Installation of Ski Patrol Hut, Top of Quad Express Chairlift, Centre Valley

Statement of Environmental Effects

Statement of Environmental Effects prepared by:

Beth Davies (Health, Safety and Environment Officer)

Perisher Blue Pty Ltd

February 2023

1 INTRODUCTION

1.1 Project Background

This report presents a statement of environmental effects (SEE) for a proposal by Perisher Blue Pty Limited (Perisher) for the installation of a repurposed hut at the top of the Quad Express Chairlift, Perisher Ski Resort.

Proposed works include removing fill material to the north of the Quad Express chairlift unload, installing a concrete slab with dimensions 2m x 2m x 600mm with a 3m x 3m hut on a pedestal approximately 1500mm high.

Currently, there is no ski patrol hut at the top of the Quad Express Chairlift. The proposed works would allow for ski patrollers to respond to incidents below the Quad Express unload much more quickly.

The area selected for the proposal is previously disturbed areas of fill and exotic vegetation.

1.2 Objectives of the Project

The objective of the proposal is to provide a base for ski patrollers to be able to respond faster to incidents from the top of the Quad Express chairlift. Currently, ski patrollers catch the chairlift from Mid-station to the top of the Quad Express when responding to an incident above Mid-Station. This can waste valuable time and extend wait times for injured skiers and snowboarders. The project aims to improve the safety of the ski slopes by providing ski patrollers with a base to respond to incidents in a significant area of the Resort more quickly.

2 PROJECT DESCRIPTION

2.1 Project Overview

Broadly, this proposal involves the following:

- Site preparation and installation of environmental controls.
- Removal of existing fill material.
- Construction of concrete slab, 2m x 2m x 600mm
- Patrol hut 3m x 3m will stand on a pedestal approximately 1500mm high.
- Conduits for communications and power will be supplied from the top station of the Express chairlift. Conduits will be attached to chairlift retaining wall blockwork.

The location and photos of the site are shown in *Appendix A- Project Maps,* and *Appendix B- Project Photos.*

2.2 Project Detail

2.2.1 Site Access

Access to the works area will be via the formed Centre Valley Access Road (see *Appendix A- Project Maps, Figure 2* and *Appendix B - Project Photos).*

2.2.2 Excavation

Existing fill material will be removed with a 12-tonne excavator and relocated to the Smiggin Hole stockpile site. A concrete slab measuring 2m x 2m x 600mm will be laid on the northern side of the Quad Express top station. An existing hut, with dimensions 3m x 3m will stand on a pedestal approximately 1500mm high. *Appendix C – SEMP* addresses sediment and erosion controls for excavation works.

2.2.3 Power & Communication

Power and communication will be supplied from the Quad Express unload station. Conduits will be attached to the chairlift retaining wall. No trenching will be required for the provision of power and communication.

2.2.4 Equipment & Machinery

The excavation will be conducted using a 12-tonne excavator. All vehicles will be limited to existing roads and access tracks.

The concrete will be transported to site in a concrete agitator on a Perisher 6x6 wheel truck. The hut will be transported to site on Perisher's 6x6 truck and lifted into place with a 15-tonne crane. All machinery will be limited to existing roads and access tracks.

2.2.5 Works Program

Works are expected to be carried out over two-week period during the summer season.

3 ENVIRONMENTAL ASSESSMENT

3.1 General site suitability and constraints

The Quad Express chairlift is highly utilised, acting as a skier access to Blue Cow, Guthega and Mt Perisher. The lack of a ski patrol hut above the Quad Express chairlift mid-station means ski patrol response times can be extended, as patrollers must first catch the chairlift to the top of the Quad Express to attend incidents above mid-station elevation.

The site currently features access roads, lifting infrastructure and other built structures. No significant impacts on biodiversity or vegetation are expected.

3.2 Ecological Impacts

As shown on *Appendix A - Figure 2,* the project area is located outside an area identified as having high biodiversity value on the Biodiversity Values Map (*Biodiversity Conservation Act, 2016).* Additionally, the project does not include the removal of native vegetation, and therefore the Biodiversity Offsets Scheme (BOS) would not be triggered based on the BV Map.

The location of the proposed ski patrol hut is entirely previously disturbed.

3.3 Impacts on aquatic ecosystems

The proposed works will have no impact on aquatic ecosystems and is not within a riparian zone.

3.4 Aboriginal cultural heritage

As shown on *Appendix A - Figure 2,* the project area is outside of any areas identified as having potential archaeological significance.

An assessment of potential archaeological impacts has been included in *Appendix D - Archaeological Due Diligence.* In summary, as all works are to occur in previously disturbed areas, an AHIP application is not necessary for the proposed works. Proceed with caution. If any Aboriginal objects are found, stop work and notify DPE. If human remains are found, stop work, secure the site and notify the NSW Police and DPE.

3.5 European cultural heritage

The proposed works will have no impact on European cultural heritage.

3.6 Construction impacts & engineering

Construction impacts including erosion, noise, air and waste are addressed in previous sections and *Appendix C - Site Environmental Management Plan*.

Engineering detail is provided in *Appendix E – Engineering Drawings*.

3.7 Geotechnical Considerations

A geotechnical assessment has been undertaken and is provided in *Appendix F – Geotechnical Report*.

3.8 Soil impacts

Erosion impacts will be managed with appropriate controls, as outlined in *Appendix C - Site Environmental Management Plan.*

3.9 Visual impacts and aesthetics

The proposed works will have only minor visual impacts for people riding the Quad Express Chairlift. The patrol hut will be in keeping with an existing lift operator hut and other structures in the area.

3.10 Social and economic impacts

The proposed works will have positive impacts on ski resort operations, as they will result in increased ski patrol access to the area above the Quad Express unload station and decrease ski patrol response times. Having a patroller based at the top of the hill is also beneficial to be able to provide advice to guests regarding ski run conditions and resort information.

3.11 Effects on ski resort operation

The proposed works will have positive impacts on ski resort operation, as they will result in shorter ski patrol response times below the Quad Express chairlift. Construction works are to be carried out during the non-operational summer season.

3.12 Noise and vibration

Some noise will result from the excavation of the fill material however this will be temporary and only during standard work hours.

No additional noise or vibration will result from the patrol hut.

3.13 Waste management

Excavated fill material will be stockpiled at the Smiggin Holes ‘quarry’ site. All other waste will be removed from the site regularly.

There will be no ongoing waste management impacts resulting from the proposal.

3.14 Energy use and conservation

Increase in energy usage from the installation of the hut will be negligible.

4 STATUTORY ASSESSMENT REQUIREMENTS

4.1 State Environmental Planning Policy (Precincts- Regional) 2021

The development is subject to the provisions of Chapter 4 – Kosciuszko Alpine Region, of the Precincts Regional SEPP.

Table 4.1 Assessment of the relevant provisions of Chapter 4

Part 4.2 Permitted or prohibited development	
4.7 Land Use Table	The development proposed is defined a "Ski slope hut" being *a race hut, lift hut, ski patrollers' hut or similar hut that—* *(a) is erected on a ski slope, and* *(b) must be fixed to the ground.* Ski slope huts are permitted with consent in the Perisher Range Alpine Resort Land Use Table
4.8 Subdivision	Not applicable
4.9 Demolition	Not applicable
4.10 Temporary Use of Land	Not applicable
Part 4.4 Other development controls	
4.14 Development by Crown, public authorities, or Snowy Hydro	Not applicable
4.15 Development on land on Kosciuszko Road and Alpine Way	Not applicable
4.16 Development near Kangaroo Ridgeline	Not applicable
4.17 Classified roads	Not applicable
4.18 Bush fire hazard reduction	Not applicable
4.19 Public utility infrastructure **(1) Development consent must not be granted for development in the Alpine Region unless the consent authority is satisfied that—** **(a) the public utility infrastructure that is essential for the proposed development is available, or**	The subject development will be connected to existing infrastructure at the top station of the Quad Express. No augmentation of infrastructure will be required to service the development.

(b) adequate arrangements have been made to make that infrastructure available when required.	
4.20 Conversion of fire alarms	Not applicable
4.21 Heritage conservation	Not applicable
4.22 Conservation incentives	Not applicable
4.23 Eco-tourist facilities	Not applicable
4.24 Flood planning	Not applicable – the development is not in a flood planning area.
4.25 Earthworks **(3) In deciding whether to grant development consent for earthworks, or for development involving ancillary earthworks, the consent authority must consider the following matters—** **(a) the likely disruption of, or adverse impact on, drainage patterns and soil stability in the locality of the development,** **(b) the effect of the development on the likely future use or redevelopment of the land,** **(c) the quality of the fill or the soil to be excavated, or both,** **(d) the effect of the development on the existing and likely amenity of adjoining properties,** **(e) the source of any fill material and the destination of any excavated material,** **(f) the likelihood of disturbing relics,** **(g) the proximity to, and potential for adverse impacts on, a waterway, drinking water catchment or environmentally sensitive area,** **(h) appropriate measures proposed to avoid, minimise, or mitigate the impacts of the development.**	(a) Erosion impacts will be managed with appropriate controls, as outlined in *Appendix C - Site Environmental Management Plan.* A geotechnical assessment has been undertaken and is provided in *Appendix F – Geotechnical Report*. (b) the development will have no impact on the future use of the site or potential redevelopment of the land. (c) Existing fill material will be removed with a 12-tonne excavator and relocated to the Smiggin Hole stockpile site. (d) the proposed development will have no amenity impacts due to its location and the surrounding uses (e) no fill will be required. (f) As shown on *Appendix A - Figure 2,* the project area is outside of any areas identified as having potential archaeological significance. (g) The proposed development site is 1km from the closest waterway and is outside of any mapped Riparian zones as such the proposed works will have no impact on a waterway, drinking water catchment. e the project area is located outside an area identified as having high biodiversity value on the Biodiversity Values Map (Biodiversity Conservation Act, 2016). Additionally, the project does not include the removal of native vegetation, and therefore the Biodiversity Offsets Scheme (BOS) would not be triggered based on the BV Map. The location of the proposed ski patrol hut is entirely previously disturbed and therefore would have no advance impacts on an environmentally sensitive area, (h) the assessments carried out and the location of the development demonstrate the principles of avoid, minimise, or mitigate with respect to the impacts of the development

Part 4.5 Development assessment and consent	
4.26 Master plans	The Snowy Mountains Special Activation Precinct Master Plan 2022 applies to the subject site.
4.27 Consultation with National Parks and Wildlife Service	Consultation will occur for this development application in accordance with these provisions.
4.28 Consideration of master plans and other documents **(1) In deciding whether to grant development consent to development in the Alpine Region, the consent authority must consider the following—**	
(a) the aim and objectives of this Chapter set out in section 4.1, which are:	
(1) to protect and enhance the Alpine Region by ensuring development is managed with regard to the principles of ecologically sustainable development, including the conservation and restoration of ecological processes, natural systems and biodiversity.	(1) The works will be managed appropriately to have regard for the principles of ecologically sustainable development. The proposed works involve excavation in previously disturbed areas avoiding native vegetation.
2 (a) to encourage the carrying out of a range of development to support sustainable tourism in the Alpine Region all year round, if the development does not result in adverse environmental, social or economic impacts on the natural or cultural environment of the Alpine Region, including cumulative impacts on the environment from development and resource use	The works are in previously disturbed areas and will not contribute to cumulative impact on the environment within the Resort. The works will not result in adverse environmental and cultural impacts and will have positive social and economic impacts.
(b) to establish planning controls that— **(i) contribute to and facilitate the carrying out of ecologically sustainable development in the Alpine Region, and** **(ii) recognise the Alpine Region's significant contribution to recreation and the tourism economy in the State,**	Not applicable

