

Appendix A: Likelihood of Occurrence

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

An assessment of likelihood of occurrence was made for threatened and migratory species identified from the database search. Additional flora species have been added where the study area is considered to provide potential habitat and additional fauna species that may inhabit the study area have also been included by correlating species habitat requirements with the existing environment. Fish have been omitted from the results due to lack of suitable habitat as have species which are not known from alpine or subalpine environments in NSW.

Five terms for the likelihood of occurrence of species are used in this report. This assessment was based on database or other records, presence or absence of suitable habitat, features of the study area, results of the field survey and professional judgement.

The terms for likelihood of occurrence are defined below:

"yes" = the species was or has been observed on the site

"likely" = a medium to high probability that a species uses the site

"potential" = suitable habitat for a species occurs on the site, but there is insufficient information to categorise the species as likely to occur, or unlikely to occur

"unlikely" = a very low to low probability that a species uses the site

"no" = habitat on site and in the vicinity is unsuitable for the species.

Scientific Name	Common Name	FM Act	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
FLORA						
<i>Argyrotegium nitidulum</i> syn. <i>Euchiton nitidulus</i>	Shining Cudweed	—	V	V	A mat-forming silver-leaved perennial daisy growing in tall alpine herbfield or open heathland above or close to the treeline. The species is known in NSW only from the high alpine area in the vicinity of Mt Kosciuszko. There is no suitable habitat for the species within the study area.	No
<i>Carex archeri</i>	Archer's Carex	—	E	—	This species is associated with alpine herbfield, sod tussock grassland or alpine heathland and is known in NSW only from the Club Lake and upper Thredbo River areas. There is a small amount of potential habitat for the species within the study area however the species was not observed there. In any case, none of this habitat will be adversely affected by the action proposed.	Unlikely
<i>Carex raleighii</i>	Raleigh Sedge	—	E	—	This rhizomatous perennial herb grows to about 25 cm and has narrow, flat and wiry leaves. The species is very similar to <i>Carex hebes</i> . It is known from a confirmed record from Spencers Creek near Charlottes Pass where it occurs in a broad valley bog on a gentle slope with a patchy cover of moss. There is a small amount of potential habitat for the species within the study area however the species was not observed there. In any case, none of this habitat will be adversely affected by the action proposed.	Unlikely
<i>Ranunculus anemoneus</i>	Anemone Buttercup	—	V	V	This perennial forb of the alpine and upper alpine zones tends to occur in areas where snow persists late into the warm season. The species has recovered well after the relaxation of grazing pressure in the alpine areas and is now locally common in a range of communities on the main range between Mt Kosciuszko and Mt Jangungal. Approximately 20 plants occurs immediately to the north of the study area and the species is known from a number of other locations in the immediate surrounds.	Yes
<i>Rytidosperma vickeryae</i>		—	E	—	This perennial grass is associated with treeless subalpine streamside vegetation and has been recorded from Perisher, Betts, and Spencers Creeks and tributaries, and Happy Jacks Plain. It is associated with bogs and sphagnum mounds. There is a small amount of potential habitat for the species within the study area however the species was not observed there. In any case, none of this habitat will be adversely affected by the action proposed.	Unlikely
ENDANGERED ECOLOGICAL COMMUNITIES						
Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps		—	EEC	—	The plant community characterizing this EEC is associated with accumulated peaty or organic-mineral sediments on poorly drained flats in the headwaters of streams. It occurs on undulating tablelands and plateaus, above 400-500 m elevation, generally in catchments with basic volcanic or fine-grained sedimentary substrates or, occasionally, granite. The Upland Bog within the study area and surrounds are part of this EEC.	Yes

Scientific Name	Common Name	FM Act	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
	Alpine Sphagnum Bogs and Associated Fens	—	—	EEC	This EEC is typically found in alpine, subalpine and montane environments. It contains many endemic species and can usually be defined by the presence of sphagnum moss, even though it may sometimes only be a minor component. It is dominated by shrubs or species such as <i>Empodisma minus</i> and is found in permanently wet areas, such as along streams, valley edges, valley floors and slopes where soils are waterlogged. The Upland Bog within the study area and surrounds are part of this EEC.	Yes
	Snowy River Aquatic Ecological Community	EEC	—	—	The bed, banks, floodplains and associated vegetation of the Snowy River and all its tributaries potentially comprise part of this EEC. Blue Cow Creek and tributaries comprise this EEC.	Yes
Disclaimer: Data extracted from the Atlas of NSW Wildlife and EPBC Act Protected Matters Report are only indicative and cannot be considered a comprehensive inventory.						
CE = Critically Endangered; E = Endangered; E2 = Endangered Population; EEC = Endangered Ecological Community; V = Vulnerable						

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
MAMMALS					
<i>Burrhamys parvus</i>	Mountain Pygmy-possum	E	E	This species lives only in the alpine and subalpine areas of the highest mountains of Victoria and NSW. It lives in rocky areas where boulders have accumulated below mountain peaks and is frequently associated with alpine heathlands dominated by Mountain Plum Pine <i>Podocarpus lawrencei</i> . The nearest core habitats for the species are 600-750 m away at the Paralyser and at Mount Blue Cow. The population at Mount Blue Cow has been surveyed extensively by Dr. Linda Broome and others. According to Dr. Broome, the study area does not provide core habitat for breeding populations but there is likelihood that the study area could be used on occasion by individuals dispersing, sheltering and foraging.	Potential
<i>Dasyurus maculatus</i>	Spotted-tailed Quoll	V	E	The species prefers moist forest types and is often associated with escarpments. There is no denning habitat for the species within the study area and the potential foraging habitat within the study area would form only a small proportion of the home range of the species, which has been estimated at between 800 ha and 2000 ha. The species may potentially forage in the study area on occasion, however it is unlikely to be dependent upon the habitats there and will not be adversely affected by the proposal.	Unlikely
<i>Mastacomys fuscus</i>	Broad-toothed Rat	V	—	This species occurs in two widely separated areas in NSW, the Barrington Tops area and the wet alpine and subalpine heaths and woodlands of the Kosciuszko NP and adjacent areas. The species lives in a complex of runways through dense vegetation of wet grass, sedge or heath and under the snow in winter. Evidence of the Broad-toothed rat activity was recorded within the study area.	Yes

