PRELIMINARY GEOTECHNICAL AND HYDROGEOLOGICAL ASSESSMENT

Proposed Additions and Alterations
5 Villiers Road, Padstow Heights NSW 2212

15 April 2025

Prepared for Sam and Loretta Khoury

Australian Ground Sciences Pty Ltd
105 / 24 Lyons Road
Camperdown NSW 2050

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PROJECT VERIFICATION

Australian Ground Sciences Pty Ltd
105 / 24 Lyons Road
Camperdown NSW 2050

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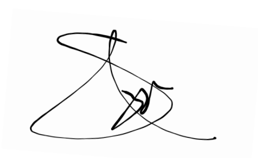
Report Reviewed by

Sami Azzi | Geotechnical Engineer | Principal



1 INTRODUCTION

This report presents the results of a geotechnical investigation undertaken by Australian Ground Sciences (AGS) for the proposed additions and alterations at 5 Villiers Road, Padstow Heights. The site location is shown in Figure 1.1. The investigation was commissioned by Sam and Loretta Khoury and was carried out to support a development application.

We are of the understanding that the project has been referred to WaterNSW for their review and comments. The following RFI extract from WaterNSW was provided to AGS:

> WaterNSW has reviewed the information provided with the development application related to water supply works.
>
> WaterNSW requests that the consent authority stop-the-clock for this development and arrange for the applicant, ES.AU Pty Ltd, to provide the following information to enable assessment of the application:
>
> 1. Geotechnical Report that includes if groundwater is to be intercepted by the project, including the extended dwelling and the swimming pool. If groundwater is to be intercepted by the dwelling, if the proposed construction design, being either tanked (fully watertight) or drained (requiring permanent ongoing dewatering).
>
> 2. If groundwater is to be intercepted, the following information is requested.
>   (i) Volume of water to be extracted annually if available.
>   (ii) Duration of the water take for dewatering if available.
>   (iii) Method of measuring the water take and recording.
>
> 3. If groundwater is to be intercepted, the method of disposal of the groundwater and if through Council stormwater or infrastructure, Council permission for this disposal.

1.1 Scope

The geotechnical investigation was carried out in general accordance with AS 1726:2017 – Geotechnical Site Investigations. The scope of the investigation included:

- A desktop study of published geological and geotechnical information, including geological maps, soil landscape mapping, and groundwater databases.
- A site inspection to assess surface conditions, topography, drainage, and any visible constraints or hazards.
- A subsurface investigation comprising two hand augered boreholes
- Interpretation of site conditions, including soil stratigraphy, groundwater conditions, and the presence of any geotechnical constraints.
- Provision of geotechnical recommendations
- Addressing the RFI from WaterNSW

1.2 Proposed Development

Based on our review of the provided drawings and project brief, we understand the proposed development involves partial demolition of the existing structure, additions and alterations and construction of a new swimming pool, pavements and a new boat shed. The development is expected to include the following activities:

- Demolition of existing structures
- Earthworks and site grading to achieve the required levels.
- Retaining structures, where necessary, to support excavation faces
- Footings for structures
- Pavement and drainage infrastructure

1.3 Basis of Assessment

This assessment is based on:

- Findings from the geotechnical investigation undertaken on **Monday 7 April 2025**.
- Published geological and geotechnical information
- Site observations and engineering judgment, in accordance with industry best practices and Australian geotechnical guidelines.

The recommendations in this report are intended to guide the design and construction of the proposed development. Site conditions may vary between test locations, and additional geotechnical assessment may be required prior to and during construction, particularly if unexpected ground conditions are encountered.

FIGURE 1: SITE LOCATION

2 INVESTIGATIONS

2.1 Fieldwork Methodology

A geotechnical investigation was carried out on 7 April 2025, comprising the drilling of two boreholes using a hand operated auger. The boreholes were advanced to depths ranging from 0.2m to 0.3m below the existing ground surface, terminating upon refusal on sandstone bedrock. The investigation was conducted by a geotechnical engineer, who was responsible for borehole layout, sampling and testing procedures, and preparation of borehole logs.

Subsurface conditions were classified and logged in accordance with AS 1726:2017 – Geotechnical Site Investigations, documenting key parameters such as:

- Soil type and inferred geological characteristics
- Moisture content and presence of inclusions
- Consistency and density of materials encountered
- Groundwater observations during and after drilling

Tactile testing was undertaken to evaluate soil texture, plasticity, and cohesiveness, providing sufficient data for soil classification.

Due to access limitations, borehole drilling was limited to hand operated equipment, a drilling rig could not be mobilised into the site.