(c) to minimise the risk to the community of exposure to environmental hazards, particularly geotechnical hazards, bush fires and flooding, by— **(i) generally requiring development consent on land in the Alpine Region, and** **(ii) establishing planning controls for buildings to ensure the safety of persons using the buildings if there is a fire.**	(c)(i) The application meets the intent of the objective as it is seeking development consent for the construction of a ski slope hut and associated earth works. (c)(ii) Not applicable. The works will not present risks to the community and this assessment addresses all necessary planning controls
(b) a draft development control plan that is intended to apply to the land and has been published on the NSW planning portal,	Not applicable
(c) a conservation agreement under the Environment Protection and Biodiversity Conservation Act 1999 of the Commonwealth that applies to the land,	Not applicable
(d) the Geotechnical Policy — Kosciuszko Alpine Resorts published by the Department in November 2003,	A geotechnical assessment has been prepared for the proposed work and is provided in Appendix F.
(e) for development in the Perisher Range Alpine Resort— **(i) the Perisher Range Resorts Master Plan, published by the National Parks and Wildlife Service in November 2001, and** **(ii) the Perisher Blue Ski Resort Ski Slope Master Plan adopted by the National Parks and Wildlife Service in May 2002.**	(e)(i) The proposal is generally consistent with the goals of the Perisher Master Plan. The proposed works will improve ski patrol response times above the Quad Express Mid-Station. (e)(ii) The proposed development is consistent with the Perisher Blue Ski Resort Ski Slope Master Plan
(2) In deciding whether to grant development consent to development in the Alpine Region, the consent authority must consider—	
(a) a master plan approved by the Minister under section 4.26 that applies to the land, or **(b) if a master plan has not been approved—a draft master plan prepared under section 4.26 that is intended to apply to the land and**	The proposed development is consistent with the approved Snowy Mountains Special Activation Precinct Master Plan 2022. The subject site sits within the Alpine Precinct however is outside of a specific structure plan area.

has been published on the NSW planning portal.	
4.29 Consideration of environmental, geotechnical, and other matters **(1) In deciding whether to grant development consent to development in the Alpine Region, the consent authority must consider the following—**	
(a) measures proposed to address geotechnical issues relating to the development,	A geotechnical assessment has been prepared for the proposed works and is provided in *Appendix F*.
(b) the extent to which the development will achieve an appropriate balance between— **(i) the conservation of the natural environment, and** **(ii) taking measures to mitigate environmental hazards, including geotechnical hazards, bush fires and flooding,**	This document addresses impacts to the natural environment. The project will not impact upon the risk of environmental hazards, including geotechnical hazards, bushfires and flooding.
(c) the visual impact of the proposed development, particularly when viewed from the land identified as the Main Range Management Unit in the *Kosciuszko National Park Plan of Management*,	There will be no long-term visual impact from the development. The hut will not be visible from the Main Range.
(d) the cumulative impacts of development and resource use on the environment of the Alpine Subregion in which the development is carried out,	The works are in previously disturbed areas and will not contribute to cumulative impact on the environment within the Resort.
(e) the capacity of existing infrastructure and services for transport to and within the Alpine Region to deal with additional usage generated by the development, including in peak periods,	The proposal will not impact upon existing Resort infrastructure and services capacity
(f) the capacity of existing waste or resource management facilities to deal with additional waste generated by the development, including in peak periods.	The proposal will not impact upon waste or resource management facilities
(2) For development involving earthworks or stormwater draining works, the consent authority must also consider measures to mitigate adverse impacts associated with the works.	This document, and the SEMP address earthworks and mitigation of adverse impacts
(3) For development the consent authority considers will significantly alter the character of an Alpine Subregion, the consent authority must also consider— **(a) the existing character of the site and immediate surroundings, and** **(b) how the development will relate to the Alpine Subregion.**	The proposed development being a ski patrol hut adjacent to the top station of a chair lift will not significantly alter the character of the Alpine Subregion, as such no further consideration of the existing character of the site and immediate surrounds is required. Nor is an assessment of how it relates to the Alpine Subregion is warranted.
4.30 Kosciuszko National Park Plan of Management	

(1) Development consent may be granted to development in the Alpine Region even if the application has not established that the development is consistent with the Kosciuszko National Park Plan of Management. **(2) This section does not prevent the consent authority from refusing to grant consent to development on the basis that the development is not consistent with the Kosciuszko National Park Plan of Management.**	The proposed development is consistent with the relevant provisions of the Kosciuszko National Park Plan of Management.

4.2 NSW Water Management Act 2000

The project site is more than 1km from the closest waterway, Perisher Creek, therefore is outside of any mapped Riparian zones and not requiring a controlled activity approval under the NSW *Water Management Act, 2000*.

4.3 Environmental Planning and Assessment Act 1979

Section 4.15 (1) of the *Environmental Planning and Assessment Act* lists the matters which must be taken into consideration by the consent authority when determining a development application. *Table 4.2* lists these matters and provides a summary assessment of each of these matters including, where appropriate, a cross reference to the relevant sections in this report.

Table 4.2 - Environmental Planning and Assessment Act checklist

Matter	Impacts / comments
(a) the provisions of any environmental planning instrument (including drafts), development control plans, planning agreements and the regulations	See Section 4
(b) the likely impacts of the development, including environmental impacts on both the natural and built environments, and social and economic impacts in the locality	See Section 3
(c) the suitability of the site for the development	See Section 3
(d) any submissions made in accordance with this Act or the regulations	N/A
(e) the public interest	The assessment addresses the aims and objectives of the SEPP (Precincts- Regional) 2021 and therefore is deemed to be in the public interest.

4.4 Biodiversity Conservation Act 2016

As outlined in Section 3.2, the Biodiversity Offset Scheme does not apply to this proposal. No impacts to threatened species are expected from this proposal.

4.5 Environment Protection and Biodiversity Conservation Act 1999

The factors which need to be considered under the Commonwealth *Environment Protection and Biodiversity Conservation Act* (*EPBC Act*) are listed in *Table 4.3* together with an assessment of each of these factors. None of these factors are considered to result in impacts which would be considered significant under the guidelines applying to the *EPBC Act.*

Table 4.3 – Environment Protection and Biodiversity Conservation Act checklist

Factor	Impacts / comments
Matters of National Environmental Significance	
Any environmental impact on a World Heritage Property?	No impact
Any environmental impact on a National Heritage Place?	No impact on the Australian Alps National Heritage Place.
Any environmental impact on wetlands of international importance?	No impact
Any environmental impact on Commonwealth listed species or ecological communities?	No impact
Any environmental impact on Commonwealth listed migratory species?	No impact
Does any part of the proposal involve a nuclear action?	No nuclear action
Any environmental impact on a Commonwealth Marine Area?	No impact
Impact on great Barrier Reef Marine Park?	No impact
Impact on Commonwealth land?	No impact
Impact on the environment, from action taken by the Commonwealth?	No impact
Commonwealth heritage places outside of Australian jurisdiction?	No impact

5 CONCLUSION

The proposed development is permitted with consent under the provisions of the SEPP (Precincts Regional) 2021 and is compliant with all relevant legislative requirements.

The proposed excavation and associated works for the installation of a ski patrol hut at the unload of the Quad Express chairlift will improve ski patrol response times and enhance the reliable and safe operation of the highly utilised Centre Valley Resort area.

The proposed location is previously disturbed, and access, vehicle movements and other works will not impact native vegetation or areas of archaeological significance.

Appendix A - Project Map and Site Plan

Figure 1: Project Location, Regional Setting

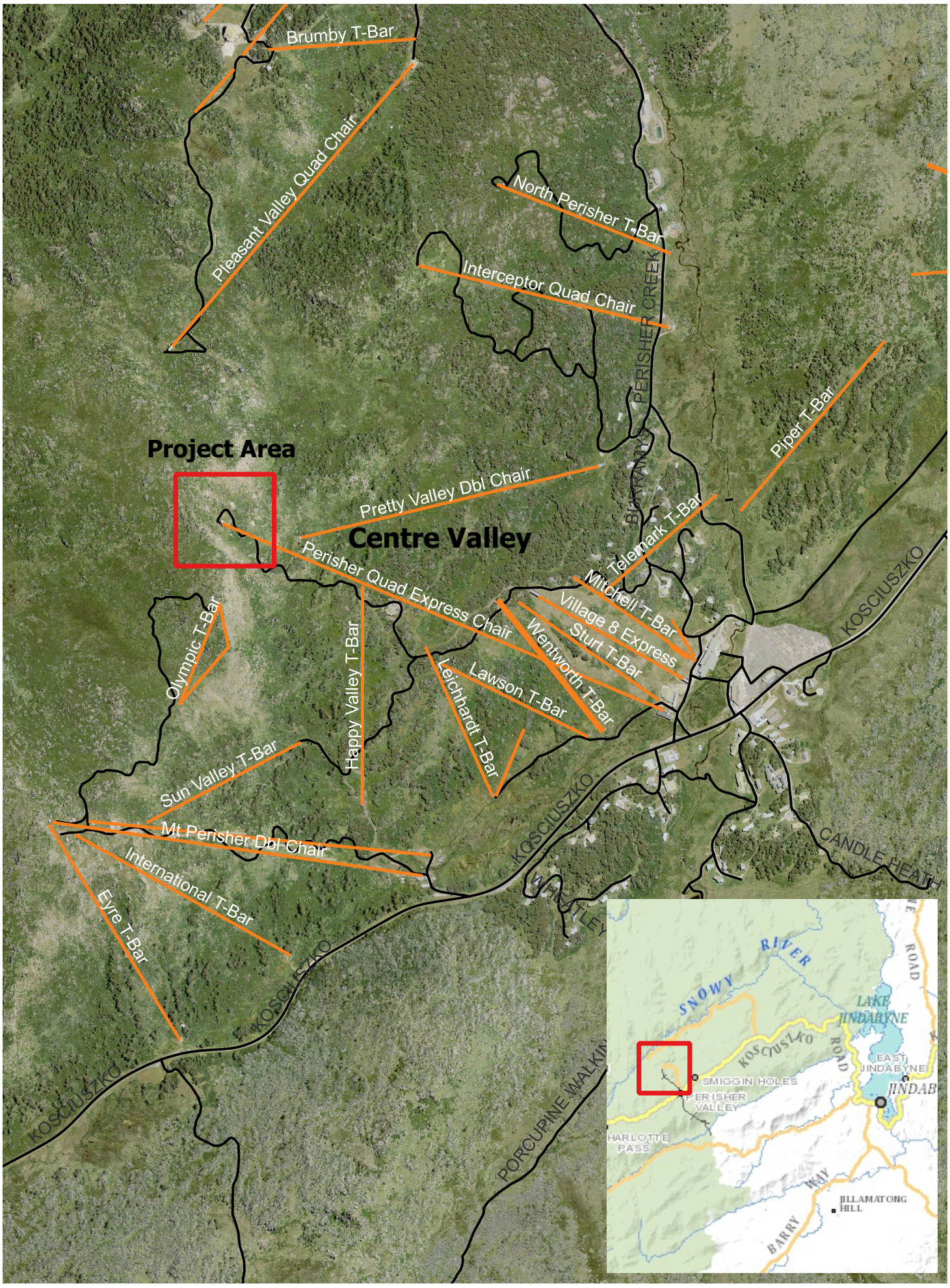
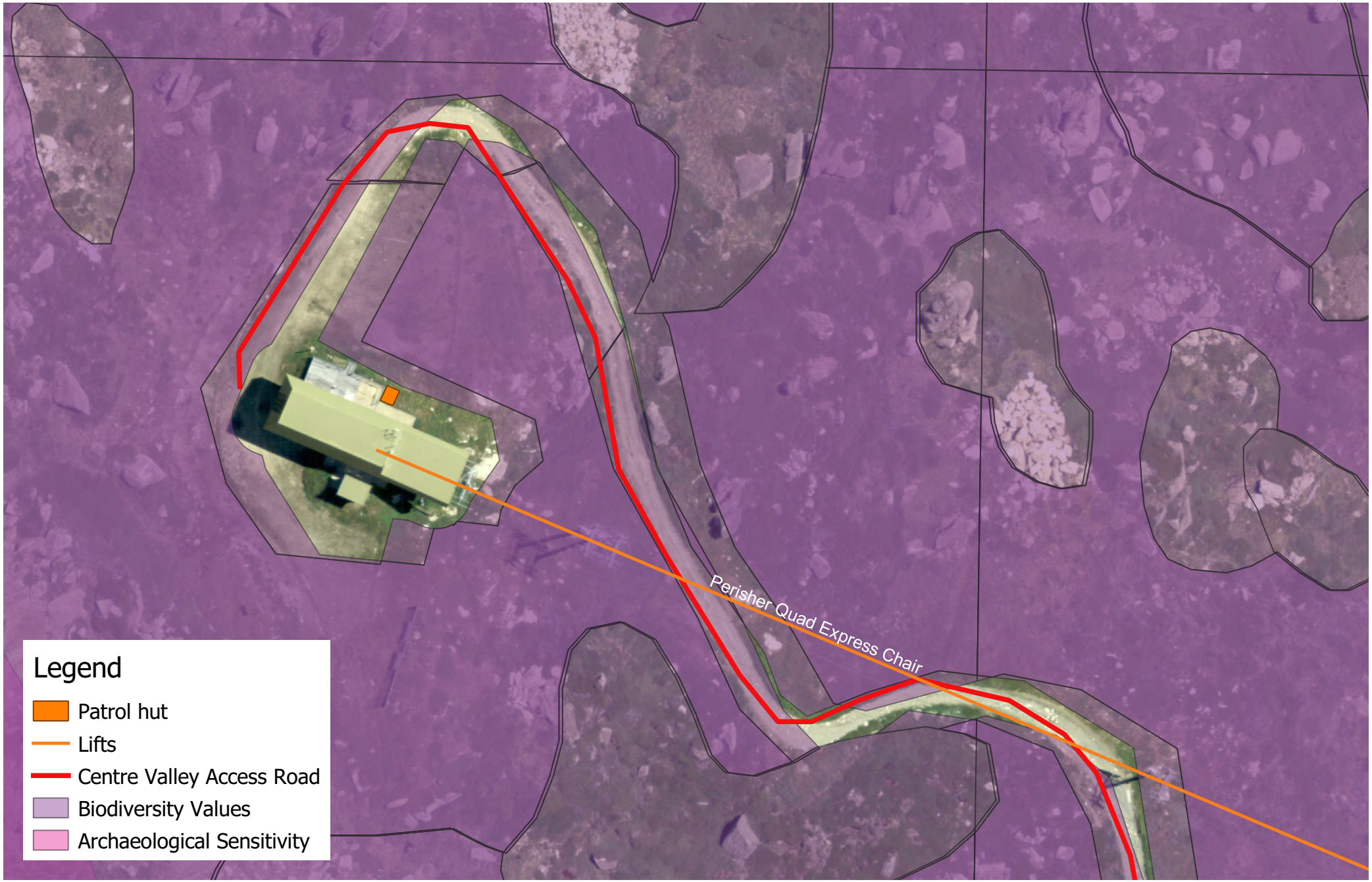