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
<i>Pseudomys fumeus</i>	Koonoom Smoky Mouse	E	E	Occurs in heath on ridge tops and slopes in sclerophyll forests, heathland and open forest along the coast and inland to sub-alpine regions. Occasionally occurs in ferny gullies. The species has been recorded from subalpine habitats in Victoria and the ACT. The study area does not provide suitable habitat and it would not occur there.	No
AMPHIBIANS					
<i>Litoria verreauxii alpina</i>	Alpine Tree Frog	E	V	This species occurs in the alpine and subalpine zones of south-eastern NSW and Victoria. It is found in a wide variety of habitats including woodland, heath, grassland and herbfields. It breeds in natural and artificial wetlands including ponds, bogs, fens, streamside pools, dams and drainage channels that are still or slow flowing. The species has disappeared from much of its former range in the last 20 years and is restricted to a few breeding sites in murky ponds. There is no suitable breeding habitat for the species within the study area and it is considered highly unlikely that it would occur there.	Unlikely
<i>Pseudophryne corroboree</i>	Southern Corroboree Frog	E	E	The Southern Corroboree Frog is limited to sphagnum bogs of the northern Snowy Mountains, in a strip from the Maragle Range in the northwest, through Mt Jagungal to Smiggin Holes in the south. Its range is entirely within Kosciuszko National Park. This species is all but extinct in the wild. It is no longer present at its former southern limit at Smiggin Holes. There is no suitable breeding habitat for the species within the study area and it is considered highly unlikely that it would occur there.	Unlikely
REPTILES					
<i>Cyclodomorphus praealtus</i>	Alpine She-oak Skink	—	E	In NSW, the species is known from open alpine heath and tussock grassland within the Kosciuszko region, preferring treeless or lightly treed areas. The habitats within the study area predominately dense heaths or bogs which are unsuitable for this species. The limited grassy areas are too small to be likely to support a population of the species. It is considered highly unlikely that the species would occur within the study area.	Unlikely
<i>Loipholis guthega</i>	Guthega Skink	—	CE (Nom)	This species is known from the Snowy Mountains and the Bogong High Plains and is associated with rocky areas in a range of alpine and subalpine vegetation communities. The species lives in extensive colonies associated with a deep burrow network that is constructed in eroded granite and humus soils beneath boulders and shrubs. The study area provides a small amount of potential habitat for the species however it was not detected there despite good survey coverage.	Potential
BIRDS					
<i>Callocephalon fimbriatum</i>	Gang-gang Cockatoo	V	—	Gang-gang Cockatoos live as pairs inhabiting woodlands of south-eastern Australia. The species feeds primarily on the seeds of eucalypts and acacias and breeds in tree hollows. The species is typically associated with taller montane forests in the region however it does forage in alpine and subalpine woodlands. It is possible that the species may forage within the study area from time to time however it would not breed or roost there.	Yes

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
<i>Pachycephala olivacea</i>	Olive Whistler	V	—	This species is usually associated with moist tall forests at high elevations but has been occasionally recorded at lower altitudes. Breeding occurs above 300m within habitats providing both a thick understorey and moderate canopy. In the alps the species is more typically associated with subalpine woodlands with a heathy understorey rather than alpine heaths. It is considered unlikely that the species would occur within the study area and it was not detected there during the survey period.	Unlikely
<i>Melanodryas cucullata</i>	Hooded Robin	V	—	This species generally prefers lightly wooded country, usually open eucalypt woodland, and often occurs in or near clearings or open areas. It requires structurally diverse habitats featuring mature eucalypts, saplings, some small shrubs and a ground layer of moderately tall native grasses. The study area provides a small area of very marginal habitat for the species given the density of the understorey where present, and it is considered unlikely that it would occur within the study area regularly nor be dependent upon the habitats there.	Unlikely
<i>Petroica rodinogaster</i>	Pink Robin	V	—	The Pink Robin is found in Tasmania and the uplands of eastern Victoria and far south-eastern NSW, almost as far north as Bombala. It inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies. In the alps the species is more typically associated with subalpine woodlands with a heathy understorey rather than alpine heaths. It is considered unlikely that the species would occur within the study area and it was not detected there during the survey period.	Unlikely
<i>Petroica boodang</i>	Scarlet Robin	V	—	This species is found in south-eastern Australia (extreme south-east Queensland to Tasmania, western Victoria and south-east South Australia) and south-west Western Australia. In NSW it occupies open forests and woodlands from the coast to the inland slopes. Some dispersing birds may appear in autumn or winter on the eastern fringe of the inland plains. The Scarlet Robin breeds in drier eucalypt forests and temperate woodlands, often on ridges and slopes, within an open understorey of shrubs and grasses and sometimes in open areas. Abundant logs and coarse woody debris are important structural components of its habitat. In autumn and winter it migrates to more open habitats such as grassy open woodland or paddocks with scattered trees. There is no suitable habitat for the species within the study area and it is considered unlikely that it would occur there.	Unlikely
<i>Petroica phoenicea</i>	Flame Robin	V	—	The Flame Robin is found in south-eastern Australia (Queensland border to Tasmania, western Victoria and south-east South Australia). In NSW it breeds in upland moist eucalypt forests and woodlands, often on ridges and slopes, in areas of open understorey. It migrates in winter to more open lowland habitats such as grassland with scattered trees and open woodland on the inland slopes and plains. The species is well known from the locality and may potentially use habitats within the study area from time to time for foraging and possibly breeding.	Yes
<i>Rostratula benghalensis australis</i>	Australian Painted Snipe	E	V, M	Resides in swamps, dams and nearby marshy areas that contain grasses, lignum, low scrub or open timber that provides cover. There is no suitable habitat for the species within the study area.	No

