# Arlberg Ski Lodge - Proposed Extension

## Geotechnical Investigation Report

Arlberg Ski Club Limited

11 April 2024

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Arlberg Ski Club Limited

## Issued by

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# Document Register

| Date | Revision | Change summary |
|---|---|---|
| 10/04/2024 | 0 | Original Report |
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# 1 Introduction

Arlberg Ski Club Limited (Arlberg) proposes to carry out extensions to their existing Ski Lodge (the structure), located at Charlotte Pass, NSW.

A schematic of the existing structure and extension is shown in Plate 1 below.

As part of this work, Arlberg requires a geotechnical investigation and assessment in accordance with the Department of Infrastructure, Planning and Natural Resources (DIPNR) Geotechnical Policy for Kosciuszko Alpine Reports (2003). The site is within the "G" area in accordance with the DIPNR Geotechnical Policy.

This report provides the results of a geotechnical investigation and geotechnical slope risk assessment, along with Form 1 of the DIPNR Policy. Forms 2 and 3 will be provided separately following completion of the respective design and construction stages.

This report has been prepared by our Principal Geotechnical Engineer Rian Vleggaar, who is as required by the DIPNR Policy, a Member of Engineers Australia, a Chartered (CPEng) and a member of the National Engineering Register (NER, 3008850). He is further an accredited TfNSW Slope Risk Assessor.

The report is provided for the proposed extension to the building frontage only and does not constitute a detailed review or update of the geotechnical conditions for the existing structure.

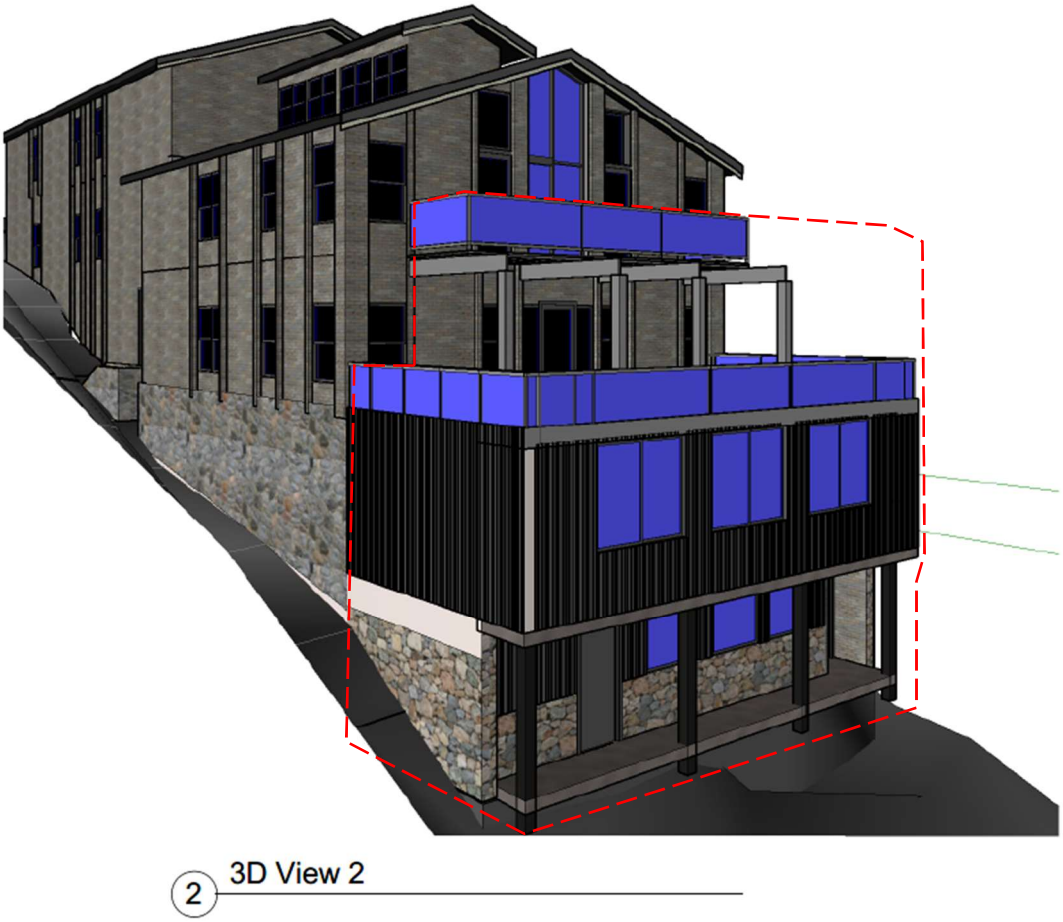



*Plate 1 – Schematic View of existing structure and proposed extension (red dashed outline).*

# 2 Proposed Extension to Arlberg Ski Lodge

The proposed extension is shown in perspective in Plate 1 and will comprise:

- Demolition of the existing external staircase.
- Demolition of the existing steel columns and deck over.
- Construction of a structural extension as shown in Plate 2 below, supported on structural walls or posts.
- The new extension lower floor level would be at RL 1776.60 m, which is about 0.9 m below the existing lower ski lodge store floor level.

For information, the current concept design architectural plans and survey is attached as Appendix A.

No work is proposed on the existing structure uphill of the existing building frontage/structure.

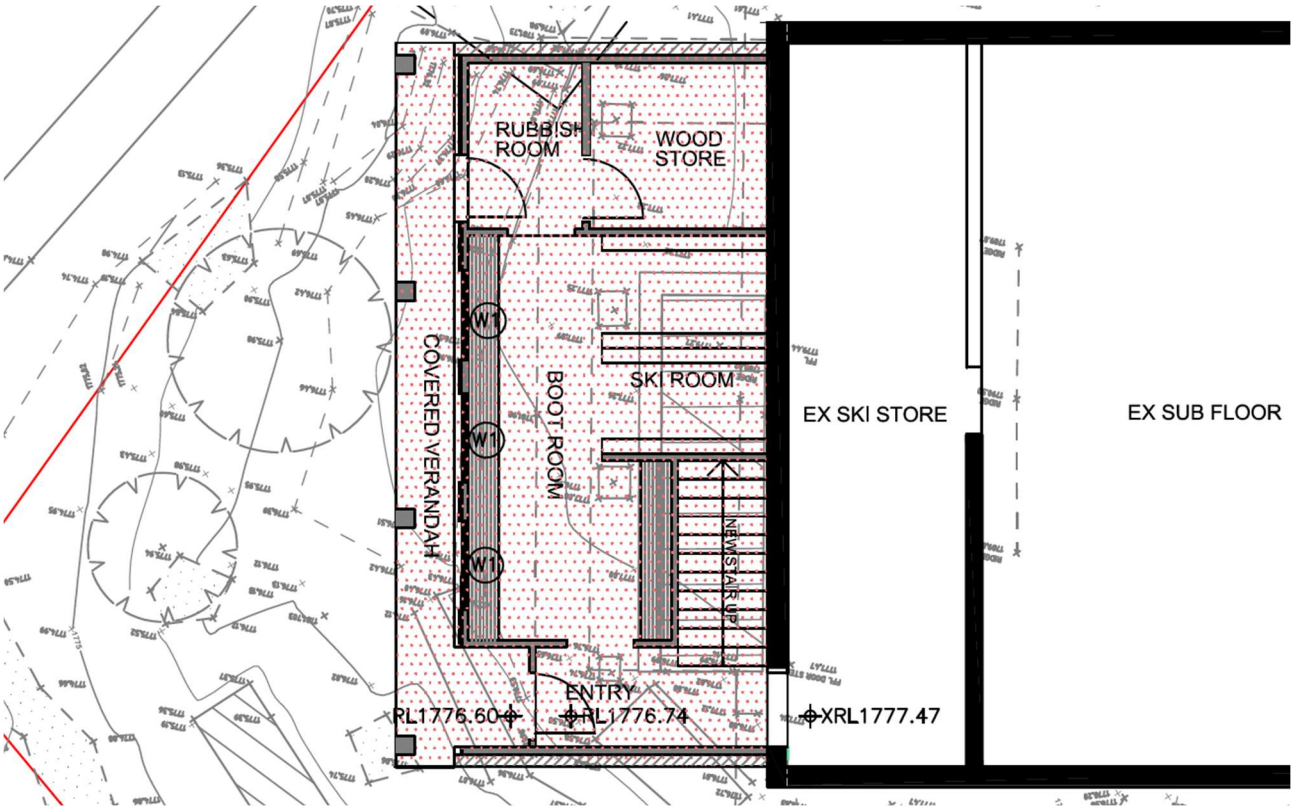



*Plate 2 – Extract from the Architectural Drawings of the extension (Hatched area).*

# 3 Site Investigation

## 3.1 Site Investigation Scope

The site investigation scope carried out by D&N Geotechnical included the following:

- A site walkover and photography by the author of this report.
- Two hand-auger boreholes (HA01 and HA02) drilled at the location of the proposed extension in front of the existing building.
- Six Dynamic Cone Penetration Tests (DCP tests), as follows:
  - Two DCPs (DCP1 and 2) at the proposed extension location.
  - Two DCP's each at the upslope rear corners of the existing building (DCP3, 3A, 4, 4A.

The investigation locations are shown on the enclosed Figure 1 – Site Plan with Investigation locations, and the Geotechnical Model sketches below.

Engineering logs for HA01 and HA02 are enclosed in Appendix B, along with Logging Explanation Sheets.

DCP Test Results are shown in Appendix C.

## 3.2 Site Geology and Regional Setting

The site location and regional geology map is shown on Plate 19 below, which also includes approximate 10 m contours, hill shade, and access roads.

The site is underlain by the Silurian-aged Mowambah Granodiorite. This unit comprises of '*medium-grained mafic biotite-rich granodiorite; with strong foliation.'*.

Soil cover at the site comprises of anthropogenic fill, colluvial soils and residual soils with a blocky bedrock weathering pattern associated with intrusive igneous emplacements as shown diagrammatically on Plate 20 below.

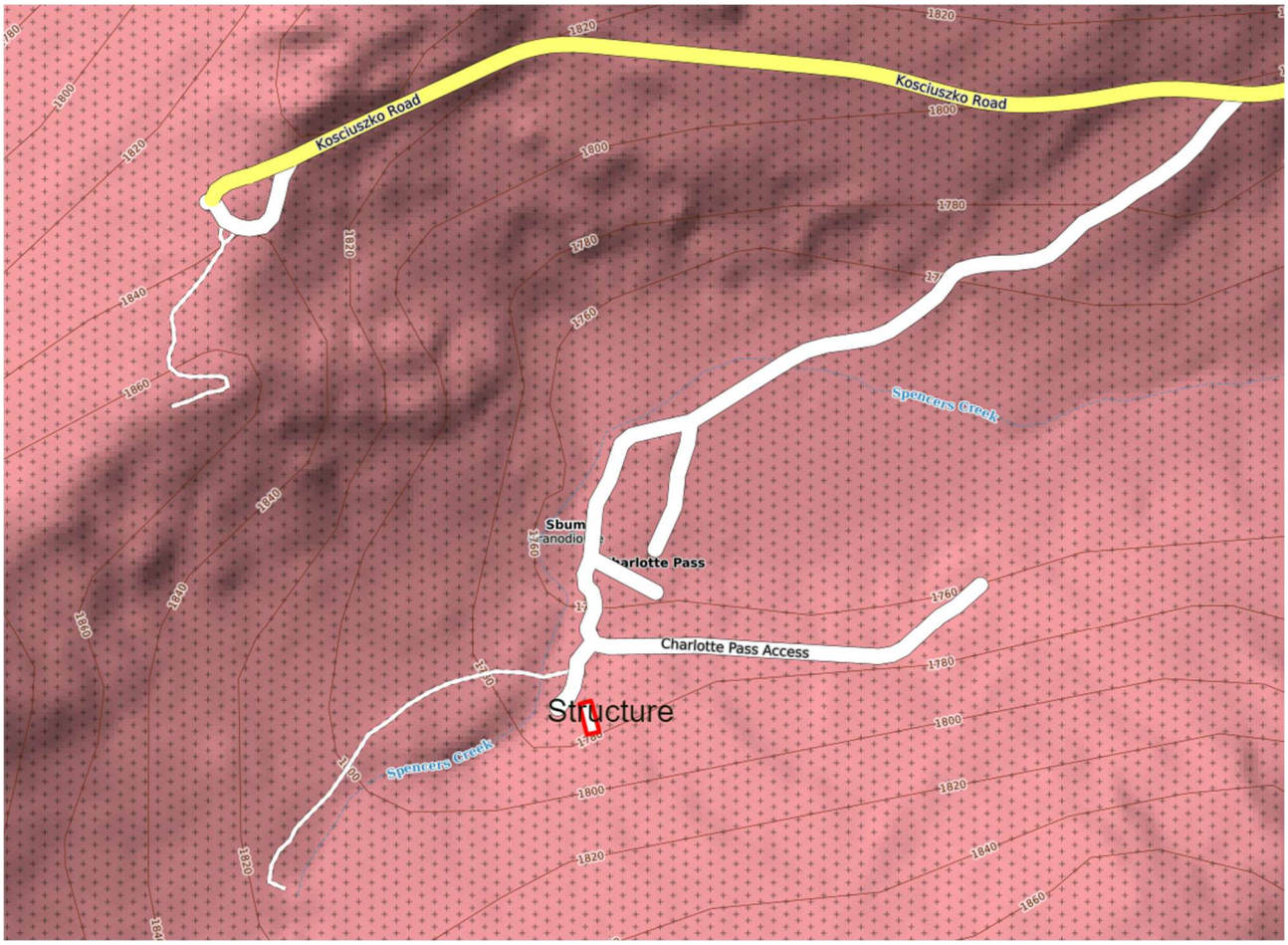



*Plate 3 – The site location annotated on the NSW Seamless Geology Dataset (v2.3).*

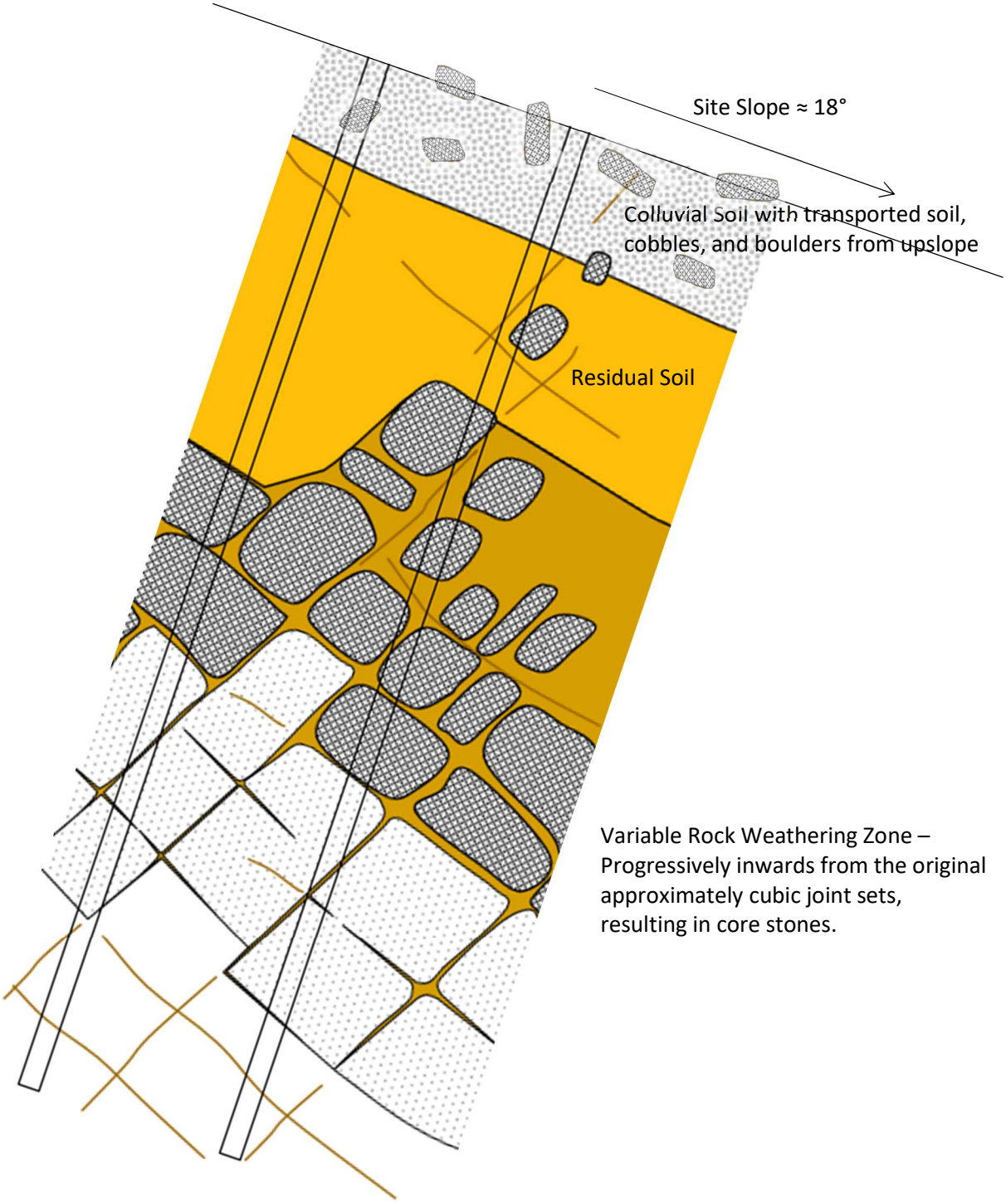



*Plate 4 – Conceptual weathering profile for igneous rock with blocky joint sets with typical soil units. Source – Annotated extract from Hong Kong Geo Publication No 1/2006. Note that all depth intervals may vary significantly from the concept.*

## 3.3 Site Description and Photographs

The following site description and site photographs are provided to provide an understanding of both the location of the proposed extension and the broader site.,.