Figure 2: Site Plan, Quad Express Patrol Hut



Appendix B- Project Photos

Image 1: Unload of the Quad Express looking south, showing access road. The location of the patrol hut it shown by the orange box.

Image 2: Looking north, orange box shows location footing of the concrete slab.

Image 3: Location of excavation (indicative) for concrete slab and patrol hut.

Image 4: Existing hut to be installed at the top of the Quad Express chairlift.

APPENDIX C – Site Environmental Management Plan

PROJECT & EMERGENCY CONTACTS	
Project Name	Installation of ski patrol hut, top of Quad Express Chair, Centre Valley
Perisher Project Manager	Andrew Kennedy – 02 6459 4402
Perisher Operations	Mountain Office - 02 6459 4408
Perisher Environmental Manager	Tanya Bishop – 02 6459 4504
Perisher HSE Officer	Beth Davies – 02 6459 4487
Emergency	000
DPE	Sarah Collum – 02 6450 5543
EPA	131 555

ENVIRONMENTAL MANAGEMENT MEASURES	
PRIOR TO CONSTRUCTION	
Induction	• All project staff to be made aware of disturbance footprint and environmental safeguards prior to works commencing
Access	• All access to site via the formed Centre Valley Access Track • Machinery from offsite to be cleaned prior to accessing site • Site works to be limited to dry periods, to minimise soil disturbance
Storage	• All equipment to be stored in areas of exotic grass or formed access track only. No storage of equipment or machinery on native vegetation.
Disturbance to Soil	• Sedimentation and erosion controls to be installed in areas likely to experience soil loss into the surrounding environment.
DURING CONSTRUCTION	
Disturbance to Soil	• For erosion control, the combined use of straw bale filters and sediment fencing are to be used. • Erosion and sedimentation controls shall be monitored & maintained daily and immediately following a rainfall event.
Flora & Fauna	• No unapproved removal or disturbance of native vegetation • Refuel away from areas of native vegetation • No storage of material on native vegetation
Machinery / Fuel & Concrete	• Spill kits shall be readily accessible • Spills of any liquids shall be controlled and cleaned up immediately • No maintenance other than emergency repairs shall be undertaken on site. • No concrete washout shall be undertaken on the project site

Work Hours	• Limit work to approved hours only (daylight)
Waste	• All litter and waste to be contained and removed from site regularly
FOLLOWING CONSTRUCTION	
Stabilisation & revegetation	• Control weeds annually, or as required in the area
Disturbance to Soil	• All erosion and sedimentation controls to be removed from site once ground has stabilised

APPENDIX D - Archaeological Due Diligence

Project Name: Installation of Ski Patrol Hut, Top of Quad Express Chairlift, Centre Valley.

The due diligence assessment below is taken from the Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales, DECCW 2010. The assessment was undertaken by Beth Davies, Perisher Health, Safety and Environmental Officer, January 2023.

1 Generic Due Diligence Process

1. Will the activity disturb the ground surface or any culturally modified trees?

   Yes, excavations will occur in previously disturbed areas.

2. Are there any:

   a. relevant confirmed site records or other associated landscape feature information on AHIMS? and/or

   b. any other sources of information of which a person is already aware? and/or

   c. landscape features that are likely to indicate presence of Aboriginal objects?

      Is the proposed development:

      - Located within 200m of water? No

      - Located within a sand dune system? No

      - Located on a ridge top, ridge line or headland? No

      - Located within 20m of a cave, rock shelter? No

      And, is on land that is not disturbed land? No

   NO, none

CONCLUSION - AHIP application not necessary. Proceed with caution. If any Aboriginal objects are found, stop work and notify DECCW. If human remains are found, stop work, secure the site and notify the NSW Police and DECCW.

AHIMS Web Services (AWS)
Search Result

Your Ref/PO Number : quad express patrol hut

Client Service ID : 746084

Perisher

Date: 17 January 2023

Kosciuszko Road
Perisher New South Wales 2624

Attention: Beth Davies

Email: bethany.davies@vailresorts.com.au

Dear Sir or Madam:

AHIMS Web Service search for the following area at Lat, Long From : -36.401, 148.3923 - Lat, Long To : -36.3999, 148.3942, conducted by Beth Davies on 17 January 2023.

The context area of your search is shown in the map below. Please note that the map does not accurately display the exact boundaries of the search as defined in the paragraph above. The map is to be used for general reference purposes only.

A search of Heritage NSW AHIMS Web Services (Aboriginal Heritage Information Management System) has shown that:

0	Aboriginal sites are recorded in or near the above location.
0	Aboriginal places have been declared in or near the above location. *

If your search shows Aboriginal sites or places what should you do?

- You must do an extensive search if AHIMS has shown that there are Aboriginal sites or places recorded in the search area.
- If you are checking AHIMS as a part of your due diligence, refer to the next steps of the Due Diligence Code of practice.
- You can get further information about Aboriginal places by looking at the gazettal notice that declared it. Aboriginal places gazetted after 2001 are available on the NSW Government Gazette (https://www.legislation.nsw.gov.au/gazette) website. Gazettal notices published prior to 2001 can be obtained from Heritage NSW upon request

Important information about your AHIMS search

- The information derived from the AHIMS search is only to be used for the purpose for which it was requested. It is not be made available to the public.
- AHIMS records information about Aboriginal sites that have been provided to Heritage NSW and Aboriginal places that have been declared by the Minister;
- Information recorded on AHIMS may vary in its accuracy and may not be up to date. Location details are recorded as grid references and it is important to note that there may be errors or omissions in these recordings,
- Some parts of New South Wales have not been investigated in detail and there may be fewer records of Aboriginal sites in those areas. These areas may contain Aboriginal sites which are not recorded on AHIMS.
- Aboriginal objects are protected under the National Parks and Wildlife Act 1974 even if they are not recorded as a site on AHIMS.
- This search can form part of your due diligence and remains valid for 12 months.

Level 6, 10 Valentine Ave, Parramatta 2150
Locked Bag 5020 Parramatta NSW 2124
Tel: (02) 9585 6345

ABN 34 945 244 274
Email: ahims@environment.nsw.gov.au
Web: www.heritage.nsw.gov.au

Appendix E - Engineering Drawing

Quad Express Top Station Patrol Hut

Perisher Ski Resort, Perisher Valley

GENERAL

1. These structural drawings are to be used for structural works purposes only. They are to be read in conjunction with all other project disciplines drawings. No other trade or architectural details are to be inferred from these drawings.
2. The drawn details are to be read in conjunction with all notes provided herein and all text which accompanies such detail. Any discrepancy between notes, text and/or details must be referred to the engineer for clarification.
3. All works related to these drawings are to be carried out in accordance with the relevant building codes and Australian standards as required by the certifying authority.
4. Any dimensions, whether scaled or written, are provided for information only. Works dimensional set out is not to be carried out according to these drawings and should be based on architectural information. The builder is to coordinate these drawings with architectural set out and report any discrepancies to both architect and engineer.
5. The drawings are provided showing the works in a completed state only. No inference is to be made regards construction methods. The builder retains sole responsibility for all construction methods and techniques which are employed.
6. The structural design depicted in these drawings has been carried out with due regard to construction risk mitigation. As the builder is responsible for all construction methods and techniques, it remains the builders responsibility to ensure risk and safety management is practised onsite.

TEMPORARY BRACING

1. The structure shown in these drawings has been detailed as stable in its final built condition.
2. During construction, and at every stage until completion, the structure shown in these drawings does not possess the stability required to be self supporting.
3. It remains the responsibility of the builder to provide temporary bracing to all building elements during the construction process. This bracing must be installed such that all elements remain in a stable state and experience no overstress.

WORKS INSPECTIONS

1. Inspections will likely be required to allow as-built certification of the works by the engineer. The builder is to obtain such certification requirements through liaison with the certifying authority and engineer.
2. Where inspections are required, the builder shall give a minimum two working days notice to the contract engineer.
3. Any engineer inspection is carried out with the sole intent to ensure that the structural construction works generally comply with the structural design. Inspections, the results of, and any associated documentation in no way relieves the builder of their full responsibility to ensure complete and detailed works compliance with the structural design. The engineer takes no responsibility for any other job aspects observed during the course of an inspection.
4. Where required inspections are not organised by the builder, the engineer takes no responsibility for any inability to certify completed works.

DESIGN LOAD ALLOWANCES

Design loads have been allowed for in accordance with the relevant sections of AS/NZS 1170. Loads are based upon the occupancy types shown on the architectural drawings.

