1 PROTECTING BIODIVERSITY VALUES

The aim of the SAP should be to avoid, conserve and enhance biodiversity values of the region. Specifically, the aims should include:

- to preserve the Precinct's landscape and biodiversity values
- to avoid or minimise impacts to threatened ecological communities
- to minimise impacts within undisturbed areas of Kosciuszko National Park
- to minimise the removal of remnant vegetation wherever possible
- to increase the number of trees in the Jindabyne region (where appropriate), including strategic revegetation to connect existing habitat and provide stepping stone linkages for mobile fauna
- to improve connectivity and wildlife corridors
- to preserve and rehabilitate natural waterways, which contribute to the area's character and biodiversity
- to improve water quality and reduce stormwater run-off through passive landscape design.

When considering the development location and impacts it is important to consider all the elements required including associated infrastructure (e.g. roads, utilities) as well as asset protection zones.

With a focus on avoiding and minimising impacts on biodiversity, development is therefore best suited to areas that are already disturbed including areas of existing development, cleared areas, and areas supporting exotic vegetation. This corresponds to Tier 4 and 3. It is acknowledged however that some disturbed areas may still contain constraints such as threatened fauna habitat and hydrological functions important for surrounding vegetation communities which may require avoidance or minimisation/mitigation.

Where possible, development should be located close to existing infrastructure as to limit the additional impacts associated with establishing supporting infrastructure (e.g., roads and utilities). This is of particular importance in areas within Kosciuszko National Park given its significance as a conservation area which supports a number of high biodiversity values.

Tier 1 and 2 have the highest biodiversity values and development in these areas should be avoided or minimised. Tier 1 and 2 areas that are linked to areas of native vegetation areas would provide good offsets for development in other areas.

The following considerations should be made to minimise impacts to biodiversity as far as reasonably practicable:

- development within Tier 1 and 2 should be avoided or minimised and offset
- any development within Alpine Precinct of Kosciuszko National Park should be low impact sustainable development and would need to consider the impacts of bushfire asset protection zones
- focussing or keeping development within already disturbed areas as far as possible (Tier 3 and 4)
- locating development nearby existing infrastructure to limit the need for additional impacts associated with creation of infrastructure and services (e.g. roads and utilities)
- maintaining a buffer between high ecological constraints (Tier 1 and 2) and development. A buffer of 30 m should be applied, or for specific species as specified in the Threatened Species Database.
- co-locating (and infill) developments as to minimise the spread of impacts on biodiversity values.

Residual impacts to biodiversity values would be assessed under the Biodiversity Assessment Methodology and require biodiversity offsetting in accordance with the NSW Biodiversity Offset Scheme. This scheme provides a transparent and scientific methodology to assess suitable offset types and quantum and provides a mechanism for long-term protection and management of offsets for conservation. The approach for biodiversity offset arrangements would be tailored for the

Alpine region and the Jindabyne region. In the Jindabyne region, where possible local or regional biodiversity offset arrangements should be investigated and provided to deliver benefits back to the regional community. This could include residual areas that are not developed becoming offset sites. In the Alpine region, the potential to deliver biodiversity offset arrangements will require further investigation with both NPWS and DPIE due to the unique environment of the Alpine area.

Residual impacts to biodiversity listed under the EPBC Act would require assessment including the need for a referral to the Commonwealth Department of Agriculture, Water and the Environment.

5.2 SUGGESTIONS FOR MASTERPLAN

An evidenced based approach should be adopted to determine the best outcome and to provide a clear pathway for the right types of future development, in the right locations. This process should seek to avoid and minimise impacts to biodiversity with a focus on mapping areas best suited to future development and expansion. This includes already disturbed areas of existing development, cleared areas, and areas supporting exotic vegetation corresponding to Tier 4 and 3 vegetation. Tier 1 and 2 vegetation have the highest biodiversity values and development in these areas should be avoided or minimised.

The following recommendations are provided to guide the master planning for the project.

5.2.1.1 JINDABYNE REGION

AIMS

- To preserve the Precinct's landscape, cultural, heritage and biodiversity values.
- To avoid or minimise impacts to threatened ecological communities.
- To minimise the removal of remnant vegetation wherever possible.
- To preserve and rehabilitate natural waterways, which contribute to the area's character and biodiversity.
- To prioritise new development in areas of low ecological value (Tier 3 and 4).
- To maintain and improve green connections across the Precinct, including strategic revegetation to connect wildlife habitats and provide stepping stone linkages for mobile fauna
- To improve water quality and reduce stormwater run-off through passive landscape design.
- To minimise impacts to important habitats such as rocky outcropping.

PERFORMANCE CRITERIA

a Areas of high ecological value and Tier 1 and 2 vegetation should not be removed. Development may occur in these areas if it is for essential infrastructure or where it can be demonstrated that impacts are minimal and will be appropriately offset.

b The subdivision of land may allow for the removal of some areas of high ecological value. The subdivision of land should consider the future uses of land and how biodiversity values can be retained. This may include the provision of vegetation links, the enhancement of riparian corridors and the retention and integration of smaller remnant vegetation areas and paddock trees with green infrastructure and active transport connections. Development should be designed to ensure connectivity through the landscape including corridors linking the lake foreshore with areas of high altitude.

c Development should be designed to be sympathetic to the biodiversity constraints.

d Development should be designed to ensure connectivity through the landscape including corridors linking the lake foreshore with areas of high altitude.

e Development should be concentrated in and around already disturbed areas. Co-locating (and infill) developments to minimise the spread of impacts on biodiversity values

f Where possible, development should provide a suitable buffer between areas of high ecological values and buildings and structures.

g Development should be focused on colocation and infill development to minimise the spread of impacts on biodiversity values.

h Development should minimise the clearing of vegetation, such as existing native vegetation and paddock trees, and important habitat areas, such as rocky outcrops.

i Tree plantings of endemic local species is encouraged to create green networks that support wildlife corridors and vegetation stepping stones for fauna movement. These species should be from a genetic source (usually seed) that have been assessed as being able to grow comfortably in the conditions projected from the present day to the end of the life of the tree.

j Riparian corridors, must be preserved and revegetated where possible. Setbacks to the corridors are to be provided in accordance with the Guidelines for Controlled Activities on Waterfront Land (2018, NRAR).