A site inspection was also conducted to assess surface features, drainage patterns, vegetation, and any indicators of ground instability. These observations, in conjunction with borehole data, form the basis for assessing subsurface conditions, groundwater behavior, and foundation design considerations.

This report presents the findings of the investigation and offers geotechnical recommendations, including considerations for groundwater, shrink-swell movements, foundation support strategies, excavation conditions, and construction feasibility. The borehole logs, along with a glossary of terms and symbols used, are appended to this report.

2.2 Subsurface Conditions

The MinView Seamless Geology Map indicates that the site is underlain by Hawkesbury Sandstone.

During our inspection, sandstone outcrops and 'floaters' could be observed throughout the site.

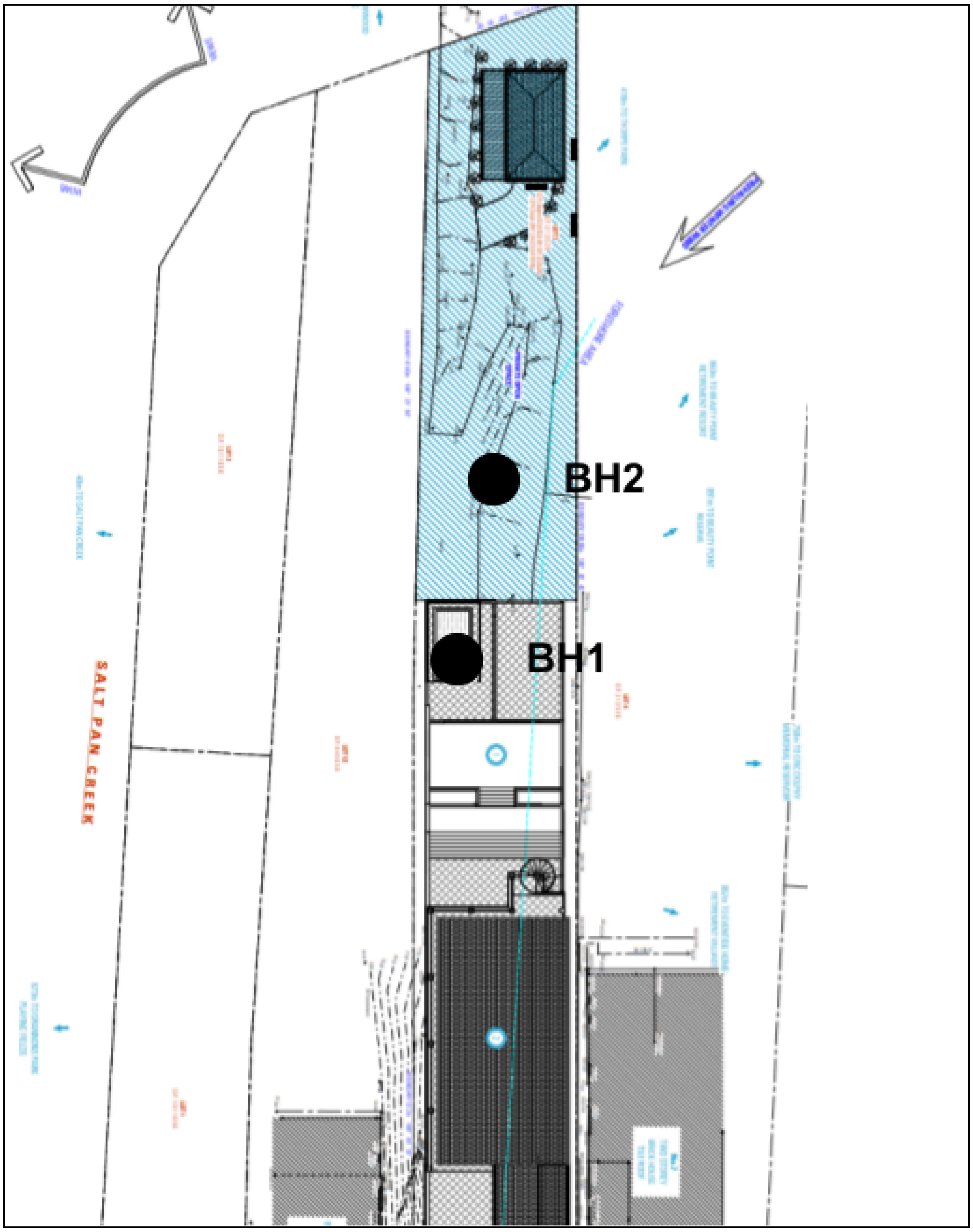
The encountered subsurface conditions generally comprised fill over relatively shallow sandstone bedrock.