Floor Live Loads
Hut..... 2.5 kPa &

Wind Loads
Hut..... Vdes = 60m/s (216 km/h)

Snow Loads
Hut..... 6.0 kPa Ultimate

SITE PREPARATION & FOUNDATIONS

1. All site preparation, foundation and soil-related works are based upon assumed parameters inferred from site visit/s. The builder must confirm these parameters via liaison with a suitably qualified geotechnical professional prior to commencement of any construction works. The structural engineer takes no responsibility for the suitability of the provided structural design should any works be undertaken without this confirmation.
2. Per the information referred to in sub-clause 1, the site parameters used in structural design are:
   - Site Classification..... A (to AS 2870)
   - Sub-soil type..... Loam/Rock
   - Allowable Bearing Capacity..... 50 kPa
3. All works shall be founded on a consistent sub-soil in accordance with the parameters above. This site class, sub-soil type and the stated bearing capacity shall be confirmed by a suitably qualified geotechnical professional prior to any works commencing.
4. Where the structure is classified as being within the scope of AS 2870 (refer AS 2870 Clause 1.1), then the design has been carried out in accordance with that code. The owner should familiarise themselves with the footings performance allowances made under this code (particular attention is drawn to acceptable levels of cracking and/or foundation movement).
5. All topsoil, roots and organic matter shall be removed from the area in which the footings and/or slab are to rest. This is to be carried out to a depth as required to remove these undesirable materials.
6. Any excavation is to be carried out in accordance with authority conditions. Batters are to be provided to the direction of a suitably qualified geotechnical professional. Temporary drainage is to be provided to ensure stability of batters in all conditions. In no case are excavations to undermine any adjacent structure. Advice should be sought from the engineer in any case where this is a possibility.
7. Any over-excavation beyond required levels shall be back-filled under the supervision of a suitably qualified professional to achieve the required bearing capacity. Mass concrete filling is possible only at the discretion of the engineer.
8. Where the structure is classified as being within the scope of AS 2870, further site preparation shall be carried out per the requirements of that code, possibly including but not limited to sand blinding, controlled filling, provision of vapour barriers, sloping of soils away from structure and protection of services, etc.
9. Footings and/or slabs are to be poured within 24 hours of inspection and reinforcement approval under dry conditions.
10. Unless noted otherwise, all footings and piers are to be centred under columns, walls and piers over.
11. Retaining walls are not to be back filled until core filled and cured. At a minimum this is to be 7 days from point of core filling and if required, the provision of top edge support (refer details). Back fill is to be granular and free draining. A suitable dewatering system is to be employed such as strip drains or geofabric with polymer drainage sheet connected to free flowing outlets. Walls are to be waterproofed where required by the architectural specification.

STEELWORK

1. All steelwork associated materials, the manufacture and the erection of such materials is to be in accordance with relevant Australian Standards including but not limited to AS4100.
2. All steel is to be of minimum yield stress of 250MPa in accordance with Australian standards shown in Table 2.1 of AS4100 unless noted otherwise.
3. Welds shall be GP unless noted otherwise. The minimum size of a fillet weld shall be 6mm, except where material is 6mm or thinner, then it shall be the thickness of the material (based on the thinner material being joined).
4. All bolts are to comply with AS111, AS1110 and/or AS/NZS1252. Bolts are to be of the category denoted in structural details, being one of the following:
   - 4.6/S Grade 4.6, snug tightened
   - 8.8/S Grade 8.8, snug tightened
   - 8.8/TB Grade 8.8, fully tensioned
   - 8.8/TF Grade 8.8, fully tensioned
5. Surface preparation for bolted joints is to be in strict accordance with AS4100. One washer is to be located under any rotated part. The length of a bolt shall be such that a minimum of one clear thread plus runout is showing after tightening. Any nut subject to vibration shall be secured to prevent loosening. Tapered washers shall be provided where the slope of surfaces in contact exceeds 1:20. Tensioned bolts shall be installed by the part-turn method of tensioning or with the use of a direct-tension indicating device.
6. All seal plates for hollow members are to be vented in a manner which will not compromise performance. Drain holes are to be provided in any members undergoing galvanising.
7. All finishes are to comply with the following. Decorative finishes are permissible so long as they do not hinder the performance of the finish specified below. Any site activity which compromises the factory finish is to be repaired such that the factory finish is achieved.

Location	Finish Type	Code
All	Paint as Selected	

8. Fire rating has not been allowed for. The builder is to ensure fire rating is provided as per the architectural and project specifications.
9. Workshop drawings for structural steelwork shall be provided to the engineer at least 10 working days prior to the commencement of materials ordering or fabrication. Materials ordering or fabrication shall not be undertaken until the engineer has confirmed the suitability of such drawings by writing. The purpose of checking drawings is solely to ensure conformance with structural intent. No responsibility is taken by the engineer other than for this purpose. The builder retains sole responsibility for ensuring architectural intent, dimensional correctness and fitness for site delivery/installation is achieved.
10. Baseplates/endplates are to be grouted with a high strength non-shrink grout ensuring full bedding is achieved. Post installed anchors shall only be used where detailed. Anchors shall be installed in full compliance with manufacturers specification ensuring that no damage to the reinforcement is made. Anchors are to be load tested according to manufacturer recommendations.

CONCRETE

1. All concrete materials and construction requirements are to be in strict accordance with AS 3600 and any associated standards. All concrete mixes are to be of normal weight proportioned to meet the following characteristics. Mixes are to be tested in accordance with the requirements set out in AS3600.
   - Drying Shrinkage Strain ..... 800 microns @ 56 days
   - Maximum Aggregate Size 20mm
   - Slump..... Suitable for method of placement, 100mm for strip footings
   - Ad-mixtures ..... Only by engineers permission
2. Concrete characteristic compressive strength (28 days) and clear cover to reinforcement are to be in accordance with the following table for respective structural elements. Covers are minimum and are to be maintained at all chamfers, drip grooves, etc.

Element	Strength	Cover (External)	Cover (Internal)
Footing	40 MPa	50	n/a

3. Refer to notes on reinforcement for its material and construction requirements.
4. Sizes shown are the structural minimum and may only be varied with the written permission of the engineer (inclusive of any induced detailing, reinforcement changes, etc).
5. Construction joints are permitted only at the written approval of the engineer. Specific detailing will be provided.
6. No penetrations, blockouts, services embedment, etc, other than that shown on the structural drawings are allowed. Contact the engineer where changes to these details are required.
7. Concrete shall be placed to ensure that no segregation of materials occurs, and be laid such that the concrete fills all forms and encompasses all reinforcement as a dense, monolithic mass with no voids or entrapped air. Mechanical vibration shall be used.
8. Pouring of elements where formwork restricts movement such as slabs over columns shall be timed to ensure allowance for wet concrete settlement. Minimum pour separation of 1 day.
9. Concrete shall be finished to the architectural specification ensuring that required structural sizes are maintained and cover to reinforcement is not reduced.
10. Curing of concrete shall commence as soon as practical after finishing. It shall involve the prevention of loss of excess moisture and protection from extremes of temperature for a minimum of 7 days. Techniques allowed include fogging or ponding of water, covering with plastic or wet hessian and the use of curing compounds. Selection of method and responsibility for proper execution of curing remains the responsibility of the builder.
11. Concrete shall be protected from freezing, the effects of rain or running water and from excess drying during the curing period.
12. Where concrete repairs are found to be necessary the engineer shall be contacted for written instruction. No repairs are to be carried out otherwise.

Rev	Issued For	Date
A	Issued for Construction	15 FEB 23
1	Preliminay Issue	25 JAN 23

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Notes Sheet 1
Quad Express Top Station Patrol Hut @ Perisher Ski Resort
Vail Resorts
Not to Scale
22088-S01 A

REINFORCEMENT

1. All reinforcing materials, the manufacture and the placement of such materials is to be in accordance with relevant Australian Standards including but not limited to AS3600 and AS/NZS 4671.
2. Reinforcement shall be of the proper class, in accordance with AS/NZS 4671, as denoted in the structural drawings. Such classes include:

N ..... D500N, Hot rolled deformed 500MPa
R ..... R250N, Hot rolled round 250 MPa
S ..... D250N, Hot rolled deformed 250 MPa, typically pool reinforcement

3. Ductility class L reinforcement shall not be used unless specifically detailed (exception being as is normally detailed for mesh in slab on grade).
4. All reinforcement shall be uniformly supported on bar chairs, and tied together sufficiently, to ensure correct position and cover is achieved and maintained throughout concrete placement and hardening. Plastic tipped steel bar chairs are only permitted where the use does not compromise cover requirements (i.e. no raw steel of the chair is permitted to lie within the reinforcement cover zone).
5. Bundled bars are to be tied together sufficiently to ensure they remain in full contact.
6. Splicing of reinforcement shall only be made as shown on the structural drawings. Splicing shall be made by lapping bars or alternatively with the use of mechanical means (proprietary couplers). Lapped splice lengths shall be in accordance with the following.

For single bars in normal 32MPa concrete

Slabs 350mm thick or less, wall verticals

N12	N16	N20	N24
500	700	950	1200

Slabs greater than 350mm thick, wall horizontals and beams

N12	N16	N20	N24	N28
600	900	1250	1600	1950

Columns

N12	N16	N20	N24	N28
500	650	800	1050	1350

The above values are to be increased for (multiply given lengths by)

25MPa concrete	x 1.15
Bundled bars	x 1.2 for 3 bars
	x 1.33 for 4 bars
Lightweight concrete	x 1.3
Elements in slip forms	x 1.3
Epoxy coated bars.	x 1.5

7. Where offsets are used in lapped splices, the offset shall be of one bar diameter only. The maximum slope of the inclined section of bar at the offset is to be 1 in 6.
8. Splicing of mesh shall be made such that the two outermost cross bars of sheets being joined are overlapped. In addition, the minimum length of overlap shall be 100mm.
9. Site bending of reinforcement is permissible if required however shall avoid any impact loading (such as with a hammer), and any damage to the bars surface. Bending in one location may only be performed twice and any further bend shall not be made within 20 bar diameters of the previous. No heat is to be used.
10. No welding of reinforcement is to be carried out without the written permission and direction of the engineer.
11. At the time of concrete placement, the surface condition of the reinforcement shall not impair the bond with concrete. Minor surface rust is acceptable.

TIMBER

1. All timber associated materials, the manufacture and the erection of such materials is to be in accordance with relevant Australian Standards including but not limited to AS1720 and/or AS1684.
2. All timber is to be of the wood type (hard/soft/manufactured), of the minimum strength and durability grades as shown in the structural drawings.
3. All timber is to be seasoned and to be of a moisture content suitable for the location it is being used.
4. All fixings, nails, bolts, brackets, etc, are to be galvanised as required to suit the location of use.
5. Bolts shall be pre-bored at a diameter equal to the shank. Washers shall be used at the end of each bolt in accordance with Table 4.11 of AS1720.1.
6. All connections are to be made in accordance with the relevant standard.
7. Where manufactured timber is used, all works are to be carried out in accordance with the manufacturers specification.

FORMWORK

1. All concrete formwork design and construction remains the responsibility of the builder. All formwork shall be designed to support all loads supported by it including, but not limited to, materials loads prior to and after pour, the wet weight of the concrete, construction equipment, live loads and any lateral or PT induced loads.
2. Formwork finishes are to be specified by the architect.
3. Stripping times shall comply with the relevant Australian Standards. Attention is to be given to back-propping removal in multi-storey construction to avoid slabs being loaded beyond design limits (including allowance for strengths less than specified at 28 days).