SUPPORTING PROVISIONS TO BE DEVELOPED

a Development to avoid impacts to Tier 1 and 2 by altering the development proposal. A suitable buffer around these areas must be provided to ensure its protection both during the short-term construction phase of development and in the long-term use of the area.

b Further assessment for threatened biodiversity should be undertaken when specific impacts are known for sites that have not been surveyed and/or where there is potential habitat for threatened species.

c A Management Plan that incorporates the biodiversity aims should be developed as part of the Delivery Plan or DCP. This plan should address:

- **i** The retention and maintenance of existing native vegetation and areas of high ecological areas (Tier 1 & Tier 2).
- **ii** Additional planting and the creation of connections, wildlife corridors and vegetation stepping stones, where possible.
- **iii** Areas for new public open spaces, publicly accessible areas or paths, including appropriate management strategies for these areas.
- **iv** Riparian corridors, setbacks and design objectives for development interfacing with watercourses.
- **v** Plantings along road reserves that address visual amenity, public amenity considerations and road safety.
- **vi** Client ready species which are locally endemic to the Region.
- **vii** The mitigation of urban heat island impacts, particularly in the Town Centre.
- **viii** Connection and Return to Connection, including through, but not limited to, landscape design.
- **ix** Site-based setbacks, landscaping and public domain requirements.
- **x** How vegetation clearing and biodiversity offsets will be managed (either across Precincts, Sub-Precincts or on a development-by-development basis).

5.2.1.2 ALPINE PRECINCT

AIMS

- To preserve the Precinct's unique landscape and biodiversity values.
- To avoid impacts to threatened ecological communities, threatened species and their habitats.
- To minimise the removal of existing native vegetation wherever possible.
- To preserve and rehabilitate natural waterways, which contribute to the area's character and biodiversity.
- To improve water quality and reduce stormwater run-off particularly to sensitive habitats.
- To prioritise new development in areas of low ecological value (Tier 3 and 4) and minimise impacts within undisturbed areas of Kosciuszko National Park.
- To minimise impacts to important habitats such as rocky boulder fields, unburnt areas of old growth Snow Gum woodland, bogs and fens.
- To avoid impacts to endemic alpine biodiversity with highly restricted distributions: Mountain Pygmy Possum, Alpine Skink and Guthega Skink
- To preserve natural waterways and bogs and fens
- To ensure that any impacts within Kosciuszko National Park are offset through direct management measures within the Park and should be related to the biodiversity impacted.

PERFORMANCE CRITERIA

a Development is to avoid Tier 1 and 2 vegetation to minimise impacts to areas of high ecological value. Areas of high ecological value and Tier 1 and 2 vegetation should not be removed. Development may occur in these areas if it is for essential infrastructure.

b Development should be concentrated in and around already disturbed areas. Where possible, development should provide a buffer between areas of high ecological values and buildings and structures.

c Development should be focused on colocation and redevelopment to minimise the impact to biodiversity valued land.

d Development within the Kosciuszko National Park should minimise its impact to the environmental and natural landscape, implement sustainable development and consider the impacts of bushfire asset protection zones (APZ).

e Development must offset any impacts to biodiversity through direct management measures within Kosciuszko National Park and should be related to the biodiversity impacted.

f Riparian corridors must be preserved and revegetated where possible. Setbacks to the corridors are to be provided in accordance with the Guidelines for Controlled Activities on Waterfront Land (2018, NRAR).

g Any revegetation or planting within the National Park should utilise local species.

SUPPORTING PROVISIONS TO BE DEVELOPED

a Design guidance should be provided to identify how these areas will ensure will be protected during the short-term construction phase of development and in the long-term use of the area. Design guidance for each Sub-Precinct identifying how biodiversity aims will be addressed, including:

- **i** The retention and maintenance of existing native vegetation and areas of high ecological areas (Tier 1 & Tier 2).
- **ii** Additional planting and areas for new public open spaces, publicly accessible areas or paths, including appropriate management strategies for these areas.
- **iii** Riparian corridors, setbacks and design objectives for development interfacing with watercourses.
- **iv** Plantings along road reserves that address visual amenity, public amenity considerations and road safety.
- **v** Client ready species which are locally endemic to the Alpine Region.
- **vi** Site-based setbacks, landscaping and public domain requirements.
- **vii** How vegetation clearing and biodiversity offsets will be managed (either across Precinct, Sub-Precincts or on a development-by-development basis).

5.3 ADDITIONAL FIELD SURVEY

Not all areas of each sub-precinct have been surveyed (Figure 2.1 and Figure 2.2). Detailed ecology surveys following would be required for areas not yet surveyed to verify the plant community types and habitats present.

Targeted field surveys are recommended should potential habitat for threatened species be impacted for the SAP. Threatened species listed under the BC and EPBC Acts and the seasonal survey timings are outlined below.

The seasonal species surveys required have been summarised based on known habitat within the Alpine and Jindabyne precincts. As the plant community types and habitats within all areas of the sub-precincts has not been verified with field surveys, this list is indicative, and a definitive list cannot be provided until initial plant community type and habitat surveys and mapping have been undertaken across the sub-precinct.

5.3.1 BC ACT LISTED SPECIES

Targeted field surveys are recommended should potential habitat for candidate species be impacted for the SAP. Targeted surveys within potential habitats for the following candidate species credit species would be recommended should impacts to potential habitat be considered (Table 5.1 and Table 5.2).

Seasonal surveys are the preferred approach to determine presence within the investigation area. It should be noted that as an alternate to additional seasonal field surveys, an expert report could be prepared by an expert appointed under the BC Act to cover off survey deficiencies for these species or the species could be assumed present and biodiversity offsets would be required for these species. Alternatively, the avoidance of impact to potential habitat for these species would eliminate the requirement for additional targeted surveys.

Table 5.1 Survey season for candidate flora species with potential habitat

SPECIES NAME	COMMON NAME	BC ACT	EPBC ACT	PLANT COMMUNITY TYPE	ALPINE SUB-PRECINCTS	JINDABYNE SUB-PRECINCTS	SURVEY SEASON
Caladenia montana	Caladenia montana	Vulnerable	-	— 679, 1196	— Ski Rider Resort — Bullocks Flat — Thredbo Ranger Station — Thredbo Village — Island Bend	—	Nov
Calotis glandulosa	Mauve Burr-daisy	Vulnerable	Vulnerable	— 679, 1196, 1191	— Ski Rider Resort — Bullocks Flat — Thredbo Ranger Station — Thredbo Village — Island Bend	— All Jindabyne sub-precincts	Oct – Jan
Carex raleighii	Raleigh Sedge	Endangered	-	— 637	— Charlotte Pass — Guthega — Perisher Valley — Thredbo Village	—	Dec – Mar

SPECIES NAME	COMMON NAME	BC ACT	EPBC ACT	PLANT COMMUNITY TYPE	ALPINE SUB-PRECINCTS	JINDABYNE SUB-PRECINCTS	SURVEY SEASON
Discaria nitida	Leafy Anchor Plant	Vulnerable	-	— 679, 637, 644	— Charlotte Pass — Guthega — Perisher Valley — Thredbo Village — Ski Rider Resort — Island Bend — Bullocks Flat — Thredbo Ranger Station — Sponars Chalet Resort	—	Nov – Apr
Euphrasia scabra	Rough Eyebright	Endangered	-	— 679,637, 1191	— Charlotte Pass — Guthega — Perisher Valley — Thredbo Village — Ski Rider Resort — Island Bend — Bullocks Flat — Thredbo Ranger Station	— All Jindabyne sub-precincts	Feb – Apr