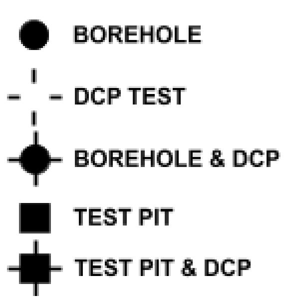
Table 2.1 summarises the inferred subsurface conditions encountered during the investigation, including depth of fill, natural soil descriptions, depth to inferred bedrock, and groundwater observations. Detailed borehole logs are presented in the appendix of this report and their location shown on figure 2.1.

It should be noted that differentiating between natural soils and fill material can be challenging and that the soil-rock interface is often a gradual transition rather than a distinct boundary. As such, geotechnical inspections during construction are required to confirm subsurface conditions and validate design assumptions.

Table 2.1: Summary of Inferred Subsurface Conditions

Testing Location	Depth of Fill (m)	Description of Natural Soils	Depth to Inferred Bedrock (m)	Initial Groundwater Seepage (m)
BH1	0.2	Natural soils not encountered, fill has been placed over bedrock.	0.2	Groundwater not encountered. Boreholes 'dry' on completion of drilling.
BH2	0.3		0.3	





Job Number: 25198

Site Address: 5 Viliers Road, Padstow Heights

Notes: -

FIGURE 2.1: TEST LOCATION PLAN

2.3 Site Observations

The site at 5 Villiers Road, Padstow Heights, NSW, is situated on a notably steep incline, descending towards the southeast. This gradient is characteristic of the area's topography, which is influenced by the underlying Hawkesbury Sandstone formation—a coarse-grained quartz sandstone prevalent in the Sydney Basin. The presence of rock outcrops and sandstone 'floaters' throughout the site aligns with the geological features typical of this region, where such formations are common due to the weathering patterns of the sandstone.

An existing 2 to 3-level structure occupies the property and appears to be in good condition upon visual inspection. The property is enveloped by medium to large-sized trees. Overall, the site's unique combination of steep topography, significant geological features, and mature vegetation presents both opportunities and challenges.

The site is surrounded by similar residential dwellings to the south and east of the site, with notable elevation differences at their respective common boundaries. Plate 2.1 shows a 3D satellite image that was generated using Google Earth Pro, which visually demonstrates the steep terrain between the site, the neighbouring properties and the nearby Georges River.

Plate 2.1: 3D Satellite Rendering of the Site and its Surroundings (Google Earth Pro)

Site observations have been made based on a cursory inspection of the subject site and its surroundings, together with a review of satellite imagery and available information provided by the client. These observations during our fieldwork were limited to accessible areas and so some features may not have been omitted due to a limited field of view. Other parts of the site or its surrounds may have been partially obstructed and so we note that observations may be subject to a degree of error. If actual conditions differ to our documented observations or have changed since our investigation, AGS should be immediately informed and this report revised if necessary.

3 GEOTECHNICAL ASSESSMENT

3.1 Groundwater

No groundwater was encountered during our investigation. Nevertheless, seepage from rainwater and/or perched water (if present during excavation) is anticipated and is expected to be manageable using temporary sump and pump systems. Although a groundwater table was not identified (and is not expected at depth due to the topography and elevation of the site), allowances should still be made for minor seepage.

Based on our experience with sites exhibiting similar topography, geology, and hydrogeological conditions, we do not anticipate encountering a standing groundwater table during excavation for the proposed development, including the swimming pool. However, minor seepage is expected through natural discontinuities in the sandstone and along the soil–rock interface. Such seepage is likely to be slow and manageable.

Drawing from our experience on comparable projects—supported by groundwater modelling undertaken in similar geological conditions—we estimate that groundwater ingress into the proposed excavations will be minimal, likely less than 0.5 megalitres per year. We do not anticipate the need for continuous dewatering; rather, intermittent sump and pump operations following rainfall events should be sufficient. Prior to disposing of the seepage groundwater, the groundwater should be collected (and its volume measured) in square or rectangular water tanks and before reusing the water on landscaping areas. It is not advised to pump the seepage groundwater to the stormwater system.

It is common practice for swimming pools to be excavated and constructed early in the development sequence. We expect a similar approach to be adopted at this site, with any required dewatering during the swimming pool excavation likely to be completed within approximately three months.

The swimming pool is expected to be the only significant excavation associated with the proposed development. By design, swimming pools are effectively 'tanked' structures and do not rely on drained basement designs. All other subgrade structures are also expected to be fully waterproofed and tanked. The specific details of the tanking system and associated basement design requirements should be provided by the structural engineer and waterproofing consultant.

