

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 5° to 10°.

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

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

Distribution Register

| 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 | <i>MAB</i> | 26 February 2023 |
| | | | | | | | |



ISO 9001:2015
ISO 14001:2015
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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 ☒ Ms ☐ Mrs ☐ Dr ☐ Other

| First Name | Family Name |
|------------|-------------|
| Mark | Bartel |

OF
 Company/organisation

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

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

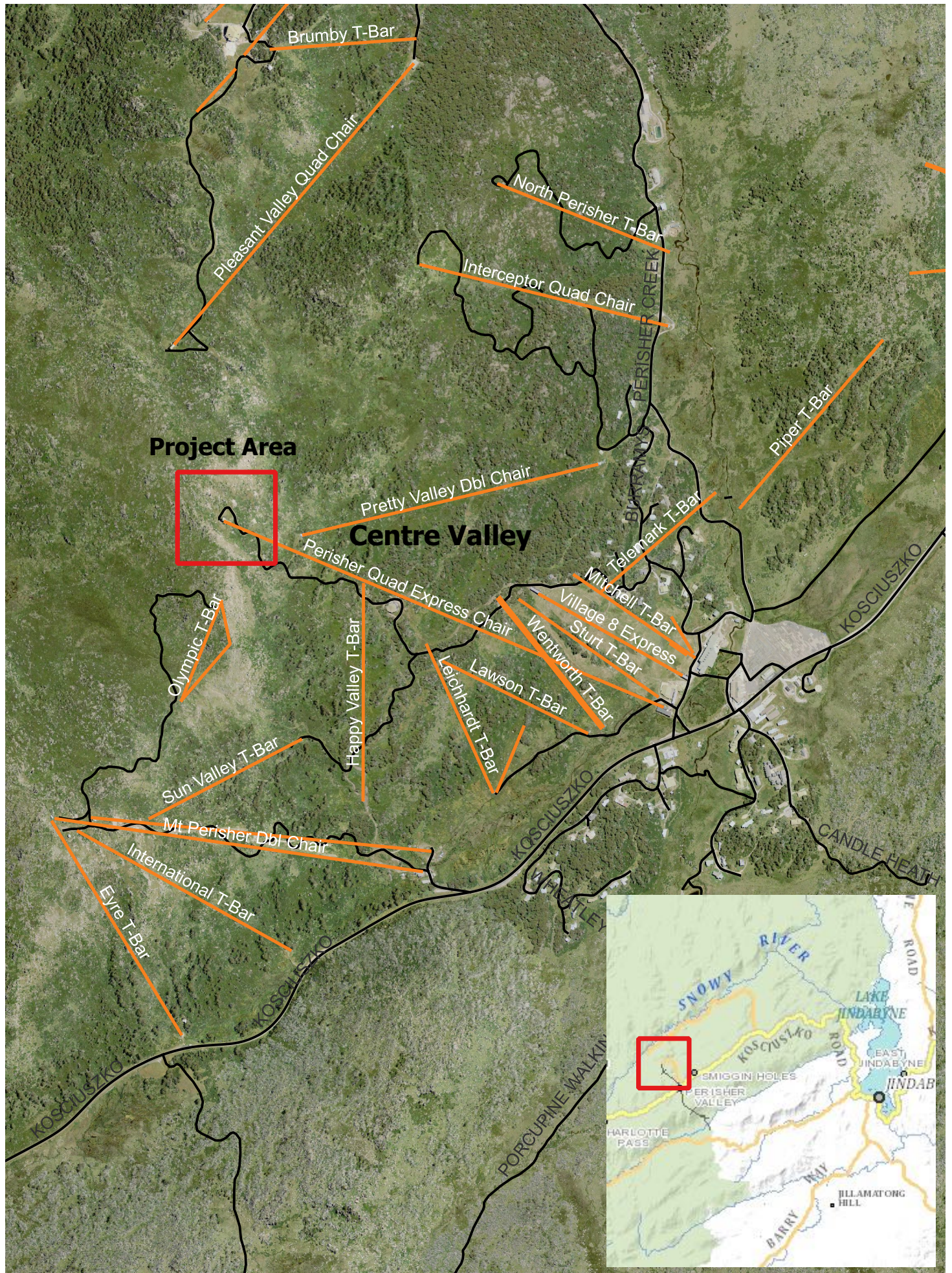


Figure 2: Location Map, Quad Express Patrol Hut



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

This report is the subject of copyright and shall not be reproduced either totally or in part without the express permission of this Company. Where information from the accompanying report is to be included in contract documents or engineering specification for the project, the entire report should be included to minimize the likelihood of misinterpretation from logs.