SPECIES NAME	COMMON NAME	BC ACT	EPBC ACT	PLANT COMMUNITY TYPE	ALPINE SUB-PRECINCTS	JINDABYNE SUB-PRECINCTS	SURVEY SEASON
Pterostylis alpina	Alpine Greenhood	Vulnerable	–	— 679, 1196	— Ski Rider Resort — Bullocks Flat — Thredbo Ranger Station — Thredbo Village — Island Bend	—	Aug – Nov
Pterostylis foliata	Slender Greenhood	Vulnerable	–	— 679, 1196	— Ski Rider Resort — Bullocks Flat — Thredbo Ranger Station — Thredbo Village — Island Bend	—	Oct – Nov
Pterostylis oreophila	Blue-tongued Greenhood	Critically Endangered	Critically Endangered	— 637	— Charlotte Pass — Thredbo Village — Perisher Village — Guthega	—	Dec – Jan
Ranunculus anemoneus	Anemone Buttercup	Vulnerable	Vulnerable	— 637	— Charlotte Pass — Thredbo Village — Perisher Village — Guthega	—	Oct – Apr

SPECIES NAME	COMMON NAME	BC ACT	EPBC ACT	PLANT COMMUNITY TYPE	ALPINE SUB-PRECINCTS	JINDABYNE SUB-PRECINCTS	SURVEY SEASON
Rytidosperma vickeryae	Perisher Wallaby-grass	Endangered	–	— 637	— Charlotte Pass — Thredbo Village — Perisher Village — Guthega	—	Feb – Mar
Swainsona sericea	Silky Swainson-pea	Vulnerable	-	— 1191	—	— All Jindabyne sub-precincts	Oct-Nov
Thesium australe	Austral Toadflax	Vulnerable	Vulnerable	— 679, 1196, 1191	— Ski Rider Resort — Bullocks Flat — Thredbo Ranger Station — Thredbo Village — Island Bend	— All Jindabyne sub-precincts	Nov – Feb

Note: Based on known vegetation and habitats identified in surveyed areas

(1) Plant Community Type that are known to occur within the precincts that provide habitat for these species. Description of PCTs is provided in Appendix A. PCTs include:

- *PCT 637: Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 643: Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion*
- *PCT 644: Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 645: Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion*
- *PCT 679: Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion*
- *PCT 1196: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion.*

Table 5.2 Survey season for candidate fauna species with potential habitat

COMMON NAME	SCIENTIFIC NAME	BC ACT	EPBC ACT	PLANT COMMUNITY TYPE[1]	ALPINE SUB-PRECINCTS	JINDABYNE SUB-PRECINCTS	SURVEY SEASON
Pink-tailed Legless Lizard	*Aprasia parapulchella*	Vulnerable	Vulnerable	— 1191	—	— All Jindabyne sub-precincts	Sep- Nov
Gang-gang Cockatoo (breeding)	*Callocephalon fimbriatum*	Vulnerable	–	— 644, 645, 679, 1191,1196	— All Alpine sub-precincts	— All Jindabyne sub-precincts	Dec-Jan
Eastern Pygmy-possum	*Cercartetus nanus*	Vulnerable	–	— 1191,1196	— Ski Rider Resort — Kosciuszko Mountain Retreat Alpine Resort	— All Jindabyne sub-precincts	Oct-March
Little Eagle (breeding)	*Hieraaetus morphnoides*	Vulnerable	–	— 637, 643, 644, 645, 679, 1191,1196	— All Alpine sub-precincts	— All Jindabyne sub-precincts	Aug-Oct
Alpine Tree Frog	*Litoria verreauxii alpina*	Endangered	Vulnerable	— 637, 643, 644, 645, 679, 1196	— All Alpine sub-precincts	—	Nov-Dec
Broad-toothed Rat	*Mastacomys fuscus*	Vulnerable	Vulnerable	— 637, 643, 644, 645, 679	— All Alpine sub-precincts	—	Oct- May
Southern Myotis	*Myotis macropus*	Vulnerable	–	— 1191	—	— All Jindabyne sub-precincts	Dec- Mar
Barking Owl (breeding)	*Ninox connivens*	Vulnerable	–	— 1191	—	— All Jindabyne sub-precincts	May- Dec

COMMON NAME	SCIENTIFIC NAME	BC ACT	EPBC ACT	PLANT COMMUNITY TYPE[1]	ALPINE SUB-PRECINCTS	JINDABYNE SUB-PRECINCTS	SURVEY SEASON
Powerful Owl (breeding)	*Ninox strenua*	Vulnerable	–	— 1191	—	— All Jindabyne sub-precincts	May- Aug
Pink Robin	*Petroica rodinogaster*	Vulnerable	–	— 644, 679, 1191,1196	— Sponars Chalet Resort — Ski Rider Resort — Island Bend — Bullocks Flat — Thredbo Ranger Station — Thredbo Village — Kosciuszko Mountain Retreat Alpine Resort —	— All Jindabyne sub-precincts	All year (May-Aug for altitudinal or seasonal vagrants
Smoky Mouse	*Pseudomys fumeus*	Critically Endangered	Endangered	— 643, 1196	— Ski Rider Resort — Kosciuszko Mountain Retreat Alpine Resort — Charlotte Pass — Island Bend	—	Sep – early Dec; Feb – Apr
Mountain Pygmy-possum	*Burramys parvus*	Endangered	Endangered	— 637, 643, 644, 645	— Charlotte Pass — Perisher Valley — Guthega — Sponars Chalet Resort — Thredbo Village	—	Oct-Mar

COMMON NAME	SCIENTIFIC NAME	BC ACT	EPBC ACT	PLANT COMMUNITY TYPE[1]	ALPINE SUB-PRECINCTS	JINDABYNE SUB-PRECINCTS	SURVEY SEASON
Alpine She-oak Skink	*Cyclodomorphus praealtus*	Endangered	Endangered	— 637, 643, 644, 645, 679, 1196	— All Alpine sub-precincts	—	Oct-Apr
Guthega Skink	*Liopholis guthega*	Endangered	Endangered	— 643, 644, 645, 679, 1196	— All Alpine sub-precincts	—	Oct-Apr
Alpine Tree Frog	*Litoria verreauxii alpina*	Endangered	Vulnerable	— 637, 643, 644, 645, 679, 1196	— All Alpine sub-precincts	—	Nov-Dec
Broad-toothed Rat	*Mastacomys fuscus*	Vulnerable	Vulnerable	— 637, 643, 644, 645, 679	— All Alpine sub-precincts	—	Oct- May

Notes: *Based on known vegetation and habitats identified in surveyed areas and Threatened Species Database*

(1) Plant Community Type that are known to occur within the precincts that provide habitat for these species. Description of PCTs is provided in Appendix A. PCTs include:

- *PCT 637: Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 643: Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion*
- *PCT 644: Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 645: Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion*
- *PCT 679: Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion*
- *PCT 1196: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion.*

5.3.2 EPBC ACT LISTED SPECIES

The EPBC Act listed species with potential habitat listed in the tables above and in Table 5.3 below, should be considered for further assessment via targeted survey, expert report, or assumed presence.