3.2 Preparation

Prior to excavation, it is recommended that detailed dilapidation reports are carried out on adjoining properties. All topsoil is to be stripped and disposed of or reused in landscaping as appropriate. Due to the presence of poor surface soils which most likely extend beyond the site boundaries, we recommend that the tracking of heavy plants be carried out with caution. Sudden stop/start movements may cause ground vibration damage to nearby structures.

3.3 Site Classification and Footings

During our inspection, we noted the potential presence of sandstone 'floaters' beneath the existing footings, as well as within the anticipated zones for future footings. As such, there is a possibility that both existing and proposed foundations may not be fully founded into continuous bedrock. To confirm the subsurface conditions and the founding material, we recommend the drilling of several NMLC-cored boreholes. The results of this supplementary investigation should be used to prepare an addendum report. Depending on the findings, remedial works may be required, subject to review and advice by the structural engineer.

In accordance with AS 2870-2011 *Residential Slabs and Footings*, the site is classified as 'Class P' due to abnormal moisture conditions and the influence of existing structures, pavements, and trees. Where footings are founded on low to medium strength sandstone bedrock, the expected shrink-swell movement is comparable to that of a 'Class A' site.

Footing design may be carried out as follows:

Shallow strip or pad footings may be founded on low to medium strength sandstone bedrock, with an allowable bearing pressure (ABP) of 1000 kPa.

A geotechnical engineer should inspect at least the initial stages of footing excavation to confirm founding assumptions, identify any variations to the expected subsurface profile, and verify that competent bedrock has been reached. All footing excavations must be dry and free of loose or softened material prior to the placement of concrete.

3.4 Excavation

All works relating to excavation should be completed with reference to Safe Work Australia's 'Excavation Work - Code of Practice' October 2018. Care should be taken during site stripping and subsequent excavations not to undermine or remove support from the site boundaries.

Excavations are expected to encounter **fill material and sandstone bedrock.** Excavation through these materials can be readily completed with the bucket of an excavator. Although excavation through upper bedrock will most likely not be extensive, deeper higher strength bedrock may require rock excavation techniques.

When it comes to excavating through the harder bedrock, it is advised that non-percussive excavation equipment (e.g. ripping hooks, rotary grinders and rock saws) are used for excavating. If rock hammers must be utilised, then excavation should be strictly controlled as there may be a direct transmission of ground vibrations to neighbouring houses and other structures. Excessive vibrations may cause damage and/or settlement of structures. Therefore, it is necessary to commence rock excavation using the smallest possible rock hammer and gauge the extent of vibrations. If percussive rock excavation techniques are to be undertaken, then quantitative vibration monitoring should be carried out on adjoining neighbouring structures. We recommend a peak particle velocity limit of 5mm/s be applied for the neighbouring structures to the east and west of the site. If vibrations are found to be excessive, then smaller rock hammers are to be utilised. Other strategies to reduce in ground vibrations include but are not limited to the following:

- Rock saw faces of excavation before hammering
- Use only small jack hammer bursts to reduce vibration amplification
- Ensure the hammer is oriented towards the rock face and enlarge the excavation by breaking small wedges of rock. This should be combined with rock sawing in a grid
- Enure the hammer's moil is kept sharp

Temporary excavated slope batters should be no steeper than those specified in Table 3-1, and temporary batters should only be considered if all nearby structures are offset a distance of at least twice the excavation depth from the crest of the excavation. .

Table 3-1 Maximum Recommended Batter Slopes for Each Geological Unit

Geotechnical Consideration	Batter slope
Fill	No steeper than 1 Vertical (V) in 1.5 Horizontal (H)
Natural Soil	No steeper than 1 Vertical (V) in 1 Horizontal (H)
sandstone Bedrock	Subvertically, subject to geotechnical inspections

Should temporary batters be implemented, surface water should be allowed to flow over the crest of temporary batters and should be discharged so that water flows are not concentrated. This is particularly important if there are periods of sustained heavy rainfall. Furthermore, the type and compaction of backfill against permanent basement walls should be considered. Poorly compacted backfill may lead to large settlements, which can affect structures, pavements, or landscaping. This backfill should comprise suitable uniformly sized granular material surrounded by geotextile fabric.