Scientific Name	Common Name	TSC Act	EPBC Act	Habitat Associations	Likelihood of Occurrence
<i>Stagonopleura guttata</i>	Diamond Firetail	V	—	This species is found in grassy eucalypt woodlands. The study area provides a small area of very marginal habitat for the species given the density of the understorey within the Subalpine Woodland, and it is considered unlikely that it would occur within the study area regularly nor be dependent upon the habitats there.	Unlikely
Disclaimer: Data extracted from the Atlas of NSW Wildlife and EPBC Act Protected Matters Report are only indicative and cannot be considered a comprehensive inventory. 'Migratory marine species', 'Migratory wetland species', and 'listed marine species' listed on the EPBC Act (and listed on the DEW protected matters report) have not been included in this table, since they are considered unlikely to occur within the study area due to the absence of marine and wetland habitats.					
CE = Critically Endangered; E = Endangered; E2 = Endangered Population; V = Vulnerable; M = Migratory; Nom = Nomination					

Appendix B: Flora List

Scientific Name	Common Name
<i>Acaena</i> sp. A	Bidgee-widgee
<i>Acaena novae-zelandiae</i>	Bidgee Widgee
<i>Acetosella vulgaris</i> *	Sheep Sorrel
<i>Aciphylla glacialis</i>	Mountain Celery
<i>Aciphylla simplicifolia</i>	Mountain Aciphyll
<i>Agrostis capillaris</i> *	Browntop Bent*
<i>Asperula gunnii</i>	Mountain Woodruff
<i>Astelia psychrocharis</i>	Kosciuszko Pineapple-grass
<i>Baeckea gunniana</i>	Alpine Baeckea
<i>Baeckea utilis</i>	Mountain Baeckea
<i>Blechnum penna-marina</i> subsp. <i>alpina</i>	Alpine Water-fern
<i>Brachyschome scapigera</i>	Tufted Daisy
<i>Brachyscome tenuiscapa</i>	Mountain Daisy
<i>Carex breviculmis</i>	Short-flowered Dryland Sedge
<i>Carex canescens</i>	
<i>Carpha nivicola</i>	Broad-leaf Flower-rush
<i>Celmisia costiniana</i>	Snow-daisy
<i>Celmisia pugioniformis</i>	
<i>Chionochloa frigida</i>	Ribbony Grass
<i>Coronidium scorpioides</i>	Button Everlasting
<i>Craspedia aurantia</i>	A Billy-button
<i>Empodisma minus</i>	Spreading Rope Rush
<i>Epacris glacialis</i>	Epacris glacialis
<i>Epacris paludosa</i>	Swamp Heath
<i>Epilobium gunnianum</i>	Gunn's Willow-herb
<i>Eucalyptus niphophila</i>	Snow Gum
<i>Euphrasia collina</i>	Eyebright
<i>Gonocarpus micranthus</i>	
<i>Grevillea australis</i>	Alpine Grevillea
<i>Festuca nigrescens</i> *	Chewings Fescue
<i>Festuca rubra</i> *	Red Fescue
<i>Hovea montana</i>	Alpine Hovea
<i>Hypochaeris radicata</i> *	Flatweed
<i>Leptorhynchus squamatus</i>	Scaly Buttons
<i>Leucopogon montanus</i>	Snow Beard-heath
<i>Luzula novae-cambriae</i>	

Scientific Name	Common Name
<i>Lycopodium fastigatum</i>	Mountain Clubmoss
<i>Melicytus dentata</i>	Tree Violet
<i>Microseris lanceolata</i>	Murnong
<i>Nematolepis ovalifolium</i>	
<i>Olearia phlogopappa</i>	Dusty Daisy-bush
<i>Oreobolus distichus</i>	
<i>Oreomyrrhis eriopoda</i>	Australian Carraway
<i>Orites lancifolia</i>	Alpine Orites
<i>Oxylobium ellipticum</i>	Common Shaggy Pea
<i>Ozothamnus alpinus</i>	Alpine Everlasting
<i>Ozothamnus hookeri</i>	Kerosene Bush
<i>Ozothamnus secundiflorus</i>	Cascade Everlasting
<i>Pentachondra pumila</i>	Carpet Heath
<i>Pimelea alpina</i>	Alpine Rice-flower
<i>Pimelea ligustrina</i> subsp. <i>ciliata</i>	Kosciuszko Rose
<i>Poa costiniana</i>	Bog Snow Grass
<i>Poa hiemata</i>	Soft Snowgrass
<i>Poa fawcettiae</i>	Smooth Blue Snowgrass
<i>Poa saxicola</i>	Rock Poa
<i>Podocarpus lawrencei</i>	Mountain Plum Pine
<i>Polystichum proliferum</i>	Mother Shield-fern
<i>Pratia pendunculata</i>	Matted Pratia
<i>Prasophyllum</i> sp.	
<i>Prostanthera cuneata</i>	Alpine Mint Bush
<i>Ranunculus anemoneus</i>	Anemone Buttercup
<i>Ranunculus graniticola</i>	Granite Buttercup
<i>Rytidosperma nudiflorum</i>	
<i>Richea continentis</i>	Candle Heath
<i>Scleranthus biflorus</i>	Two-flowered Knawel
<i>Senecio gunnii</i>	
<i>Sphagnum cristatum</i>	Sphagnum Moss
<i>Stylidium graminifolium</i>	Grass Triggerplant
<i>Tasmannia xerophila</i>	Alpine Pepperbush
<i>Trisetum spicatum</i>	Bristle Grass
<i>Viola betonicifolia</i>	Native Violet
<i>Wahlenbergia ceracea</i>	Waxy Bluebell

Appendix C: Assessment of Significance

EP&A ACT ASSESSMENT OF SIGNIFICANCE (7-PART TEST)

An assessment of the effects of the proposal on threatened species, populations and ecological communities, may be carried out by applying the seven factors from Section 5A of the amended NSW Environmental Planning and Assessment Act 1979 in accordance with gazetted assessment guidelines to each identified threatened species, population and ecological community.