Regionally, the site is located on a north-facing hillside slope, with a natural slope angle of approximately 18°. Locally, the site slope is similar to the hillside slope, with the existing structure having been constructed predominantly in a terraced fashion, with a limited sub-floor/basement level on the downslope (front) end of the building.

General land use in the area comprises of low-rise (less than 5 stories) ski lodge style accommodation making up the Charlotte Pass village. Above the site, the hillside is undeveloped.

No significant slope changes occur across the broader slope. Below the existing frontage of the building, ie the site of the proposed extension, a small level area is present with a low batter, likely comprising fill, grading to the north at approximately 1V:1.5H.

Drainage of the site surface is commensurate with the north-facing hillside slope. Localised seepages were observed along the eastern side of the building, and there is an existing creek/drainage line with flowing water present below the extension site as shown on the photographs.

Vegetation on the site comprised of low grasses with minor shrubbery present below the site of the extension. On the slope above the site, there was a relatively dense cover of eucalypt trees, each with a predominant downslope lean.

Surface soils were onserved to comprised of colluvial soil, typically silty sand, with organics and numerous cobbles forming an irregular surface. Minor (< 300 mm high) timber terraces were observed alongside the existing structure to facilitate walking/access on the slope. No clear bedrock outcrops were observed, however, a large boulder (which was not possible to confirm as bedrock) is located in the fill batter at the extension zone (refer to the plates below).

The existing subfloor of the structure was cut into the slope for approximately 11 m in the upslope direction,. The remainder of the structure is expected to have been constructed near grade with minor terracing.

At the front of the property, in the area of the proposed extensions, a zone of fill is inferred of up to 1.2 m thickness, as also shown in the photographs.

Minor indications of erosion were observed at the upper, southern corners of the structure, where a cut-off drain is present in the slope above the structure, and a collector (catch) drain is present immediately above the structure. The drains discharge either side of the structure (i.e. the eastern and western slopes alongside the structure). Joints between sections of the catch drain were dislocated and requires repair.

At the time of our wite walkover, no indications of existing landslides were observed at the site of the proposed extension, around the existing structure, or for a distance of 50 m up slope from the structure.

No existing site works were underway.

The stone façade of the existing structure typically exhibited some localised or loosening. A detailed review of existing structural performance was not conducted, however, no significant structural damage was observed.

Pavements in the area are unsealed with variable surface gravels. Access to the site is from the main Charlotte Pass parking area.

*Plate 5 – View of the north-eastern corner of the existing structure. Note the approximately 18° slope. The proposed extension area which is the subject of this report, is at the right of the photograph.*

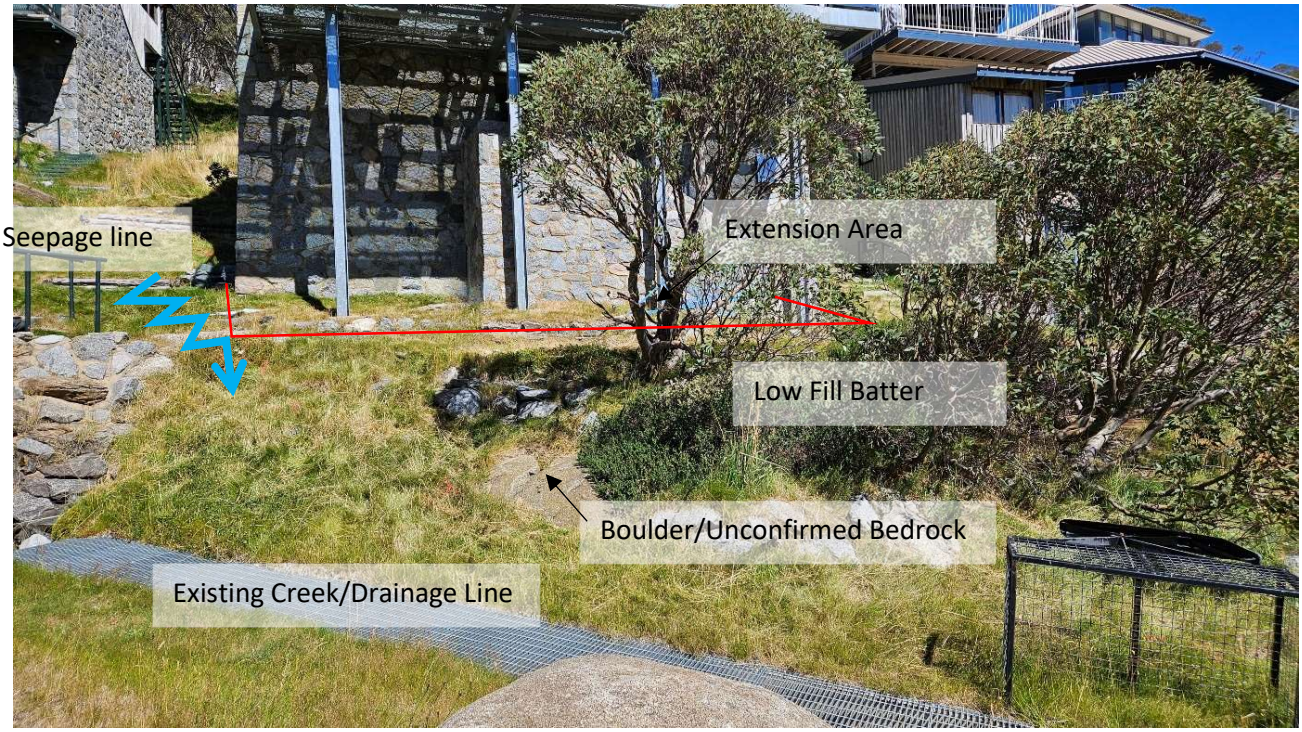



*Plate 6 – View of the frontage of the existing structure. Note the drainage line from left to right; location of seepage (blue arrow) and the approximate level of the proposed extension (red). Note the fill batter below the extension zone. Note surficial cobbles and boulders, and potential large boulder or bedrock outcrop at the red arrow.*

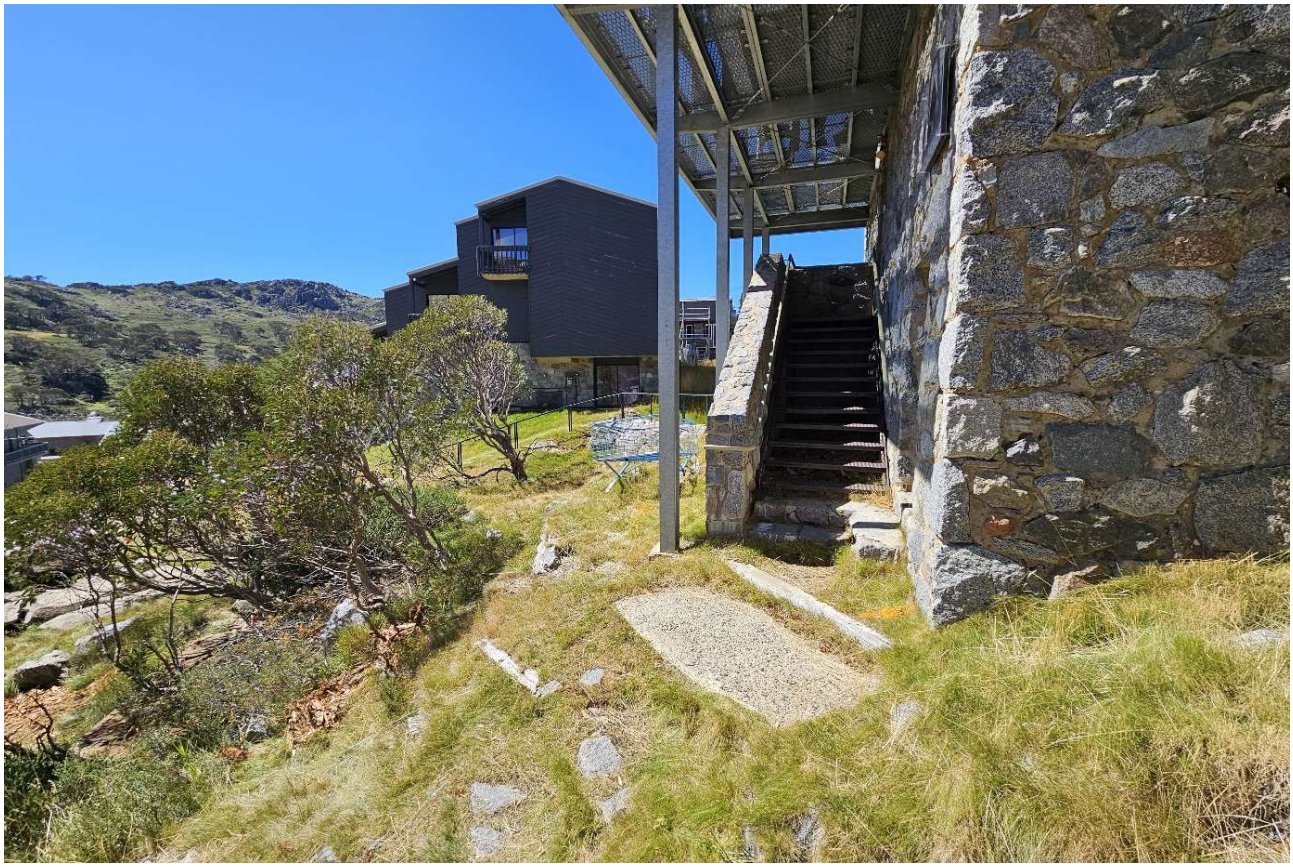


*Plate 7 – View east of the extension area. Note the fill area at and below the proposed extension area. The existing posts, deck and stairs are to be demolished.*

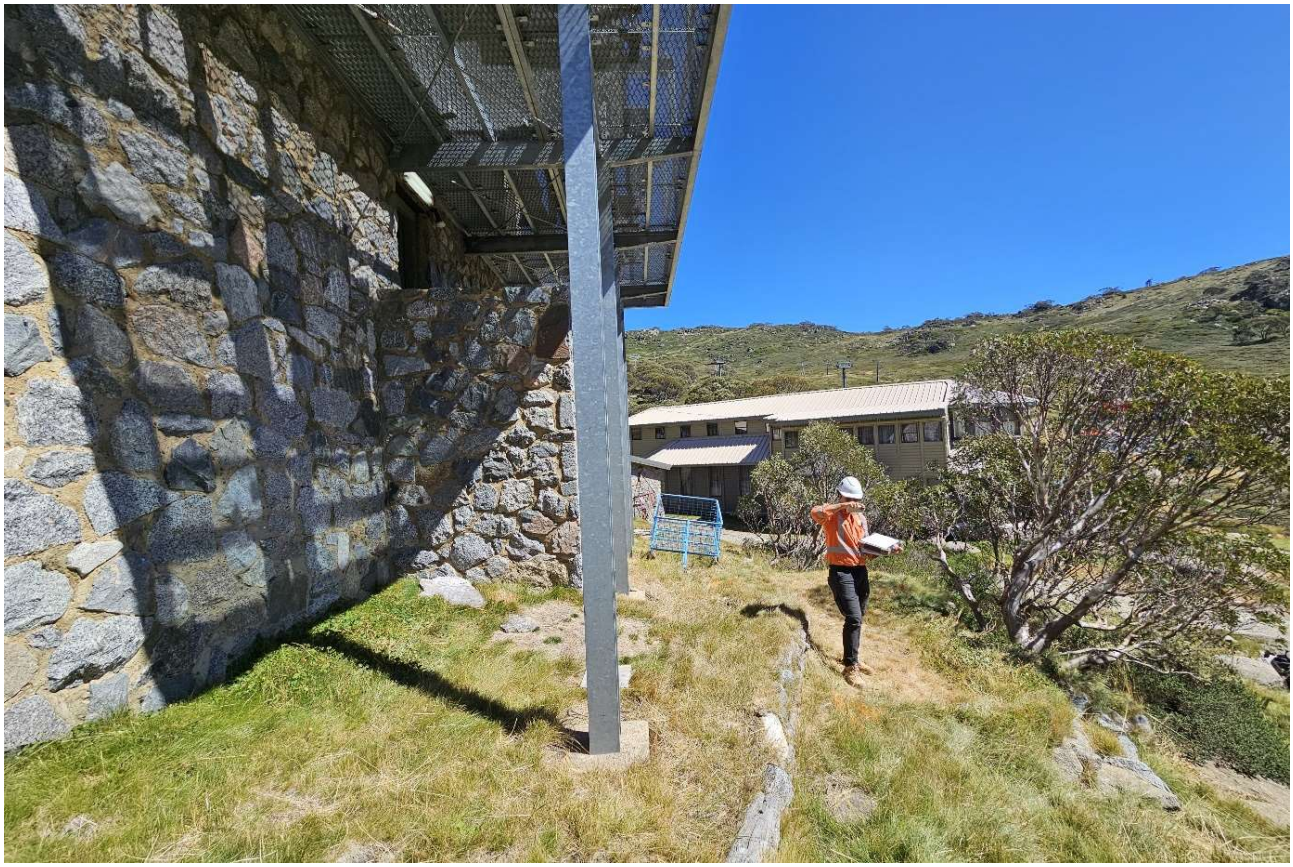


*Plate 8 – View west of the extension area. Note the fill area at and below the proposed extension area. The existing posts, deck and stairs are to be demolished. The level of the new extension is approximately at the lower level where the engineer is standing.*

*Plate 9 – HA01 location (three attempts, each refused at shallow depth on cobbles in the fill). Note underground services running from right to left (pink ground marks), likely comprising of kitchen liquid waste to the grease trap at the left of the photograph. A sewer line is inferred from the services location to run from right to left within the slope below this level.*


*Plate 10 – HA02 location shown. Note underground power at the right of the photograph (orange ground marks), and kitchen and sewer drainage lines at the left of the photograph.*

*Plate 11 – View downslope of the existing structure above the proposed extension area. Note drainage channels.*

*Plate 12 – View upslope of the existing structure above the proposed extension area. Note drainage channels. Note irregular surface due to the presence of surficial cobbles and boulders. Note slope extending significant distance above the property.*

*Plate 13 – View downhill of western façade. Minor cracking and dislodgement of stone pitching was evident, predominantly on the lower zone of the structure in this photograph. Note terraced steps.*

*Plate 14 – View south-east, of the slope above the property. Note eucalypt trees and typical downslope lean.*

*Plate 15 – View west of the slope above the property. Note eucalypt trees and typical downslope lean, indicative of regional, slow colluvial mantle creep.*

*Plate 16 – View of the water supply line at the south-eastern corner of the property. Note stone lined cutoff drain.*

*Plate 17 – View east of a large boulder some 50 m laterally above the property. Note the split. The smaller section is not restrained and has been considered in the risk assessment.*

*Plate 18 – View west of a large boulder some 50 m laterally above the property. Note the split. The smaller section is not restrained and has been considered in the risk assessment. The tree to the right may provide some restraint should the split component separate and topple.*

*Plate 19 – View east, above the southern wall of the property. Note existing catch drain at the structure, and cut-off drain at the right of the photograph, uphill of the structure.*

*Plate 20 – Condition of joints in the catch drain at the southern edge of the structure, which requires sealing/resetting to avoid ingress.*

## 3.4 Inferred Geotechnical Model

At the proposed location of the extension, the inferred geotechnical units comprise of:

- Unit 1 – FILL: uncontrolled fill, comprising of silty SAND, with gravel, cobbles and boulders. Shallow refusal (0.3 m to 0.5 m) of hand-operated excavation equipment was encountered.
- Unit 2 – COLLUVIUM: inferred silty SAND with gravel, cobbles and boulders, loose to medium dense. Not intersected by the hand-augered investigations, however, likely penetrated by the DCP equipment.