3.5 Engineered Fill

Where site levels are to be raised, site-won clayey soils could be used as the engineered fill provided reactive movements are not critical. These soils should not be used as backfill to retaining walls as they could result in high lateral swell pressures against the retaining walls. Where these soils are suitable, they should be compacted to at least 98% of SMDD, at a moisture content within 2% of the Standard Optimum Moisture Content (SOMC). Assuming that movements in the driveway fill are not critical, *in-situ* density tests should be undertaken at the commencement of fill placement to confirm the compaction method is achieving the correct compaction, and then the remainder of the fill should be placed using the proven method.

3.6 Further Geotechnical Input

The following geotechnical inputs are recommended:

- Borehole Drilling: After demolition, conduct two additional NMLC cored boreholes using a drilling rig to obtain detailed subsurface information.
- Geotechnical Inspections:
    - Excavation Monitoring: Perform regular geotechnical inspections during excavation to identify and address unforeseen subsurface conditions.
    - Footing Assessments: Inspect footing excavations to confirm that exposed surfaces have adequate bearing capacity and are free from unsuitable materials.
- Vibration Monitoring during Sandstone Excavation: Implement real-time vibration monitoring during shale excavation to ensure vibration levels remain within acceptable limits, protecting nearby structures.

4 GENERAL COMMENTS AND LIMITATIONS

Australian Ground Sciences (AGS) has based its geotechnical assessment on information gathered from its fieldwork. The recommendations and observations provided in this report are limited to the information gathered from test and inspection areas and are presented to address specific issues during construction. In the event that our recommendations are not implemented in full, AGS does not accept responsibility for the performance of any structures.

The accuracy of our recommendations and factual information may be limited by undetected variations (or misinterpretations) in subsurface conditions between test and inspection locations. Subsurface conditions may change after field testing and/or inspections. For any reason, should any changes to the site surface, subsurface, or geotechnical and groundwater conditions be observed during or before construction, it is recommended that AGS be contacted immediately. Further recommendations may be required at an additional cost. AGS does not accept responsibility for any variations in subsurface conditions that were not observed or accessible during our fieldwork.

This report and any associated information has been prepared solely for the addressed client and for the proposed works mentioned in the provided documentation. Any misinterpretation or reliance by third parties shall be at their own risk. Designers and consultants should satisfy themselves that this report has been understood thoroughly. This report should be read in full. Please contact AGS to clarify any concerns or misunderstandings related to this report or if ground conditions have been found to differ to those presented.

A waste classification is required for any soil excavated from the site prior to offsite disposal.

This report may only be reproduced in full. This report is only valid once the client has paid the full agreed cost.

5 REPORT EXPLANATION NOTES

Introduction

The following notes are brief explanations and summaries of practices by Australian Ground Sciences. It outlines the company's standard procedures and practices for reference in the report.

Description and Classification Methods

Soil and rock descriptions and classifications are based on Australian Standard 1726:2017. Identification of soil and rock requires judgement and AGS infers accuracy only to the extent that is common in geotechnical practice.

Sampling

Sampling of soil is carried out during drilling to allow examination. Samples are used to provide information about plasticity, colour, moisture content, grain size, minor constituents, and occasionally,strength and structure.

Investigation Methods

- **Auger Drilling:** A borehole with a diameter of approximately 100mm advanced by battery or hand operated equipment. Refusal of the auger does not necessarily indicate rock level and can occur on many materials such as fill, tree roots, hard clay, gravel or ironstone, or even cobbles and boulders.

- **Continuous Spiral Flight Augers:** A borehole with a diameter between 100mm and 150mm is advanced by a drill rig. Samples collected from using this method can be very disturbed and layers may become mixed. Samples are of limited reliability due to mixing or softening of samples by groundwater or uncertainties.

- **Rock Augering:** Using a Tungsten Carbide (TC) drill bit, the drill rig may advance into rock. This method is fast and inexpensive in comparison to continuous core drilling but only provides an indication of the likely rock strength and predicted values may be in error by a strength order. Where rock strengths have a significant impact, further investigations by core drilling may be recommended.

- **Continuous Core Drilling:** Using a diamond tipped core barrel, the drill rig may obtain a continuous core sample. This technique provides a reliable but relatively expensive method of investigation.

- **Dynamic Cone Penetrometer (DCP):** A 9kg hammer is dropped down 510mm onto an anvil that drives a 16mm diameter rod with a 20mm diameter cone tip into the soil. The DCP test results are used to assess the compaction of fill, strength of cohesive soils, and the relative density of granular soil.

Refusal of the dynamic cone penetrometer (DCP) does not necessarily indicate rock level and can occur on many materials such as fill, tree roots, hard clay, gravel or ironstone, and cobbles and boulders.