This assessment of significance is presented below for the threatened species Mountain Pygmy-possum, Anemone Buttercup, Broad-toothed Rat, Gang-gang Cockatoo, and Flame Robin, and for the endangered ecological communities the Montane Peatlands and Swamps and Snowy River Aquatic Ecological Community.

Part a)

In the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction

Schedule 1 Endangered Species

Fauna

Mountain Pygmy-possum *Burramys parvus* (potential occurrence).

The Mountain Pygmy-possum is the only mammal endemic to the Australian Alps. The species primary habitat comprises boulderfields and associated Podocarpus Heaths where it hibernates under the snow in winter. The species feeds primarily on Bogong Moths but also on other insects and the fruits of Podocarpus and other heath species. Individual animals are capable of travelling up to 3 km in a night to meet their daily or seasonal needs. The species hibernates for periods of up to seven months from autumn to spring, with breeding occurring in November and December. Movements between boulderfields occur through areas of shrub cover, with roads and slashed ski runs being shown to inhibit movement in places. Movements of more than a few metres tend to be restricted to the snow-free season.

The primary nesting/hibernating sites for the Mountain Pygmy-possum in the vicinity of the study area are 600m-750 m to the northwest and northeast of the study area, in association with the east face of Blue Cow Mountain and near the bottom of Parachute ski run. The population centre on Blue Cow Mountain is considered to be one of the "source" populations for the species in NSW.

There are a number of secondary boulderfields in association with Blue Cow Creek, including three within the study area. It is likely that Mountain Pygmy-possums forage and possibly nest within the study area from time to time, however the boulderfields within the study area are not breeding sites or likely to be important hibernating sites for the species (L. Broome pers. comm. 2011).

The life cycle of Mountain Pygmy-possum could be significantly disrupted if:

- habitats, which may be used as breeding or hibernating sites, are modified or removed
- vegetation removal, snow compaction or other activities restrict the movement of populations or individuals
- actions result in increase predation on the species
- actions result in reductions in snow cover or compaction of the snow cover and the loss of subnivean space
- the availability of food resources is greatly reduced by vegetation removal or disturbance to habitats for prey species such as the Bogong Moth.

Whilst the proposal will result in the blasting of the tops of six rocks in one of the boulderfields within the study area, this is unlikely to affect the thermal properties of this boulderfield or otherwise adversely affect the ability of Mountain Pygmy-possums to use this secondary habitat. Whilst increased grooming and snowrider activity may compress the snow in this area, it represents a small part of the boulderfield, which appears to be quite deep in this area. As such, it is considered unlikely that the any compression of the surface snow would adversely affect the capacity of this area to provide potentially suitable sheltering habitat for Mountain Pygmy-possums.

The blasting associated with the rock removal will be undertaken in low snow conditions at the end of winter. It is unlikely, although possibly that some Mountain Pygmy-possums, may be hibernating within the study area during that time. It is highly unlikely that the proposed rock blasting will be sufficiently close to any hibernating Mountain Pygmy-possums to kill them, given the small area to be affected relative to the size of the boulderfields within the study area and immediate surrounds, which are secondary boulderfields of lower importance to the species than the nearby primary sites associated with Mt Blue Cow and the Parachute area. The blasting may cause any Mountain Pygmy-possums in the immediate vicinity to come out of hibernation or torpor, which can place stresses on individual animals. However, given the relatively short duration of the proposed blasting (a week or so to complete all 56 rocks), the relatively small area of boulderfield to be affected, and the secondary nature of the potential habitat to be affected, the impacts on the species are likely to be relatively minor.

The proposal will only affect a very small amount of the Mountain Plum Pine and other foraging habitat within the study area and will not affect any Bogon Moth aestivation sites. The proposal will not result in increased predation on the species.

A potential indirect impact on the Mountain Pygmy-possum associated with the proposal is for increased usage and grooming (grooming the snow with snow grooming machines). However the study area is already slope groomed, which is thought to be the activity with the main potential to result in snow compaction and reductions in subnivean space. As such, whilst there is likely to be increased usage of study area, this is unlikely to translate into increased snow compaction or reductions in subnivean space. Furthermore, the dominance of heathy taller vegetation within the study area, as opposed to the exotic grassland on some runs in the Guthega area i.e. Bloody Mary, means that reductions in subnivean space are less likely to result from snow grooming activities (NPWS 2002). Any increased snowrider usage is unlikely to affect the movement of individual Mountain Pygmy-possums, as they do not move more than a few metres from boulderfield nesting/hibernating sites during the winter months.

Under these circumstances, it is considered highly unlikely that the action proposed is likely to have an adverse effect on the life cycle of the Mountain Pygmy-possum such that a viable local population is likely to be placed at risk of extinction.

Notwithstanding this conclusion, given the small potential for blasting to kill or injure any Mountain Pygmy-possums that may be in close proximity to blasting, it is proposed to undertake a search of the areas immediately surrounding those rocks that are within a boulderfield (rocks 8-12) immediately prior to the proposed blasting. If any Mountain Pygmy-possums are detected, then blasting will be delayed until such time as the Mountain Pygmy-possums have moved from the area.