Table 5.3 Survey season for additional EPBC Act listed species with potential habitat

COMMON NAME	SPECIES NAME	BC ACT	EPBC ACT	PCT[2]	SUB-PRECINCTS	SURVEY SEASON
Flora						
Swamp Everlasting, Swamp Paper Daisy	*Xerochrysum palustre*	-	Vulnerable	637, 679	Alpine: Perisher Valley, Guthega, Charlotte Pass, Ski Rider Resort, Bullocks Flat, Thredbo Village	Nov-Mar
Birds						
Regent Honeyeater	*Anthochaera phrygia*	Critically Endangered[1]	Critically Endangered	1191	All Jindabyne sub-precincts	Apr-Aug
White-throated Needletail	*Hirundapus caudacutus*	-	Vulnerable	637, 643, 644, 645, 679, 1191,1196	All sub-precincts	Oct-May
Mammals						
Spot-tailed Quoll, Spotted-tail Quoll, Tiger Quoll (southeastern mainland population)	*Dasyurus maculatus maculatus* (SE mainland population)	Vulnerable[1]	Endangered	644, 679, 1191, 1196	All sub-precincts	May - Aug
Greater Glider	*Petauroides volans*	-	Vulnerable	1191, 1196	All Jindabyne sub-precincts	
Reptiles						
Striped Legless Lizard, Striped Snake-lizard	*Delma impar*	Vulnerable[1]	Vulnerable	1191 derived grassland, 320	All Jindabyne sub-precincts	Sept-May

Notes:

(1) Ecosystem credit species under BAM;

(2) Plant Community Types that are known to occur within the precincts that provide habitat for these species. - description of PCTs is provided in Appendix A. PCTs:

- *PCT 637: Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 643: Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion*

- *PCT 644: Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 645: Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion*
- *PCT 679: Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion*
- *PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion*
- *PCT 1196: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion.*

6 LIMITATIONS

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6.5 FIELD SURVEY LIMITATIONS

No sampling technique can eliminate the possibility that a species is present on a site. For example, some species of plant may be present in the soil seed bank and some fauna species use habitats on a sporadic or seasonal basis and may not be present on site during surveys. The conclusions in this report are based upon previous studies, data acquired for the site and the biodiversity field surveys and are, therefore, merely indicative of the environmental condition of the site at the time of preparing the report, including the presence or otherwise of species. Also, it should be recognised that site conditions, including the presence of threatened species, can change with time.

Surveys were undertaken outside optimal survey season for a number of species which are difficult to detect outside these times including *Rytidosperma vickeryae* or *Carex raleighi.* Weather conditions including temperature are critical to fauna surveys, particularly in the sub-alpine and alpine areas. Targeted season surveys for candidate threatened species have not been undertaken for this BDAR and have been recommended where potential habitat occurs.

Given access restrictions, for example areas closed due to Asbestos hazard at Island Bend, some sections of the study area were unable to be inspected. Where access was not available, biodiversity values were extrapolated from desktop assessment.

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APPENDIX A

PLANT COMMUNITY TYPES

A1 PLANT COMMUNITY TYPE DESCRIPTIONS

Seven Plant Community Types (PCTs) were identified during field surveys as follows:

- PCT 637: Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion
- PCT 643: Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion
- PCT 644: Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP, South Eastern Highlands Bioregion and Australian Alps Bioregion
- PCT 645: Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion
- PCT 679: Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion
- PCT 1191: Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion
- PCT 1196: Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion.

In addition, Miscellaneous Ecosystems were identified which were largely areas of planted exotic trees or weed dominated vegetation.

These Plant Communities are described below.

A1.1 PCT637: ALPINE AND SUB-ALPINE PEATLANDS, DAMP HERBFIELDS AND FENS, SOUTH EASTERN HIGHLANDS BIOREGION AND AUSTRALIAN ALPS BIOREGION

Vegetation formation: Alpine Complex

Vegetation class: Alpine Bogs and Fens

Conservation Significance: This PCT is part of the Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions which is listed as an Endangered Ecological Community under the BC Act.

Description

The Alpine and sub-alpine peatlands, damp herbfields and fens, South Eastern Highlands Bioregion and Australian Alps Bioregion PCT (PCT 637) is described in the BioNet Vegetation Classification database as a low shrubland, wet herbfield or sedgeland often with moss hummocks, occurring in areas with impeded drainage and peaty soils between 1100 and 2000 m elevation.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Baeckea gunniana, Epacris paludosa,* and *Richea continentis* with a ground stratum characterised by species including *Baloskion australe, Brachyscome obovata, Carex gaudichaudiana, Empodisma minus, Luzula modesta, Oreobolus distichus, Oreomyrrhis ciliata, Poa costiniana,* and *Sphagnum cristatum* (a moss).

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 637 for the following reasons:

- The mid stratum is dominated by species typical of PCT 637 including *Epacris paludosa, Richea continentis,* and *Baeckea gunniana* among a variety of other species.
- The ground stratum contains species typical of PCT 637 including *Carex gaudichaudiana, Empodisma minus, Luzula* sp., *Oreobolus distichus, Oreomyrrhis* spp., *Poa costiniana,* and *Sphagnum cristatum.*
- The vegetation occurs in areas with impeded drainage and peaty soils between 1,100 and 2,000 m elevation.

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 637 within the subject lands is given below in Table A.1. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands. PCT 637 is situated adjacent to PCT 643 and PCT 645 and there is overlap with species at ecotones.