Logs

The attached borehole log presents our geological interpretation of subsurface conditions. Boreholes represent a very small sample of the total subsurface conditions and therefore cannot capture all subsurface features of a site. The reliability of the results rely on the method of drilling and the frequency of sampling. One of the most reliable assessments of soil is the use of continuous undisturbed sampling or core drilling, though this is not always practical.

Groundwater

Groundwater is measured during, on completion of, and sometimes a short time after drilling. It is possible that although groundwater may be present, it may not be shown in the short time the borehole is observed, especially in low permeability soils. On the other hand, a local perched water table may misleadingly represent a true water table. Water tables often vary over time with seasons or with recent rain and may change by the time construction begins. The installation and use of standpipes may be more reliable to read groundwater levels as the groundwater may stabilise after several days or weeks.

Fill

The distinction of fill from natural material can often be determined only by foreign inclusions (such as brick, concrete, plastic, etc.). Therefore, it is often difficult to distinguish fill from natural material if the fill material is similar to the natural material present on site. The presence of fill should be noted because there is much more potential for fill to vary over a site than for natural material. There is an increased risk, therefore, of loading on fill due to its unpredictable nature.

Laboratory Testing

Australian Ground Sciences does not conduct the laboratory testing. Where testing is necessary, collected samples are sent to NATA accredited geotechnical testing labs. Laboratory testing is carried out to Australian Standard 1289 or NSW Government Roads & Maritime Services test methods.

Engineering Report

This report has been prepared by a qualified engineer and is based on the interpretation of factual information obtained from the site. If a report has been prepared for a specific project, the information and interpretation may not be relevant if the structure is changed. Therefore, it is imperative that Australian Ground Sciences is informed of any changes so that it may adjust the advice given or engage in further investigation. Additional fees may apply.

Site Anomalies

If subsurface or site conditions differ to those expected from the information gathered from our investigation, it is crucial that AGS is notified immediately. It is much easier to resolve issues once subsurface conditions have been exposed and before structures have been constructed.

Review of Design

It is recommended that a joint design review is undertaken with an experienced geotechnical engineer or engineering geologist, especially where investigation is limited.

Site Inspection

It is recommended that AGS is contacted to perform inspections. Site visits may be required to confirm expected conditions as well as assist contractors in identifying soil/rock and appropriate footing/pile depths and conditions.

Classifications

PARTICLE SIZE DEFINITIONS

Fraction	Components	Subdivision	Size* mm
Oversize	BOULDERS		>200
	COBBLES		63–200
Coarse grained soil	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
Fine grained soil	SILT		0.002–0.075
	CLAY		<0.002

* These sizes correspond approximately to standard sieve sizes.

RELATIVE DENSITY OF NON-COHESIVE SOILS

Term	Density index %
Very Loose (VL)	≤15
Loose (L)	>15 and ≤35
Medium Dense (MD)	>35 and ≤65
Dense (D)	>65 and ≤85
Very Dense (VD)	>85

NOTE: The moisture content may influence the inferred relative density.

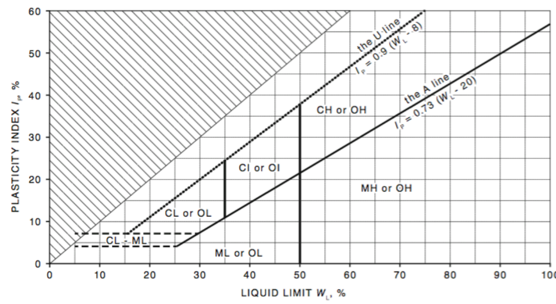
CONSISTENCY TERMS FOR COHESIVE SOILS

Consistency	Field guide to consistency	Indicative undrained shear strength kPa
Very Soft (VS)	Exudes between the fingers when squeezed in hand	≤12
Soft (S)	Can be moulded by light finger pressure	>12 and ≤25
Firm (F)	Can be moulded by strong finger pressure	>25 and ≤50
Stiff (St)	Cannot be moulded by fingers	>50 and ≤100
Very Stiff (VSt)	Can be indented by thumb nail	>100 and ≤200
Hard (H)	Can be indented with difficulty by thumb nail	>200
Friable (Fr)	Can be easily crumbled or broken into small pieces by hand	—

NOTE: Consistency is affected by the moisture content of the soil at the time of measurement.