REPORT FOR BENEFIT OF CLIENT

The report has been prepared for the benefit of the Client and no other party. Asset assumes no responsibility and will not be liable to any other person or organisation for or in relation to any matter dealt with or conclusions expressed in the report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in the report (including without limitation matters arising from any negligent act or omission of Asset or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in the report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

DATA MUST NOT BE SEPARATED FROM THE REPORT

The report as a whole presents the site assessment and must not be copied in part or altered in any way.

Logs, figures, drawings, test results etc. included in our reports are developed by professionals based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These data should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

PARTIAL USE OF REPORT

Where the recommendations of the report are only partially followed, there may be significant implications for the project and could lead to problems. Consult Asset if you are not intending to follow all the report recommendations, to assess what the implications could be. Asset does not accept responsibility for problems that develop where the report recommendations have only been partially followed if they have not been consulted.

OTHER LIMITATIONS

Asset will not be liable to update or revise the report to consider any events or emergent circumstances or fact occurring or becoming apparent after the date of the report.

Log Abbreviations & Notes

METHOD

borehole logs

| | |
|----|-------------------|
| AS | auger screw * |
| AD | auger drill * |
| RR | roller / tricone |
| W | washbore |
| CT | cable tool |
| HA | hand auger |
| D | diatube |
| B | blade / blank bit |
| V | V-bit |
| T | TC-bit |

* bit shown by suffix e.g. ADV

excavation logs

| | |
|----|--------------------|
| NE | natural excavation |
| HE | hand excavation |
| BH | backhoe bucket |
| EX | excavator bucket |
| DZ | dozer blade |
| R | ripper tooth |

coring

NMLC, NQ, PQ, HQ

SUPPORT

borehole logs

| | |
|----|---------|
| N | nil |
| M | mud |
| C | casing |
| NQ | NQ rods |

excavation logs

| | |
|---|---------|
| N | nil |
| S | shoring |
| B | benched |

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 |
| WI | 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

Soil

| | |
|--|---------------|
| | Fill |
| | Peat, Topsoil |
| | Clay |
| | Silty Clay |
| | Gravelly Clay |
| | Sandy Clay |
| | Silt |
| | Sandy Silt |
| | Clayey Silt |
| | Gravelly Silt |
| | Gravel |
| | Sandy Gravel |
| | Clayey Gravel |
| | Silty Gravel |
| | Sand |
| | Gravelly Sand |
| | Silty Sand |
| | Clayey Sand |

Rock

| | |
|--|------------------|
| | Sandstone |
| | Shale |
| | Clayey Shale |
| | Siltstone |
| | Conglomerate |
| | Claystone |
| | Dolerite, Basalt |
| | Granite |
| | Limestone |
| | Tuff |
| | Porphyry |
| | Pegmatite |
| | Gneiss, Schist |
| | Quartzite |
| | Coal |

Other

| | |
|--|----------|
| | Asphalt |
| | Concrete |
| | Brick |

Water

| | |
|--|--------------------|
| | Level |
| | Inflow |
| | Outflow (complete) |
| | Outflow (partial) |

Boundaries

| | |
|--|----------|
| | Known |
| | Probable |
| | Possible |

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 (%)

$$= \frac{\text{sum of intact core pieces} > 2 \times \text{diameter}}{\text{total length of core run drilled}} \times 100$$

DEFECTS:

| type | | coating | |
|------|------------|---------|---------|
| JT | joint | cl | clean |
| PT | parting | st | stained |
| SZ | shear zone | ve | vener |
| SM | seam | co | coating |

shape

| | |
|----|------------|
| pl | planar |
| cu | curved |
| un | undulating |
| st | stepped |
| ir | irregular |

roughness

| | |
|----|--------------|
| po | polished |
| sl | slickensided |
| sm | smooth |
| ro | rough |
| vr | very rough |

inclination

measured above axis and perpendicular to core

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) [\gg 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 | $> 100 - \leq 200$ |
| Soft | $> 12 - \leq 25$ | Hard | > 200 |
| Firm | $> 25 - \leq 50$ | Friable | - |
| Stiff | $> 50 - \leq 100$ | | |

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: | |
|-------|-----------------------|---------------------|
| | <u>coarse grained</u> | <u>fine grained</u> |
| Trace | $\leq 15\%$ | $\leq 5\%$ |
| With | $> 15\% - \leq 30\%$ | $> 5\% - \leq 12\%$ |

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 |
|--------|---|
| 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. |
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| 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. |

Rock

SEDIMENTARY ROCK TYPE DEFINITIONS

| Rock Type | Definition (more than 50% of rock consists of) |
|--------------|--|
| Conglomerate | ... gravel sized ($> 2\text{mm}$) fragments. |
| Sandstone | ... sand sized (0.06 to 2mm) grains. |
| Siltstone | ... silt sized ($< 0.06\text{mm}$) 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 $< 1\text{mm}$). Feels like fine to coarse sandpaper. |
| Very Rough | Many large surface irregularities, amplitude generally $> 1\text{mm}$. 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

View 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.