Our inferred geotechnical sketches of the inferred site geotechnical model are presented below.
The contact between colluvium and underlying residual soil is likely parallel to the ground surface.

Groundwater was not encountered at HA01 or HA02. However, seepage was encountered at the eastern side of the extension area, near HA02. This seepage may be natural or associated with anthropogenic changes to drainage on the site (e.g. trenching of services along the eastern side of the existing building, to the building frontage).

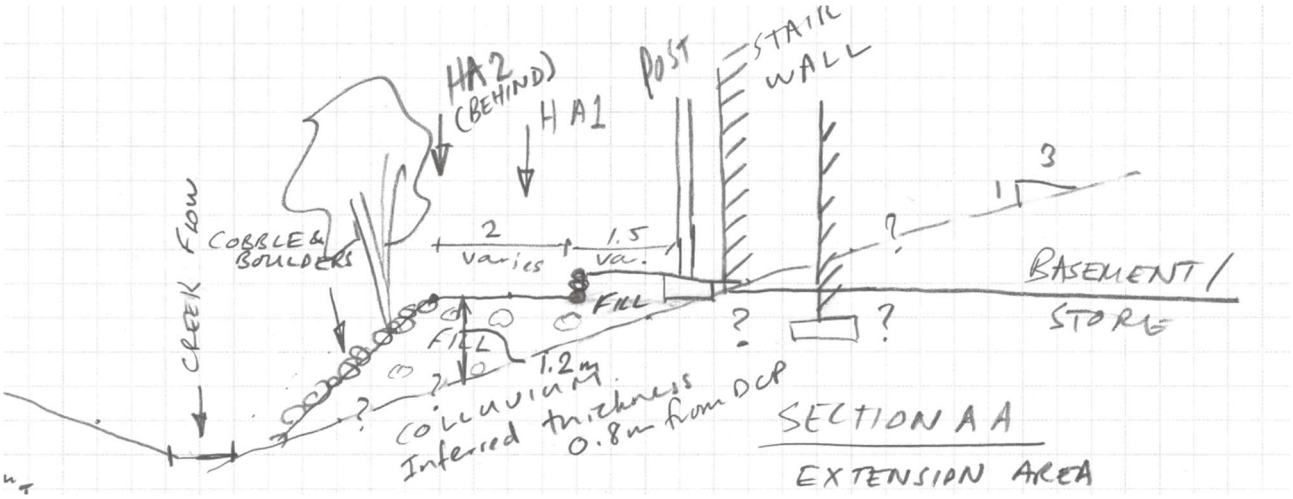



*Plate 21 – Cross-section field sketch of the geotechnical model at the extension area (existing conditions). Note fill wedge overlying colluvial soil.*

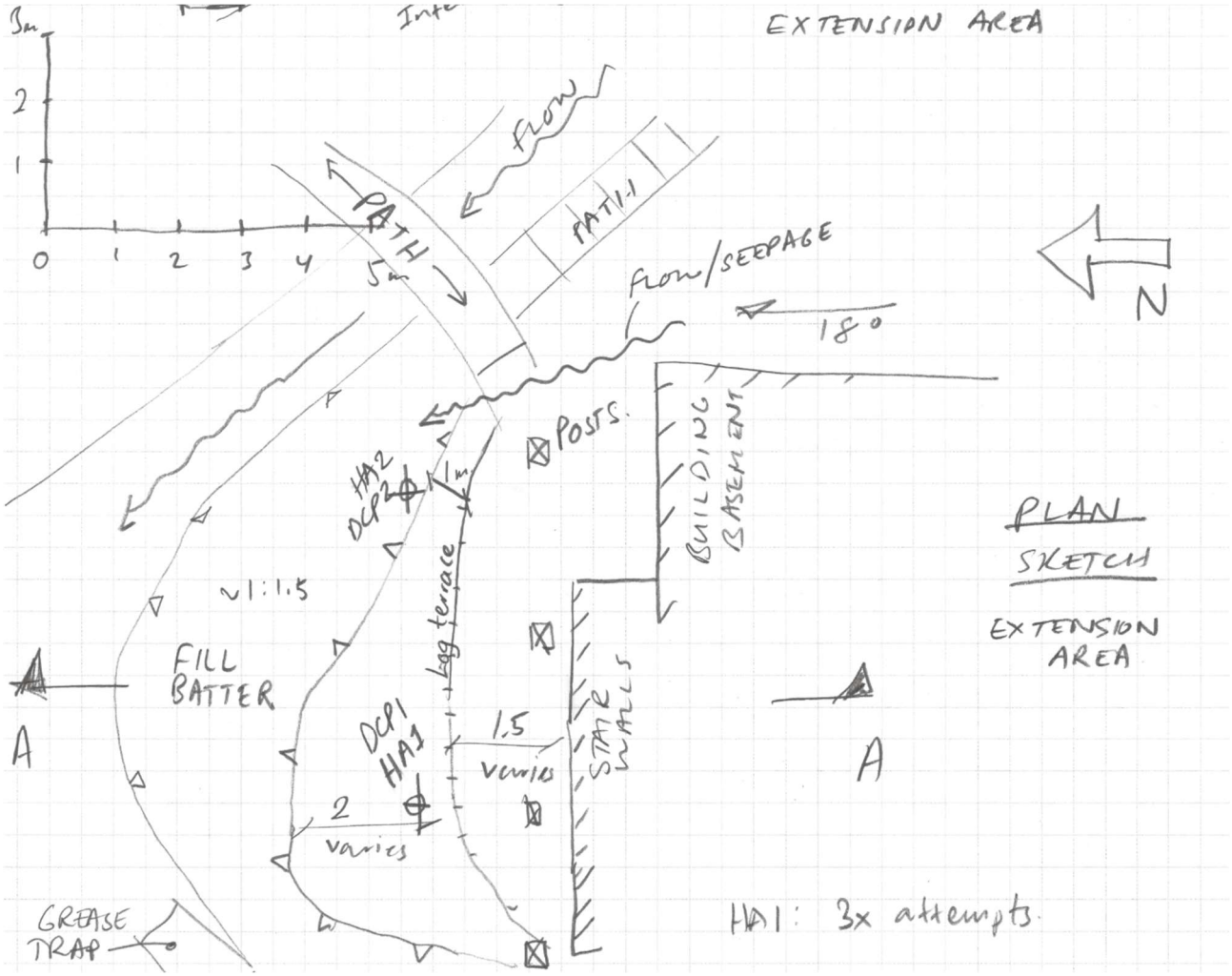



*Plate 22 – Plan field sketch of the extension area (existing conditions). Note fill wedge overlying colluvial soil. Note drainage and seepage observation at the east of the extension area.*

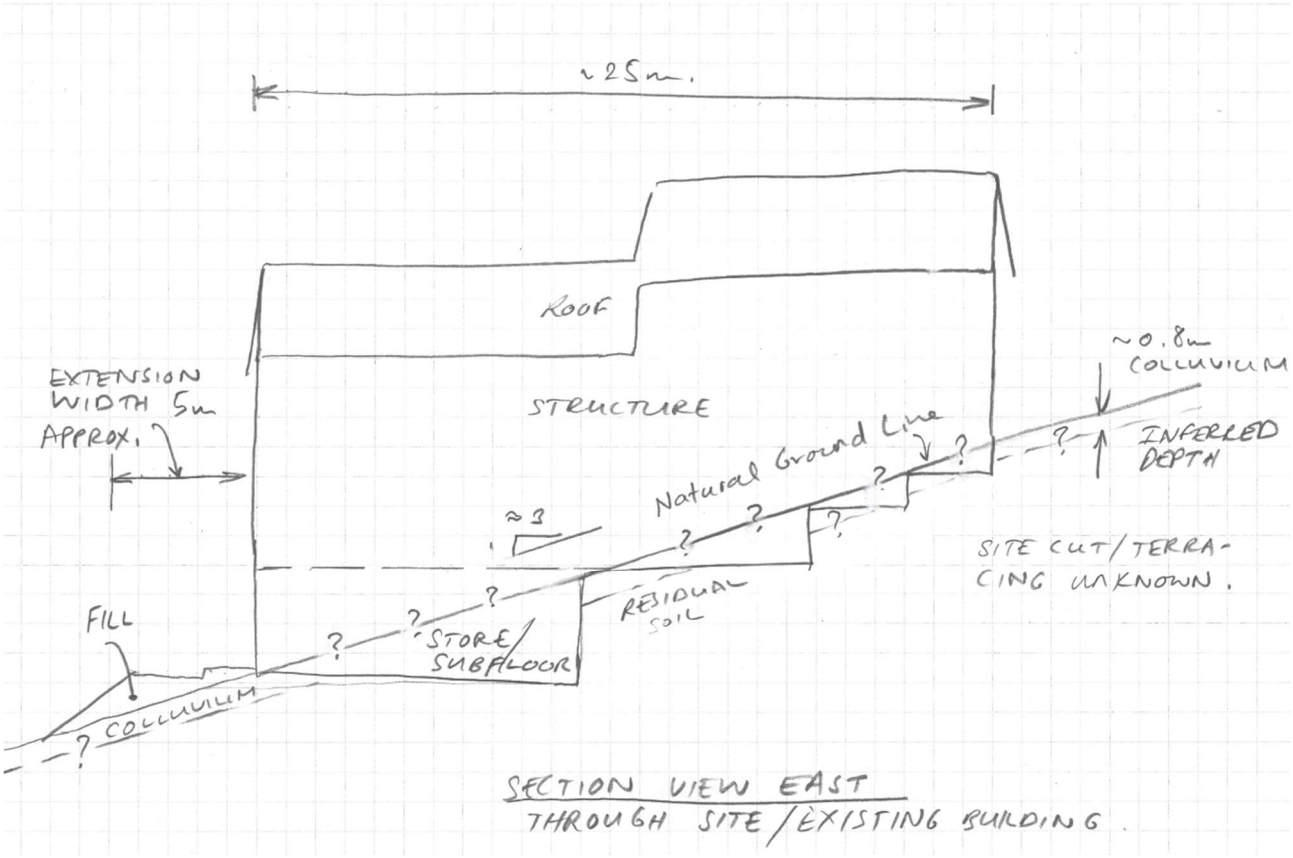



*Plate 23 – Section view field sketch of the full site. Note the extent of the extension area at the north of the structure. Surface boulders and cobbles are not shown.*

# 4 Geotechnical Recommendations for Design

## 4.1 Foundation Recommendations

### *4.1.1 Site Classification*

The site classification for the extension area would be Class P, due to the presence of inferred uncontrolled fill. Accordingly, specific geotechnical engineering advice is required for extension footings. In its current state the existing fill must not be relied on for footing support.

### *4.1.2 Foundation Recommendations*

Based on the site observation and geotechnical model, the following foundation methods may be considered for the extension area:

- Bored piers, excavated using rotary large diameter auger attachments, founded onto residual soil.
- Removal and recompaction of the existing fill as controlled fill for raft/spread footing support.

Notwithstanding the foundation system selected, the existing seepage point on the eastern side of the extension area should be provided with slotted subsoil drainage to channelise/capture the flow and to avoid weakening of the future foundations from infiltration.

**Bored Piers**

Bored pier excavations are likely to be frustrated by the presence of cobbles and boulders in the fill and colluvial soil units. Collapse of the fill and colluvial granular units is also possible, and casing (either temporary or permanent) may be required. Selection of a larger diameter auger such as a 600 mm or greater auger, with large flight spacing of more than 400 mm, may assist with penetrating and removing cobble inclusions within the soils.

The anticipated bored pier depth may be in the order of 2 m to 3 m, to be founded at least 500 mm into residual soil, as based on our inferred fill thickness and inferred colluvial thickness from the site DCP results.

An allowable bearing pressure of 250 kPa may be adopted for bored piles founded at least 500 mm into residual soil.

A geotechnical engineer will need to observe and verify that residual soil has been intersected, at the time of construction.

**Removal and Recompaction as Controlled Fill**

As an alternative to the use of bored pile footing, the existing fill could be reworked and recompacted to form an Engineered Fill platform on which raft/spread footing could then be formed. To do this it is recommend that the existing fill be removed to the level of colluvial soil, and then screened for reuse as controlled filling under Level 1 conditions.,.

As part of the Level 1 Geotechnical Inspection and Testing activities, and conditions for the Geotechnical Certification, the geotechnical consultant shall be commissioned to inspect at the time of construction:

- The underlying foundation material and benching for new fill after stripping of the uncontrolled fill.
- The footing excavations prior to concreting.

For reuse, existing fill should be screened to remove particles larger than 100 mm diameter and then placed in max. 150 mm compacted lift thickness. The Compaction level shall be 95% SMDD and Level 1 inspection and testing shall be provided in accordance with AS3798-2007. During placement, over-filling

beyond the batter face is required, to allow full compaction in the design volume; then, the final trim cut into the compacted fill to achieve the design batter position with a fully compacted face.

A conceptual sketch of the filling arrangement is shown in Plate 24 below.

It is possible that minor import of fill may be required should the number of cobbles screened out be significant, and due to the recommended controlled fill batter of 1V:2H. Selected material may be used for this purpose, however, the proposed source of material and type of material should be vetted with the project geotechnical consultant prior to use. Material with a CBR of at least 5% and shrink-swell index of less than 1% (or CBR swell of 0.5% or less) is recommended.

An allowable bearing pressure of 100 kPa may be adopted for spread footings founded on the controlled fill. The offset between any footing and the batter face of the fill shall be at least twice the footing width – that is, for a 500 mm strip footing, the footing shall be located at least 1.0 m offset from the fill batter face. The footing depth may need to be adjusted to achieve this offset. The minimum footing depth shall be 500 mm below the surface level.

For the controlled fill replacement as described above, a site reactivity of up to 40 mm (similar to Class M per AS2870-2011) may be adopted for seasonal moisture changes.

The filled area and batters should be provided with suitable vegetation and be made to drain appropriately to prevent future erosion.