DESCRIPTIVE TERMS FOR ACCESSORY (SECONDARY AND MINOR) SOIL COMPONENTS

Designation of components	In coarse grained soils				In fine grained soils	
	% Fines	Terminology	% Accessory coarse fraction	Terminology	% Sand/ gravel	Terminology
Minor	≤5	Add 'trace clay/silt' to description, as applicable	≤15	Add 'trace sand/gravel' to description, as applicable	≤15	Use 'trace'
	>5, ≤12	Add 'with clay/silt' to description, as applicable	>15, ≤30	Add 'with sand/gravel' to description, as applicable	>15, ≤30	Add 'with sand/gravel' to description, as applicable
Secondary	>12	Prefix soil name as 'silty' or 'clayey', as applicable	>30	Prefix soil name with 'sandy' or 'gravelly', as applicable	>30	Prefix soil name with 'sandy' or 'gravelly', as applicable



NOTE: The U line is an approximate upper bound for most natural soils. Data which plot above the U line may represent unusual/problem soil behaviour, or unreliable data and should be considered carefully.

DESCRIPTIVE TERMS FOR PLASTICITY

Descriptive term	Range of liquid limit for silt	Range of liquid limit for clay
Non-plastic	Not applicable	Not applicable
Low plasticity	≤50	≤35
Medium plasticity	Not applicable	>35 and ≤50
High plasticity	>50	>50

ROCK MATERIAL STRENGTH CLASSIFICATION

Term	Abbreviation	Uniaxial compressive strength (see Note 1 and Note 2) MPa	Guide to strength	
			Point load strength index $I_{s(50)}$ (see Note 3) MPa	Field assessment
Very Low Strength	VL	0.6 to 2	0.03 to 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; too hard to cut a triaxial sample by hand. Pieces up to 30 mm thick can be broken by finger pressure.
Low Strength	L	2 to 6	0.1 to 0.3	Easily scored with a knife; indentations 1 mm to 3 mm show in the specimen with firm blows of the pick point; has dull sound under hammer. A piece of core 150 mm long by 50 mm diameter may be broken by hand. Sharp edges of core may be friable and break during handling.
Medium Strength	M	6 to 20	0.3 to 1	Readily scored with a knife; a piece of core 150 mm long by 50 mm diameter can be broken by hand with difficulty.
High Strength	H	20 to 60	1 to 3	A piece of core 150 mm long by 50 mm diameter cannot be broken by hand but can be broken by a pick with a single firm blow; rock rings under hammer.
Very High Strength	VH	60 to 200	3 to 10	Hand specimen breaks with pick after more than one blow; rock rings under hammer.
Extremely High Strength	EH	more than 200	more than 10	Specimen requires many blows with geological pick to break through intact material; rock rings under hammer.

NOTES:

1 Material with strength less than 'Very Low' shall be described using soil characteristics. The presence of an original rock structure, fabric or texture should be noted, if relevant.

2 The method for measuring the uniaxial compressive strength shall be in accordance with AS 4133.4.2.1.

3 The method for measuring the point load strength index shall be in accordance with AS 4133.4.1.

CLASSIFICATION OF MATERIAL WEATHERING

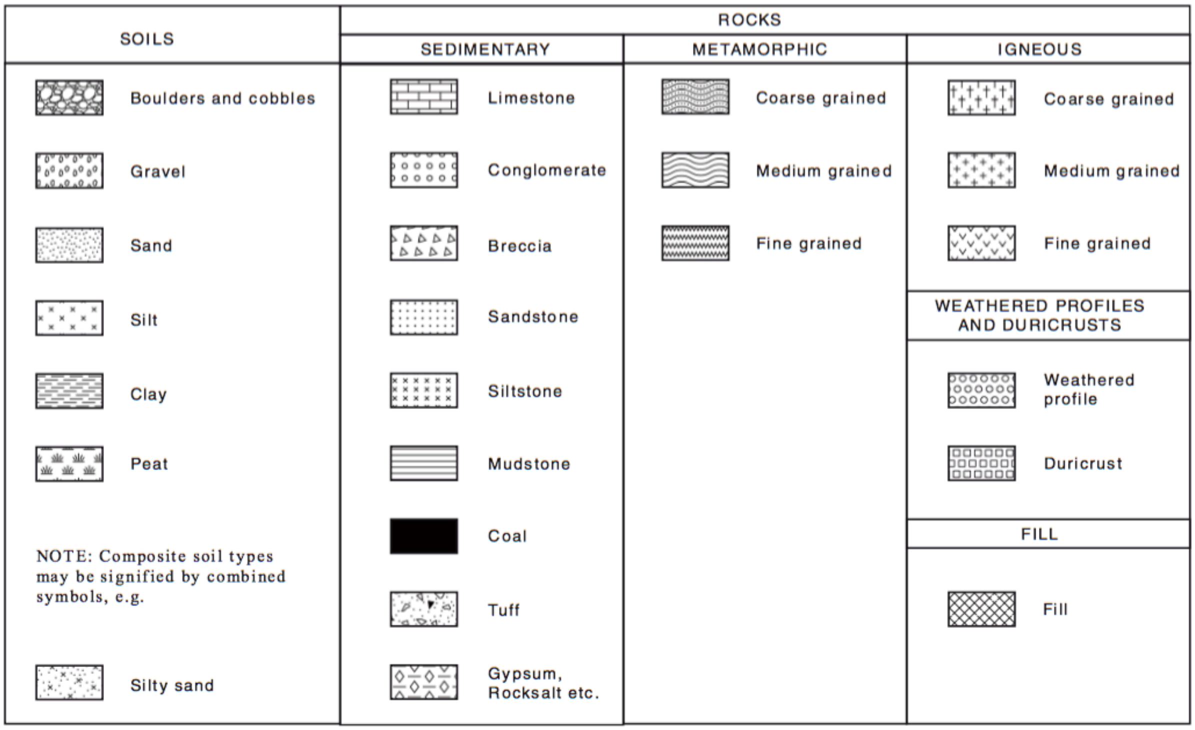
Term		Abbreviation		Definition
Residual Soil (Note 1)		RS		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely Weathered (Note 1)		XW		Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible.
Highly Weathered (Note 2)	Distinctly Weathered (Note 2)	HW	DW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately Weathered (Note 2)		MW		The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognizable, but shows little or no change of strength from fresh rock.
Slightly Weathered		SW		Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh		FR		Rock shows no sign of decomposition of individual minerals or colour changes.