Table A.1 Floristic and structural summary of PCT 637 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	Absent
Midstorey (mid-stratum)	*Epacris paludosa, Epacris microphylla, Epacris breviflora, Epacris petrophila, Richea continentis, Baeckea gunniana, Oxylobium ellipticum, Callistemon pityoides, Cassinia monticola, Hovea montana, Hakea microcarpa, Grevillea australis, Olearia algida, Olearia phlogopappa, Nematolepis ovatifolia, Rubus parvifolius, Prostanthera cuneata, Pimelea ligustrina, Pimelea alpina*

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Groundcovers (ground stratum)	*Poa costiniana, Poa phillipsiana, Poa labillardierei, Poa hiemata, Carex appressa, Carex gaudichaudiana, Carex inversa, Empodisma minus, Epilobium billardierianum* subsp. *Cinereum, Acaena ovina, Acaena novae-zelandiae, Aciphylla glacialis, Aciphylla simplicifolia, Brachyscome graminea, Brachyscome decipiens, Euphrasia collina* subsp. *Diversicolor, Oschatzia cuneifolia, Oreomyrrhis brevipes, Oreomyrrhis eriopoda, Lythrum salicaria, Chrysocephalum apiculatum, Ranunculus graniticola, Ranunculus gunnianus, Ranunculus pimpinellifolius, Ranunculus millanii, Celmisia pugioniformis, Celmisia longifolia, Festuca asperula, Craspedia aurantia, Scleranthus biflorus, Trisetum spicatum, Senecio gunnii, Luzula* sp., *Cardamine lilacina, Oreobolus distichus, Neopaxia australasica, Myriophyllum* sp., *Viola fuscoviolacea, Sphagnum cristatum* (moss so not detailed in BAM plot surveys).
Exotic species	*Anthoxanthum odoratum, Rubus ulmifolius, Taraxacum officinale, Hypochaeris radicata, — Veronica peregrina, Cerastium glomeratum*
High Threat Weeds	*Achillea millefolium, Acetosella vulgaris*

Photo A.1 Example of PCT 637 at Perisher

Photo A.2 Example of PCT 637 at Charlottes Pass

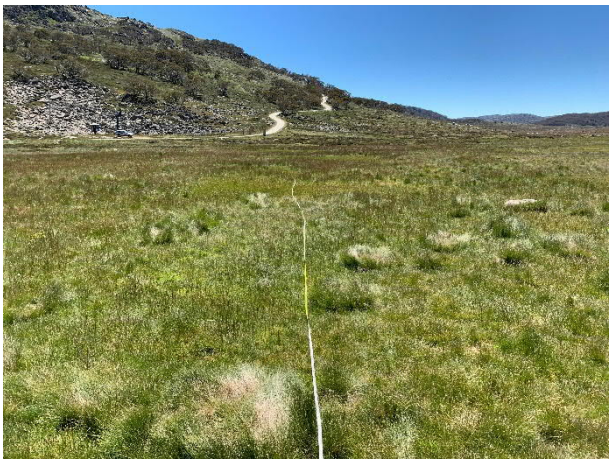

Photo A.3 Example of PCT 637 at Charlottes Pass

Photo A.4 Example of PCT 637 at Charlottes Pass

A1.2 PCT643: ALPINE SHRUBLAND ON SCREE, BLOCKSTREAMS AND ROCKY SITES OF HIGH ALTITUDE AREAS OF KOSCIUSZKO NATIONAL PARK, AUSTRALIAN ALPS BIOREGION

Vegetation formation: Alpine Complex

Vegetation class: Alpine Heaths

Conservation significance: This PCT is not part of a TEC.

Description

The Alpine shrubland on scree, blockstreams and rocky sites of high altitude areas of Kosciuszko National Park, Australian Alps Bioregion PCT (PCT 643) is described in the BioNet Vegetation Classification database as an open or closed shrubland occurring in rocky areas above 1,300m in the sub-alpine and alpine areas of Kosciuszko NP.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Grevillea australis, Nematolepis ovatifolia, Oxylobium ellipticum, Podocarpus lawrencei, Prostanthera cuneata, Leucopogon montanus,* and *Olearia phlogopappa* subsp. *flavescens* with a ground stratum characterised by species including *Acaena novae-zelandiae, Asperula gunnii, Austrodanthonia alpicola, Carex breviculmis, Deyeuxia crassiuscula, Epilobium billardierianum, Luzula novae-cambriae, Poa fawcettiae, Polystichum proliferum, Scleranthus singuliflorus, Oreomyrrhis eriopoda,* and *Viola betonicifolia.*

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 643 for the following reasons:

- The mid stratum is dominated by species typical of PCT 643 including *Grevillea australis, Oxylobium ellipticum, Podocarpus lawrencei, Prostanthera cuneata, Acrothamnus montanus* (syn. *Leucopogon montanus*) and *Olearia phlogopappa.*
- The ground stratum contains species typical of PCT 643 including *Polystichum proliferum* and *Oreomyrrhis eriopoda.*
- The vegetation occurs in rocky areas above 1,300m in the sub-alpine and alpine areas of Kosciuszko NP. Within the subject lands this PCT is restricted to the Charlottes Pass where there are large boulder fields where there is a heath of *Podocarpus lawrencei.*

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 643 within the subject lands is given below in Table A.2. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands. PCT 643 is situated adjacent to PCT 637 and PCT 645 and there is overlap with species at ecotones.

Table A.2 Floristic and structural summary of PCT 643 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	*Eucalyptus niphophila* juveniles at edges
Midstorey (mid-stratum)	*Podocarpus lawrencei, Prostanthera cuneata, Tasmannia xerophila, Oxylobium ellipticum, Pimelea ligustrina, Epacris paludosa, Epacris petrophila, Olearia brevipedunculata, Olearia phlogopappa, Olearia algida, Baeckea gunniana, Oxylobium ellipticum, Grevillea australis, Acrothamnus montanus*

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Groundcovers (ground stratum)	*Polystichum proliferum, Senecio gunnii, Poa sieberiana* var. *cyanophylla, Poa hiemata, Oreomyrrhis eriopoda, Celmisia longifolia, Carex inversa, Asperula gunnii, Cardamine lilacina, Lythrum salicaria, Craspedia aurantia*
Exotic species	None apart from High Threat Weeds listed below
High Threat Weeds	*Pinus sp., Acetosella vulgaris*

Photo A.5 Example of PCT 643 at Charlottes Pass

Photo A.6 Example of PCT 643 on a narrow boulder field between stands of *Eucalyptus niphophila* at Charlottes Pass

Photo A.7 Example of PCT 643 at Charlottes Pass

Photo A.8 Example of PCT 643 on a broader more extensive boulder field at Charlottes Pass

A1.3 PCT644: ALPINE SNOW GUM - SNOW GUM SHRUBBY WOODLAND AT INTERMEDIATE ALTITUDES IN NORTHERN KOSCIUSZKO NP, SOUTH EASTERN HIGHLANDS BIOREGION AND AUSTRALIAN ALPS BIOREGION

Vegetation formation: Grassy Woodlands

Vegetation class: Subalpine Woodlands

Conservation significance: This PCT is not part of a TEC.