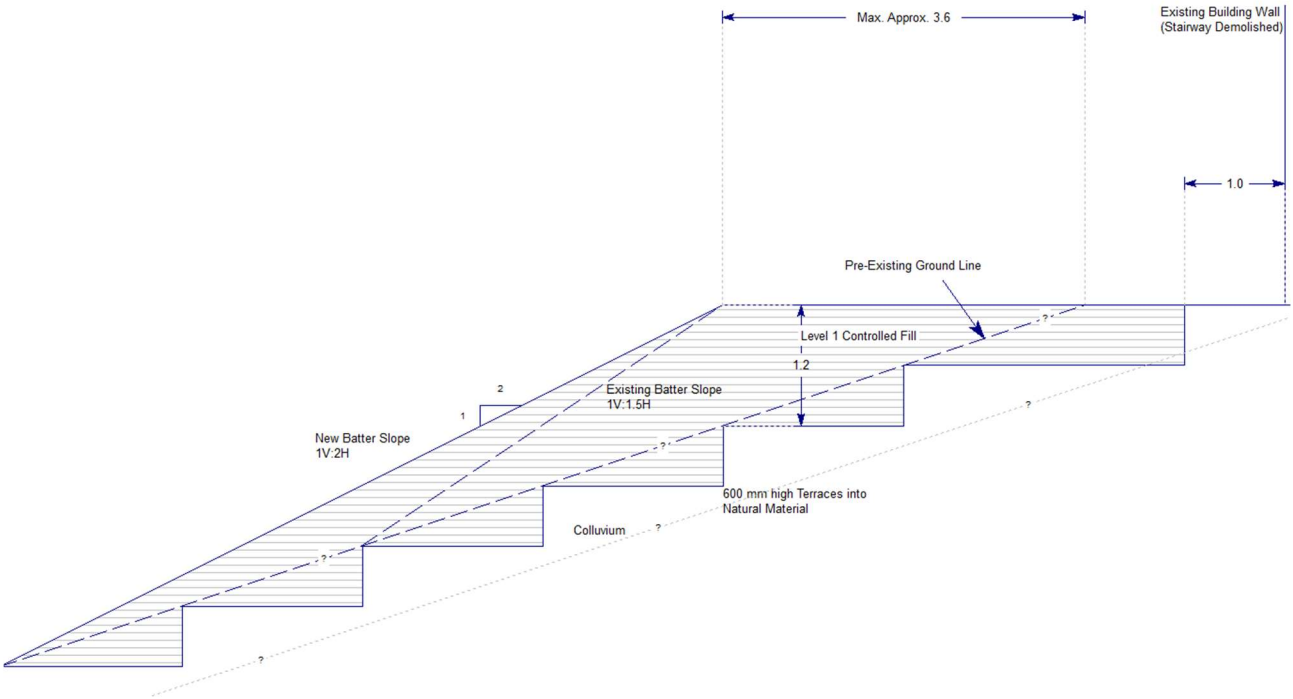



*Plate 24 – Conceptual Sketch of Controlled Fill Replacement for Support of the Extension.*

### *4.1.3 Existing Services Presence*

Based on the services location carried out during our investigation, underground power, kitchen liquid waste and a sewer were identified as passing through or nearby the extension footprint. These services will require protection (or relocation) from the new foundation or fill replacement works.

The water supply line at the uphill south-eastern corner must be checked for integrity and that no leakage is occurring, as such leakage my increase the probability of landsliding at the structure or below any leaks.

The joints at the catch drain on the southern wall of the existing buildings must be reset/sealed to avoid water ingress.

The erosion from flows from the catch drains at the upslope wall/corners must be repaired/infilled with cobble/rockfill armouring to reduce erosion which may cause geometric changes, increasing geohazard likelihoods.

## 4.2 Geotechnical Risk Assessment – Proposed Extension

### *4.2.1 Method*

The geotechnical risk assessment has been carried out on the basis of the Landslide Risk Management Publication – AGS (2000) – Volume 35 No 1, March 2000.

The quantitative risk estimation was carried out in accordance with Section 3.5.1 , extracted below.

**3.5.1 QUANTITATIVE RISK ESTIMATION**

Quantitative risk estimation involves integration of the frequency analysis and the consequences.

For property, the risk can be calculated from:

$$R_{(Prop)} = P_{(H)} \times P_{(S:H)} \times V_{(Prop:S)} \times E \quad (1)$$

where

$R_{(Prop)}$ is the risk (annual loss of property value)
$P_{(H)}$ is the annual probability of the hazardous event (the landslide)
$P_{(S:H)}$ is the probability of spatial impact by the hazard (i.e. of the landslide impacting the property, taking into account the travel distance) and for vehicles, for example, the temporal probability
$V_{(Prop:S)}$ is the vulnerability of the property to the spatial impact (proportion of property value lost)
E is the element at risk (e.g. the value or net present value of the property)

For loss of life, the individual risk can be calculated from:

$$R_{(DI)} = P_{(H)} \times P_{(S:H)} \times P_{(T:S)} \times V_{(D:T)} \quad (2)$$

where

$R_{(DI)}$ is the risk (annual probability of loss of life (death) of an individual)
$P_{(H)}$ is the annual probability of the hazardous event (the landslide)
$P_{(S:H)}$ is the probability of spatial impact by the hazard (e.g. of the landslide impacting a building (location) taking into account the travel distance) given the event
$P_{(T:S)}$ is the temporal probability (e.g. of the building being occupied by the individual) given the spatial impact
$V_{(D:T)}$ is the vulnerability of the individual (probability of loss of life of the individual given the impact).

### *4.2.2 Hazard Identification*

The geotechnical hazards associated with the proposed extensions are summarised in Table 1 below.

*Table 1 – Geotechnical Hazards*

| Hazard Number | Type | Description/Element at risk |
|---|---|---|
| Hazard 1 | Colluvial Soil Creep (Ref. Plate 13) | Colluvial Creep affecting the foundations to the extensions. |
| Hazard 2A | Boulder Roll from Upslope Boulder (Ref Plates 15 and 16) | Split boulder toppling and rolling down the slope to impact the extension. |
| Hazard 2B | | Split boulder toppling and rolling down the slope to impact the main building, followed by progressive collapse of the entire structure, affecting the extension. |

| Hazard Number | Type | Description/Element at risk |
|---|---|---|
| Hazard 3 | Foundation Settlement of Controlled Fill | Spread Footings for the Extension, on Controlled Fill, undergoing settlement more than 10 mm down, or more than 40 mm seasonal reactivity. |
| Hazard 4 | Instability of the Controlled Fill | Sliding of the Controlled Fill, leading to excessive deformation of the foundations to the new extension. |
| Hazard 5A | Shallow Landslide in Colluvial or Residual Soil | A shallow landslide in Colluvial or Residual Soil Units impacting the extension. |
| Hazard 5B | | A shallow landslide impacting the main building, followed by progressive collapse of the entire structure, affecting the extension. |

### *4.2.3 Likelihood and Vulnerability Assessment*

A likelihood assessment of the identified hazards has been carried out in accordance with guidance from the AGS (2000) Landslide Risk Management framework and in accordance with observation, experience and engineering judgement of the hazards and sequence of events.

The following aspects of the Likelihood assessment were considered:

- $P_{(H)}$ – Probability of the hazard's occurence.
- $P_{(S:H)}$ – Probability of spatial impact/travel to the element at risk (the main building or the extension).
- $P_{(T:S)}$ – Temporal Probability of the Extension being occupied given the spatial impact occurrence.
- $V_{(Prop:S)}$ – Vulnerability of the property to the spatial impact (proportion of property value lost).
- $V_{(D:T)}$ – Vulnerability of the individual (probability of loss of life of the individual given impact).

The likelihood assessment is summarised in Table 2 below based on guidance from the AGS (2000) Publication.

The average temporal probability of occupation in the extension (whether a person is present in the extension) has been taken to be 0.1 (10% of the time) in summer months and 0.6 (60% of the time) in winter months, for an average of 0.35.

*Table 2 – Likelihood Assessment*

| Hazard | Annual Occurrence/ Detachment $P_{(H)}$ | Spatial Impact/ Travel to Extension $P_{(S:H)}$ | Temporal Probability of occupation $P_{(T:S)}$ | Vulnerability to Property $V_{(Prop:S)}$ | Total Property Value | Vulnerability to Individual $V_{(D:T)}$ |
|---|---|---|---|---|---|---|
| 1 – Creep at extension[1] | $10^{-4}$ | 1.0 | 0.35 | 0.1 | $5m | 0.001 |

[1] Likelihoods for creep considered the presence of the existing structure and subfloor space excavated, which removed upslope colluvium local to the extension area and hence removed driving colluvial downslope effects.

| Hazard | Annual Occurrence/ Detachment $P_{(H)}$ | Spatial Impact/ Travel to Extension $P_{(S:H)}$ | Temporal Probability of occupation $P_{(T:S)}$ | Vulnerability to Property $V_{(Prop:S)}$ | Total Property Value | Vulnerability to Individual $V_{(D:T)}$ |
|---|---|---|---|---|---|---|
| 2A – Boulder Roll[2] to Extension | $10^{-3}$ | 0.001 Glancing blow to the side | 0.35 | 0.1 | $5m | 0.1 |
| 2B – Boulder Roll to Main Structure | $10^{-3}$ | 0.1 to main building 0.01 for progressive collapse (=0.001) | 0.35 | 1.0 | $5m | 0.9 |
| 3 – Controlled Fill Settlement | $10^{-3}$ | 1.0 | 0.35 | 0.1 | $5m | 0.001 |
| 4 – Controlled Fill Instability | $10^{-4}$ | 0.1 | 0.35 | 0.1 | $5m | 0.9 |
| 5 – Shallow[3] Landslide to Extension | $10^{-4}$ | 0.1 Slides occur alongside the building. | 0.35 | 0.1 | $5m | 0.1 |
| 5 – Shallow Landslide to Main Building | $10^{-4}$ | 0.1 to main building 0.1 for progressive collapse (=0.01) | 0.35 | 1.0 | $5m | 0.9 |

### *4.2.4 Quantitative Risk Assessment*

The result of the Quantitative Risk Assessment is shown in Table 3 below.

*Table 3 – Quantitative Risk Assessment*

| Hazard | Risk to Property | Risk to Life |
|---|---|---|
| 1 – Creep at extension | $50 | $4 \times 10^{-8}$ |
| 2A – Boulder Roll to Extension | $0.50 | $4 \times 10^{-8}$ |
| 2B – Boulder Roll to Main Structure | $5 | $3 \times 10^{-7}$ |
| 3 – Controlled Fill Settlement | $500 | $4 \times 10^{-7}$ |
| 4 – Controlled Fill Instability | $5 | $3 \times 10^{-6}$ |

[2] Boulder movement is likely to result in topple and arrest on the ground slope due to the shape of the front split component. Detailed boulder roll modelling was not undertaken.

[3] No existing landsliding was observed near the property or above the property within say 50 m laterally.

| Hazard | Risk to Property | Risk to Life |
|---|---|---|
| 5 – Shallow Landslide to Extension | $5 | $4 \times 10^{-7}$ |
| 5 – Shallow Landslide to Main Building | $5 | $3 \times 10^{-7}$ |

#### *4.2.5 Discussion of Risk Assessment*

The Acceptable Risk to life is selected as $10^{-5}$ in accordance with the DIPNR Policy, as being one magnitude lower than the Tolerable Risk for an Existing Slope ($10^{-4}$) in Table 4.2.2 of AGS (2000).

All of the calculated risk to life values for the respective hazards were less than the Acceptable Risk, and therefore no further risk management activities or work are required beyond the recommendations in this report. The highest calculated risk was $3 \times 10^{-6}$ for the hazard of controlled fill instability. Other hazards presented a risk to life of at least an order of magnitude less.

The calculated risk to property was found to be very low as a proportion of the estimated property value, between $0.50 and $500. The highest risk was from controlled fill settlement. No additional risk management activities or work are required to manage risk to property beyond the recommendations in this report.

### 4.3 Conclusion of Site Suitability for the Proposed Development

The site of the extension is considered suitable for the proposed development, with the following conditions:

- The recommendations of this report are implemented in the design and construction of the works.
- The design drawings are to be reviewed by this report preparer and a Form 2 is to be issued under the DIPNR policy following appropriate review and implementation.
- During construction, the works are to be inspected in accordance with the recommendations in this report and a Form 3 is to be issued under the DIPNR policy following appropriate site inspections and construction methods.

### 4.4 DIPNR Form 1

The DIPNR Form 1 is enclosed with this report in Appendix D.

## 5 Limitations

D&N Geotechnical has prepared this report specifically for the Arlberg Ski Lodge Extension project, intended solely for Arlberg Ski Club Limited and the purposes outlined within this report. It is not suitable for use or reliance in other projects, varied purposes, or by third parties. Any third party relying on this report beyond its intended use, without the written consent of D&N, does so at their own risk, and D&N holds no responsibility for any resulting loss or damage.

Subsurface conditions can be complex and vary over relatively short distances, and over time. The inferred geotechnical models and recommendations in this report are based on limited subsurface investigations at discrete locations. The engineering logs describe subsurface conditions only at the investigation locations at the time of the investigation.

D&N's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided may be limited by undetected variations in ground conditions between sampling locations, site accessibility or budget constraints.

The assessment of hazards arising from this advice is restricted to the geotechnical components set out in this report and are based on known project conditions and stated assumptions. Detailed safety in design assessments are outside the scope of a geotechnical investigation report.

Further investigations may be required to support detailed design if there are scope limitations or changes to the nature of the project.

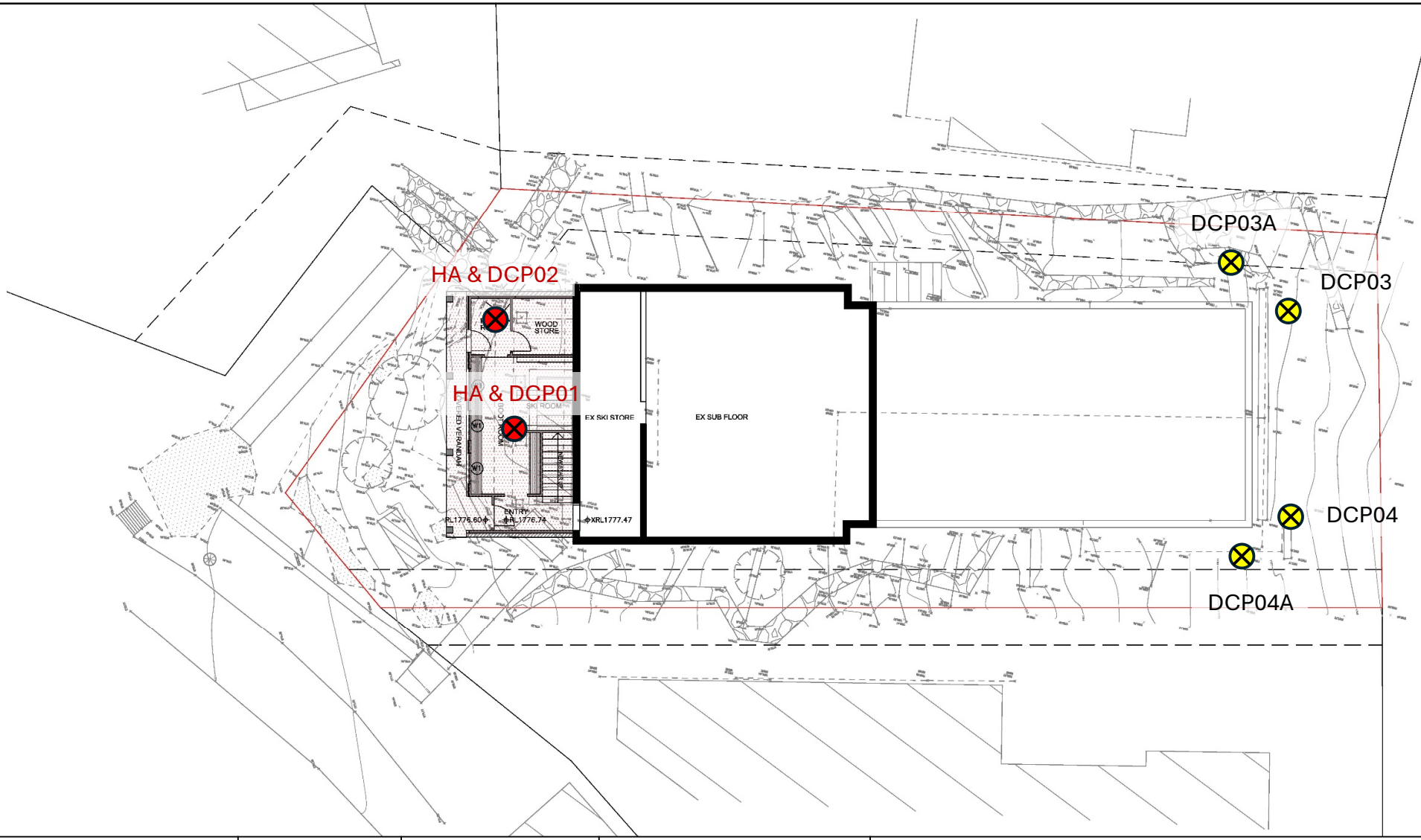
The report must be read in its entirety without separation of individual pages or sections. D&N cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation or conclusion given in this report.