Schedule 2 Vulnerable Species

Flora

Anemone Buttercup *Ranunculus anemoneus* (known occurrence)

The Anemone Buttercup is a perennial forb of the alpine and upper alpine zones which tends to occur in areas where snow persists late into the warm season. The species has recovered well after the relaxation of grazing pressure in the alpine areas and is now locally common in a range of communities on the main range between Mt Kosciuszko and Mt Jangungal. The species is known from a number of locations throughout the Perisher Resort Area and elsewhere in the locality. Approximately 20 plants were detected to the immediate north of the study area in a small patch of grass amongst heath.

The Anemone Buttercup individuals to the immediate north of the study area occurs at least 50 m away from the proposed activities and will not be affected by the action proposed.

Under these circumstances, the action proposed is highly unlikely to disrupt the life cycle of the Anemone Buttercup such that a viable local population is likely to be placed at risk of extinction.

Fauna

Broad-toothed Rat *Mastacomys fuscus* (Known occurrence)

The Broad-toothed Rat generally occurs in two widely separated areas in NSW, the Barrington Tops area and the wet alpine and subalpine heaths and woodlands of the Kosciuszko NP and adjacent areas. The species lives in a complex of runways through dense vegetation of wet grass, sedge or heath and under the snow in winter. The species appears to be limited to patches of optimal habitat, which is usually close to streams with steep banks, although it will cross unsuitable habitat when dispersing, searching for mates or nest sites. Home ranges range between approximately 0.1 ha and 0.27 ha. Individuals nest alone over summer but congregate in communal nests during winter.

Evidence of the species foraging activity, scats, and runways were recorded throughout the study area and surrounds during the survey period. The mosaic of heath, bog, creeks and rock outcrops in the study area provides excellent habitat for the species. The species is thought to be locally common in the alpine and high subalpine tracts of the Snowy Mountains area (Green 2002), where suitable habitats are present.

The life cycle of Broad-toothed Rat could be significantly disrupted if:

- habitats, which may be used as breeding sites, are modified or removed;
- vegetation removal results in the isolation of populations or individuals; or
- the availability of food resources is greatly reduced by vegetation removal or disturbance.

Whilst the action proposed will affect a small amount of known habitat for the species, it will affect only a very small amount of the habitat which is available to the species in the study area, and elsewhere in the locality.

The action proposed will not result in the further fragmentation of the remnant native vegetation within the study area and surrounds or isolate individuals or a population of the Broad-toothed Rat.

Under these circumstances, the action proposed is considered unlikely to disrupt the life cycle of the Broad-toothed Rat such that a viable local population is likely to be placed at risk of extinction.

Gang-gang Cockatoo *Callocephalon fimbriatum* (Potential occurrence)

In New South Wales, the Gang-gang Cockatoo is distributed from the south-east coast to the Hunter region, and inland to the Central Tablelands and south-west slopes. It occurs regularly in the Australian Capital Territory, but is rare at the extremities of its range. In summer, this species is generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, the Gang-gang Cockatoo may occur at lower altitudes in drier more open eucalypt forests and woodlands, and is often found in urban areas. It may also occur in sub-alpine Snow Gum woodland and occasionally in temperate rainforests (DECC 2005).

The Gang-gang Cockatoo is likely to occur throughout the Perisher Resort area from time to time during the summer months. However the species is unlikely to breed or roost within the study area, as it typically prefers the nearby montane forests where there is an abundance of potential roosting and nesting habitat.

The study area provides a very small area of suitable foraging resources for the species. Given the extent of foraging resources in the general area, the impacts on the foraging habitats to be affected by the proposal are very minor.

Under these circumstances, the proposal is unlikely to disrupt the life cycle of the Gang-gang Cockatoo such that a viable local population of the species is likely to be placed at risk of extinction.

Flame Robin *Petroica phoenicea* (Known occurrence)

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

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

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

Part b)

In the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised.

There are no endangered populations within the study area.

Part c)

In the case of an endangered ecological community, whether the action proposed:

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

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

Montane Peatlands and Swamps

i. Extent of Local Occurrence

The action proposed will not affect the extent of the Montane Peatlands and Swamps EEC which occurs within the study area and in adjoining areas. The proposal will involve minor temporary damage to individual plants in association with the proposed rock and tree removal. The patches of the community within the study area and in adjoining areas are in good condition and have persisted despite previous tree and rock removal activities of the nature of those proposed associated. As such, it is considered unlikely that the community would be adversely affected by the action proposed.

The Montane Peatlands and Swamps EEC which occurs within the study area is part of a large local occurrence of the community, extending along Blue Cow Creek which is estimated by Ecology Australia (2002) to be in excess of 26.5 ha in extent.

ii. Composition of Local Occurrence

The composition of the Montane Peatlands and Swamps EEC which occurs within the study area and in adjoining areas is highly unlikely to be significantly different to the composition in similar habitats within the locality. That is, it is highly unlikely that it supports a unique assemblage of the characteristic species of the community that does not occur elsewhere. In any case, the action proposed will not adversely modify the composition of the community or otherwise adversely affect it such that its local occurrence is likely to be placed at risk of extinction.

Snowy River Aquatic Ecological Community

i. Extent of Local Occurrence

The extent of the local occurrence of the Snowy River Aquatic Ecological Community is not known however it is likely to be very extensive. The action proposed will not have any direct impacts on the Snowy River Aquatic Ecological Community. The indirect impacts on the community in association with the action proposed will be negligible.

ii. Composition of Local Occurrence

The composition of the Snowy River Aquatic Ecological Community was not surveyed as part of this assessment, however it is highly unlikely to be significantly different to the composition in similar habitats within the Snowy River and its tributaries in the locality. That is, it is highly unlikely that the study area supports a unique assemblage of the characteristic species of the Snowy River Aquatic Ecological Community that does not occur elsewhere within the local occurrence. Aquatic fauna species utilising foraging substrates within the study area would not be restricted to the areas affected by the action proposed and would be highly likely to continue to utilise habitats in the remainder of the local occurrence after the implementation of the action proposed.