Description

The Alpine Snow Gum - Snow Gum shrubby woodland at intermediate altitudes in northern Kosciuszko NP, South Eastern Highlands Bioregion and Australian Alps Bioregion PCT (PCT 644) is described in the BioNet Vegetation Classification database as a low open woodland with mixed understorey of shrubs and tussock grasses occurring in sub-alpine areas between 1,500 and 1,700 m usually on free draining slopes, ridges and spurs.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Eucalyptus niphophila* and *Eucalyptus pauciflora* with a shrub layer of *Bossiaea foliosa, Daviesia ulicifolia, Hovea montana,* and *Leucopogon montanus.* The ground stratum characterised by species including *Goodenia hederaceae, Poa* spp., *Scleranthus biflorus, Stellaria pungens, Helichrysum scorpioides,* and *Oreomyrrhis eriopoda.*

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 644 for the following reasons:

- The canopy is dominated by the characteristic species *Eucalyptus niphophila* and *Eucalyptus pauciflora*.
- The mid stratum is dominated by *Bossiaea foliosa* which is a species typical of PCT 644 and lacks species such as *Prostanthera cuneata* which is more typical of PCT 645.
- The ground stratum contains species typical of PCT 644 including *Poa* spp., *Oreomyrrhis eriopoda* and *Scleranthus biflorus*.

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 644 within the subject lands is given below in Table A.3. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands.

Table A.3 Floristic and structural summary of PCT 644 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	*Eucalyptus niphophila, Eucalyptus pauciflora*
Midstorey (mid-stratum)	*Cassinia monticola, Melicytus angustifolius* subsp. *divaricatus, Hakea microcarpa, Bossiaea foliosa, Ozothamnus thyrsoideus, Olearia phlogopappa, Hovea linearis, Epacris breviflora, Kunzea ericoides, Mirbelia oxylobioides*
Groundcovers (ground stratum)	*Acaena* sp., *Oxalis* sp., *Geranium solanderi, Poa fawcettiae, Poa costiniana, Chrysocephalum apiculatum, Veronica subtilis, Scleranthus biflorus, Epilobium billardierianum, Ranunculus productus, Oreomyrrhis eriopoda, Oreomyrrhis argentea, Carex* sp., *Ranunculus pimpinellifolius, Asperula scoparia*

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Exotic species	*Anthoxanthum odoratum, Trifolium repens, Taraxacum officinale, Malus* sp., *Hypochaeris radicata,*
High Threat Weeds	*Acetosella vulgaris*

Photo A.9 Example of PCT 644 at Sponars Resort showing shrub layer of *Bossiaea foliosa* in flower

Photo A.10 Example of PCT 644 at Sponars Resort showing *Eucalyptus niphophila* trees

Photo A.11 Example of PCT 644 at Sponars Resort showing derived shrubland

Photo A.12 Example of PCT 644 at Sponars Resort showing dense shrub layer up slope

A1.4 PCT645: ALPINE SNOW GUM SHRUBBY OPEN WOODLAND AT HIGH ALTITUDES IN KOSCIUSZKO NP, AUSTRALIAN ALPS BIOREGION

Vegetation formation: Grassy Woodlands

Vegetation class: Subalpine Woodlands

Conservation significance: This PCT is not part of a TEC.

Description

The Alpine Snow Gum shrubby open woodland at high altitudes in Kosciuszko NP, Australian Alps Bioregion PCT (PCT 645) is described in the BioNet Vegetation Classification database as a low open woodland with mixed understorey of shrubs and tussock grasses occurring in sub-alpine areas between 1,600 and 1,900 m on slopes, ridges and spurs.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Eucalyptus niphophila* with a shrub layer of *Hovea montana, Olearia phlogopappa, Prostanthera cuneata,* and *Tasmannia xerophila.* The ground stratum characterised by species including *Asperula gunnii, Poa ensiformis, Poa hiemata,* and *Stellaria pungens*.

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 645 for the following reasons:

- The canopy is dominated by the characteristic species *Eucalyptus niphophila*.
- The mid stratum is characterised by the typical species *Hovea montana, Olearia phlogopappa, Prostanthera cuneata,* and *Tasmannia xerophila.*
- The ground stratum contains species typical of PCT 645 including *Poa hiemata* and *Asperula gunnii*.

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 645 within the subject lands is given below in Table A.4. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands.

Table A.4 Floristic and structural summary of PCT 645 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	*Eucalyptus niphophila*
Midstorey (mid-stratum)	*Nematolepis ovatifolia, Hovea montana, Oxylobium ellipticum, Prostanthera cuneata, Olearia brevipedunculata, Olearia algida, Olearia phlogopappa, Pimelea alpina, Grevillea australis, Orites lancifolius, Podocarpus lawrencei, Acrothamnus montanus, Baeckea gunniana, Melicytus dentatus, Epacris microphylla, Ozothamnus secundiflorus, Callistemon pityoides, Tasmannia xerophila, Richea continentis, Epacris paludosa*
Groundcovers (ground stratum)	*Lycopodium fastigiatum, Deyeuxia quadriseta, Viola betonicifolia, Oreobolus distichus, Craspedia aurantia, Aciphylla simplicifolia, Aciphylla glacialis, Luzula novae-cambriae, Chrysocephalum apiculatum, Empodisma minus, Oreomyrrhis eriopoda, Euphrasia collina, Caladenia* sp., *Poa hiemata, Acaena novae-zelandiae, Chiloglottis valida, Viola betonicifolia, Gonocarpus montanus, Asperula gunnii, Festuca asperula, Celmisia longifolia, Senecio gunnii, Poa sieberiana* var. *cyanophylla, Poa sieberiana* var. *sieberiana, Carex appressa, Asperula pusilla, Polystichum proliferum, Blechnum penna-marina subsp. alpina*
Exotic species	*Trifolium repens, Taraxacum officinale, Malus pumila, Lotus uliginosus*
High Threat Weeds	*Pinus* sp., *Acetosella vulgaris, Achillea millefolium*

Photo A.13 Example of PCT 645 at Perisher showing *Eucalyptus niphophila* trees

Photo A.14 Example of PCT 645 at Plot PNip1 at Perisher showing large *Eucalyptus niphophila* trees

Photo A.15 Example of PCT 645 at Charlottes Pass showing large *Eucalyptus niphophila* trees

Photo A.16 Example of PCT 645 at Charlottes Pass showing young tree regrowth

A1.5 PCT679: BLACK SALLEE - SNOW GUM LOW WOODLAND OF MONTANE VALLEYS, SOUTH EASTERN HIGHLANDS BIOREGION AND AUSTRALIAN ALPS BIOREGION

Vegetation formation: Grassy Woodlands

Vegetation class: Subalpine Woodlands

Conservation significance: This PCT is part of the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion as listed under the BC Act where it is present in the Monaro subregion.