The report may not be used as part of a project specification without review and agreement by D&N.

Please refer to the enclosed document: Important Information about your Report, enclosed in Appendix E.

# Figure

*Figure 1 – Site Plan with Investigation Locations*




| | | | |
|---|---|---|---|
| Drawn | **LP** | Client: | **Brooks Project Architects** |
| Approved | **RV** | Project: | **Arlberg Ski Lodge - Proposed Extension** |
| Date | **9 April 2024** | | |
| Scale | **1:100** | Title: | **Investigation Location Plan** |
| Original size | **A4** | Project no: **C-2209.00** | Figure no: **Figure 1** |

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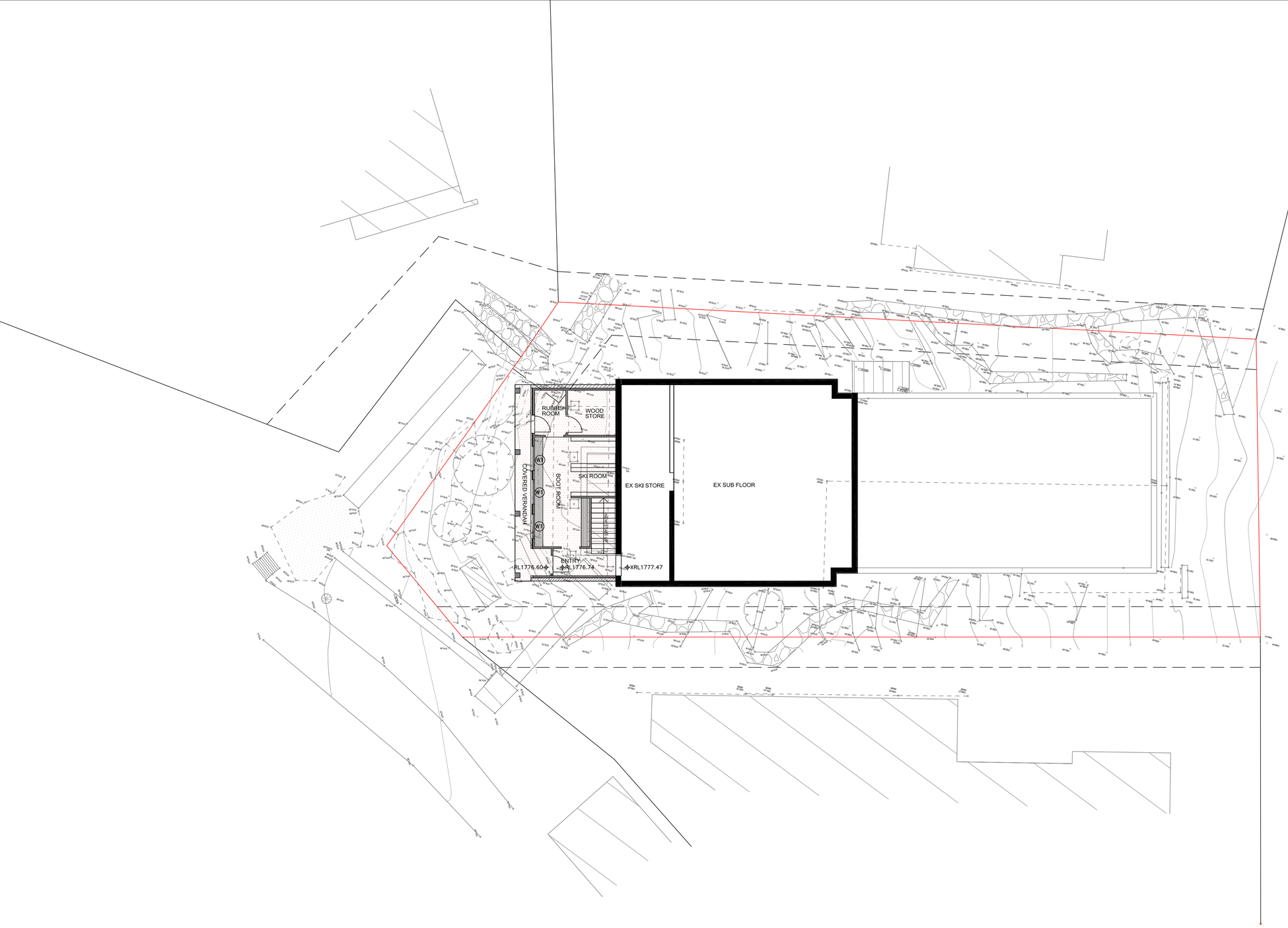
# Appendix A Architectural Plans and Survey




COLORBOND CUSTOM ORB ON TOP HAT PURLINS

REUSED GRANITE CLADDING

CROSS LAMINATED TIMBER STRUCTURAL WALLS

(W1) DOUBLE GLAZED WINDOW WITH SINGLE AWNING
WIDTH 1200 HEIGHT 1200 HEAD 2400

RENOVATION TO EXISTING

NEW ADDITION

| ISSUE | DATE | AMENDMENT |
|---|---|---|
| B | 19.01.22 | PRELIMINARY DA ISSUE |
| A | 14.03.22 | PRELIMINARY DA ISSUE |



TN

**PROJECT**
ALTERATIONS + ADDITIONS
ARLBERG SKI LODGE
LOT 103 DP 1242013
CHARLOTTE PASS NSW 2624

**CLIENT**
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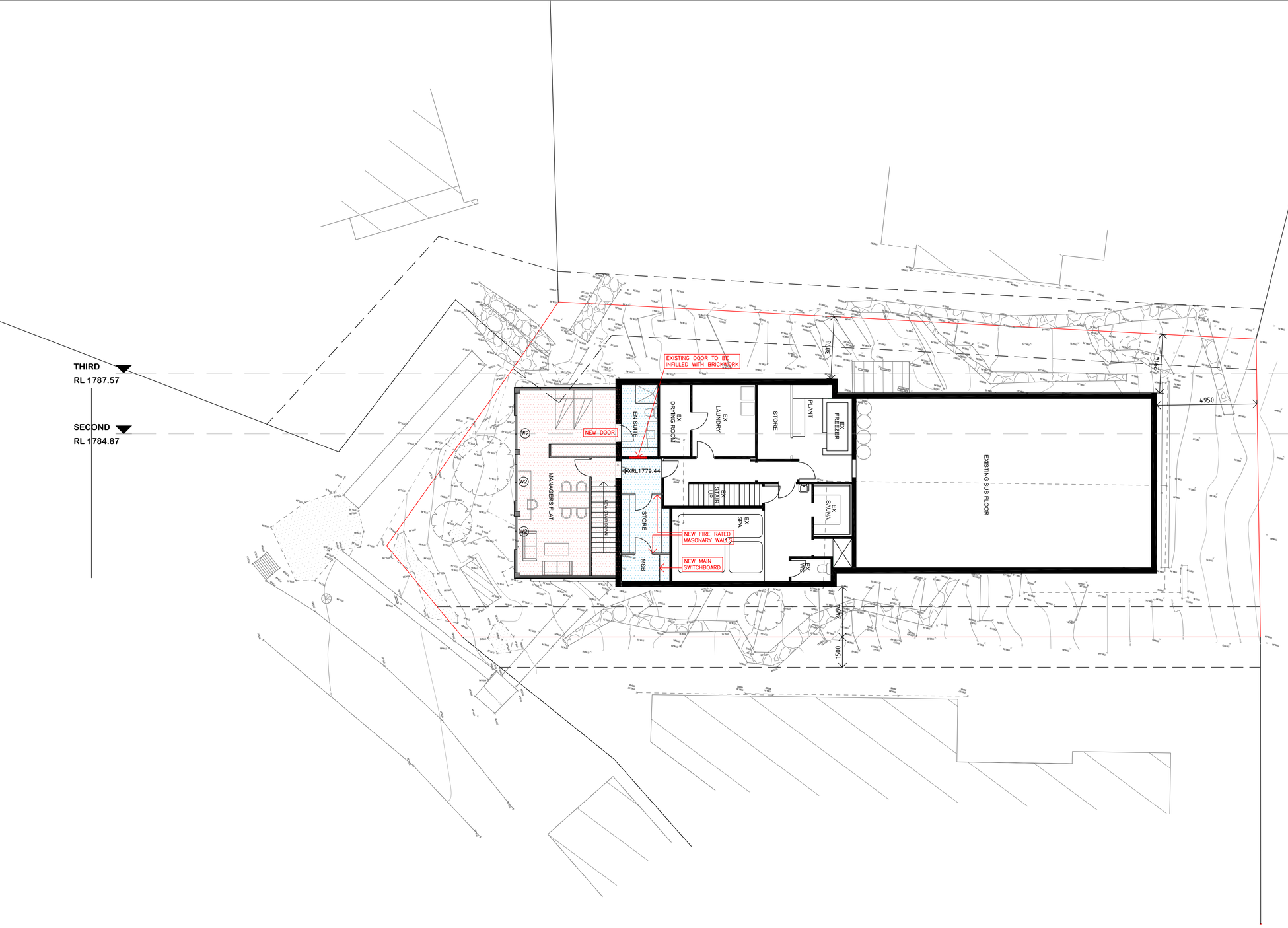
A.B.N. 36 001 720 707

**TITLE**
FLOOR PLAN
ENTRY LEVEL

SCALE: 1:100(A1)
DATE: 01.01.21
REF : BPAARLBERG

Sk1b




COLORBOND CUSTOM ORB ON TOP HAT PURLINS

REUSED GRANITE CLADDING

CROSS LAMINATED TIMBER STRUCTURAL WALLS

(W1) DOUBLE GLAZED WINDOW WITH SINGLE AWNING
WIDTH 1200 HEIGHT 1200 HEAD 2400

(W2) DOUBLE GLAZED WINDOW WITH SINGLE AWNING
WIDTH 1800 HEIGHT 2100 HEAD 2400

RENOVATION TO EXISTING

NEW ADDITION

| ISSUE | DATE | AMENDMENT |
|---|---|---|
| B | 19.01.22 | PRELIMINARY DA ISSUE |
| A | 14.03.22 | PRELIMINARY DA ISSUE |

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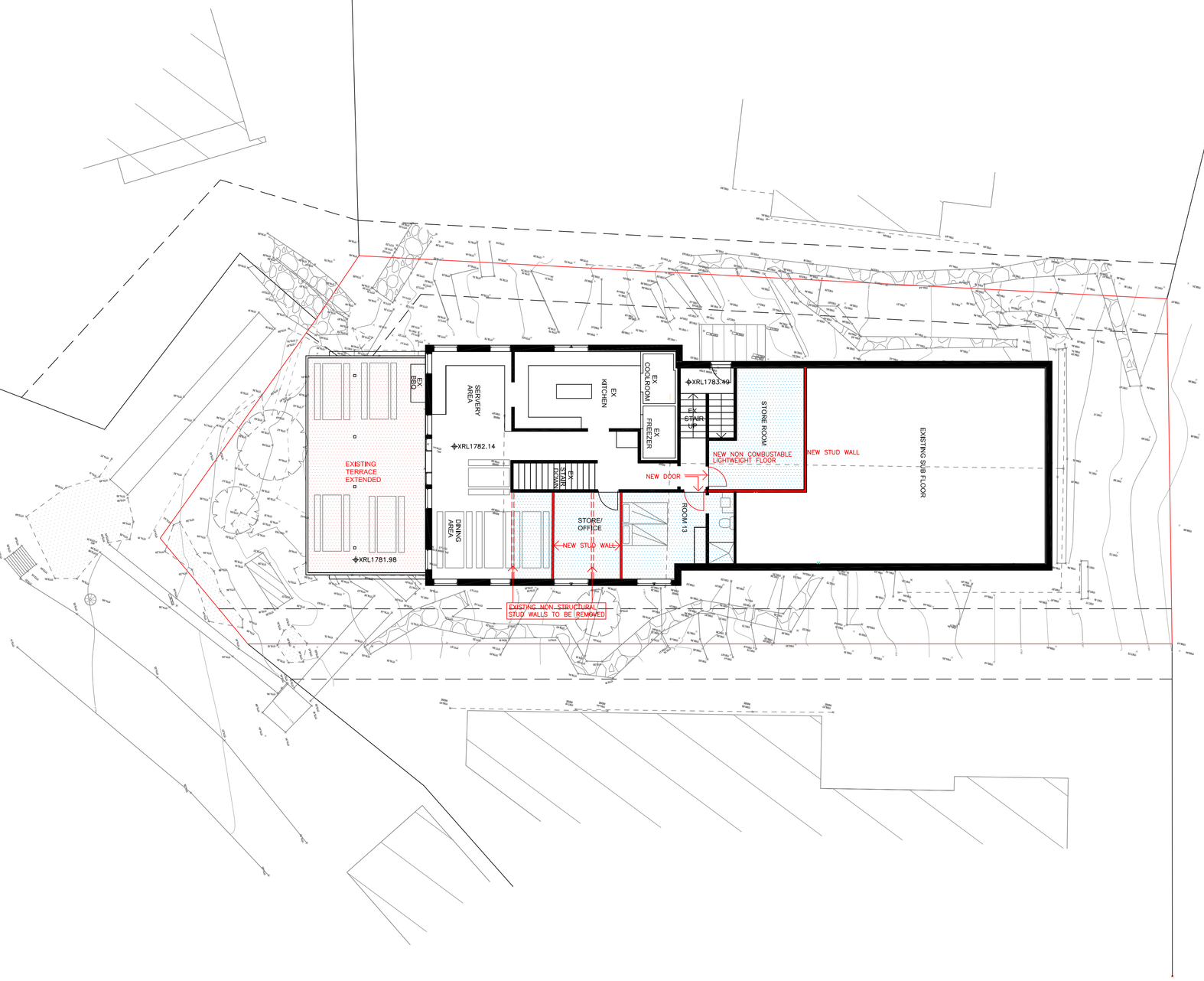
**TITLE**
FLOOR PLAN
GROUND FLOOR

SCALE: 1:100(A1)
DATE: 01.01.21
REF : BPAARLBERG

Sk2b




RENOVATION TO EXISTING

NEW ADDITION

| ISSUE | DATE | AMENDMENT |
|---|---|---|
| B | 19.01.22 | PRELIMINARY DA ISSUE |
| A | 14.03.22 | PRELIMINARY DA ISSUE |