Rev	Issued For	Date
A	Issued for Construction	15 FEB 23
1	Preliminay Issue	25 JAN 23

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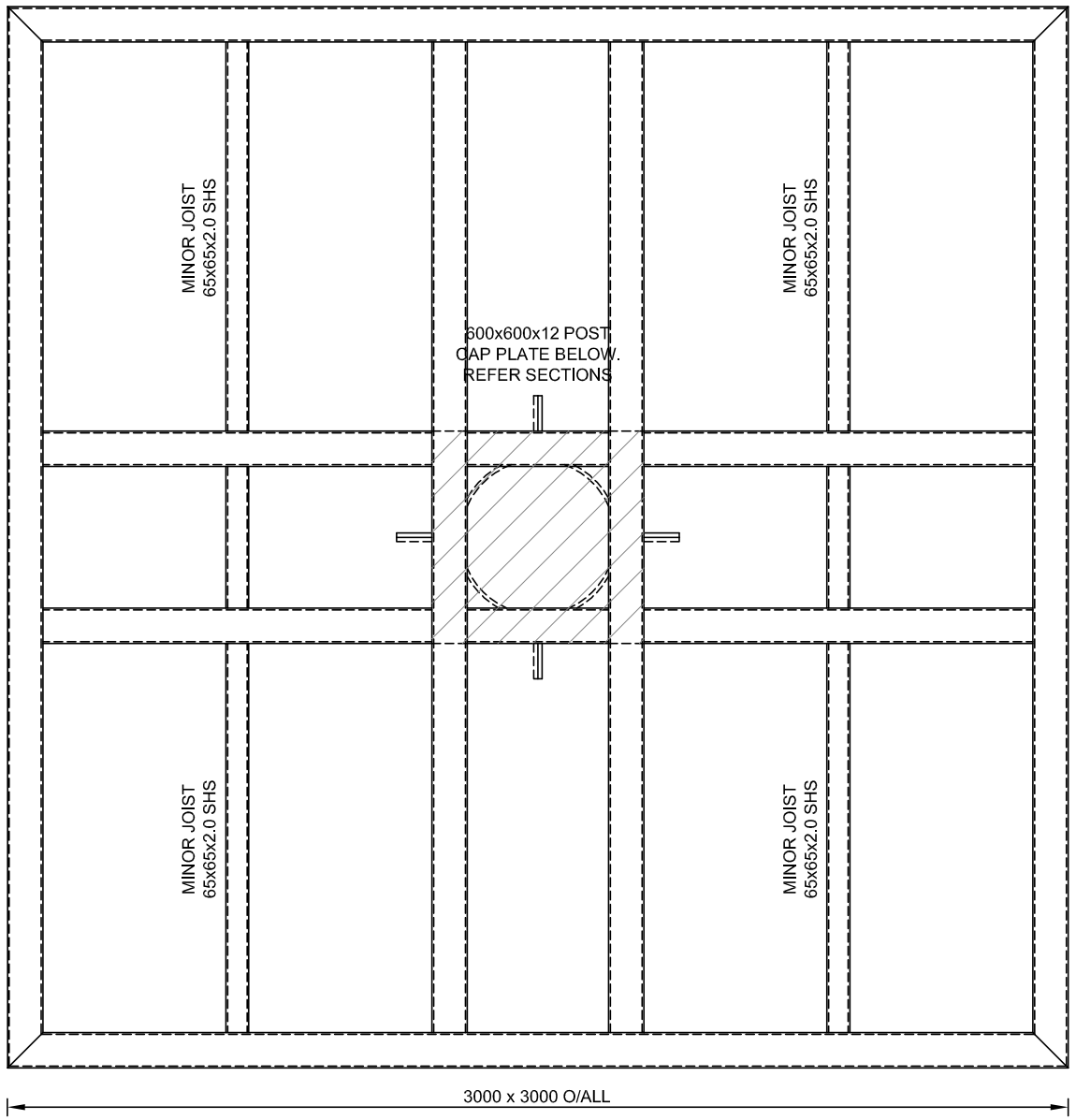
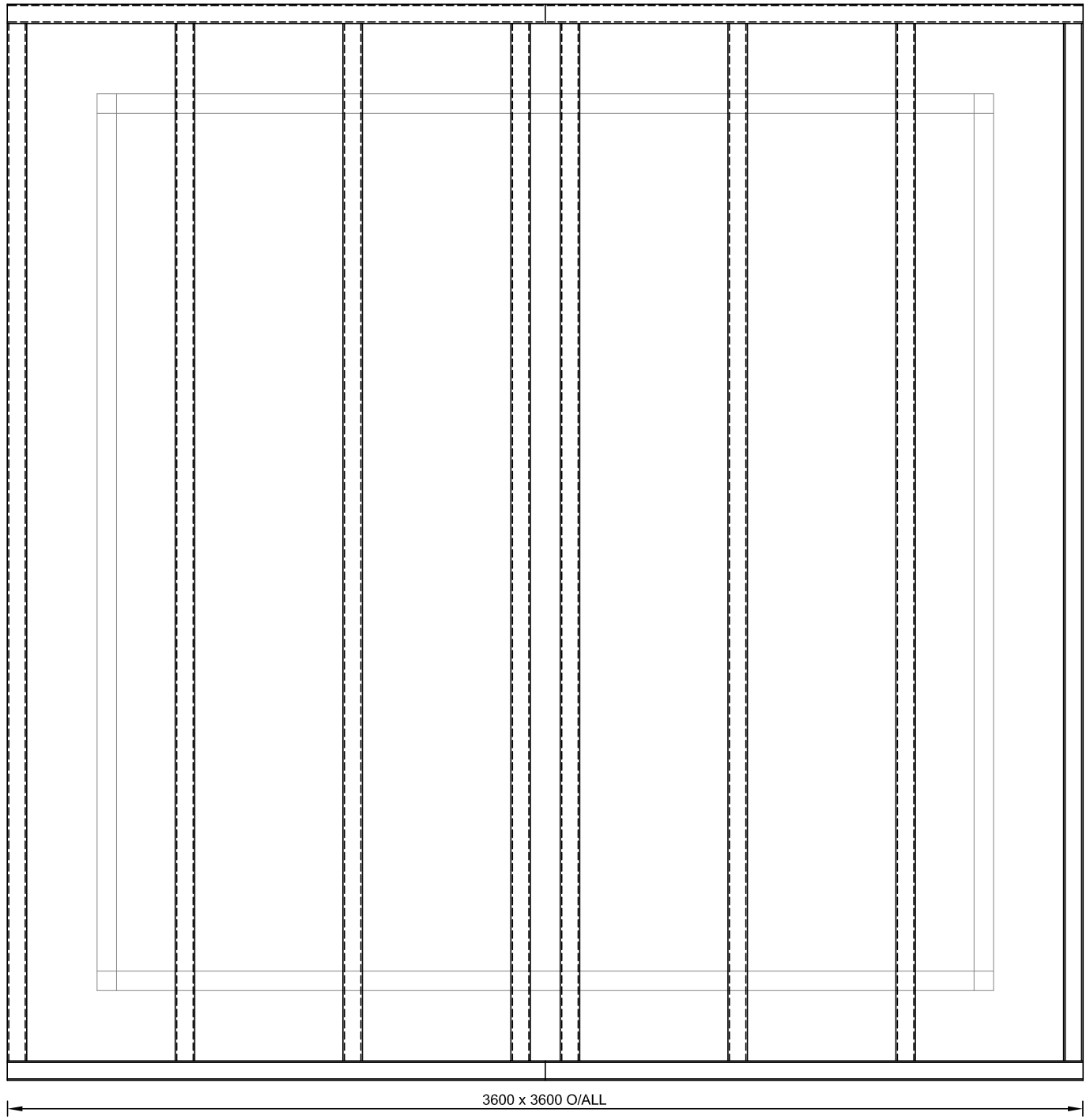
Notes Sheet 2
Quad Express Top Station Patrol Hut @ Perisher Ski Resort
Vail Resorts
Not to Scale
22088-S02 A



FLOOR PLAN

150x100x4.0 RHS UNLESS NOTED OTHERWISE



ROOF PLAN

ALL MEMBERS 65x65x2.0 SHS

LIFT HUT DETAILS

1. Refer relevant notes on general notes sheet.
2. All levels and falls to architects details.
3. All works to be carried out in strict accordance with NCC & relevant Australian Standards.

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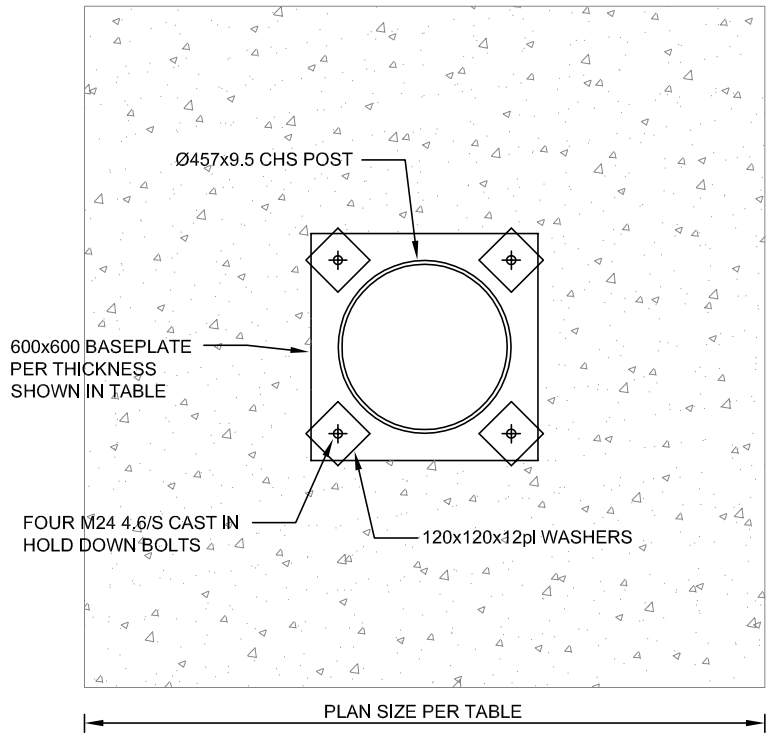
Lift Hut Details 1