Description

The Black Sallee - Snow Gum low woodland of montane valleys, South Eastern Highlands Bioregion and Australian Alps Bioregion PCT (PCT 679) is described in the BioNet Vegetation Classification database as a low open woodland often with a wet heath and/or tussock grass understorey occurring in frost hollow drainage lines in montane and tableland areas.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Eucalyptus stellulata, Eucalyptus pauciflora, Eucalyptus rubida, Eucalyptus dalrympleana,* and *Eucalyptus aggregata.* The shrub layer is characterised by *Baeckea utilis, Hakea microcarpa,* and *Leucopogon hookeri*. The ground cover is characterised by species including *Acaena novae-zelandiae, Asperula scoparia, Carex appressa, Carex inversa, Empodisma minus, Poa labillardierei* var. *labillardierei, Poa sieberiana* var. *sieberiana, Hydrocotyle peduncularis* and *Restio australis.*

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 679 for the following reasons:

- The canopy is dominated by the characteristic species *Eucalyptus stellulata* and *Eucalyptus pauciflora* with *Eucalyptus rubida* and *Eucalyptus dalrympleana* also present to a varying degree depending on landscape position.
- The mid stratum is characterised by the typical species *Hakea microcarpa* and a range of other shrub species.
- The ground stratum contains species typical of PCT 679 including *Acaena novae-zelandiae, Asperula scoparia, Carex appressa, Carex inversa, Empodisma minus, Poa labillardierei* var. *labillardierei,* and *Poa sieberiana* var. *sieberiana.*

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 679 within the subject lands is given below in Table A.5. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands.

Table A.5 Floristic and structural summary of PCT 679 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	*Eucalyptus stellulata, Eucalyptus dalrympleana, Eucalyptus rubida, Eucalyptus pauciflora*
Midstorey (mid-stratum)	*Tasmannia xerophila, Leptospermum grandifolium, Callistemon pityoides, Bossiaea foliosa, Rubus parvifolius, Leucopogon gelidus, Polyscias sambucifolia* subsp. *leptophylla, Baeckea gunniana, Olearia megalophylla, Epacris breviflora, Epacris microphylla, Cassinia aculeata, Olearia phlogopappa, Grevillea lanigera, Melicytus angustifolius* subsp. *divaricatus, Ozothamnus thyrsoideus, Pimelea pauciflora, Hakea microcarpa, Olearia erubescens,*

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Groundcovers (ground stratum)	*Imperata cylindrica, Blechnum nudum, Ranunculus pimpinellifolius, Geranium solanderi, Luzula flaccida, Carex inversa, Asperula scoparia, Polystichum proliferum, Carex appressa, Carex longebrachiata, Carex inversa, Acaena ovina, Acaena novae-zelandiae, Deyeuxia* sp., *Selaginella uliginosa, Ranunculus lappaceus, Geum urbanum, Stellaria pungens, Elymus scaber, Poa helmsii, Empodisma minus, Gonocarpus micranthus, Poranthera microphylla, Lagenifera stipitata, Veronica gracilis, Veronica subtilis, Festuca asperula, Dichondra* sp. A, *Oreomyrrhis eriopoda, Senecio prenanthoides, Scleranthus biflorus, Poa ensiformis, Poa labillardierei, Poa sieberiana* var. *cyanophylla, Poa sieberiana* var. *sieberiana*
Exotic species	*Anthoxanthum odoratum, Cerastium vulgare, Hypochaeris radicata, Ligustrum vulgare, Geranium molle, Medicago lupulina, Veronica peregrina, Cerastium balearicum, Aira elegantissima, Trifolium repens, Spergularia rubra, Bromus hordeaceus, Vulpia myuros, Festuca rubra*
High Threat Weeds	*Acetosella vulgaris, Crataegus monogyna, Holcus lanatus, Rubus fruticosus* agg., *Bromus diandrus, Rosa rubiginosa*

Photo A.17 Example of PCT 679 near Jindabyne showing *Eucalyptus stellulata* trees and disturbance

Photo A.18 Example of PCT 679 near Jindabyne showing *Eucalyptus stellulata* trees and cleared shrub layer

Photo A.19 Example of PCT 679 on Sawpit Creek at Ski Rider Motel

Photo A.20 Example of PCT 679 at Bullocks Flat Terminal

A1.6 PCT1191: SNOW GUM - CANDLE BARK WOODLAND ON BROAD VALLEY FLATS OF THE TABLELANDS AND SLOPES, SOUTH EASTERN HIGHLANDS BIOREGION

Vegetation formation: Grassy Woodlands

Vegetation class: Subalpine Woodlands

Conservation significance: This PCT is part of the Monaro Tableland Cool Temperate Grassy Woodland in the South Eastern Highlands Bioregion as listed under the BC Act where it is present in the Monaro subregion.

Description

The Snow Gum - Candle Bark woodland on broad valley flats of the tablelands and slopes, South Eastern Highlands Bioregion PCT (PCT 1191) is described in the BioNet Vegetation Classification database as an open forest, woodland (or occasionally as grassland patches) with a sparse shrub layer and a dense grassy groundcover occurring on frost-hollow flats and footslopes in undulating tableland areas between 600 and 1,100 m.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Eucalyptus pauciflora, Eucalyptus rubida, Eucalyptus stellulata, Eucalyptus viminalis, Eucalyptus bridgesiana,* and *Eucalyptus aggregata*. The shrub layer is characterised by *Acacia dealbata, Acacia melanoxylon,* and *Lissnthe strigosa.* The ground cover is characterised by species including *Chrysocephalum apiculatum, Elymus scaber, Gonocarpus tetragynus, Hydrocotyle laxiflora, Hypericum gramineum, Microlaena stipoides,* and *Themeda triuandra.*

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 1191 for the following reasons:

- The canopy is dominated by the characteristic species *Eucalyptus pauciflora* with *Eucalyptus rubida, Eucalyptus stellulata* and occasional (planted) *Eucalyptus viminalis* and *Eucalyptus bridgesiana.*
- The mid stratum is characterised by the typical species *Acacia dealbata* and *Acacia melanoxylon.*
- The ground stratum contains species typical of PCT 1191 including *Chrysocephalum apiculatum, Elymus scaber, Gonocarpus tetragynus, Hydrocotyle laxiflora, Microlaena stipoides,* and *Themeda triandra*.

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 1191 within the subject lands is given below in Table A.6. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands.

Table A.6 Floristic and structural summary of PCT 1191 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	*Eucalyptus pauciflora, Eucalyptus rubida, Eucalyptus stellulata, Eucalyptus viminalis, Eucalyptus bridgesiana*
Midstorey (mid-stratum)	*Acacia dealbata, Melicytus angustifolius* subsp. *divaricatus, Acacia melanoxylon, Pimelea pauciflora, Bossiaea buxifolia, Mirbelia oxylobioides*
Groundcovers (ground stratum)	*Crassula sieberiana, Austrostipa scabra, Poa sieberiana* var. *sieberiana, Hydrocotyle laxiflora, Bulbine bulbosa, Rumex brownii, Asplenium flabellifolium, Poa meionectes, Carex inversa, Wahlenbergia communis, Convolvulus erubescens, Microlaena stipoides, Acaena ovina, Geranium solanderi* var. *solanderi, Swainsona monticola, Rytidosperma tenuius, Elymus scaber, Acaena novae-zelandiae, Dichondra repens, Lomandra longifolia, Swainsona behriana, Vittadinia muelleri, Panicum effusum, Chrysocephalum apiculatum, Chrysocephalum semipapposum, Themeda triandra, Asperula conferta, Cymbonotus lawsonianus*

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Exotic species	*Bromus hordeaceus, Petrorhagia nanteuilii, Echium plantagineum, Avena barbata, Arenaria leptoclados, Verbascum thapsus, Hirschfeldia incana, Trifolium arvense, Vulpia myuros, Taraxacum officinale, Hordeum leporinum, Hypochaeris radicata, Cirsium vulgare, Erodium cicutarium, Plantago lanceolata, Potentilla recta, Lolium perenne, Salvia coccinea, Marrubium vulgare*
High Threat Weeds	*Bromus diandrus, Crataegus monogyna, Acetosella vulgaris, Hypericum perforatum, Pyracantha* sp.