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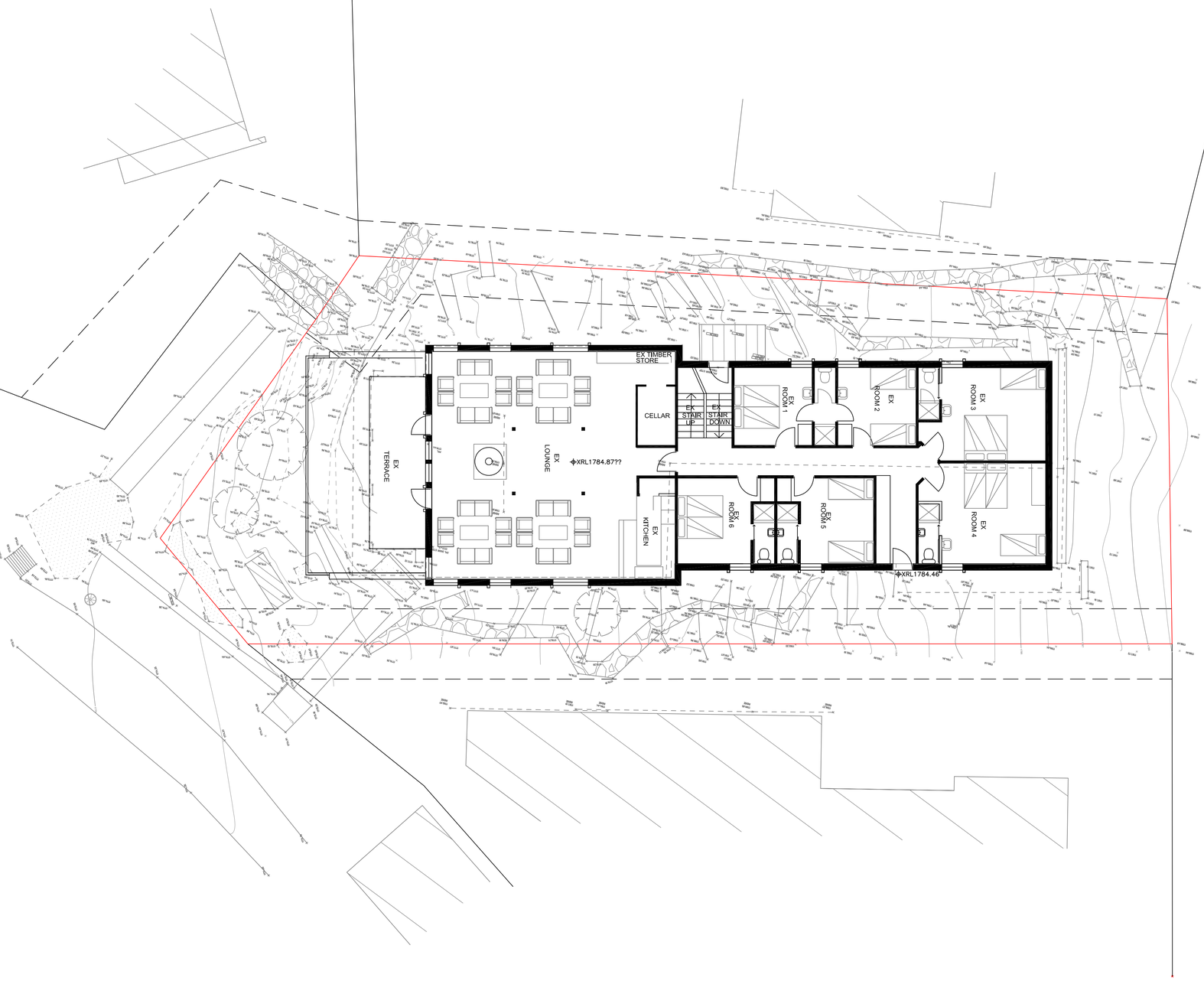
**TITLE**
FLOOR PLAN
FIRST FLOOR

SCALE: 1:100(A1)
DATE: 01.01.21
REF : BPAARLBERG

Sk3b




RENOVATION TO EXISTING

NEW ADDITION

| ISSUE | DATE | AMENDMENT |
|---|---|---|
| B | 19.01.22 | PRELIMINARY DA ISSUE |
| A | 14.03.22 | PRELIMINARY DA ISSUE |

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**TITLE**
# FLOOR PLAN SECOND FLOOR

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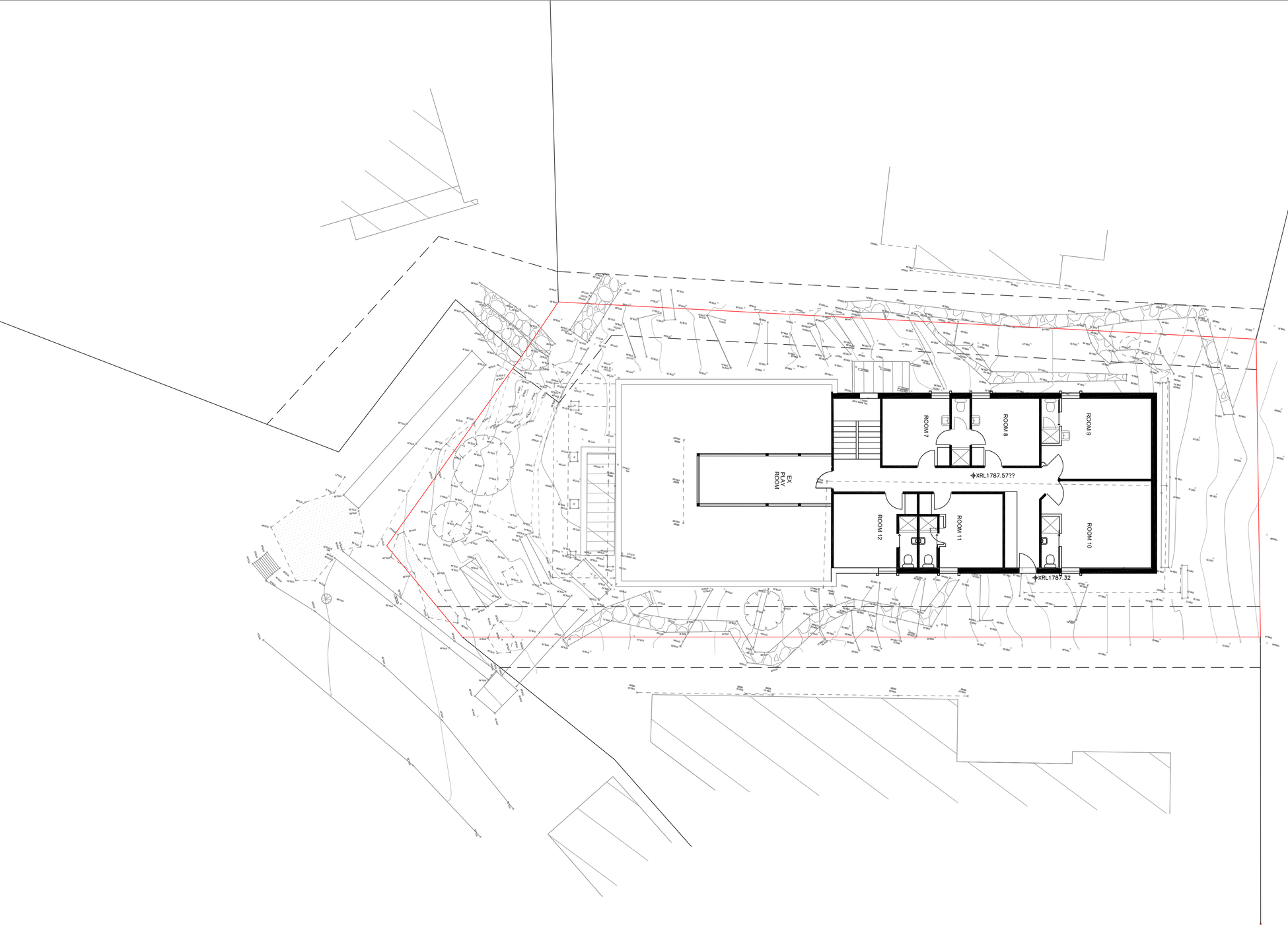
Sk4b




RENOVATION TO EXISTING

NEW ADDITION

| ISSUE | DATE | AMENDMENT |
|---|---|---|
| B | 19.01.22 | PRELIMINARY DA ISSUE |
| A | 14.03.22 | PRELIMINARY DA ISSUE |

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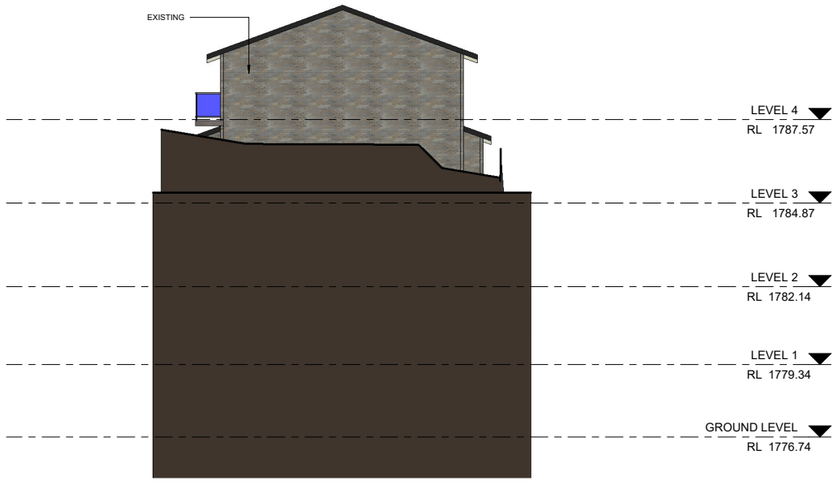
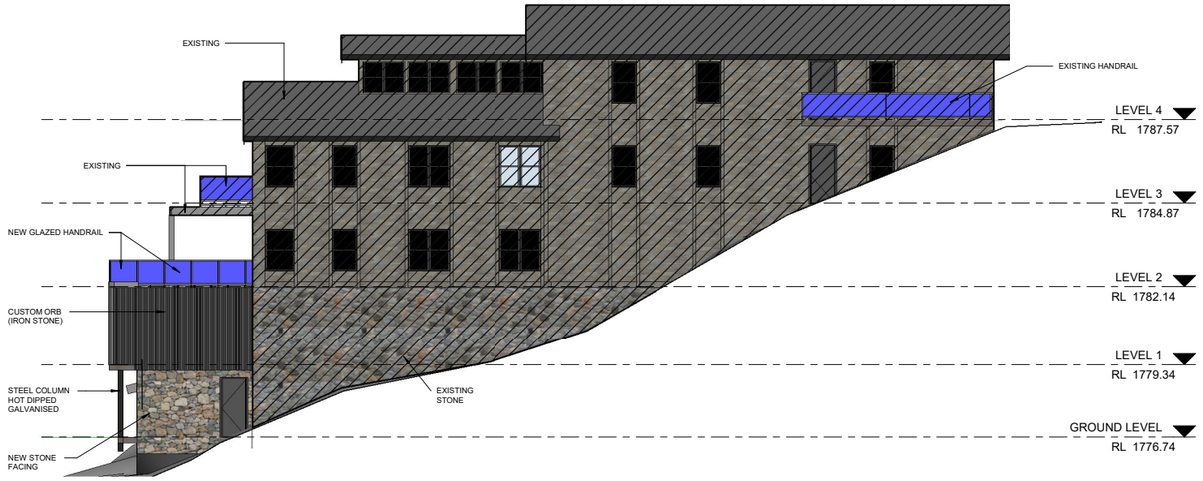
**TITLE**
FLOOR PLAN
THIRD FLOOR

SCALE: 1:100(A1)
DATE: 01.01.21
REF : BPAARLBERG

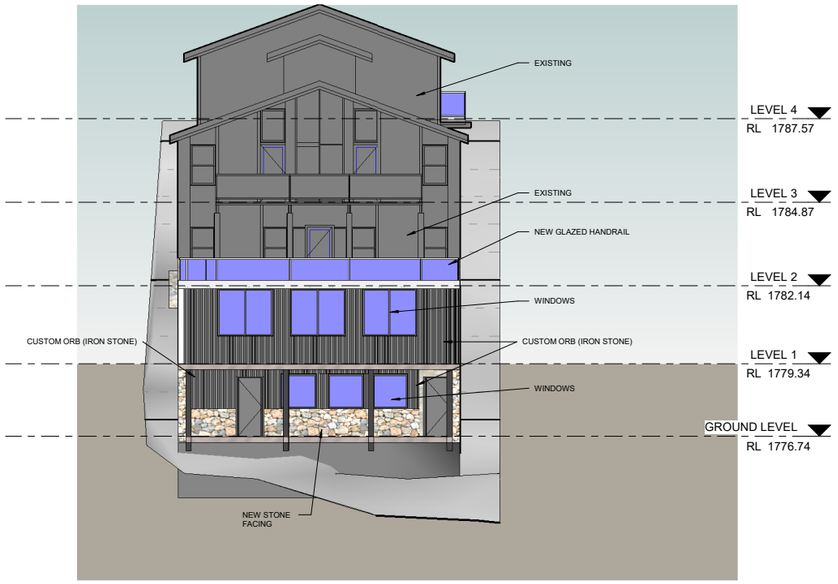
Sk5b



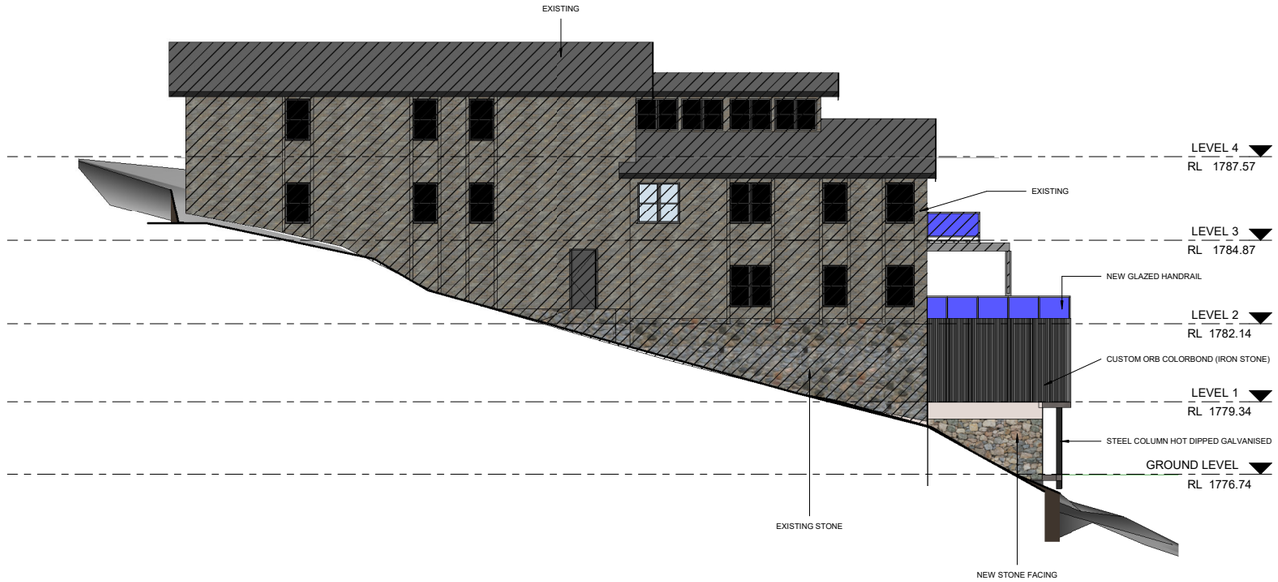

1 SOUTH ELEVATION
1 : 100




2 WEST ELEVATION
1 : 100




3 NORTH ELEVATION
1 : 100




4 EAST ELEVATION
1 : 100

| ISSUE | DATE | AMENDMENT |
|---|---|---|
| B | 10.07.23 | ISSUED FOR DA |
| A | 14.03.22 | PRELIMINARY DA ISSUE |



PROJECT
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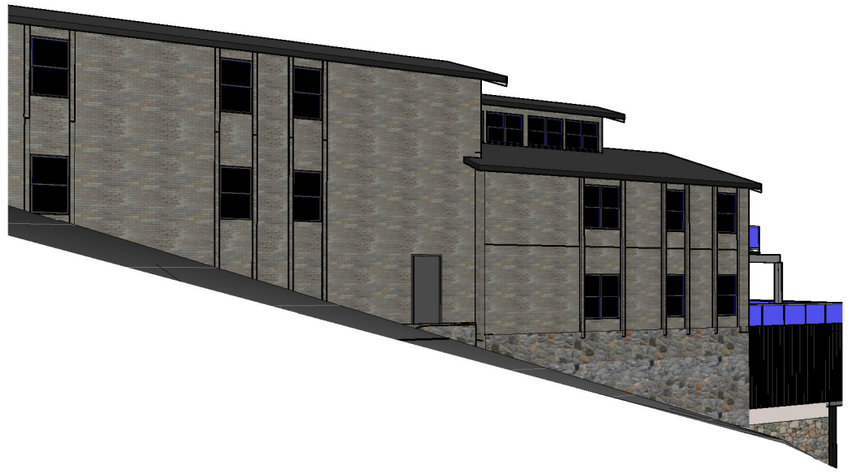
A.B.N. 36 001 720 707