Quad Express Top Station Patrol Hut @ Perisher Ski Resort

Vail Resorts

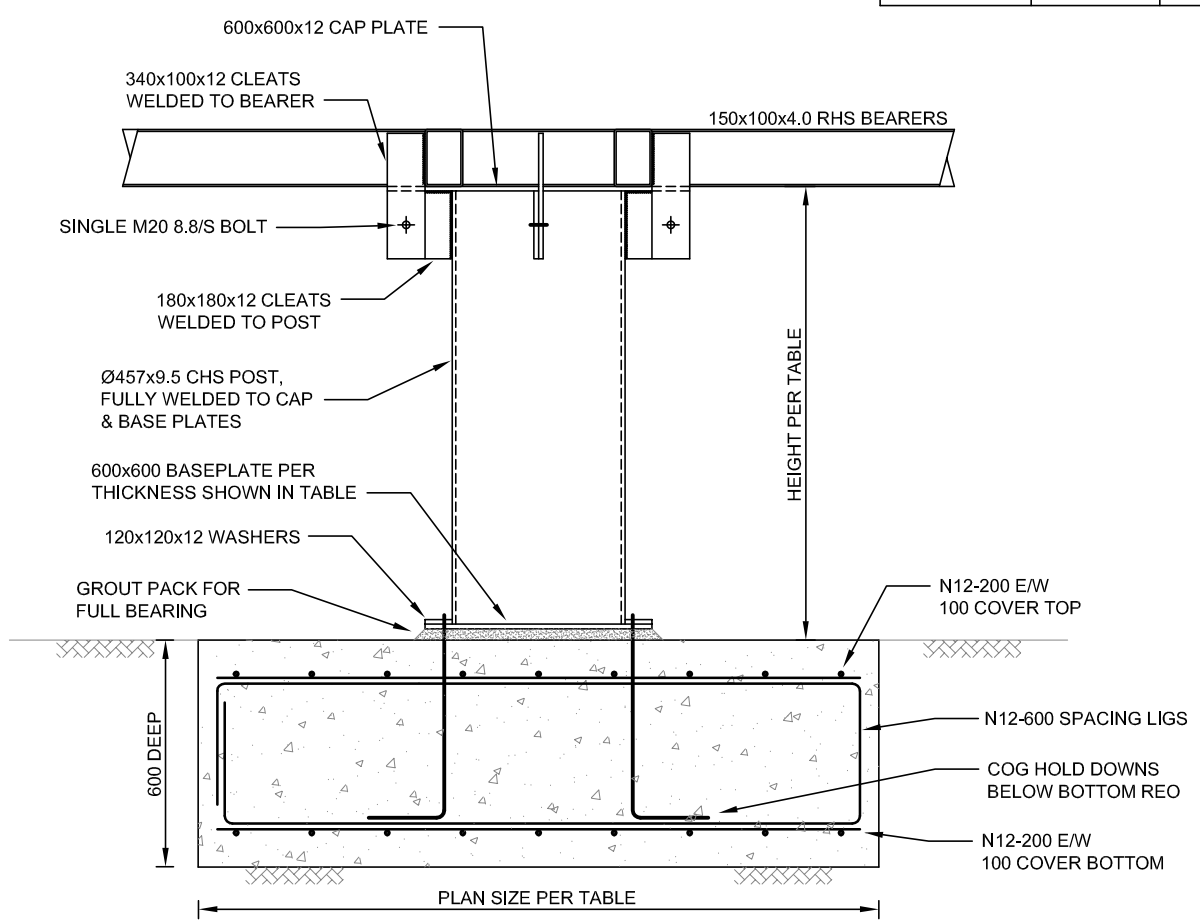
Approx 1:20 @ A3

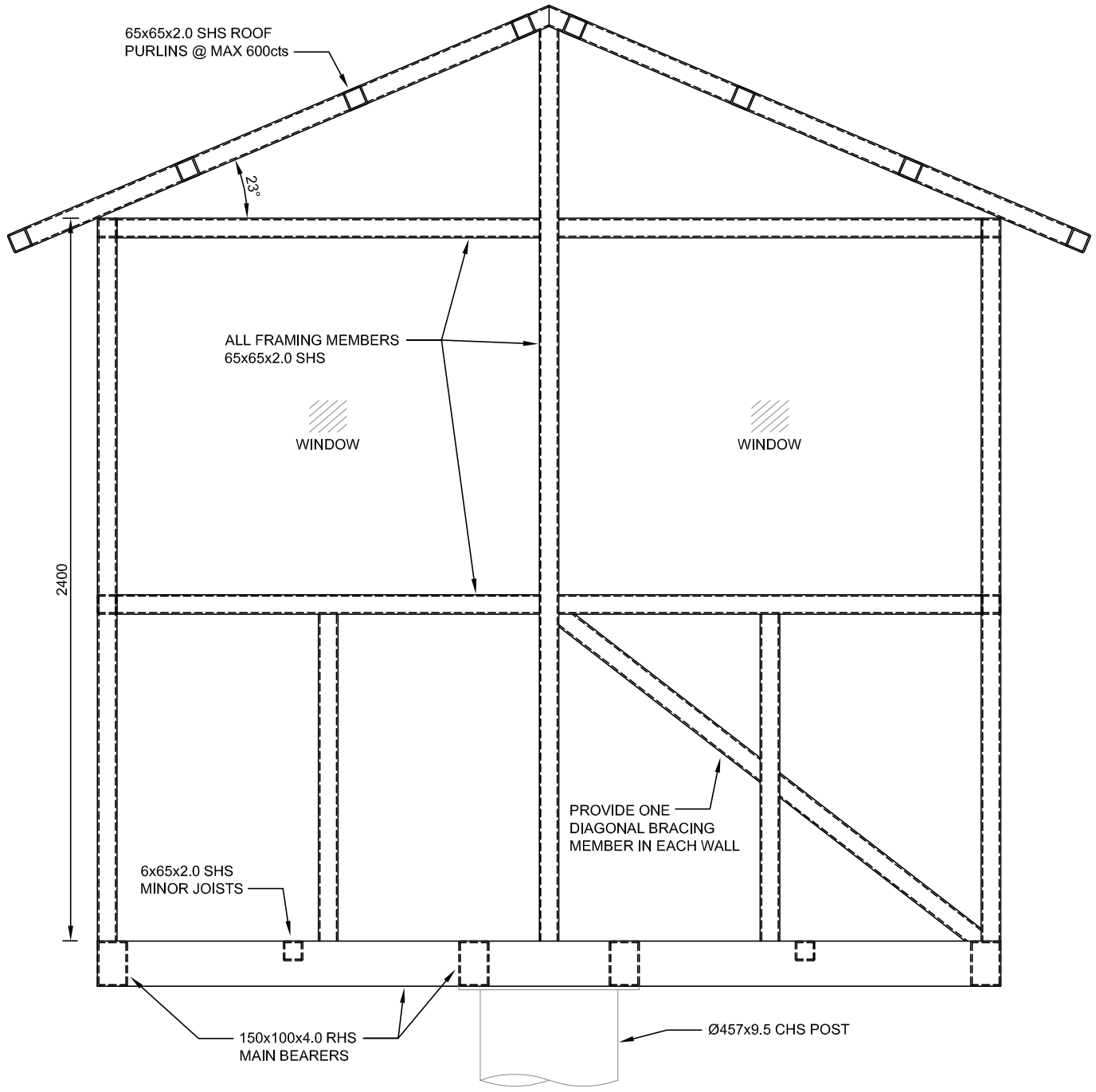
22088-S03 A



FOOTING & POST DETAILS

POST HEIGHT	FOOTING PLAN SIZE	FOOTING PLATE THICKNESS
Up to 1200	1800 x 1800	12mm
1201 to 1500	2000 x 2000	16mm
1501 to 1800	2200 x 2200	20mm





WALL ELEVATION

STAIRS TO BE CONSTRUCTED WITH
200x8pl STRINGERS WITH BOLTED
WEBFORGE OR WELDLOK TREADS.
SIMLIAR PER EXISTING.
OR APPROVED EQUIVALENT.

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Lift Hut Details 2

Quad Express Top Station Patrol Hut @ Perisher Ski Resort

Vail Resorts

Approx 1:20 @ A3

22088-S04 A

Appendix F - Geotechnical Report

assetgeoenviro

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North Ryde NSW 2113
02 9878 6005
assetgeoenviro.com.au

Our ref: 7087-G1
26 February 2023

Vail Resorts
PO Box 42
Perisher Valley NSW 2624

By email: andrew.kennedy@vailresorts.com.au

Attention: Andrew Kennedy

Dear Andrew,

Ski Patrol Hut, Top of Quad Express Chairlift, Perisher, Centre Valley
Geotechnical Assessment

1. INTRODUCTION

1.1 General

This report presents the results of a geotechnical assessment for a proposed Ski Patrol Hut, Top of Quad Express Chairlift at Perisher, Centre Valley (the Site). The assessment was commissioned on 10 November 2022 by Andrew Kennedy of Vail Resorts. The work was carried out in accordance with the email proposal by AssetGeoEnviro (Asset) dated 10 November 2022, reference 7087-P1.

Documents supplied to us for this assessment comprised:

- Structural Plans (prepared by: Camstruct Consulting Pty Ltd; ref: 22088; drawings: S01 to S04; issue: 1; dated 28 January 2023).
- Draft Statement of Environmental Effects (prepared by: Perisher Blue Pty Ltd; dated: January 2023).

Based on the supplied documents, we understand that the project involves removing fill material to the north of the Quad Express chairlift unload, installing a concrete slab with dimensions 2m x 2m x 600mm with a 3m x 3m hut on a pedestal approximately 1500mm high. The footing has been designed for a Class A site as per AS2870-2011 'Residential Slabs and Footings', and a required allowable bearing capacity of 50 kPa.

The Site lies within the G-line as defined in DIPNR's "Geotechnical Policy – Kosciuszko Alpine Resorts", November 2003. However, given that existing fill is being removed and a lightly loaded structure built instead, the development falls under Minimal Impact criteria.

1.2 Scope of Work

The main objectives were to assess the surface and likely subsurface conditions and to provide comments and recommendations relating to Site Classification to AS2870–2011 "Residential Slabs and Footings", and allowable bearing pressure.

The following scope of work was carried out to achieve the project objectives:

- A review of existing regional maps and reports relevant to the Site held within our files.
- Visual observations of surface features.
- Engineering assessment and reporting.

This report must be read in conjunction with the attached "Important Information about your Geotechnical Report" in Appendix A. Attention is drawn to the limitations inherent in site investigations and the importance of verifying the subsurface conditions inferred herein.

2. SITE DESCRIPTION

The Site is located at the top of the Quad Ski as shown in Figure 1. The Ski Hut is to be located at the northeastern side of the offload ramp as shown in Figure 2 and the aerial photo following.

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Topographically, the Site is located in moderately to steeply sloping terrain. In the site vicinity, the slopes are relatively gentle, estimated less than 5º to 10º.

The ground next to the offload ramp where the Ski Hut is to be located has been filled up to about 1.5m depth, as shown in Photos 1 and 2. The fill has been battered at about 2H:1V and has been covered with grass.

The uphill side of the filled area had ponded water from uphill surface runoff, which drains around the eastern edge of the fill as shown in Photo 3. The water has locally saturated and softened the ground.

The 1:250,000 Tallangatta Geological Map indicates the Site is underlain by Lower Devonian aged intrusive granites, micro-diorites and tonalites. This is locally weathered to produce core-stones and tor outcrops. These can be of significant size.

Granite rocks can be seen outcropping in the site vicinity just under the grass cover in the vicinity of the Ski Hut, and tor outcrops upslope and downslope.

3. DISCUSSIONS & RECOMMENDATIONS

As the fill is to be removed, and the foundation material at subgrade level is likely to be weathered granite bedrock, the Site is classified as a Class A Site in accordance with AS 2870–2011 “Residential Slabs and Footings”.

The allowable bearing pressure for the extremely weathered granite is expected to be at least 600 kPa, which is in excess of the minimum 50 kPa required.

An experienced Geotechnical Engineer should review footing designs to check that the recommendations of the geotechnical report have been included and should assess footing excavations to confirm the design assumptions.

It is also recommended that surface drainage be improved to prevent water from ponding on the uphill side of the unload and Ski Hut area.

4. LIMITATIONS

In addition to the limitations inherent in site investigations (refer to the attached Information Sheets), it must be pointed out that the recommendations in this report are based on assessed subsurface conditions from limited observations. To confirm the assessed soil and rock properties in this report, further investigation would be required.

Asset accepts no liability where our recommendations are not followed or are only partially followed. The document “Important Information about your Geotechnical Report” in Appendix A provides additional information about the uses and limitations of this report.

❖❖❖

Please do not hesitate to contact the undersigned if you have any questions regarding this report or if you require further assistance.

For and on behalf of
AssetGeoEnviro

Mark Bartel

Mark Bartel
BE, MEngSc, GMQ, CPEng, RPEQ/NER(Civil), DEP/PRE (NSW)
Managing Director | Senior Principal Geotechnical Engineer

Encl: Form 4 – Minimal Impact Certification
Figure 1 – Project Location, Regional Setting
Figure 2 – Location Map, Quad Express Patrol Hut
Important Information about your Geotechnical Report
Soil and Rock Explanation Sheets
Site Photos

DOCUMENT CONTROL

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Copy	Media	Recipient	Location
1	Secure PDF	Andrew Kennedy	Vail Resorts
2	Secure PDF	Mark Bartel	Asset Geotechnical Engineering

DOCUMENT STATUS

Rev	Revision Details	Author	Reviewer		Approved for Issue		
			Name	Initials	Name	Initials	Date
0	Initial issue	M. Bartel			M. Bartel		26 February 2023

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Form 4 – Minimal Impact Certification

DA Number: _____

This form may be used where minor construction works which present minimal or no geotechnical impact on the site or related land are proposed to be erected within the "G" line area of the geotechnical maps.

A geotechnical engineer or engineering geologist must inspect the site and/or review the proposed development documentation to determine if the proposed development requires a geotechnical report to be prepared to accompany the development application. Where the geotechnical engineer determines that such a report is not required then they must complete this form and attach design recommendations where required. A copy of Form 4 with design recommendation, if required, must be submitted with the development application.

Please contact the Alpine Resorts Team in Jindabyne for further information - phone 02 6456 1733.

To complete this form, please place a cross in the appropriate boxes ☐ and complete all sections.

1. Declaration made by geotechnical engineer or engineering geologist in relation to a nil or minimal geotechnical impact assessment and site classification

I,

Mr [x] Ms ☐ Mrs ☐ Dr ☐ Other ☐

First Name	Family Name
Mark	Bartel

OF

Company/organisation

Asset Geotechnical Engineering Pty Ltd (trading as AssetGeoEnviro)

certify that I am a geotechnical engineer /engineering geologist as defined by the "Policy" and I have inspected the site and reviewed the proposed development known as

Ski Patrol Hut, Top of Quad Express Chairlift, Perisher, Centre Valley

As a result of my site inspection and review of the following documentation

(List of documentation reviewed)

Structural Plans (Camstruct Consulting Pty Ltd; ref: 22088; drawings: S01 to S04; issue: 1; dated 28 January 2023).