The action proposed is not anticipated to result in adverse impacts on the Snowy River Aquatic Ecological Community within or beyond the study area. The proposal will include appropriate measures to avoid fuel or chemical spills or any substantial sediment input into watercourses. In the context of the other impacts on the Snowy River, in association with Guthega Pondage, and natural events such as the 2003 wildfires, or major flood events, the potential indirect impacts on water quality, and thus on the Snowy River Aquatic Ecological Community, associated with the action proposed are negligible.

Part d)

In relation to the habitat of a threatened species, population or ecological community:

- (i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and*
- (ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and*
- (iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality.*

i. Effects on Extent of Habitat

Threatened Species

Mammals

The action proposed will impact on only a very small area of known or potential habitat for the Broad-toothed Rat and Mountain Pygmy-possum.

Birds

The action proposed will result in the loss of a very small amount of potential foraging habitat for the Gang-gang Cockatoo and foraging and potential breeding habitat for the Flame Robin.

Reptiles

The action proposed will impact on only a very small area of potential habitat for the Guthega Skink and will not affect any burrow or other key habitat resources.

Endangered Populations

There are no endangered populations within the study area.

Endangered Ecological Communities

The action proposed will not affect the local occurrence of the Montane Peatlands and Swamps EEC or the Snowy River Aquatic Ecological Community.

ii. Effects on Habitat Connectivity

Threatened Species

The action proposed will not result in any adverse impacts on habitat connectivity. On the contrary, the proposal involves compensatory tree plantings adjacent to Bloody Mary ski run. This action will enhance connectivity for fauna species between the patches of remnant native vegetation within the area.

Endangered Populations

There are no endangered populations within the study area.

Endangered Ecological Communities

The action proposed will not affect the local occurrence of the Montane Peatlands and Swamps EEC or the Snowy River Aquatic Ecological Community.

iii. Importance of Habitat to be Affected

Threatened Species

Mammals

The Broad-toothed Rat habitats to be affected overwhelmingly comprise foraging habitats and the action proposed will not affect any known communal nesting sites or likely breeding sites. Whilst there is evidence of Broad-toothed Rat use throughout the study area, evidence of Broad-toothed Rat use is common throughout Guthega area.

The potential Mountain Pygmy-possum habitat to be affected is not considered to be particularly important given, the relatively small area of boulderfield to be affected and the secondary nature of the potential habitat to be affected.

Under these circumstances, the habitats to be affected are not considered to be particularly important for the Broad-toothed Rat or Mountain Pygmy-possum.

Birds

In the context of the extent of similar habitat available for the Gang-gang Cockatoo and the Flame Robin in the Perisher Resort area and elsewhere in the locality, the habitats within the study area are not considered to be important to the long-term survival of these species in the locality.

Reptiles

Given the absence of records of the species within the study area despite targeted surveys for this assessment, and the absence of records in the Guthega area generally, the habitats to be affected by the action proposed are not considered to be important to the Guthega Skink.

Endangered Populations

There are no endangered populations within the study area.

Endangered Ecological Communities

The action proposed will not affect the local occurrence of the Montane Peatlands and Swamps EEC or the Snowy River Aquatic Ecological Community.

Part e)

Whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly).

The action proposed will not affect any critical habitat.

Part f)

Whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan.

Recovery Plans

A recovery plan has been prepared for threatened alpine flora which includes the Anemone Buttercup. The action proposed is consistent with the objectives and actions of this recovery plan.

A recovery plan has been prepared for the Mountain Pygmy-possum. The action proposed, in avoiding disturbances to the primary habitats for the species, is consistent with the objectives and actions of this recovery plan. The action proposed, is inconsistent with the action to protect all existing Mountain Pygmy-possum populations and habitat. However, as discussed above, the impacts on secondary boulderfields and potential foraging habitat will be relatively minor. These habitats are already accessed by snowriders and grooming machines.

A draft recovery plan has been prepared for the Broad-toothed Rat. The action proposed, in avoiding disturbances to the primary habitats for the species, is consistent with the objectives and actions of this recovery plan.

No recovery plans have been prepared for the Gang-gang Cockatoo, Flame Robin, Guthega Skink or the Montane Peatlands and Swamps EEC.

Threat Abatement Plans

Threat abatement plans have not been prepared for the key threatening process *Clearing of native vegetation* is involved with the action proposed.

Part g)

Whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The action proposed involves the key threatening process *Clearing of native vegetation*.

Clearing of native vegetation

Whilst the proposal will result temporary damage to and shading of approximately 80 m² of Tall Alpine Heath in association with the proposal bridge, some temporary damage to shrubs immediately surrounding the rock to be blasted, and the removal or pruning of 44 Snow Gum trees, this is a minor impact in the context of the abundance of other Snow Gum trees within the study area and immediate

surrounds. The impacts on Snow Gums will be offset by the planting of 88 Snow Gums adjacent to the Bloody Mary Ski Run.

Under these circumstances, any increase in the impact of the key threatening process *Clearing of native vegetation* associated with the action proposed is minor and will not result in a substantial increase in the key threatening process *Clearing of native vegetation*.

EPBC ACT SIGNIFICANT IMPACT CRITERIA ON MIGRATORY SPECIES

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

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

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

No threatened and migratory species listed under the EPBC Act are considered likely to occur within the study area. Only Natter of National Environmental Significance, the Alpine Sphagnum Bogs and Associated Fens EEC, is known to occur within the study area or immediate surrounds.

The relevant Significant Impact Criteria have been applied to Alpine Sphagnum Bogs and Associated Fens EEC to determine the significance of impacts associated with the proposal.