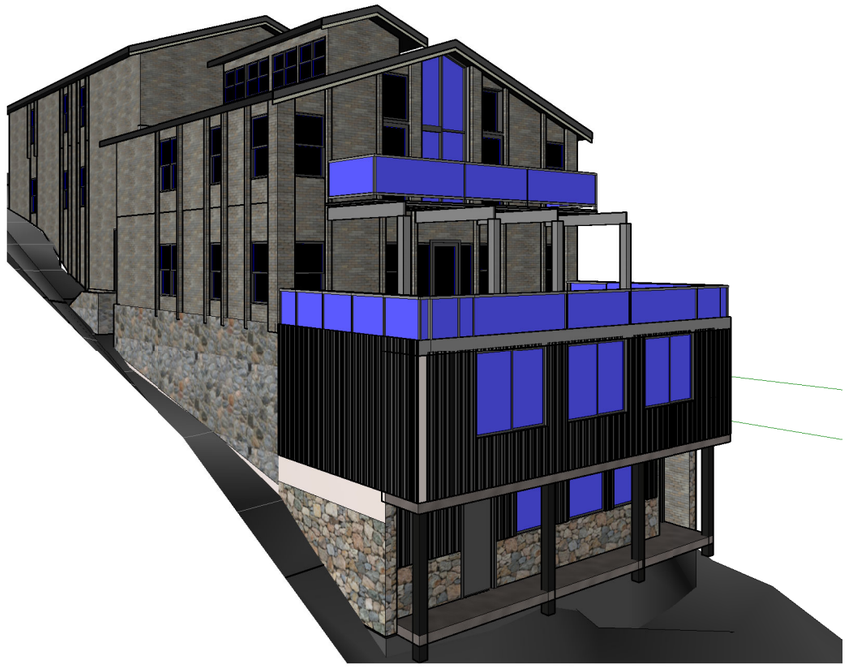
TITLE
ELEVATION

SCALE: 1:100(A1)
DATE: 01.01.21
REF :BPAARLBERG

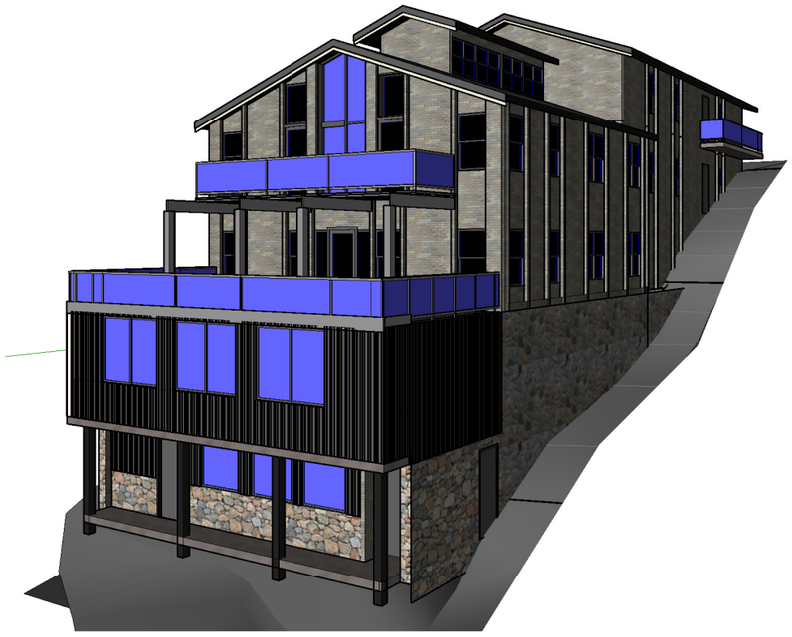
Sk6b



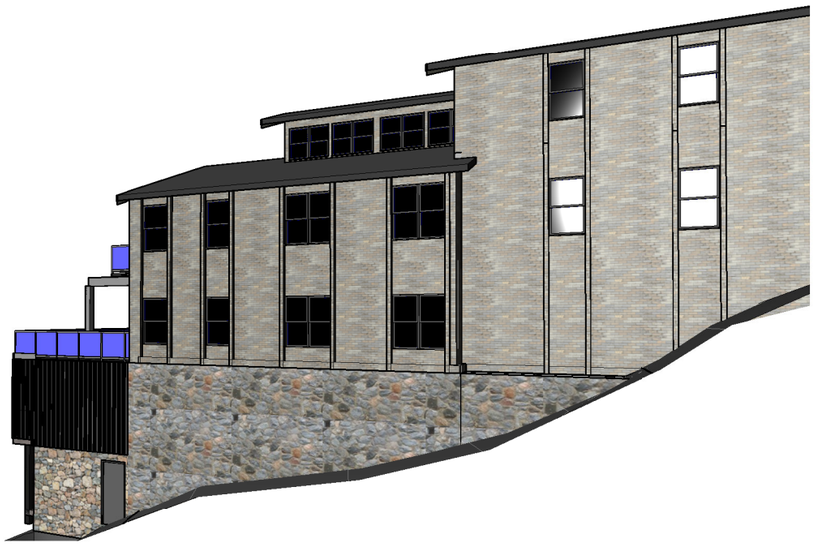
1 3D View 1



2 3D View 2



3 3D View 3



4 3D View 4

| ISSUE | DATE | AMENDMENT |
|---|---|---|
| B | 10.07.23 | ISSUED FOR DA |
| A | 14.03.22 | PRELIMINARY DA ISSUE |



PROJECT
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A.B.N. 36 001 720 707

TITLE
ELEVATION

SCALE: 1:100(A1)
DATE: 01.01.21
REF :BPAARLBERG

Sk7b

# Appendix B Engineering Borehole Logs

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Borehole No.
**HA01**
Page 1 of 1

# Engineering Log - Borehole

Project No.: C-2209.00

| | | | |
|---|---|---|---|
| Client: | Brooks Project Achitects | Commenced: | 21/3/2024 |
| Project Name: | Arlberg Ski Lodge | Completed: | 21/3/2024 |
| Hole Location: | Arlberg Ski Lodge, Charlottes Pass NSW | Logged By: | LP |
| Hole Position: | 619397.0 m E 5966866.0 m N MGA2020-55 | Checked By: | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Drill Model and Mounting: | Hand Auger | Inclination: | -90° | RL Surface: | No survey | | |
| Hole Diameter: | 100 mm | Bearing: | | Datum: | AHD | Operator: | |

| ***Drilling Information*** | | | | | | | | ***Soil Description*** | | | | | | ***Observations*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method | Penetration | Support | Water | Samples & Field Tests | Recovery | RL (m) | Depth (m) | Graphic Log | Group Symbol | Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional | Moisture Condition | Consistency Relative Density | Pocket Penetrometer UCS (kPa) 100 200 300 400 500 | DCP TEST Blows per 100 mm 5 10 15 20 25 | | Structure and Additional Observations |
| HA | | | Not Encountered | | | | 0.0 | | SP | FILL Silty SAND: fine to coarse grained, dark brown, silt is low plasticity; with fine to coarse, sub-rounded to sub-angular gravel; trace plastic sheet and mulch. | M | | | 2<br>3<br>3<br>8<br>6 | | FILL |
| | | | | | | | 0.5 | | | Hole Terminated at 0.50 m<br>Refusal<br>Backfilled with spoil<br>refusal on Boulder | | | | 11<br>12<br>HB 50 mm | | |
| | | | | | | | 1.0 | | | | | | | | | |
| | | | | | | | 1.5 | | | | | | | | | |
| | | | | | | | 2.0 | | | | | | | | | |

***Method***
AS - Auger Screwing
ADV - Auger V Bit
ADT - Auger Tungsten Carbide Bit
RR - Rock Roller
WB - Washbore

***Penetration***
No resistance ranging to refusal

***Water***
Level (Date)
Inflow
Partial Loss
Complete Loss

***Samples and Tests***
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
PP - Pocket Penetrometer

***Moisture Condition***
D - Dry
M - Moist
W - Wet
w - Moisture Content
PL - Plastic Limit
LL - Liquid Limit

***Consistency/Relative Density***
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
Fr - Friable
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

***Support***
C - Casing

***Classification Symbols and Soil Descriptions***
Based on Unified Soil Classification System

D&N Geotechnical

Borehole No.
**HA02**
Page 1 of 1

# Engineering Log - Borehole

Project No.: C-2209.00

| | | | |
|---|---|---|---|
| Client: | Brooks Project Achitects | Commenced: | 21/3/2024 |
| Project Name: | Arlberg Ski Lodge | Completed: | 21/3/2024 |
| Hole Location: | Arlberg Ski Lodge, Charlottes Pass NSW | Logged By: | LP |
| Hole Position: | 619406.0 m E 5966874.0 m N MGA2020-55 | Checked By: | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Drill Model and Mounting: | Hand Auger | Inclination: | -90° | RL Surface: | No survey | | |
| Hole Diameter: | 100 mm | Bearing: | | Datum: | AHD | Operator: | |

| ***Drilling Information*** | | | | | | | | ***Soil Description*** | | | | | | ***Observations*** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Method | Penetration | Support | Water | Samples & Field Tests | Recovery | RL (m) | Depth (m) | Graphic Log | Group Symbol | Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional | Moisture Condition | Consistency Relative Density | Pocket Penetrometer UCS (kPa) 100 200 300 400 500 | DCP TEST Blows per 100 mm 5 10 15 20 25 | | Structure and Additional Observations |
| HA | | | Not Encountered | | | | | | SP | FILL Silty SAND: fine to coarse grained, dark brown, silt is low plasticity; with fine to coarse, sub-rounded to sub-angular gravel; trace angular to sub-angular cobbles. | M | | | 1 1 2 | | FILL |
| | | | | | | | 0.5 | | | Hole Terminated at 0.30 m<br>Refusal<br>Backfilled with spoil | | | | 2 3 1 1 2 2 1 2 1 9 5 6 8 5 6 5 5 5 Refusal 13 | |
| | | | | | | | 1.0 | | | | | | | | | |
| | | | | | | | 1.5 | | | | | | | | | |
| | | | | | | | 2.0 | | | | | | | | | |

***Method***
AS - Auger Screwing
ADV - Auger V Bit
ADT - Auger Tungsten Carbide Bit
RR - Rock Roller
WB - Washbore

***Penetration***
No resistance ranging to refusal

***Water***
Level (Date)
Inflow
Partial Loss
Complete Loss

***Samples and Tests***
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
PP - Pocket Penetrometer

***Moisture Condition***
D - Dry
M - Moist
W - Wet
w - Moisture Content
PL - Plastic Limit
LL - Liquid Limit

***Consistency/Relative Density***
VS - Very Soft
S - Soft
F - Firm
VSt - Very Stiff
H - Hard
Fr - Friable
VL - Very Loose
L - Loose
MD - Medium Dense
D - Dense
VD - Very Dense

***Support***
C - Casing

***Classification Symbols and Soil Descriptions***
Based on Unified Soil Classification System

# Explanatory Notes

The techniques employed in this report to describe and classify soils and rocks are in general accordance with the Australian Standard AS1726-2017 Geotechnical Site Investigations. The material descriptions are derived from field observations and engineering assessments and may be supplemented or validated by in situ or laboratory testing. The accuracy of the information is dependent on the level of investigation, the extent of sampling and testing, and the inherent variability of the conditions encountered.

**Method**

Test Pitting: excavation/trench

| | |
|---|---|
| BH | Backhoe bucket |
| EX | Excavator bucket |
| R | Ripper |
| H | Hydraulic Hammer |
| X | Existing excavation |
| N | Natural exposure |

Manual drilling: hand operated tools

| | |
|---|---|
| HA | Hand Auger |

Continuous sample drilling

| | |
|---|---|
| PT | Push tube |
| PS | Percussion sampling |
| SON | Sonic drilling |

Hammer drilling

| | |
|---|---|
| AH | Air hammer |
| AT | Air track |

Spiral flight auger drilling

| | |
|---|---|
| AS | Auger screwing |
| AD/V | Continuous flight auger: V-bit |
| AD/T | Continuous spiral flight auger: TC-Bit |
| HFA | Continuous hollow flight auger |

Rotary non-core drilling

| | |
|---|---|
| WB | Washbore drilling |
| RR | Rock roller |

Rotary core drilling

| | |
|---|---|
| PQ | 85 mm core (wire line core barrel) |
| HQ | 63.5 mm core (wire line core barrel) |
| NMLC | 51.94 mm core (conventional core barrel) |
| NQ | 47.6 mm core (wire line core barrel) |
| DT | Diatube (concrete coring) |

Sampling is conducted to facilitate further assessment of selected materials encountered.

**Sampling method**

Soil sampling

| | |
|---|---|
| B | Bulk disturbed sample |
| D | Disturbed sample |
| C | Core sample |
| ES | Environmental soil sample |
| SPT | Standard Penetration Test sample |
| U | Thin wall tube 'undisturbed' |

Water sampling

| | |
|---|---|
| WS | Environmental water sample |

**Field testing**

| | |
|---|---|
| SPT | Standard Penetration Test |
| HP/PP | Hand/Pocket Penetrometer |

Dynamic Penetrometers (blows per noted increment)

| | |
|---|---|
| DCP | Dynamic Cone Penetrometer |
| PSP | Perth Sand Penetrometer |

| | |
|---|---|
| VS | Vane Shear |
| PLT | Plate Load Test |
| PID | Photo Ionization Detector |

If encountered, refusal (R), or hammer bouncing (HB) of penetrometers may be noted.

The quality of the rock can be assessed by the degree of natural defects/fractures and the following.

**Rock quality description**

| | |
|---|---|
| TCR | Total Core Recovery (%)<br>(length of core recovered divided by the length of core run) |
| RQD | Rock Quality Designation (%)<br>(sum of axial lengths of core greater than 100 mm long divided by the length of core run) |
| SCR | Solid Core Recovery (%)<br>(sum of axial lengths of core greater than the core diameter mm long divided by the length of core run) |

**Groundwater**

Not Encountered Excavation is dry in the short term

| | |
|---|---|
| Not Observed | Water level observation not possible |
| Seepage | Water seeping into hole |
| Inflow | Water flowing/flooding into hole |

The presence of perched groundwater can often lead to an incorrect estimation of the true depth to the water table. It is essential to consider that groundwater levels can fluctuate significantly based on a range of factors, such as climatic changes and site conditions. Therefore, any assessment of groundwater levels should be conducted with caution and verified through reliable testing methods.

**Excavation conditions**

| | |
|---|---|
| Stable | No obvious short term instability noted |
| Spalling | Material falling into excavation (minor/major) |
| Unstable | Collapse of one or more face of the excavation |

# Explanatory Notes: General Soil Description

The methods of description and classification of soils used in this report are based on Australian Standard AS1726-2017 Geotechnical Site Investigations. A material is described as a soil if it can be remoulded by hand in its field condition or in water. The dominant component is shown in upper case, with secondary components in lower case. In general descriptions cover: soil type, plasticity or particle size/shape, colour, strength or density, moisture and inclusions.

In general, soil types are classified according to the dominant particle on the basis of the following particle sizes.

| Soil Classification | | Particle Size (mm) |
|---|---|---|
| CLAY | | < 0.002 |
| SILT | | 0.002 0.075 |
| SAND | fine | 0.075 to 0.21 |
| | medium | 0.21 to 0.6 |
| | coarse | 0.6 to 2.36 |
| GRAVEL | fine | 2.36 to 6.7 |
| | medium | 6.7 to 19 |
| | coarse | 19 to 63 |
| COBBLES | | 63 to 200 |
| BOULDERS | | > 200 |

Soil types may be qualified by the presence of minor components on the basis of field examination methods and/or the soil grading.

| In coarse grained soils | | In fine soils | |
|---|---|---|---|
| Terminology | % fines | % coarse | % coarse |
| Trace | ≤5 | ≤15 | ≤15 |
| With | >5, ≤12 | >15, ≤30 | >15, ≤30 |

The strength of cohesive soils is classified by engineering assessment or field/lab testing as follows.

| Strength | Symbol | Undrained shear strength |
|---|---|---|
| Very Soft | VS | ≤12kPa |
| Soft | S | 12kPa to ≤25kPa |
| Firm | F | 25kPa to ≤50kPa |
| Stiff | St | 50kPa to ≤100kPa |
| Very Stiff | VSt | 100kPa to ≤200kPa |
| Hard | H | >200kPa |

Cohesionless soils are classified on the basis of relative density as follows.

| Relative Density | Symbol | Density Index |
|---|---|---|
| Very Loose | VL | <15% |
| Loose | L | 15% to ≤35% |
| Medium Dense | MD | 35% to ≤65% |
| Dense | D | 65% to ≤85% |
| Very Dense | VD | >85% |

The plasticity of cohesive soils is defined by the Liquid Limit (LL) as follows.

| Plasticity | Silt LL | Clay LL |
|---|---|---|
| Low plasticity | ≤ 35% | ≤ 35% |
| Medium plasticity | N/A | > 35% ≤ 50% |
| High plasticity | > 50% | > 50% |

The moisture condition of soil is described by appearance and feel and for cohesive soils may be described in relation to the Plastic Limit (PL) or Liquid Limit (LL).

| Moisture condition and description | |
|---|---|
| Dry | Cohesive soils: hard, friable, dry of plastic limit.<br>Granular soils: cohesionless and free-running |
| Moist | Cool feel and darkened colour:<br>Cohesive soils can be moulded.<br>Granular soils tend to cohere |
| Wet | Cool feel and darkened colour:<br>Cohesive soils usually weakened & free water forms.<br>Granular soils tend to cohere |

The structure of the soil may be described as follows.

| Zoning | Description |
|---|---|
| Layer | Continuous across exposure or sample |
| Lens | Discontinuous layer (lenticular shape) |
| Pocket | Irregular inclusion of different material |

Soil layers may exhibit various structural features such as softened zones, fissures, cracks, joints, and root-holes. In addition, coarse-grained soils can be described based on their degree of cementation, which can be classified as either strong or weak.