Draft Statement of Environmental Effects (Perisher Blue Pty Ltd; dated: January 2023)

I have determined that;

- ☒ the current load-bearing capacity of the existing building will not be exceeded or adversely impacted by the proposed development, and
- ☒ the proposed works are of such a minor nature that the requirement for geotechnical advice in the form of a geotechnical report, prepared in accordance with the "Policy", is considered unnecessary for the adequate and safe design of the structural elements to be incorporated into the new works, and
- ☒ in accordance with AS 2870.1 Residential Slabs and Footings, the site is to be classified as a type

(insert classification type)

Class A (provided footings on rock)

- ☒ I have attached design recommendations to be incorporated in the structural design in accordance with this site classification. Refer report 7087-G1

I am aware that this declaration shall be used by the Department as an essential component in granting development consent for a structure to be erected within the "G" line area (as identified on the geotechnical maps) of Kosciuszko Alpine Resorts without requiring the submission of a geotechnical report in support of the development application.

2. Signatures

Signature

Mark Bartel

Chartered professional status

CPEng 35641 NER (Civil)

Name

Mark Bartel

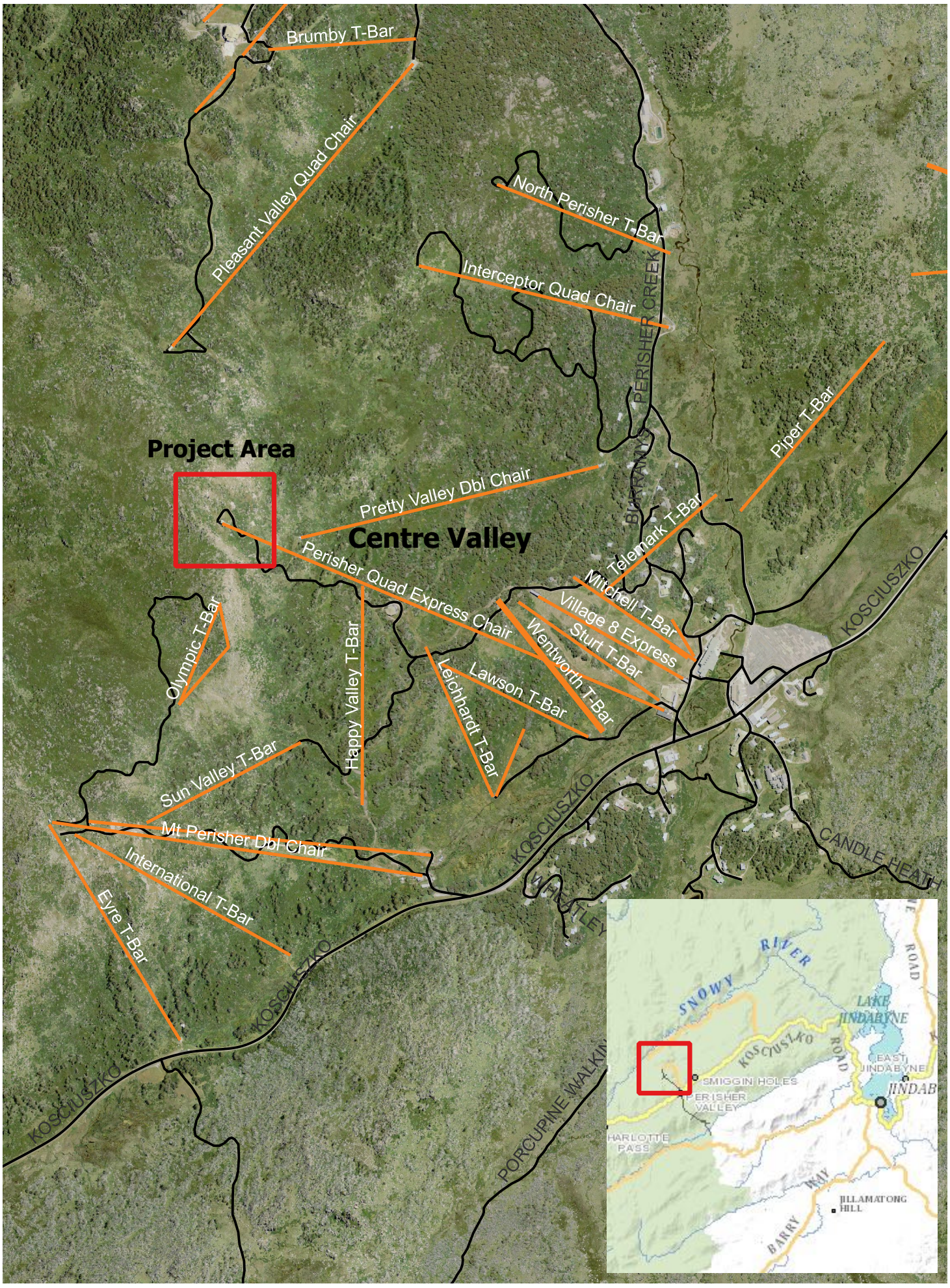
Date

26 February 2023

3. Contact details

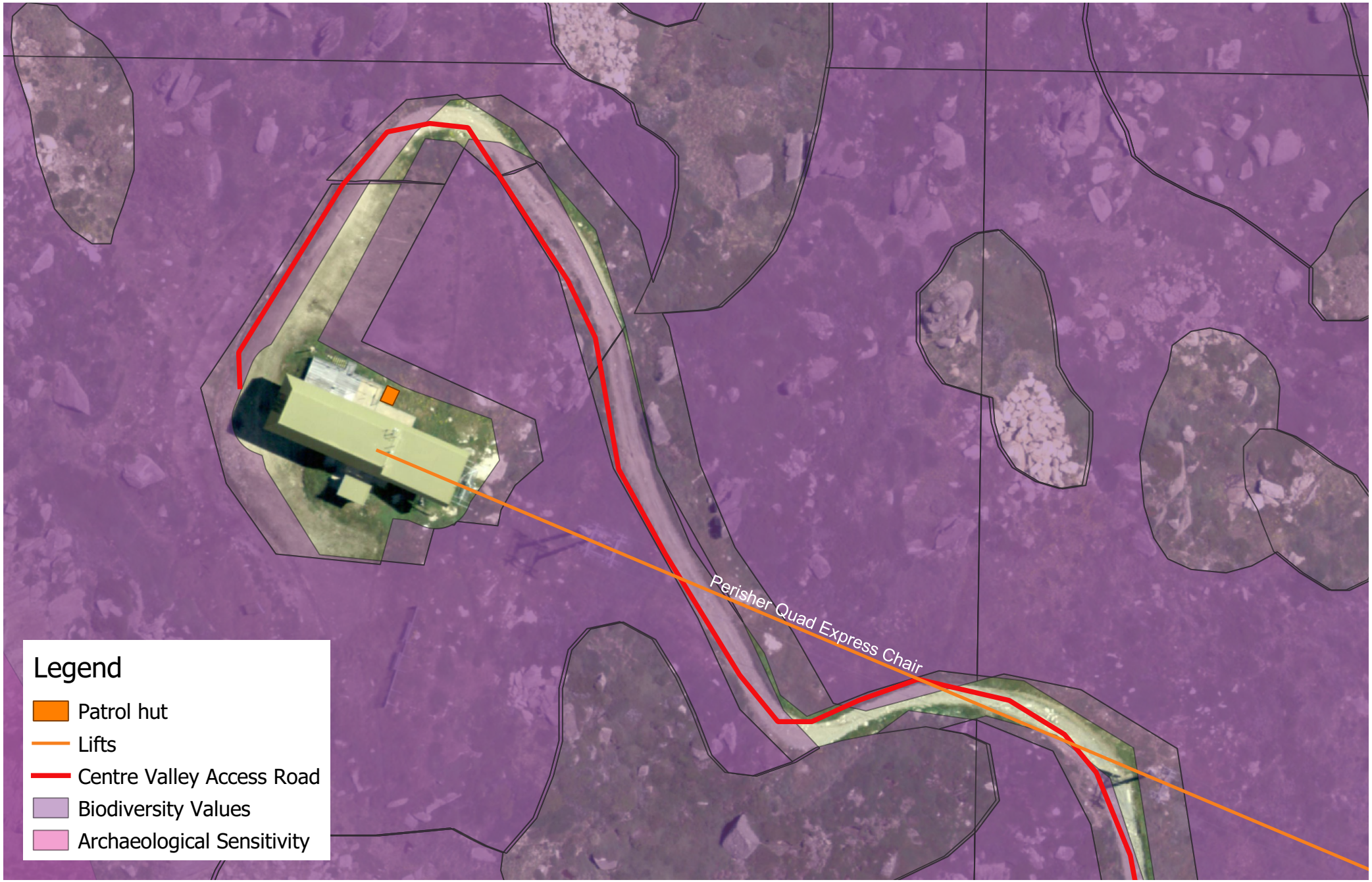
Alpine Resorts Team
Shop 5A, 19 Snowy River Avenue
P O Box 36, JINDABYNE NSW 2627
Telephone: 02 6456 1733
Facsimile: 02 6456 1736
Email: alpineresorts@planning.nsw.gov.au

Figure 1: Project Location, Regional Setting



0 500 1,000 m

Figure 2: Location Map, Quad Express Patrol Hut



Important Information about your Geotechnical Report

SCOPE OF SERVICES

The geotechnical report ("the report") has been prepared in accordance with the scope of services as set out in the contract, or as otherwise agreed, between the Client and Asset Geotechnical Engineering Pty Ltd ("Asset"), for the specific site investigated. The scope of work may have been limited by a range of factors such as time, budget, access and/or site disturbance constraints.

The report should not be used if there have been changes to the project, without first consulting with Asset to assess if the report's recommendations are still valid. Asset does not accept responsibility for problems that occur due to project changes if they are not consulted.

RELIANCE ON DATA

Asset has relied on data provided by the Client and other individuals and organizations, to prepare the report. Such data may include surveys, analyses, designs, maps, and plans. Asset has not verified the accuracy or completeness of the data except as stated in the report. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations ("conclusions") are based in whole or part on the data, Asset will not be liable in relation to incorrect conclusions should any data, information or condition be incorrect or have been concealed, withheld, misrepresented, or otherwise not fully disclosed to Asset.

GEOTECHNICAL ENGINEERING

Geotechnical engineering is based extensively on judgment and opinion. It is far less exact than other engineering disciplines. Geotechnical engineering reports are prepared for a specific client, for a specific project and to meet specific needs, and may not be adequate for other clients or other purposes (e.g., a report prepared for a consulting civil engineer may not be adequate for a construction contractor). The report should not be used for other than its intended purpose without seeking additional geotechnical advice. Also, unless further geotechnical advice is obtained, the report cannot be used where the nature and/or details of the proposed development are changed.

LIMITATIONS OF SITE INVESTIGATION

The investigation program undertaken is a professional estimate of the scope of investigation required to provide a general profile of subsurface conditions. The data derived from the site investigation program and subsequent laboratory testing are extrapolated across the site to form an inferred geological model, and an engineering opinion is rendered about overall subsurface conditions and their likely behavior regarding the proposed development. Despite investigation, the actual conditions at the site might differ from those inferred to exist, since no subsurface exploration program, no matter how comprehensive, can reveal all subsurface details and anomalies.

The engineering logs are the subjective interpretation of subsurface conditions at a particular location and time, made by trained personnel. The actual interface between materials may be more gradual or abrupt than a report indicates.

Therefore, the recommendations in the report can only be regarded as preliminary. Asset should be retained during the project implementation to assess if the report's recommendations are valid and whether changes should be considered as the project proceeds.