MATTERS TO BE ADDRESSED	IMPACT (COMMONWEALTH LEGISLATION)
(a) any environmental impact on a World Heritage Property or National Heritage Places;	No. The proposal does not impact on a World Heritage Property or a National Heritage Place as addressed in the SEE. (listed natural: Australian Alpine National Parks and Reserves; nominated historic: Snowy Mountains Scheme NSW).
(b) any environmental impact on Wetlands of International Importance;	No. The proposal will not affect any part of RAMSAR wetland.
(c) any impact on Commonwealth Listed Critically Endangered or Endangered Species or Endangered Ecological Communities;	<p>Yes. The study area does provide potential habitat for the following Commonwealth listed endangered entities.</p> <p>Endangered: Mountain Pygmy-possum and Guthega Skink</p> <p>The significant impact criteria for endangered or critically endangered species are discussed below:</p> <p><i>a. lead to a long-term decrease in the size a population of a species,</i></p> <p>The proposal will affect a relatively small area of potential habitat for the endangered species identified above.</p> <p>The potential habitats for the Mountain Pygmy-possum that will be affected are not considered to comprise key habitat resources. Whilst a few rock within secondary boulderfield habitats will be partially reduced through blasting, these rocks comprise a very small component of the secondary boulderfields to be affected. It is considered highly unlikely that the proposed blasting would result in any mortality of substantial disturbance to the local population of the Mountain Pygmy-possum given the limited duration of the activity, its timing in late winter, and the lower importance of the habitats to be affected relative to nearby primary habitats. Under these circumstances, the proposal is unlikely to lead to a long-term decrease in the size of the population of the Mountain Pygmy-possum.</p> <p>Notwithstanding this conclusion, given the small potential for blasting to kill or injure any Mountain Pygmy-possums that may be in close proximity to blasting, it is proposed to undertake a search of the areas immediately surrounding those rocks that are within a boulderfield (rocks 8-12) immediately prior to the proposed blasting. If any Mountain Pygmy-possums are detected, then blasting will be delayed until such time as the Mountain Pygmy-possums have moved from the area.</p> <p>The Guthega Skink was not detected within the study area despite targeted searches. The surveys undertaken for this assessment did not find any evidence of important communal nest sites for the Guthega Skink and the potential habitat for the species within the study area is negligible in the context of similar habitat available to them in contiguous vegetation and elsewhere in the locality. Under these circumstances, it is considered unlikely that the proposal will lead to a long-term decrease in the size of the population of the Guthega Skink.</p> <p><i>b. reduce the area of occupancy of the species</i></p> <p>The proposal will affect only a very small area of potential habitat for the Mountain Pygmy-possum and Guthega Skink comprising a few rocks (up to 56) and surrounding shrubs. The area affected will continue to be able to be used by these species after the implementation of the proposal.</p> <p>The habitat to be affected by the proposal is negligible in the context of the extent of superior potential foraging habitat for these species in the locality.</p> <p>Under these circumstances, it is unlikely that the proposal will reduce the area of</p>

MATTERS TO BE ADDRESSED	IMPACT (COMMONWEALTH LEGISLATION)
	<p>occupancy for these species.</p> <p><i>c. fragment an existing population into two or more populations</i> The proposal will not fragment any population of the Mountain Pygmy-possum or Guthega Skink.</p> <p><i>d. adversely affect habitat critical to the survival of a species</i> No habitat within the study area is considered to be critical to the survival of the Mountain Pygmy-possum or Guthega Skink.</p> <p><i>e. disrupt the breeding cycle of a population</i> The proposal will not affect any known or likely breeding habitat for the Mountain Pygmy-possum or Guthega Skink.</p> <p><i>f. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</i> The proposal will affect only a very small area of potential habitat for the Mountain Pygmy-possum and Guthega Skink comprising a few rocks (up to 56) and surrounding shrubs. Under these circumstances, it is highly unlikely that the proposal would modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species are likely to decline.</p> <p><i>g. result in invasive species that are harmful to an endangered species becoming established in the endangered or critically endangered species' habitat</i> The proposal is unlikely to result in invasive species that are harmful becoming established in potential habitat of the Mountain Pygmy-possum or Guthega Skink.</p> <p><i>h. introduce disease that may cause the species to decline</i> The proposal is unlikely to introduce disease that may cause the Mountain Pygmy-possum or Guthega Skink to decline.</p> <p><i>i. interfere substantially with the recovery of the species.</i> As the proposal is not considered to decrease or fragment existing populations, the recovery of these species is unlikely to be adversely impacted.</p>
(d) any impact on Commonwealth Listed vulnerable Species;	<p>Yes. The study area provides potential habitat for one Commonwealth listed vulnerable species: Anenome Buttercup</p> <p>The significant impact criteria in terms of the vulnerable species are discussed below:</p> <p><i>a. lead to a long-term decrease in the size of an important population of a species,</i> The proposal will not have any direct impacts on the Anenome Buttercup. The Anenome Buttercup has recovered well from the brink of extinction since the cessation of grazing in the NSW alpine areas, and is now locally common throughout the main range. The local population of the species is expected to be more than 1000 plants (Briggs and Leigh 1996, NPWS 2001a).</p> <p>Under these circumstances, the proposal will not lead to a long-term decrease in the size of an important population of the Anenome Buttercup.</p> <p><i>b. reduce the area of occupancy of an important population</i> The proposal will not have any direct impacts on the Anenome Buttercup. Under these circumstances, the proposal will not reduce the area of occupancy of an important population of the Anenome Buttercup.</p>