Photo A.21 Example of PCT 1191 at the Jindabyne Sport & education sub-precinct

Photo A.22 Example of PCT 1191 in West Lake Jindabyne

Photo A.23 Example of PCT 1191 rocky outcrop shrubland

Photo A.24 Example of PCT 1191 derived native grassland variant

A1.7 PCT1196: SNOW GUM - MOUNTAIN GUM SHRUBBY OPEN FOREST OF MONTANE AREAS, SOUTH EASTERN HIGHLANDS BIOREGION AND AUSTRALIAN ALPS BIOREGION

Vegetation formation: Grassy Woodlands

Vegetation class: Subalpine Woodlands

Conservation significance: This PCT is not part of a TEC.

Description

The Snow Gum - Mountain Gum shrubby open forest of montane areas, South Eastern Highlands Bioregion and Australian Alps Bioregion PCT (PCT 1196) is described in the BioNet Vegetation Classification database as an open to tall open forest with an open shrubby understorey and grassy ground layer widespread on montane to sub alpine slopes and ridges.

The dominant species in this PCT as outlined in the BioNet Vegetation Classification database are *Eucalyptus pauciflora, Eucalyptus dalrympleana, Eucalyptus fastigata, Eucalyptus delagatensis,* and *Eucalyptus robertsonii* subsp. *robertsonii*. The shrub layer is characterised by *Acacia dealbata, Coprosma hirtella, Daviesia latifolia, Daviesia ulicifolia, Olearia erubescens, Olearia megalophylla, Oxylobium ellipticum, Platylobium formosum, Daviesia mimosoides* and *Polyscias sambuccifolia.* The ground cover is characterised by species including *Acaena novae-zelandiae, Acaena ovina, Asperula scoparia, Dianella tasmanica, Geranium neglectum, Lomandra longifolia, Luzula flaccida, Microlaena stipoides var. stipoides, Persoonia chamaepitys, Poa meionectes, Poa sieberiana var. sieberiana, Poranthera microphylla, Senecio gunnii, Stellaria pungens, Stylidium graminifolium, Brachycome spathulate, Helichrysum scorpioides, Lagenifera stipitata,* and *Viola betonicifolia*.

The vegetation within the subject lands that has been assigned to this PCT is considered to be nearest to being representative of PCT 1196 for the following reasons:

- The canopy is dominated by the characteristic species *Eucalyptus pauciflora* and *Eucalyptus dalrympleana* with occasional *Eucalyptus delagatensis* (present at Ski Rider Motel).
- The mid stratum is characterised by the typical species *Acacia melanoxylon, Coprosma hirtella, Daviesia ulicifolia, Olearia erubescens, Daviesia mimosoides* and *Polyscias sambucifolia.*
- The ground stratum contains species typical of PCT 1196 including *Acaena novae-zelandiae, Acaena ovina, Asperula scoparia, Dianella tasmanica, Lomandra longifolia, Luzula flaccida, Poa meionectes, Poa sieberiana var. sieberiana, Poranthera microphylla, Senecio gunnii, Stellaria pungens, Stylidium graminifolium*

No other PCTs as described in the BioNet Vegetation Classification database provide a better fit for the description of this vegetation. A summary of the vegetation structure and floristics of PCT 1196 within the subject lands is given below in Table A.7. This list of species reflects the local variation gathered from the floristic plots undertaken within the subject lands.

Table A.7 Floristic and structural summary of PCT 1196 within the development site

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Tree canopy (upper stratum)	*Eucalyptus pauciflora, Eucalyptus dalrympleana, Eucalyptus stellulata*

VEGETATION LAYER	DOMINANT SPECIES RECORDED FROM THE SURVEYS
Midstorey (mid-stratum)	*Mirbelia oxylobioides, Exocarpos strictus, Brachyloma daphnoides, Leucopogon gelidus, Acrothamnus hookeri, Olearia erubescens, Acacia melanoxylon, Coprosma hirtella, Bossiaea foliosa, Rubus parvifolius, Polyscias sambucifolia, Daviesia mimosoides, Leucopogon fletcheri, Ozothamnus thyrsoideus, Daviesia ulicifolia, Acacia falciformis, Acacia decora, Lomatia myricoides, Acacia siculiformis*
Groundcovers (ground stratum)	*Calotis scabiosifolia, Daucus glochidiatus, Stellaria pungens, Senecio gunnii, Galium ciliare, Poa sieberiana* var. *sieberiana, Poa sieberiana* var. *cyanophylla, Poa meionectes, Poranthera microphylla, Ophioglossum lusitanicum, Geranium solanderi, Hydrocotyle laxiflora, Euchiton involucratus, Glycine clandestina, Stackhousia monogyna, Herpolirion novae-zelandiae, Chiloglottis valida, Acaena novae-zelandiae, Acaena ovina, Hypericum gramineum, Asperula conferta, Veronica gracilis, Luzula flaccida, Viola betonicifolia, Elymus scaber, Ranunculus plebeius, Crassula sieberiana, Lomandra longifolia, Gonocarpus tetragynus, Dianella tasmanica, Cymbonotus lawsonianus, Craspedia variabilis, Ajuga australis, Cynoglossum australe, Polystichum proliferum, Clematis aristata, Goodenia hederacea, Veronica derwentiana, Poa ensiformis, Stylidium graminifolium, Asperula scoparia*
Exotic species	*Anthoxanthum odoratum, Aira elegantissima, Hypochaeris radicata, Medicago lupulina, Poa pratensis, Trifolium repens*
High Threat Weeds	*Cotoneaster* sp., *Rubus fruticosus* agg., *Rosa rubiginosa, Holcus lanatus, Achillea millefolium*

Photo A.25 Example of PCT 1196 at the Kosciuszko Tourist Park

Photo A.26 Example of PCT 1196 at the Kosciuszko Tourist Park

Photo A.27 Example of PCT 1196 at the Kosciuszko Tourist Park

Photo A.28 Example of PCT 1196 at Ski Rider Motel showing remnant trees in the car park

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