SUBSURFACE CONDITIONS ARE TIME DEPENDENT

Subsurface conditions can be modified by changing natural forces or man-made influences. The report is based on conditions that existed at the time of subsurface exploration. Construction operations adjacent to the site, and natural events such as floods, or ground water fluctuations, may also affect subsurface conditions, and thus the continuing adequacy of a geotechnical report. Asset should be kept appraised of any such events and should be consulted to determine if any additional tests are necessary.

VERIFICATION OF SITE CONDITIONS

Where ground conditions encountered at the site differ significantly from those anticipated in the report, either due to natural variability of subsurface conditions or construction activities, it is a condition of the report that Asset be notified of any variations and be provided with an opportunity to review the recommendations of this report. Recognition of change of soil and rock conditions requires experience, and it is recommended that a suitably experienced geotechnical engineer be engaged to visit the site with sufficient frequency to detect if conditions have changed significantly.

REPRODUCTION OF REPORTS

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REPORT FOR BENEFIT OF CLIENT

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Soil and Rock Explanation Sheets (1 of 2)

Log Abbreviations & Notes

METHOD

borehole logs		excavation logs	
AS	auger screw *	NE	natural excavation
AD	auger drill *	HE	hand excavation
RR	roller / tricone	BH	backhoe bucket
W	washbore	EX	excavator bucket
CT	cable tool	DZ	dozer blade
HA	hand auger	R	ripper tooth
D	diatube		
B	blade / blank bit		
V	V-bit		
T	TC-bit		

* bit shown by suffix e.g. ADV

coring
NMLC, NQ, PQ, HQ

SUPPORT

borehole logs		*excavation logs*	
N	nil	N	nil
M	mud	S	shoring
C	casing	B	benched
NQ	NQ rods		

CORE—LIFT

‖	casing installed
⊢	barrel withdrawn

NOTES, SAMPLES, TESTS

D	disturbed
B	bulk disturbed
U50	thin-walled sample, 50mm diameter
HP	hand penetrometer (kPa)
SV	shear vane test (kPa)
DCP	dynamic cone penetrometer (blows per 100mm penetration)
SPT	standard penetration test
N*	SPT value (blows per 300mm) * denotes sample taken
Nc	SPT with solid cone
R	refusal of DCP or SPT

USCS SYMBOLS

GW	Gravel and gravel-sand mixtures, little or no fines.
GP	Gravel and gravel-sand mixtures, little or no fines, uniform gravels
GM	Gravel-silt mixtures and gravel-sand-silt mixtures.
GC	Gravel-clay mixtures and gravel-sand-clay mixtures.
SW	Sand and gravel-sand mixtures, little or no fines.
SP	Sand and gravel sand mixtures, little or no fines.
SM	Sand-silt mixtures.
SC	Sand-clay mixtures.
ML	Inorganic silt and very fine sand, rock flour, silty or clayey fine sand or silt with low plasticity.
CL, CI	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays.
OL	Organic silts
MH	Inorganic silts
CH	Inorganic clays of high plasticity.
OH	Organic clays of medium to high plasticity, organic silt
PT	Peat, highly organic soils.

MOISTURE CONDITION

D	dry
M	moist
W	wet
Wp	plastic limit
Wl	liquid limit

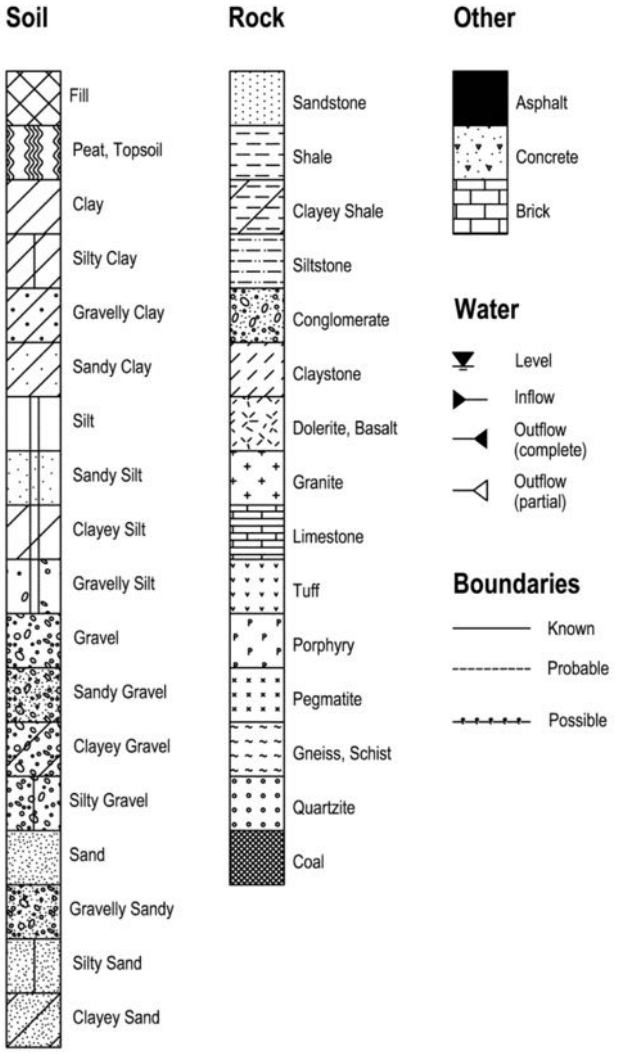
CONSISTENCY

VS	very soft
S	soft
F	firm
St	stiff
VSt	very stiff
H	hard
Fb	friable

DENSITY INDEX

VL	very loose
L	loose
MD	medium dense
D	dense
VD	very dense

Graphic Log



WEATHERING

XW	extremely weathered
HW	highly weathered
MW	moderately weathered
SW	slightly weathered
FR	fresh

STRENGTH

VL	very low
L	low
M	medium
H	high
VH	very high
EH	extremely high

RQD (%)

= sum of intact core pieces > 2 x diameter x 100
total length of core run drilled

DEFECTS:

type		*coating*	
JT	joint	cl	clean
PT	parting	st	stained
SZ	shear zone	ve	veneer
SM	seam	co	coating

shape		*roughness*	
pl	planar	po	polished
cu	curved	sl	slickensided
un	undulating	sm	smooth
st	stepped	ro	rough
ir	irregular	vr	very rough

inclination
measured above axis and perpendicular to core

Soil and Rock Explanation Sheets (2 of 2)

AS1726-2017

Soils and rock are described in the following terms, which are broadly in accordance with AS1726-2017.

Soil

MOISTURE CONDITION

Term	Description
Dry	Looks and feels dry. Fine grained and cemented soils are hard, friable or powdery. Uncemented coarse grained soils run freely through hand.
Moist	Soil feels cool and darkened in colour. Fine grained soils can be moulded. Coarse soils tend to cohere.
Wet	As for moist, but with free water forming on hand.

Moisture content of cohesive soils may also be described in relation to plastic limit (W_P) or liquid limit (W_L) [>> much greater than, > greater than, < less than, << much less than].

CONSISTENCY OF FINE-GRAINED SOILS

Term	Su (kPa)	Term	Su (kPa)
Very soft	< 12	Very Stiff	>100 – ≤200
Soft	>12 – ≤25	Hard	> 200
Firm	>25 – ≤50	Friable	–
Stiff	>50 – ≤100		

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Term	Density Index (%)	Term	Density Index (%)
Very Loose	< 15	Dense	65 – 85
Loose	15 – 35	Very Dense	>85
Medium Dense	35 – 65		

PARTICLE SIZE

Name	Subdivision	Size (mm)
Boulders		> 200
Cobbles		63 – 200
Gravel	coarse	19 – 63
	medium	6.7 – 19
	fine	2.36 – 6.7
Sand	coarse	0.6 – 2.36
	medium	0.21 – 0.6
	fine	0.075 – 0.21
Silt & Clay		< 0.075

MINOR COMPONENTS

Term	Proportion by Mass:	
	coarse grained	*fine grained*
Trace	≤ 15%	≤ 5%
With	>15% – ≤30%	>5% – ≤12%

SOIL ZONING

Layers	Continuous across exposures or sample.
Lenses	Discontinuous, lenticular shaped zones.
Pockets	Irregular shape zones of different material.

SOIL CEMENTING

Weakly	Easily broken up by hand pressure in water or air.
Moderately	Effort is required to break up by hand in water or in air.

USCS SYMBOLS

Symbol	Description
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Rock

SEDIMENTARY ROCK TYPE DEFINITIONS

Rock Type	Definition (more than 50% of rock consists of …..)
Conglomerate	... gravel sized (>2mm) fragments.
Sandstone	... sand sized (0.06 to 2mm) grains.
Siltstone	... silt sized (<0.06mm) particles, rock is not laminated.
Claystone	... clay, rock is not laminated.
Shale	... silt or clay sized particles, rock is laminated.

LAYERING

Term	Description
Massive	No layering apparent.
Poorly Developed	Layering just visible. Little effect on properties.
Well Developed	Layering distinct. Rock breaks more easily parallel to layering.

STRUCTURE

Term	Spacing (mm)	Term	Spacing
Thinly laminated	<6	Medium bedded	200 – 600
Laminated	6 – 20	Thickly bedded	600 – 2,000
Very thinly bedded	20 – 60	Very thickly bedded	> 2,000
Thinly bedded	60 – 200		

STRENGTH (NOTE: Is50 = Point Load Strength Index)

Term	Is50 (MPa)	Term	Is50 (MPa)
Extremely Low	<0.03	High	1.0 – 3.0
Very low	0.03 – 0.1	Very High	3.0 – 10.0
Low	0.1 – 0.3	Extremely High	>10.0
Medium	0.3 – 1.0		

WEATHERING

Term	Description
Residual Soil	Material is weathered to an extent that it has soil properties. Rock structures are no longer visible, but the soil has not been significantly transported.
Extremely …..	Material is weathered to the extent that it has soil properties. Mass structures, material texture & fabric of original rock is still visible.
Highly …..	Rock strength is significantly changed by weathering; rock is discolored, usually by iron staining or bleaching. Some primary minerals have weathered to clay minerals.
Moderately …..	Rock strength shows little or no change of strength from fresh rock; rock may be discolored.
Slightly …..	Rock is partially discolored but shows little or no change of strength from fresh rock.
Fresh	Rock shows no signs of decomposition or staining.

DEFECT DESCRIPTION

Type	
Joint	A surface or crack across which the rock has little or no tensile strength. May be open or closed.
Parting	A surface or crack across which the rock has little or no tensile strength. Parallel or sub-parallel to layering/bedding. May be open or closed.
Sheared Zone	Zone of rock substance with roughly parallel, near planar, curved or undulating boundaries cut by closely spaced joints, sheared surfaces or other defects.
Seam	Seam with deposited soil (infill), extremely weathered insitu rock (XW), or disoriented usually angular fragments of the host rock (crushed).
Shape	
Planar	Consistent orientation.
Curved	Gradual change in orientation.
Undulating	Wavy surface.
Stepped	One or more well defined steps.
Irregular	Many sharp changes in orientation.
Roughness	
Polished	Shiny smooth surface.
Slickensided	Grooved or striated surface, usually polished.
Smooth	Smooth to touch. Few or no surface irregularities.
Rough	Many small surface irregularities (amplitude generally <1mm). Feels like fine to coarse sandpaper.
Very Rough	Many large surface irregularities, amplitude generally >1mm. Feels like very coarse sandpaper.
Coating	
Clean	No visible coating or discolouring.
Stained	No visible coating but surfaces are discolored.
Veneer	A visible coating of soil or mineral, too thin to measure; may be patchy
Coating	Visible coating =1mm thick. Thicker soil material described as seam.

SITE PHOTOS

Photo 1

View of proposed Ski Patrol Hut looking across slope to southwest.

Photo 2

View of proposed Ski Patrol Hut looking upslope to west-north-west.

Photo 3

Vie of stairs at rear of proposed Ski Hut, looking across slope to southwest. Note ponded surface water at rear, wet / softened ground along drainage flow path downslope.