NOTES:

1 The term 'Extremely Weathered rock' is misleading as the material has soil properties. The word 'rock' should be replaced with the name of the original rock in lower case or the word 'material', e.g. Extremely Weathered granite or Extremely Weathered material. Residual Soil and Extremely Weathered material should be described using soil descriptive terms.

2 Where it is not practicable to distinguish between 'Highly Weathered' and 'Moderately Weathered' rock the term 'Distinctly Weathered' may be used. 'Distinctly Weathered' is defined as follows: 'Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores'. There is some change in rock strength.

Symbols


SOILS
ROCKS
SEDIMENTARY
METAMORPHIC
IGNEOUS
Boulders and cobbles
Gravel
Sand
Silt
Clay
Peat
NOTE: Composite soil types may be signified by combined symbols, e.g.
Silty sand
Limestone
Conglomerate
Breccia
Sandstone
Siltstone
Mudstone
Coal
Tuff
Gypsum, Rocksalt etc.
Coarse grained
Medium grained
Fine grained
Coarse grained
Medium grained
Fine grained
WEATHERED PROFILES AND DURICRUSTS
Weathered profile
Duricrust
FILL
Fill

6 APPENDICES

Borehole Log	BH1
Job No.	25198

Drilling Date: 7 April 2025
Drilling Method: Hand Auger
Drilling Rig: -
Groundwater Seepage: N/A

Approximate RL: N/A
Well details: N/A
Logged by: Sami Azzi
Reviewed by: Sami Azzi

Elevation (mAHD)	Depth (m)	Profile Start Depth (m)	Strata Description	USCS	Moisture Content / Weathering	Strength / Relative Density	Samples	Tests (SPT, DCP, etc)	Comments (ORIGIN IN BRACKETS)
-	0.0 0.1 0.2	0.0	FILL: silty sandy clay, low plasticity, grey brown fine to coarse grained, grey brown, with fine grained gravel	-	w> PL	-	-	-	Fill appeared to be moderately compacted.

Refusal at 0.2m on Sandstone Bedrock

Borehole Log	BH2
Job No.	25198

Drilling Date: 7 April 2025
Drilling Method: Hand Auger
Drilling Rig: -
Groundwater Seepage: N/A

Approximate RL: N/A
Well details: N/A
Logged by: Sami Azzi
Reviewed by: Sami Azzi

Elevation (mAHD)	Depth (m)	Profile Start Depth (m)	Strata Description	USCS	Moisture Content / Weathering	Strength / Relative Density	Samples	Tests (SPT, DCP, etc)	Comments (ORIGIN IN BRACKETS)
-	0.0 0.1 0.2 0.3	0.0	FILL: silty sandy clay, low plasticity, grey brown fine to coarse grained, grey brown, with fine grained gravel	-	w> PL	-	-	-	Fill appeared to be moderately compacted.

Refusal at 0.3m on Sandstone Bedrock