MATTERS TO BE ADDRESSED	IMPACT (COMMONWEALTH LEGISLATION)
	<p><i>c. fragment an existing important population into two or more populations</i> The proposal will not have any direct impacts on the Anenome Buttercup.</p> <p><i>d. adversely affect habitat critical to the survival of a species</i> No habitat within the study area is considered to be critical to the survival of the Anenome Buttercup.</p> <p><i>e. disrupt the breeding cycle of an important population</i> The proposal will not have any direct impacts on the Anenome Buttercup. . Under these circumstances, the proposal will not disrupt the breeding cycle of a population of the Anenome Buttercup.</p> <p><i>f. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline</i> The proposal will not have any direct impacts on the Anenome Buttercup. Under these circumstances, the proposal will not modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the Anenome Buttercup is likely to decline.</p> <p><i>g. result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat</i> The proposal will not result in invasive species that are harmful becoming established in habitat for the Anenome Buttercup.</p> <p><i>h. interferes substantially with the recovery of the species.</i> The Anenome Buttercup has recovered well from the brink of extinction since the cessation of grazing in the NSW alpine areas, and is now locally common throughout the main range. The local population of the species is expected to be more than 1000 plants (Briggs and Leigh 1996, NPWS 2001a). The impacts associated with the proposal will not result in a long-term decrease in the size of an important population of the Anenome Buttercup, which was threatened by grazing, and should continue to recover in the absence of the re-introduction of grazing pressures.</p>
(e) Any impact on a Commonwealth Endangered Ecological Community	<p>Yes: The Alpine Sphagnum Bogs and Associated Fens endangered ecological community occurs within the study area. However the proposal has been designed to avoid any adverse impacts on the community.</p> <p>The significant impact criteria in terms of endangered ecological communities are discussed below:</p> <p><i>a. reduce the extent of an ecological community</i> The proposal will not reduce the extent of the Alpine Sphagnum Bogs and Associated Fens EEC which occurs within study area and surrounds. Whilst a few of the rocks and trees to be affected occur within the community, the proposed activities will be undertaken using low impact methods, and timing, such that any impacts on the community are likely to be limited to minor temporary damage to a few shrubs surrounding the effected trees and rocks.</p> <p><i>b. fragment or increase fragmentation of an ecological community, for example by clearing vegetation for roads or transmission lines;</i> The proposal will not increase fragmentation of the Alpine Sphagnum Bogs and</p>

MATTERS TO BE ADDRESSED	IMPACT (COMMONWEALTH LEGISLATION)
	<p>Associated Fens EEC which occurs within study area and surrounds</p> <p><i>c. adversely affect habitat critical to the survival of an ecological community</i> The proposal will not reduce the extent of the Alpine Sphagnum Bogs and Associated Fens EEC which occurs within study area and surrounds.</p> <p>The local occurrence of the community is known to be at least 26 ha in extent.</p> <p><i>d. modify or destroy abiotic (non-living) factors (such as water, nutrients, or soil) necessary for an ecological community's survival, including reduction of groundwater levels, or substantial alteration of surface water drainage patterns</i> The proposal will not reduce the extent of the Alpine Sphagnum Bogs and Associated Fens EEC which occurs within study area and surrounds.</p> <p>The proposal has been designed so as to not modify or destroy the abiotic factors necessary for the survival of the EEC. The EEC occurs within the study area and surrounds. These patches of the community are in relatively good condition and have persisted despite previous tree and rock removal. As such, it is considered unlikely that the action proposed will jeopardise the overall survival of the community, which is very extensive in the locality.</p> <p><i>e. cause a substantial change in the species composition of an ecological community, including causing a decline or loss of functionally important species, for example through regular burning or flora or fauna harvesting.</i> The study area does not support a unique assemblage of characteristic flora species of the Alpine Sphagnum Bogs and Associated Fens EEC that does not occur elsewhere within the local occurrence. Similarly, the fauna assemblage inhabiting the study area is likely to be distributed throughout the local occurrence and contiguous vegetation. Fauna species such as invertebrates, amphibians, reptiles, birds, and mammals utilising foraging substrates within the study area would not be restricted to the areas affected by the action proposed and would be highly likely to continue to utilise habitats in the remainder of the local occurrence.</p> <p><i>f. cause a substantial reduction in the quality or integrity of an ecological community, including, but not limited to:</i> -assisting invasive species, that area harmful to the listed ecological community, to become established, or -causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants in the ecological community which kill or inhibit the growth of species in the ecological community The proposal includes appropriate safeguards to limit the potential for invasive plants or pathogens to encroach upon the Alpine Sphagnum Bogs and Associated Fens EEC. It will also include safeguards which limit the potential for any chemicals or pollutants to enter the Alpine Sphagnum Bogs and Associated Fens EEC in association with the action proposed.</p> <p><i>g. interfere with the recovery of an ecological community</i> The Alpine Sphagnum Bogs and Associated Fens EEC has recovered well since the cessation of grazing in the NSW alps and is one of the most common vegetation communities in alpine and subalpine habitats. It has also recovered well since the 2003 wildfires. The proposal will not reduce the extent of the Alpine Sphagnum Bogs and Associated Fens EEC, will not interfere with any wider recovery of the community, which is only potentially threatened by impacts associated with climate change, the re-introduction of grazing or adverse fire regimes.</p>

MATTERS TO BE ADDRESSED	IMPACT (COMMONWEALTH LEGISLATION)
(f) any environmental impact on Commonwealth Listed Migratory Species;	No. Commonwealth Listed Migratory Species known from the locality are limited to the Australian Painted Snipe. The Australian Painted Snipe is highly unlikely to occur within the study area nor be dependent upon the habitats there. The proposal will not have any adverse impacts on any listed migratory species.
(g) does any part of the Proposal involve a Nuclear Action;	No. The project does not include a Nuclear Action.
(h) any environmental impact on a Commonwealth Marine Area;	No. There are no Commonwealth Marine Areas within the study area.
(i) In addition, any direct or indirect impact on Commonwealth lands	No. The project does not directly or indirectly affect Commonwealth land.

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