The soil origin may also be noted if possible to deduce.

| Soil origin and description | |
|---|---|
| Fill | Anthropogenic deposits or disturbed material |
| Topsoil | Zone of soil affected by roots and root fibres |
| Peat | Significantly organic soils |
| Colluvial | Transported down slopes by gravity/water |
| Aeolian | Transported and deposited by wind |
| Alluvial | Deposited by rivers |
| Estuarine | Deposited in coastal estuaries |
| Lacustrine | Deposited in freshwater lakes |
| Marine | Deposits in marine environments |
| Residual soil | Soil formed by in situ weathering of rock, with no structure/fabric of parent rock evident |
| Extremely weathered material | Formed by in situ weathering of geological formations, with the structure/fabric of parent rock intact but with soil strength properties |

The origin of the soil generally cannot be deduced solely on the appearance of the material and the inference may be supplemented by further geological evidence or other field observation. Where there is doubt, the terms ‘possibly’ or ‘probably’ may be used.

# Explanatory Notes: General Rock Description

If a material cannot be remoulded by hand in its field condition or in water, it is categorized as a rock. The description includes the rock type, grain size, structure, color, degree of weathering, strength, minor components or inclusions, and, where applicable, defect types, shape, roughness, and coating/infill. It is important to note that the origin of rocks cannot be determined solely by their appearance, and additional geological evidence or field observations may be necessary to make accurate inferences. If there is any uncertainty, the terms "possibly" or "probably" may be used to describe the rock.

To provide a comprehensive description of rock types, it is important to consider the predominant grain or crystal size. This can be achieved by grouping them into categories for each specific rock type. In doing so, the descriptions of the rocks can be more accurate and informative.

| Rock type | Groups |
|---|---|
| Sedimentary | Deposited, carbonate (porous or non), volcanic ejection |
| Igneous | Felsic (much quartz, pale), Intermediate, or mafic (little quartz, dark) |
| Metamorphic | Foliated or non-foliated |
| Duricrust | Cementing minerology (iron oxides or hydroxides, silica, calcium carbonate, gypsum) |

Reference should be made to AS1726 for details of the rock types and methods of classification.

The classification of rock weathering is described based on definitions in AS1726 and summarised as follows.

| Term and symbol | | Definition |
|---|---|---|
| Residual Soil | RS | Soil developed on rock with the mass structure and substance of the parent rock no longer evident |
| Extremely weathered | XW | Weathered to such an extent that the rock has 'soil-like' properties. Mass structure and substance still evident |
| Distinctly weathered | DW | The strength is usually changed and may be highly discoloured. Porosity may be increased by leaching, or decreased due to deposition in pores. May be distinguished into MW (Moderately Weathered) and HW (Highly Weathered). |
| Slightly weathered | SW | Slightly discoloured; little or no change of strength from fresh rock |
| Fresh Rock | FR | The rock shows no sign of decomposition or staining |

The rock material strength can be defined based on the point load index as follows.

| Term and symbol | | Point Load Index Is50 (MPa) |
|---|---|---|
| Very Low | VL | 0.03 to 0.1 |
| Low | L | 0.1 to 0.3 |
| Medium | M | 0.3 to 1.0 |
| High | H | 1.0 to 3 |
| Very High | VH | 3 to 10 |
| Extremely High | EH | > 10 |

It is important to note that the rock material strength as above is distinct from the rock mass strength which can be significantly weaker due to the effect of defects.

The field guide detailed in AS1726 may be used for a preliminary assessment of rock strength in situations where point load testing is not feasible.

The defect spacing measured normal to defects of the same set or bedding, is described as follows.

| Definition | Defect Spacing (mm) |
|---|---|
| Thinly laminated | < 6 |
| Laminated | 6 to 20 |
| Very thinly bedded | 20 to 60 |
| Thinly bedded | 60 to 200 |
| Medium bedded | 200 to 600 |
| Thickly bedded | 600 to 2000 |
| Very thickly bedded | > 2000 |

Terms for describing rock and defects are as follows.

| Defect Terms | | | |
|---|---|---|---|
| Joint | J | Infilled Seam | IS |
| Bedding Parting | P | XW Seam | EW |
| Shear Surface | S | Drill Break | DB |
| Sheared Zone | SZ | | |
| Sheared Seam | SS | | |
| Crushed Seam | CS | | |

The shape and roughness of defects in the rock mass are described using the following terms.

| Planarity | | Roughness | |
|---|---|---|---|
| Planar | PR | Very Rough | VR |
| Curved | CU | Rough | RF |
| Undulating | UN | Smooth | SM |
| Irregular | IR | Slickensided | SL |
| Stepped | ST | | |

The coating or infill associated with defects in the rock mass are described as follows.

| Infill and Coating | | |
|---|---|---|
| Clean | CN | |
| Stained | SN | |
| Carbonaceous | X | |
| Minerals | MU | Unidentified mineral |
| | MS | Secondary mineral |
| | CA | Calcite |
| | Fe | Iron Oxide |
| | Qz | Quartz |
| Veneer | VN | Thin or patchy coating |
| Coating | CT | Infill up to 1mm |

# Appendix C DCP Test Results

D&N Geotechnical

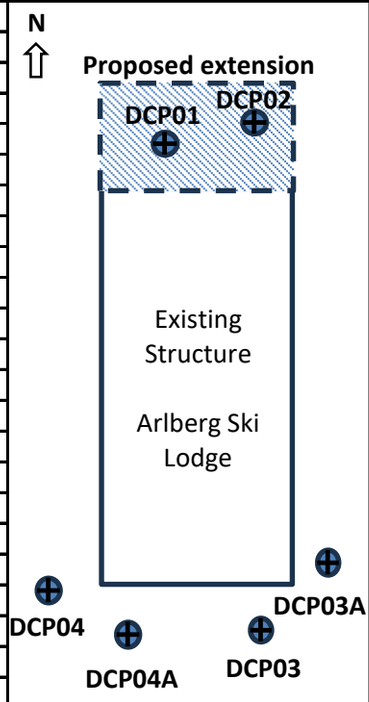
# Dynamic Cone Penetrometer Test Results

| | |
|---|---|
| **Client:** | Brooks Projects Architects |
| **Principal:** | |
| **Project:** | Arlberg Ski Lodge |
| **Location:** | Arlberg Ski Lodge, Charlottes Pass NSW |
| **Job No:** | C-2209.00 |
| **Date of Issue:** | 22 March 2024 |
| **Standard used: (eg AS, RTA)** | AS 1289 6.3.2 |

**Test procedure: AS 1289 6.3.2** **Test date: 21/03/2024**

| Depth below surface (mm) | Test Numbers / Readings recorded in blows per 100mm | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | DCP01 | DCP02 | DCP03 | DCP03A | DCP04 | DCP04A | | |
| 100 | 2 | 1 | 2 | 3 | 2 | 2 | | |
| 200 | 3 | 1 | 3 | 2 | 2 | 3 | | |
| 300 | 3 | 2 | 12 | 3 | 2 | 2 | | |
| 400 | 8 | 2 | HB 50 mm | 12 | 2 | 2 | | |
| 500 | 6 | 3 | | HB 80 mm | 1 | 2 | | |
| 600 | 11 | 1 | | | 2 | 3 | | |
| 700 | 12 | 1 | | | 2 | 4 | | |
| 800 | R/50 mm | 2 | | | 12 | 12 | | |
| 900 | | 2 | | | 7 | 20 | | |
| 1000 | | 1 | | | 6 | 8 | | |
| 1100 | | 2 | | | 11 | 7 | | |
| 1200 | | 1 | | | 12 | 12 | | |
| 1300 | | 9 | | | HB 30 mm | 13 | | |
| 1400 | | 5 | | | | 13 | | |
| 1500 | | 6 | | | | HB 50 mm | | |
| 1600 | | 8 | | | | | | |
| 1700 | | 5 | | | | | | |
| 1800 | | 6 | | | | | | |
| 1900 | | 5 | | | | | | |
| 2000 | | 5 | | | | | | |
| 2100 | | 5 | | | | | | |
| 2200 | | 13 | | | | | | |
| 2300 | | R | | | | | | |
| 2400 | | | | | | | | |
| 2500 | | | | | | | | |
| 2600 | | | | | | | | |
| 2700 | | | | | | | | |
| 2800 | | | | | | | | |
| 2900 | | | | | | | | |
| 3000 | | | | | | | | |
| 3100 | | | | | | | | |
| 3200 | | | | | | | | |
| 3300 | | | | | | | | |

Test location/Remarks




Remarks

General Information

AS 1289 6.3.2
- Drop height 510mm ± 5
- Cone tip
- Blunt tip

AS 1289 6.3.3
- Drop height 600mm ± 5

# Appendix D DIPNR Geotechnical Policy Form 1

# Form 1 – Declaration and certification made by geotechnical engineer or engineering geologist in a geotechnical report.

DA Number: _____

To be submitted with a development application

You can use Form 1 to verify that the author of a geotechnical report is a geotechnical engineer or engineering geologist as defined by the Department of Planning & Environment (DP&E) Geotechnical Policy. Alternatively, where a geotechnical report has been prepared by a professional person not recognised by DP&E Geotechnical Policy, then Form 1 may be used as technical verification of the geotechnical report if signed by a geotechnical engineer or engineering geologist as defined by the DP&E Geotechnical Policy.

**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 as part of a geotechnical report

I,

Mr ☒ Ms ☐ Mrs ☐ Dr ☐ Other ☐

| First Name | Family Name |
|---|---|
| RIAN | VLEGGAAR |

OF

Company/organisation

D&N GEOTECHNICAL PTY LTD

on this the 11 day of APRIL 20 24

certify that I am a geotechnical engineer or engineering geologist as defined by the "Policy" and I (tick appropriate box)

☒ prepared the geotechnical report referenced below in accordance with the AGS 2000 and DP&E Geotechnical Policy – Kosciuszko Alpine Resorts.

☐ am willing to technically verify that the Geotechnical Report referenced below has been prepared in accordance the AGS 2000 and DP&E Geotechnical Policy – Kosciuszko Alpine Resorts.

## 2. Geotechnical Report Details

Report Title

Arlberg Ski Lodge - Proposed Extension: Geotechnical Investigation Report

| Author | Dated |
|---|---|
| Rian Vleggaar | 11 April 2024 |

DA Site Address

Lot 103 DP 1242013
Charlotte Pass NSW 2624

DA Applicant

Arlberg Ski Club Limited

I am aware that the Geotechnical Report I have either prepared or am technically verifying, (referenced above) is to be submitted in support of a development application for the proposed development site (referenced above), and it's findings will be relied upon by the Consent Authority in determining the development application.

## 3. Checklist of essential requirements to be contained in a geotechnical risk assessment report to be submitted with a development application

The following checklist covers the minimum requirements to be addressed in a Geotechnical Risk Management Report. This checklist is to accompany the report.

Please tick appropriate box

☒ Risk assessment of all identifiable geotechnical hazards in accordance with AGS 2000, as per 6.1 (a) of the policy.

☒ Site plans with key hazards identified and other information as per 6.1 (b)

☒ Details of site investigation and inspections as per 6.1 (c)

☒ Photographs and/or drawings of the site as per 6.1 (d)

☒ Presentation of geotechnical model as per 6.1 (e)

☒ A specific conclusion as to whether the site is suitable for the development proposed on the above site, if applicable, subject to the following conditions;

- ☐ Conditions to be provided to establish design parameters,
- ☒ Conditions to be incorporated into the detailed design to be submitted for the construction certificate,
- ☒ Conditions applying to the construction phase,
- ☐ Conditions relating to ongoing management of the site/structure.

## 4. Signatures

Signature

Digitally signed by: Rian Vleggaar
Date: 2024.04.11 16:01:01 +10'00'

Chartered professional status

CPEng, NER 3008850

Name

RIAN VLEGGAAR

Date

11/04/2024

## 5. Contact details

Department of Planning & Environment
Alpine Resorts Team
Shop 5A, 19 Snowy River Avenue
PO Box 36, JINDABYNE 2627
Telephone: 02 6456 1733
Facsimile: 02 6456 1736
Email: alpineresorts@planning.nsw.gov.au

# Appendix E Information about Your Report

# Information about your D&N Geotechnical Report

**Subsurface conditions can change**

Subsurface conditions arise from a combination of natural processes, the presence of flora and fauna, and human activities. It is crucial to note that this report reflects the conditions observed during our investigation, and decisions should not solely rely on its findings, as its accuracy may be influenced by the passage of time. It is essential to recognise that alterations to site conditions, such as the introduction of fill, may have occurred since our investigation. In such cases, D&N should be consulted to advise how these changes may have impacted the project.

**Your report is based on project specific criteria**

This report is based on project-specific requirements understood by D&N during proposal acceptance, including the project's nature, site size, location, infrastructure, and conditions at the time of investigation. If there are changes to the project's nature, consult with D&N to assess their impact on our recommendations. We cannot accept responsibility for issues arising from unconsulted changes in project factors.

**Interpretation of factual data**

Site investigations identify actual subsurface conditions at those discrete locations at the specific point-in-time of the investigation. Data derived from external data sources such as literature, maps and subsequent laboratory testing are interpreted by geologists, engineers, and scientists to provide their opinion on conditions, and likely impact to the project.

Conditions can change or differ from those that are inferred to exist. To reduce impacts associated with unexpected conditions, D&N should be consulted throughout the project to identify varying conditions, undertake additional work, and recommend alternative solutions.

**Interpretation by other design professionals**

To prevent misinterpretations of our report by other professionals, it is recommended to consult with D&N. This consultation will ensure a clear understanding of report implications and facilitate a thorough review of any plans, designs, or specifications that may be influenced by our findings.

**Your report is prepared for specific persons**

To avoid the misuse of information in this report, it is recommended that D&N are consulted before passing your report on to another person or organisation who may not be familiar with the background or purpose of the report.

**Your report will only give preliminary recommendations**

Your report is based on discrete sampling locations which are indicative of actual conditions across an area. This assumption will not be substantiated until the project has begun, and as such recommendations should be treated as preliminary. D&N is familiar with the project background needed to assess and validate preliminary recommendations throughout the project. Should another party implement the recommendations of this report, there is a risk of misinterpretation. D&N cannot be held responsible for such misinterpretation.

**Data should not be separated from this report**

The report comprehensively communicates the outcomes of the site assessment. It is crucial that the report remains intact and unaltered to prevent any misinterpretation of findings when taken out of context.

**Geo-environmental**

Your report will not likely relate any findings regarding hazardous materials on the site unless specifically required. Environmental science requires specialised techniques, equipment and testing, and suitably qualified and experienced personnel.

**Standard of care**

D&N conducted consulting services and generated this report in accordance with the Client's requirements, utilising available data and expertise. The findings reflect reasonable judgment, diligence, and adherence to professional standards within commission constraints. This report carries no expressed or implied warranty regarding the professional advice provided.

**Additional assistance**

Not all approaches may have been dealt with in your report. Should the project progress, D&N should be contacted to develop alternative approaches and methods that may benefit both timing and cost.